

LAN9000 FAQs (Frequently-Asked Questions)

This is a list of the most frequently asked questions (FAQ's) regarding the LAN9000 family of Ethernet controllers. Questions answered are both software- and hardware-related. This document will be updated on a periodic basis when changes or additions are required.

Software Related Questions

1. *Question - What operating systems are currently supported in the suite of LAN Drivers for the LAN9000 Family of Ethernet controllers?*

1. *Answer - At this time, the LAN9000 10Mbps family of products supports the following operating system environments:*

Novell

NetWare 286 V 2.2 dedicated IPX drivers (NetWare IPX)
 NetWare 386 V 3.1X ODI Server Drivers (NetWare ODI)
 NetWare 386 V 4.x ODI Server Drivers (NetWare ODI)
 NetWare ODI Client Drivers (NetWare ODI)
 NetWare OS/2 V 2.0 ,2.1 Requester Drivers (NetWare ODI)
 Novell LAN Workplace v4.x for DOS (Netware ODI)
 Novell LAN Workplace v3.x for OS/2 (Netware ODI)

Compiler

Intel's ASM86
 Pharlap
 Pharlap
 TASM 3.1
 MASM
 TASM 3.1
 TASM 3.1

Microsoft

Microsoft Windows for Workgroups (NDIS 2.01)
 Microsoft Windows NT Driver (NDIS 3.0)
 Microsoft Windows 95 (NDIS 3.0)
 Microsoft LAN Manager v2.x DOS Workstation (NDIS 2.01)
 Microsoft LAN Manager v2.x OS/2 Workstation (NDIS 2.01)
 Microsoft LAN Manager v2.x Server (NDIS 2.01)

MASM 5.1
 C++ V2.1
 C++ V2.1
 MASM 5.1
 MASM 5.1
 MASM 5.1

Other

SCO Unix Drivers (LLC Mac)
 FTP PC/TCP v1.2 for OS/2 (NDIS 2.01)
 FTP PC/TCP v2.2 for DOS (NDIS 2.01)
 Banyan VINES (NDIS 2.01)
 DEC Pathworks v4.1 for DOS (NDIS 2.01)
 DecNET (NDIS 2.01)
 Hays LANstep (NDIS 2.01)
 IBM LAN Server v2.0 (NDIS 2.01)
 IBM LAN Server v2.0 DOS Requester (NDIS 2.01)
 IBM LAN Server v2.0 OS/2 Requester (NDIS 2.01)
 SUN PC-NFS v3.5 (NDIS 2.01)
 Wollongong Pathway Access v2.0 for DOS (NDIS 2.01) MASM 5.1

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Note: The driver names in “()” indicate the MAC driver supporting the OS stated.

2. Question - How do I find these drivers and where are they located ?

2. Answer - The drivers for the LAN 9000 family of products can be found at the following four (4) locations.

1. On the LAN driver diskette that you get with your product. Always read the read.me file located on the disk for the latest updated and released drivers.
2. The latest drivers can be found from the manufacturer of your product using SMSC LAN Ethernet Silicon. Contact them directly.

Note: This should be your first line of support for additional drivers. Different manufacturers support a subset/superset of SMSC LAN drivers.

3. SMSC's BBS.
Access: 516-273-4936
Library: "91C92"

Once you have logged in, select the “t” command which brings you to the “download directory area”. Type the “2” or “3” key to select the “91c92” or “Fast Ethernet” directory for download.

4. FTP Server site on the Internet:
Access: info.smc.com

3. Question - What are the file names of the LAN drivers supported on your BBS and FTP Server?

3. Answer - Date last revised: 12/21/94

ARTWORK.ZIP 109,453 12-14-92 2:32p - LAN9000 Artwork

LAN9000H.ZIP 535,043 12-20-94 4:24p - LAN9000 Hardware Design Info

LAN9000S.ZIP 452,811 12-20-94 4:23p - LAN9000 Drivers and Utilities

NT35OBJ.ZIP 34,577 06-24-94 3:09p - Win NT 3.5 Drivers (also in LAN9000s.zip)

WFW311.ZIP 156,501 12-20-94 4:28p - Win for Work Groups required files
(also in LAN9000s.zip except Netware related connectivity drivers)

OS2NWCLT.ZIP 10,767 12-19-94 5:51p - OS/2 Netware Client Software
(also in LAN9000s.zip)

ENABLERS.ZIP 9,630 09-14-94 2:57p - PCMCIA Stand Alone enablers

Important: When you PKUNZIP the files, remember to use the “-d” option to extract the sub-directories:

Example: pkunzip -d smc9000s.zip

This will put the contents of the superdisk in the current working directory and create sub-directories as well.

Note: the UNIX driver is only located on the FTP server as a TAR file. It is located in the /pub/chips/smc9000 directory, and its file name is: S9192.TAR

4. Question - Which LAN9000 drivers are Novell certified?

4. Answer - LAN9000 ODI drivers for Netware 4.1 workstations and servers are certified and are in the Redbox (the drivers are shrink wrapped together with the Netware 4.1 software). ODI drivers for Netware 386 3.X and a dedicated IPX driver for Netware 286 are also Novell certified.

5. Question - Which LAN9000 drivers are Microsoft certified?

5. Answer - LAN9000 NDIS2.01 drivers for DOS and OS/2 are Microsoft certified. The LAN9000 driver for Windows '95 is also Microsoft certified, and will be shrink wrapped with the product.

6. Question - What is required to support TCP/IP on a DOS, Windows or OS/2 Client?

6. Answer - In order to support the TCP/IP protocol suite on a PC client, the following pieces of a Network stack are required.

A) A physical LAN, Ethernet for example, but it is not required. Token Ring, ARCNET, WAN connectivity by PPP or SLIP is also acceptable.

B) A "Data Link Driver". In today's LAN environment, there are three major Data Link Interfaces. They are:

1. Novell ODI (Open Data Link Interface) - This driver specification is supported by Novell and is used in all of Novell's Client and Server products.
2. Microsoft's NDIS (Network Driver Interface Specification) - This driver specification is used as the interface to the other network components of Microsoft's operating systems. There are two flavors. They are NDIS Version 2.x (NDIS2) and NDIS Version 3.x(NDIS3).

NDIS2 is considered the older driver specification that has been around the longest and supported the OS/2 LAN Manager product. Since this specification has been around so long, many other OS manufactures such as Artisoft's "Lantastic", Banyan "Vines", FTP, Wollongong, ETC., have been supporting it as well.

NDIS3 drivers support the newer operating systems within Microsoft, specifically, Windows For Work Groups, Windows NT, and the soon to be released Windows 95. These new OS's also support NDIS2 drivers as well. Also, Novell's ODI Drivers are supported in the new "Windows" products.

3. There are other proprietary drivers for other operating systems, including "Packet Drivers" which is a Share-ware type of product. They are supported by the particular operating system vendor, Not SMSC.

C) A Transport Stack. There are currently 3 major transport stacks.

1. IPX/SPX - This transport stack is primarily used in the Novell Network environment.
2. TCP/IP - This stack is supported by many vendors and has been around in the UNIX world for many years.
3. NETBIOS / NETBEUI - This transport interface was originally designed for OS/2 Lan Manager and the IBM Network, and is still supported by Microsoft and IBM.

This software is not supported by SMSC. It is supplied by the major operating system vendors such as Microsoft, Novell, IBM, Artisoft and Banyan. Also, there are other third party software companies that support TCP/IP stacks for the major operating systems.

D) Applications and Operating systems - Many Operating Systems have many of the above pieces built in and some are add-on's. Similarly for applications, some are network aware and some are not.

The Interface to the operating system and network varies from Application and Operating Systems. See additional information from the Operating system vendor.

As can be seen in the above discussion, to support TCP/IP on a client, it depends on many network pieces from a number of network vendors. There are many combinations to get TCP/IP support. From SMSC's perspective, as long as you have a ODI or NDIS driver, both of which are supported by SMSC, you can get TCP/IP connectivity. Refer to the Operating System and application vendor for additional information.

7. *Question - What drivers do I need to get Windows NT LAN support?*

7. Answer - The NDIS 3 driver are required. The drivers can be found on the BBS and FTP server. The file name is "LAN9000s.zip".

8. *Question - What drivers do I need to get Windows for Work Groups LAN support?*

8. Answer - The NDIS 2, and/or ODI driver is required. The drivers can be found on the BBS and FTP server. The file name is "LAN9000s.zip". Depending on your connectivity requirement, you can use both or one of the drivers listed above.

9. *Question - Does SMSC have drivers for DECnet, DEC Pathworks, Hays LANstep, Wollongong Pathway Access for DOS, and Banyan Vines?*

9. Answer - Yes. The MAC layer driver that supports all of these operating systems is the LAN9000 NDIS 2.01 Driver ("LAN9000s.zip"). Contact the operating system vendor for additional information.

10. *Question - How do I get an OS/2 workstation to talk with a Novell Server?*

10. Answer- Use NetWare OS/2 V 2.0, 2.1 Requester Drivers together with the LAN9000 ODI MAC driver.

11. *Question - How do I get an OS/2 workstation to talk to a Unix host (like a Sun Workstation)?*

11. Answer- Use FTP PC/TCP v1.2 for OS/2 or Novell LAN Workplace v3.x for OS/2 together with the LAN9000 ODI client MAC driver.

12. *Question - How do I get a DOS workstation to talk to a Unix host (like a Sun Workstation)?*

12., Answer- Use FTP PC/TCP v2.2 for DOS or Novell LAN Workplace v4.x for OS/2 together with the LAN9000 ODI client MAC driver.

13. *Question - How do I get a DOS workstation to talk to a server running on OS/2?*

13. Answer- Use IBM LAN Server v2.0 DOS Requester or Microsoft LAN Manager v2.x DOS Workstation with the LAN9000 NDIS 2.01 MAC driver.

14. *Question - When I run the LAN9000 setup program and modify the configuration, the configuration does not change. Why?*

14. Answer - The software-selectable change does not take effect until you

1. Enter the "SAVE CONFIGURATION" option in the options menu
2. You power down the system and power up again, i.e. Hard Boot.

OR

1. You specify "Load and Use New Configuration" and you do not have to power down the system.

15. *Question- How do I get packet drivers?*

15. Answer- Currently Packet Drivers can be obtained for a fee from an outside consulting company (Company: Crynware; Contact: Russ Nelson; Ph. #: (315) 268-1925; Internet address: Nelson@crynwr.com)

SMSC will be providing these drivers directly in the near future.

16. Question- How do I install the OS/2 requester for Netware?

16. Answer- You will need the following packages to install the OS/2 requester.

1. The OS/2 operating system.
2. The OS/2 requester install disks from Novell. There are a total of 6 disks that are included in this package. Once the OS/2 OS is installed, install the OS/2 requester from Novell disks.
3. You will then be requested to select the OS/2 driver from SMSC which you will obtain from the LAN9000s.zip superdisk. The OS/2 requester driver is smc9000.sys on the OS/2 subdirectory.

Hardware Related Questions

1. Question - Which devices presently constitute the LAN9000 family of controllers?

1. Answer - The following devices follow the LAN9000 programming model:

SMSC91C92 - 10 Mbps Single Chip Ethernet Controller with ISA interface.

SMSC91C94 - 10 Mbps Single Chip Ethernet Controller with ISA and PCMCIA interfaces.

SMSC91C100 - 10/100Mbps Fast Ethernet Controller.

The devices can be identified in software by reading the Revision Register (Bank3 offset Ah) as described in the SMSC91C100 Data Sheet.

1b. Question - What Magnetics(Transformer/Filter) can I use for the 10BASE-T Interface?

1b. Answer - A number of vendors provide a variety of magnetics that can be used with SMSC91C92/4.

Some of the possible options are:

PE68027 (*Pulse Engineering, Inc.*)

PE68026 with external predistortion resistors(*Pulse Engineering, Inc.*)

FD22-101G with external predistortion resistors (*Halo Electronics, Inc.*)

FL1124S with external transmit predistortion resistors (*Valor Electronics, Inc.*)

DISCLAIMER: Specific environments may perform better with one device than another. The best suitable part must be used for a specific application.

2a. Question - Is the serial EEPROM always required?

2a. Answer - No. The serial EEPROM provides a convenient way for storing non-volatile default information like the node's unique IEEE address, interrupt selection, I/O and ROM decode information, physical interface information (AUI, 10BASE-T, MII), etc.

If the host CPU is capable of supplying the above information during initialization the serial EEPROM can be eliminated by grounding the ENEEP. The 91CXX will not attempt to read the EEPROM and will use hardware default information, as described in the device's Data sheets.

If the IEEE address is the only parameter to be stored in the serial EEPROM, ENEEP as well as IOS0-2 should be left open. The 91CXX will use hardware defaults for all parameters except the IEEE address.

If ENEEP is left open, and any IOS0-2 is grounded, the 91CXX will read all its configuration information from the serial EEPROM.

2b. Question - Does it have to be a 93C46 serial EEPROM?

2b. Answer - Yes. The serial EEPROM must be a 93C46. This type of EEPROM can be obtained from several sources.

3. Question - How can I obtain the IEEE address?

3. Answer - The IEEE global address ranges are assigned and registered by IEEE to individual companies requesting them. Every company is responsible for ensuring that every manufactured unit gets a unique address within its assigned range of addresses.

You can contact IEEE for global address assignment at:

Registration Authority for ISO 8802-3
c/o IEEE
445 Hoes Lane
PO Box 1331
Piscataway, NJ 08855-1331
USA

Phone: (908) 981-0060

4. *Question - What is the best way of programming the serial EEPROM in production?*
4. Answer - For low volume manufacturing the SMSC91CXX can be used to program the serial EEPROM. The PRO9000.EXE program (available in SMSC's BBS) can be used to program the IEEE address. For high volume manufacturing it is more practical to program the 93C46 using specialized equipment before mounting it on the board.
5. *Question - The SMSC91CXX provides four interrupt pins. Do I need to use them all? Do I have to use the same assignment as in the LAN9000-EVBs?*
5. Answer - The SMSC91CXX uses only one interrupt. Four pins are available to support jumperless installation. The selection is done using ILAN9000.EXE or PRO9000.EXE and stored in the serial EEPROM. The pin selected is driven, while the other three are tri-stated. Even though the LAN9000 S/W drivers can override the serial EEPROM interrupt selection, the user is encouraged to store the selected number in serial EEPROM to make sure that the SMSC91CXX will not drive the wrong interrupt before the driver is loaded.

The recommended assignment for PC based systems is:

PIN NAME	IRQ LINE
INTR0	IRQ2 (9)
INTR1	IRQ3
INTR2	IRQ10
INTR3	IRQ11

The LAN9000 S/W drivers assume this assignment, and are able to automatically determine the IRQ in use by reading the 91CXX configuration register. A different mapping can still be used, but the software driver must be informed of the desired IRQ selection (using NET.CFG for Netware drivers, PROTOCOL.INI for NDIS, etc.)

6. *Question - How fast can the CPU access the 91CXX? When do I need wait states?*
6. Answer - There are two types of accesses: a) to the DATA REGISTER b) to other REGISTERS.
 - a) Accesses to the DATA REGISTER are really accesses to the packet memory and they are ruled by the cycle time. The 10Mbps parts (91C9x) have a cycle time of 185ns for every 16 bits read or written. The 100Mbps part (91C100) has a cycle time of 80ns for every 32 bits read or written. As long as the cycle time, pointer to data register delays, setup and access times are respected there is no need to add wait states nor to use the ready line. If there is a possibility that the cycle time or pointer to data register timing might be violated, ready should be connected and it will stretch the cycle whenever necessary.
 - b) Access to other register's only requires observing the read and write access and setup times.
7. *Question - The SMSC91CXX have a little Endian memory ordering. How can they be used in big-Endian applications like Motorola CPUs?*

7. Answer - For big-endian environments the 91CXX data bus bytes should be swapped. For a 16 bit bus, for example, connect the 91CXX D0-7 to the bus D8-15 and vice versa. By doing this all register's appear swapped to the CPU, and the CPU can move data to and from the DATA REGISTER without having to swap the bytes in software.

For a 32 bit bus connect D0-7 to D24-31 and so on.

The SMSC91CXX is a slave and does not manage any data structures in system memory, the bus swapping has no adverse side-effects. For more information, call your local SMSC rep for an application note.

8. *Question - What precautions should I take when designing a SMSC91CXX into my system?*

8. Answer - Lay out the part to minimize routing of control lines (read and write and AEN). Control lines should not have spurious edges due to crosstalk or ground bounce. Use power planes whenever possible and minimize interaction between analog and digital power path. On the network side, keep traces short, straight and symmetrical on differential pairs.

9. *Question - How can I verify that my design is robust?*

9. Answer -

- a) First use standalone programs like SCECR.EXE (for SMSC91C9X), and FEAST.EXE (for 91C100) to verify access to registers, RAM self test and internal loopback transmit and receive tests.
- b) Second, use a two node setup running PONG test of SCECR.EXE and FEAST.EXE. Verify data integrity of transmit/receive. Generate collision by adding a third node to the setup just a transmit loop. First two nodes still run PONG. For help on SCECR.EXE and FEAST.EXE functions type ? and then the function key.
- c) Load LAN9000 S/W drivers and the target networking OS (Netware, WFW, LAN Manager, Lantastic, etc). Run TP.EXE (from the BBS) on network driver. Type TP with no parameters for a help screen.

Run OS specific certification and performance tests like Novell's Network Endurance and PERFORM3.

10. *Question - If I use SMSC91CXX controllers, is my design Novell and Microsoft certified?*

10. Answer - LAN9000 S/W drivers are Novell and Microsoft certified using LAN9000 evaluation boards. By using SMSC91CXX controllers your system uses certified software drivers, but your hardware is not necessarily certified until you submit it to Novell and Microsoft for certification.

11. *Question - When do I need to modify the LAN9000 drivers, and how can I get access to the software driver source code?*

11. Answer - The LAN9000 drivers were written for the PC environment, and they work well for all major operating systems and in Programmed Input/Output (non-bus master) mode with ISA, PC/104, VL and PCMCIA bus interfaces. As long as you follow the design instructions in the SMSC chip specification (such as using the correct IRQ lines...) you should be able to use LAN9000 drivers for your product, and you will therefore not have to go through the effort of recertifying the drivers.

The following are some reasons why one would need to modify the LAN9000 drivers:

- Need to interface to a bus not supported by the LAN9000 drivers: In most cases, such as with the Microchannel and EISA bus in non-bus master mode, the modification to the drivers need only be made in the initialization, and are relatively minor.
- Need to interface to a non PC compatible computer: See above comment on interfacing with a Motorola CPU.
- Need to interface with an operating system not yet supported by the LAN9000 drivers: If you need support for a new operating system, please contact your local SMSC rep., who will see what SMSC can do to help you in this effort.

Please contact your local SMSC rep. if you need LAN9000 source code. Source code can be obtained for a one time nominal fee and also requires a software licensing agreement.



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