
ARCNET Windows/DOS Drivers

Setting up an ARCNET card to run under Windows can sometimes be a confusing process. Each version of Windows has its own set of issues. Here we will try to provide some assistance as to what to use to allow ARCNET networking under the various versions of Windows. First we will supply some networking terminology.

NDIS: NDIS stands for Network Driver Interface Specification. The NDIS library provides the means to allow various network cards to be used with Windows, using various network protocols. There are multiple versions of the NDIS library and most versions of Windows have their own version of NDIS. The NDIS drivers also have an NDIS version number. The NDIS driver version number indicates the NDIS library for which it was designed. For example, NDIS 3.0 drivers are designed to work with the NDIS 3.0 library. The earlier NDIS driver versions will also, for the most part, work with later version NDIS libraries. For example, NDIS 2.0 network drivers can, theoretically, be used with the NDIS 3.0 library. One of the advantages of NDIS is that it allows the protocol drivers to be separate from the network card drivers. Also multiple network card drivers can use the same protocol driver. For example your Ethernet card and your ARCNET card can both send/receive TCP/IP messages.

ODI: ODI stands for Open Data-Link Interface. Although this is mostly used for Novell systems, ODI network card drivers will work with various versions of Windows. The ODI model also allows the protocol drivers or stacks to be separate from the network card drivers. Most ODI drivers run in real mode whereas NDIS 3.0 and greater drivers run in enhanced or protected mode.

Packet Drivers: This standard, created by FTP Software, provides a standard method for applications to interface with compatible real mode network card drivers. These compatible drivers are called "Packet Drivers". These can be used in DOS machines to perform raw messaging between computers. Protocol stacks are also available that allow TCP/IP networking between DOS machines utilizing these types of drivers.

Null Stack Drivers: These drivers provide the ability to send and receive raw packets. They perform the same functions as a Packet Driver, although they do not conform to the Packet Driver standard. We have Null Stack Drivers available for our PCX20, PCM20 and PCI20 products under DOS, Windows 95/98 and NT.

Protocol Drivers/Stacks: Most network drivers do not "speak" a particular protocol. These drivers merely send and receive generic network messages. The upper level protocols, which create these messages, are provided by protocol drivers and/or protocol stacks. Each network card can be used with one or more protocol drivers/stacks. The protocols to be used with a network card, and its driver, are said to be "bound" to the network card driver. In order for an application to be able to communicate over ARCNET (with Microsoft Networking) one must choose one or more protocols. Several of the more popular protocols are TCP/IP, IPX/SPX, and NetBEUI. Often the protocol to be used will be determined by one of the legacy devices in the network. These older devices may be limited in their protocol selections.

TCP/IP: TCP/IP stands for Transmission (or Transport) Control Protocol/Internet Protocol. This is a popular Internet protocol that can also be used in office and industrial settings. This protocol also provides connectivity to UNIX systems. TCP/IP is used with a number of applications such as FTP, Telnet and Ping. It is currently one of the most popular network protocols. This protocol usually requires either a server to assign the IP addresses or the user to set the IP address along with a netmap setting. This is in addition to the ARCNET node ID address. Windows 98 is also providing some new methods to help assign IP addresses in peer to peer networks.



IPX/SPX: IPX./SPX stands for Internet Packet Exchange/Sequenced Packet Exchange. This protocol is mostly used with Novell systems. Windows also calls this protocol NWLink. The IPX/SPX address is the ARCNET node ID address with leading zeros to fill the six byte address. A four byte network number is also specified although this is usually set to zero.

NetBEUI: NetBEUI stands for NetBIOS Extended User Interface. This protocol is mostly used with older Microsoft networks. NetBEUI is also referred to as NBF. NetBEUI is designed for use in small local area networks that do not need to be routed. This restriction is usually not a problem for most ARCNET networks.

NetBIOS: NetBIOS stands for Network Basic Input Output System. NetBIOS is often seen as an optional "layer" over one of the other protocols. Some examples are NetBIOS over TCP/IP or NetBIOS over IPX/SPX. NetBIOS provides many benefits to the protocols over which it is layered. One benefit is a means for multiple computers to communicate via assigned names in addition to network addresses. For example, when using Network Neighborhood, NetBIOS can be used for one computer to access another computer's resources by only specifying the computer's name. These names are exchanged via ARCNET broadcasts.

After reviewing this list of protocols it would appear that one would merely choose the appropriate protocols to bind to the ARCNET card driver and the networking setup would be complete. Unfortunately this is not the case. It has been found that there are some peculiarities concerning Windows and ARCNET. Microsoft has provided several knowledge base articles concerning these issues (see knowledge base article Q186150). We will now provide a list of Windows versions and our suggested protocols and associated drivers. This knowledge has been gained from a long period of testing various drivers and protocols over ARCNET (see Contemporary Controls Technical Note TN-1).

Windows 98: Although this version of Windows contains an NDIS 5.0 library, our NDIS 4.0 drivers work very well with some slight modifications. This version of Windows was found to be very similar to Windows 95B (see below). The only difference we found was that Windows no longer provides the ODI drivers for COM90C65 and COM90C66 based products. These can be found on our website.

Windows NT 4.0: Using service pack 3, we have found that TCP/IP, IPX/SPX (NWLink) and NetBEUI perform properly with the Contemporary Controls/SMSC (CCSI/SMSC) NDIS 4.0 ARCNET miniport driver. This miniport driver will only work with COM20020 based ARCNET cards. We have also done some preliminary testing with the NT supplied Thomas-Conrad TCNS driver entitled "Arcnet/TCNS (All Types)". This driver has been found to be compatible with COM90C66 ARCNET cards. NT will not work with the older ODI and the real mode NDIS drivers.

Windows 95B: This version of Windows 95 is also known as Windows 95 OSR2.x. When 95B was released it changed the version number of the NDIS library from 3.1 to 4.0. This provided some compatibility between existing NT 4.0 drivers and 95B drivers. We have found that TCP/IP and IPX/SPX perform properly with the CCSI/SMSC NDIS 4.0 ARCNET miniport driver. Again this driver only works with COM20020 based ARCNET cards. NetBEUI will not work properly with this driver. Windows 95 provides two ODI drivers for COM90C66 and COM90C65 based cards. The SMC PC600W driver will work with most COM90C66 based cards. The SMC PC130/E driver will work with most COM90C65 based cards.

Windows 95A: After Windows 95 was released, Microsoft issued an update which is called Windows 95A. Both of these versions of Windows utilize an NDIS 3.1 library. According to Microsoft (see



knowledge base article Q171891) using TCP/IP over ARCNET with these versions of Windows may be incompatible with all other versions of Windows (95B, NT, etc.). Although this problem was rectified with Windows 95B, there are a number of Windows 95 and 95A machines still in existence. It was found that while the system code (first byte of the ARCNET message) was using 0xD4 and 0xD5 under other versions of Windows, Windows 95 decided to use the 0xE8 system code. This makes using TCP/IP over ARCNET, with this version of Windows, incompatible with other versions of Windows. However, our CCSI/SMSC miniport driver, under Windows 95A, does not exhibit this behavior. Using the CCSI/SMSC miniport driver, TCP/IP messaging is compatible with other versions of Windows. It was found that the CCSI/SMSC miniport driver along with TCP/IP and IPX/SPX performs properly. NetBEUI will not work properly with this driver.

Windows for Workgroups 3.11: Windows for Workgroups (WFW) was the first version of Windows to contain built in networking. This version of Windows contains an NDIS version 3.0 library. We have found that the ARCNET ODI drivers will work with this version of Windows. We have also authored an application note (AN-209) that describes the setup process for these drivers. This operating system also provides NDIS 2 drivers for SMC ARCNET cards. The provided SMC PC600W driver is compatible with our PCA66 products. The provided SMC PC130/E driver is compatible with our PCX products. Using these drivers with WFW 3.11 bound to NetBEUI will allow communications with NT 4.0 systems containing a PCA66 using the ARCNET/TCNS driver or a PCX20 using a special version of our NDIS 4.0 driver (CCSI/SMSC NDIS 4.0 enhanced NetBEUI version) both of which are bound to NetBEUI.

DOS: Under DOS there are a number of options available. The previously mentioned SMC ODI drivers can be used under DOS (see application node AN-209). Also there are two ARCNET Packet Drivers available (see <http://www.crynwr.com>). The arcnet.com driver is a COM90C26 driver that is compatible with the COM90C65. This driver reports itself as an ARCNET driver. The arcether.com driver is also a COM90C26 driver that is compatible with the COM90C65. This driver, however, reports itself as an Ethernet card. This allows software written only for Ethernet cards to utilize this driver. This driver implements the ATA 878.2 fragmentation protocol to allow Ethernet sized packets (1500 bytes) to be sent and received over ARCNET, which is limited to 507 bytes of data. This "masquerading" allows this driver to be used with a number of DOS TCP/IP stacks or libraries, such as WATTCP (see <http://www.wattcp.com/index.shtml>). We also have a Packet Driver on our website from Klos Technologies that can be used with our COM20020 based products.

Conclusion

The table on the next page shows the Contemporary Control products along with the recommended network card driver and protocols. The network card driver is shown followed by the recommended protocols (see key below table). For example, 2:I/T/N translates to the CCSI/SMSC NDIS 3.1/4.0 ARCNET miniport driver bound to IPX/SPX, TCP/IP and NetBEUI. The drivers shown with multiple protocols indicate a list of protocol choices. You may select any number of the indicated protocols.



Product	Controller	Windows NT 4.0	Windows 98	Windows 95B	Windows 95, 95A	Windows for Workgroups 3.11	DOS
PCX	COM90C65	-----	4:I/T **	4:I/T	4:I/T	6:I 11:N	6:I 8:T
PCA66	COM90C66	7:I/T/N	3:I/T **	3:I/T	3:I/T	6:I 10:N	6:I 8:T*
PC10466	COM90C66	7:I/T/N	3:I/T **	3:I/T	3:I/T	6:I 10:N	6:I 8:T*
PCX20	COM20020	2:I/T/N 9:I/T/N	15:I/T 5:I/T	2:I/T 5:I/T	1:I/T 5:I/T	5:I	5:I
PC10420	COM20020	2:I/T/N 9:I/T/N	15:I/T 5:I/T	2:I/T 5:I/T	1:I/T 5:I/T	5:I	5:I
PCM20	COM20020	2:I/T/N 9:I/T/N	15:I/T	2:I/T	1:I/T	5:I	5:I
PCI20	COM20020	14:I/T/N	12:I/T	13:I/T	-----	5:I	5:I

Drivers:

- 1: CCSI/SMSC NDIS 3.1/4.0 ARCNET miniport driver specifying NDIS 3.1
- 2: CCSI/SMSC NDIS 3.1/4.0 ARCNET miniport driver specifying NDIS 4.0
- 3: Windows provided ODI driver for SMC PC600W
- 4: Windows provided ODI driver for SMC PC130/E
- 5: CCSI/TMC ODI driver for COM20020 (odi20ws.com)
- 6: SMC ODI driver for COM90C6x (smcarcws.com)
- 7: Windows provided NDIS driver for Arcnet/TCNS
- 8: Packet drivers (arcether.com)
- 9: CCSI/SMSC NDIS 4.0 enhanced NetBEUI ARCNET miniport driver
- 10: Windows provided NDIS 2 driver for SMC PC600W
- 11: Windows provided NDIS 2 driver for SMC PC130/E
- 12: CCSI/SMSC PCI20 NDIS 4.0 Driver Windows 98 version
- 13: CCSI/SMSC PCI20 NDIS 4.0 Driver Windows 95 version
- 14: CCSI/SMSC PCI20 NDIS 4.0 Driver Windows NT version
- 15: CCSI/SMSC PCX20/PCM20 NDIS 4.0 Driver Windows 98 version

Protocols:

- I: IPX/SPX
- T: TCP/IP
- N: NetBEUI

* The PCA66 and PC10466 require the MEMEN16B jumper to be installed.

** Windows 98 does not supply these ODI drivers. They can be found on our website.

