



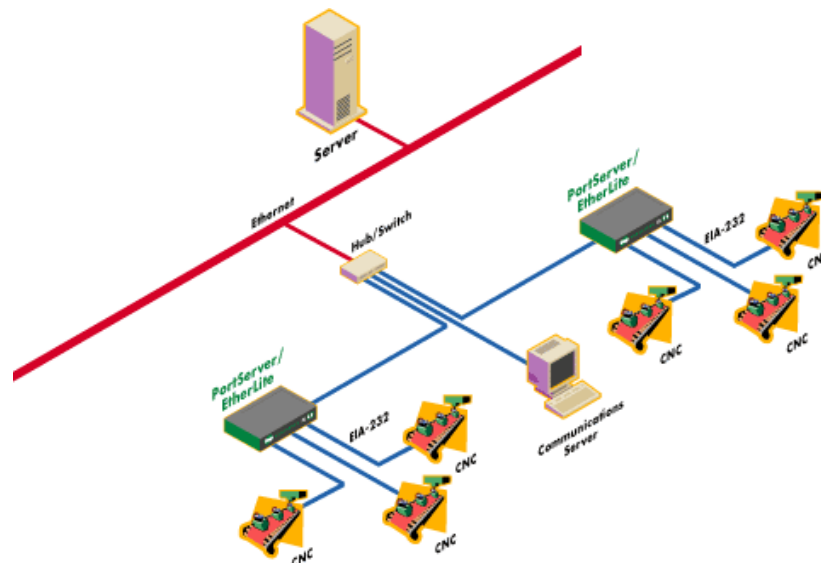
# Digi Solves CNC/DNC Integration Problems

In the Industrial Automation (IA) market space one of the most misunderstood segments is that of CNC/DNC. CNC or Computer Numerical Control stands for machinery or machine tools that utilize proprietary or PC-based controls that interpret NC or numerical control programs to make parts. Examples include CNC milling machines, CNC turning centers or lathes, CNC punch presses, CNC wire EDMs, CNC ram EDMs, etc. These machines or CNCs are programmed at the control or offline using CAM software. The programs the machines run are codes and values that tell the machines how to move. Over the decades machines have developed to address more complex manufacturing processes. As a result, the sizes of the programs they run have grown in size. Often times programs are too large to manually program and today are typically programmed offline using a CAM system. Manufacturing and production engineers, and NC programmers, are now faced with the task of getting these offline files into the CNC controls to be run.

For the past ten to fifteen years machine tool manufacturers have included an EIA-232 port on their controls as a means of transferring files to and from the CNC controls. When EIA-232 ports were introduced it was clear that a system was needed to effectively distribute NC programs to multiple machines via EIA-232 – an industrial network. This is when DNC came into being. DNC stands for Distributed Numerical Control. DNC is a system including communications software, communications hardware, and EIA-232 cable that connects programming PCs and the company network to CNC machines on shop floor. For the purposes of this study we'll focus on the communications hardware and the importance of selecting the right tool for the right situation, or this case, configuration.

No two shop floors are exactly the same. Yet, some people would have you believe that one type of hardware will work in any situation. In order to implement an effective DNC solution you need to match the hardware to the configuration requirements. To do this you need to look at several important criteria. First, the number of CNCs do you need to connect to the system. Second, you need to know the physical layout of the CNCs on the floor? Third, you need to know the performance specifications need to be met such as maximum sustained baud rate and flow control. The first area is pretty basic, how many CNCs you do you have?

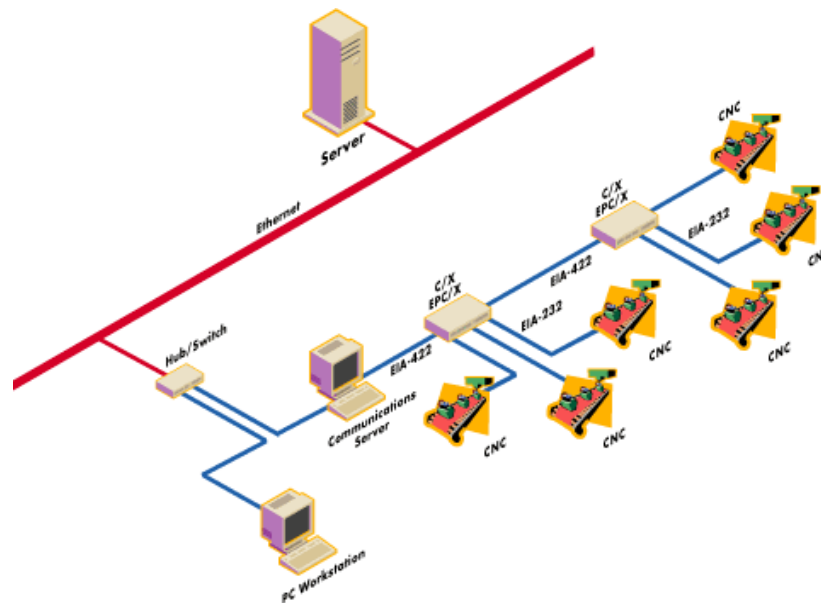
Different types of hardware were designed to support different numbers of ports. For example, the Digi Acceleport Xem hardware will support up to 64 ports while the Acceleport C/X hardware will support up to 128. Also the PortServer TS, Terminal Server and Digi One family of products allow for an unlimited number of devices to be connected to a network, allowing for maximum flexibility and scalability. Depending on how many CNCs you need to connect and where they are located around a facility, you will narrow your hardware selection down accordingly. Be sure to anticipate future expansion when considering the number of ports your system will need to support. With that issue addressed you need to move your physical shop layout.



The most important factor in determining the best hardware for your DNC system is accurately assessing your shops physical layout. In addition to how many CNCs you need to connect you also need to consider how your CNCs are grouped. Are they in one large area or group? Or, are your CNCs divided up into a number of work cells or departments? Are most of your CNCs in one area with a few off in another building? Failure to document the physical layout can result in selecting and installing the wrong hardware. Another important question with respect to your shops physical layout is how far away are your CNCs from the PC you will designate as your communications server. Will your CNCs be located within 100 feet of your communications server or several hundred? Also, do you anticipate having to move your communications server any time in the future? These are two very important questions and here is why.

Many types of hardware models are designed to work at the PC. Meaning, you have a PC card that is installed in the PC and one or more communications hubs or concentrators (connector boxes) physically connected to the PC card via a 4 foot to 10 foot proprietary cable. With such a system you will run all of your EIA-232 cable from the CNCs on the floor back to the PC. What if you have to move the PC? Will there be enough room to reach the new location? Will you have to re-route your cable? Will you have to re-run cable? If you only have 2 to 16 machines and don't anticipate having to move the communications server you have several excellent types of hardware to choose from. Digi's ClassicBoard, Acceleport Xr, Xp, and Xem will all do the job well. In each case you will run your EIA-232 cable from each CNC back to the communications server location.

**Note:** Some models support two to 8 ports while others support anywhere from 8 to 64 ports. Again, make sure you allow for expansion when selecting your hardware.



Other types of hardware were designed to address situations where either a) your communications server would need to move, b) your CNCs are located in different cell locations, or c) you have over 64 machines to contend with. Examples of such hardware include Digi's Acceleport C/X, EPC/X, PortServer, PortServer TS, and EtherLite hardware. Any of these systems will allow you to locate your communications ports out on the floor. Thus, freeing your communications PC to move when ever necessary and maximizing your investment in quality EIA-232 cable. For example, since both the Acceleport and Ethernet based solutions allow you to place the hub units on the floor you can minimize your cable runs (further improving noise immunity and signal integrity), move machines around more easily, and support from two up to 255 ports from a single communications server. In fact, the Acceleport C/X and EPC/X hardware support fiber optic connections between port hubs for extended distances while the PortServer, Digi One and EtherLite families are Ethernet based and are suited for systems from small LANs in a single facility to WANs configured across multiple campuses or facilities around the globe.

The last main consideration in selecting the right serial communications hardware for your DNC system is the specific hardware requirements of the CNCs you need to network. For example, many machines today are designed for high speed machining. These machines require sustained baud rates of 110k baud or higher. Another example is flow control. Some machines support standard software flow control (XOn/XOff) while others require hardware flow control or custom flow control. Make sure you know what your CNCs need for communications and pick the hardware that meets or exceeds those requirements.

There are many details you need to consider when selecting the right hardware for any DNC system. The number of CNCs you need to connect, how those CNCs are physically laid out, and the actual communications parameters or requirements of each machine are all items that need to be considered in the planning process. Surely, much of the planning can be done internally, if not all. However, it is recommended that you contact an experienced VAR or systems integrator who can help you in the selection process to ensure you choose the right hardware for your next DNC system. No matter the layout, no matter the requirements, Digi has the hardware to configure the smallest to the largest DNC systems.

