

Network I Lab 01

Building a Simple serial peer to peer communication network Using Null modem cables

Objective

- Build a peer2peer simple serial cable
- Use HyperTerminal software
- Use direct cable connection

Background

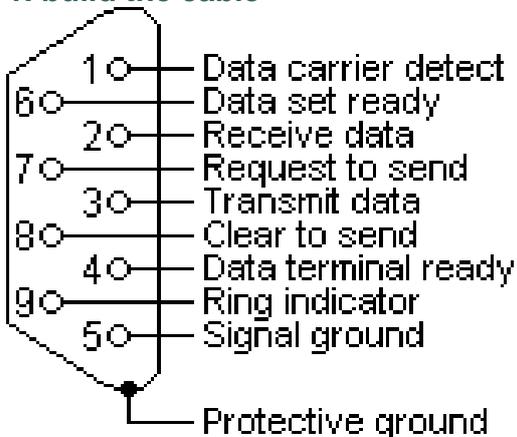
Null modem, an introduction

Serial communications with RS232. One of the oldest and most widely spread communication methods in computer world. The way this type of communication can be performed is pretty well defined in standards. I.e. with one exception. The standards show the use of **DTE/DCE** communication, the way a computer should communicate with a peripheral device like a modem. For your information, **DTE** means *data terminal equipment* (computers etc.) where **DCE** is the abbreviation of *data communication equipment* (modems). One of the main uses of serial communication today where no modem is involved—a *serial null modem* configuration with **DTE/DTE** communication—is not so well defined, especially when it comes to flow control. The terminology *null modem* for the situation where two computers communicate directly is so often used nowadays, that most people don't realize anymore the origin of the phrase and that a null modem connection is an exception, not the rule.

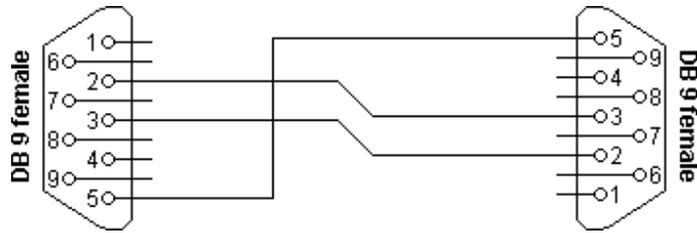
In history, practical solutions were developed to let two computers talk with each other using a null modem serial communication line. In most situations, the original modem signal lines are reused to perform some sort of handshaking. Handshaking can increase the maximum allowed communication speed because it gives the computers the ability to control the flow of information. High amounts of incoming data is allowed if the computer is capable to handle it, but not if it is busy performing other tasks. If no flow control is implemented in the null modem connection, communication is only possible at speeds at which it is sure the receiving side can handle the amount information even under worst case conditions.

Steps

1. build the cable

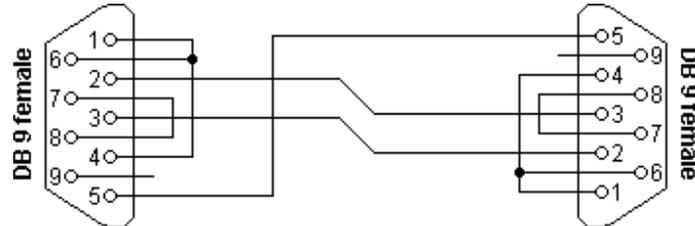


Null modem without handshaking



Connector 1	Connector 2	Function
2	3	Rx ← Tx
3	2	Tx → Rx
5	5	Signal ground

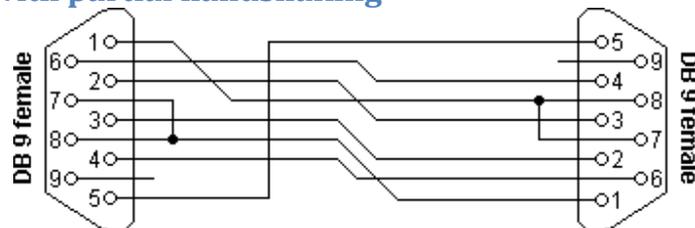
Null modem with loop back handshaking



Connector 1	Connector 2	Function
2	3	Rx ← Tx
3	2	Tx → Rx
5	5	Signal ground
1 + 4 + 6	-	DTR → CD + DSR
-	1 + 4 + 6	DTR → CD + DSR
7 + 8	-	RTS → CTS
-	7 + 8	RTS → CTS

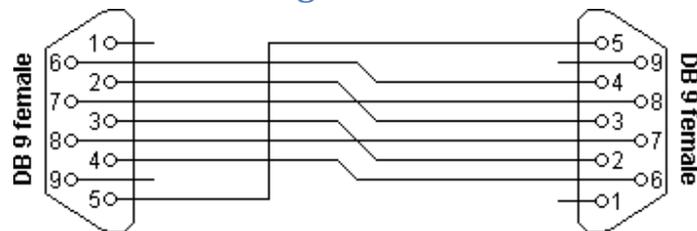
The main purpose of this null modem cable is to let well defined software *think* there is handshaking available, with a null modem cable which has no provisions for it.

Null modem with partial handshaking



Connector 1	Connector 2	Function	
1	7 + 8	RTS ₂ →	CTS ₂ + CD ₁
2	3	Rx ←	Tx
3	2	Tx →	Rx
4	6	DTR →	DSR
5	5	Signal ground	
6	4	DSR ←	DTR
7 + 8	1	RTS ₁ →	CTS ₁ + CD ₂

Null modem with full handshaking



Connector 1	Connector 2	Function	
2	3	Rx ←	Tx
3	2	Tx →	Rx
4	6	DTR →	DSR
5	5	Signal ground	
6	4	DSR ←	DTR
7	8	RTS →	CTS
8	7	CTS ←	RTS

Null modem layout selection table

The right null modem cable to choose mainly depends on the application and the software that will be used. As a general guide line, I would advise the following.

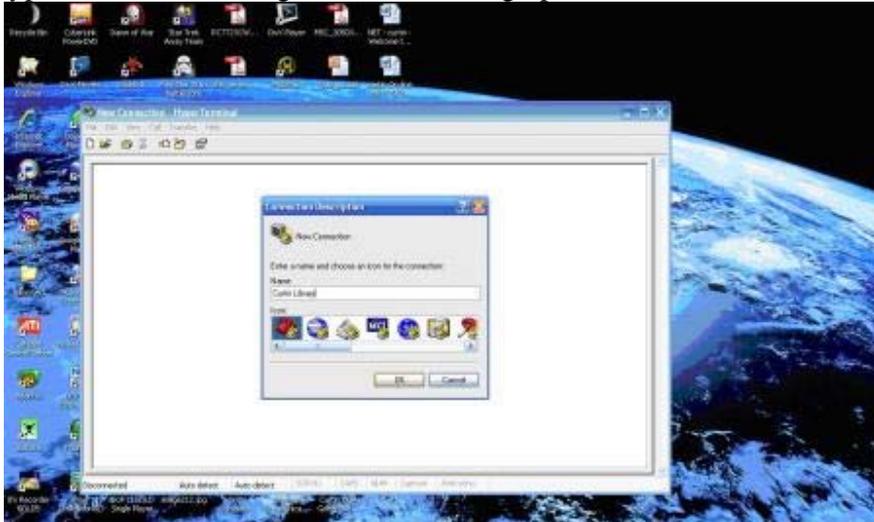
	Cable without handshaking	Loop back handshaking	Partial handshaking	Full handshaking
Software flow control only	+++	++	+	+
DTE/DCE compatible hardware flow control at low speeds	-	+++	++	-
DTE/DCE compatible hardware flow control at high speeds	-	+	+++	-
High speed communication using special software	-	-	++	+++

- +++ Recommended cable
- ++ Good alternative
- + Works, but not recommended
- Does not work

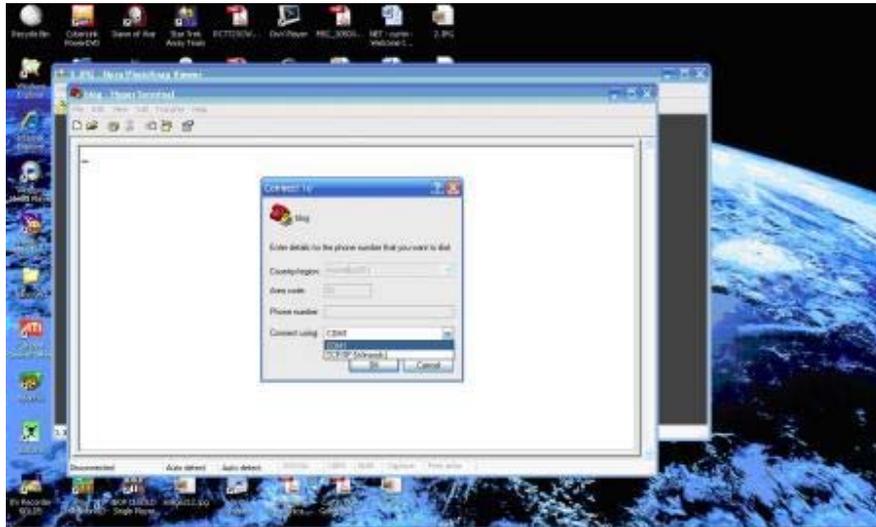
2. communication using tty software

2.1 HyperTerminal

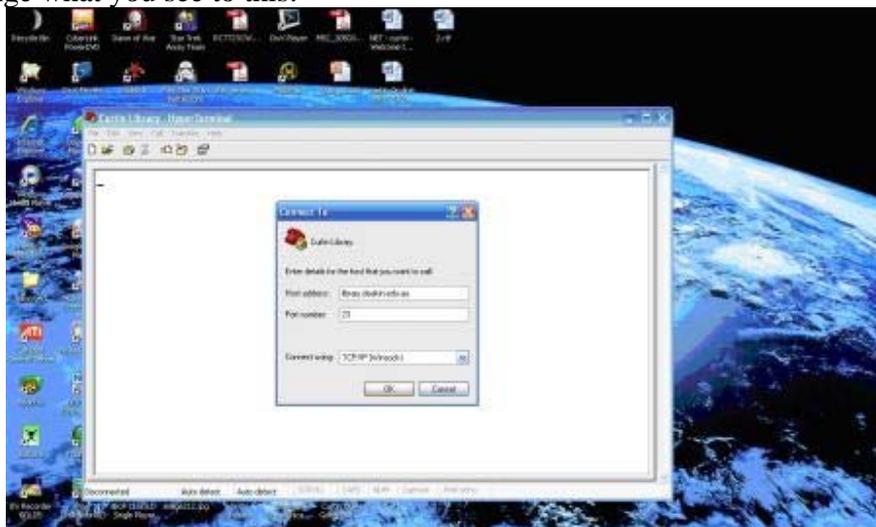
First, go to the Start menu, then to Accessories, then Communications and you'll see the icon for Hyperterminal. Clicking on that will bring up this next screen:



Simply choose an icon and name for the connection, then click ok. Note that this icon will not be placed on the desktop, but will appear when you choose File > Open from the top toolbar menu in Hyperterminal. This is where all your connections that you save are kept. We then come to this screen:

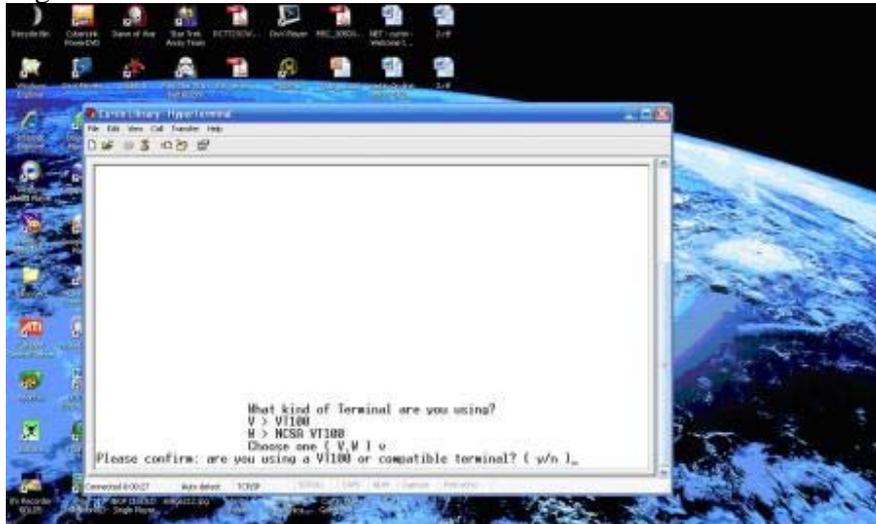


Now it is asking for your country and area code, as the default is for the program to dial a connection. Remember that when this program was made, there was no such thing as ADSL or cable modems for personal computers. To change this screen, click on the "Connect using" radio button and switch from COM 1 to TCP/IP (Winsock). This will then change what you see to this:

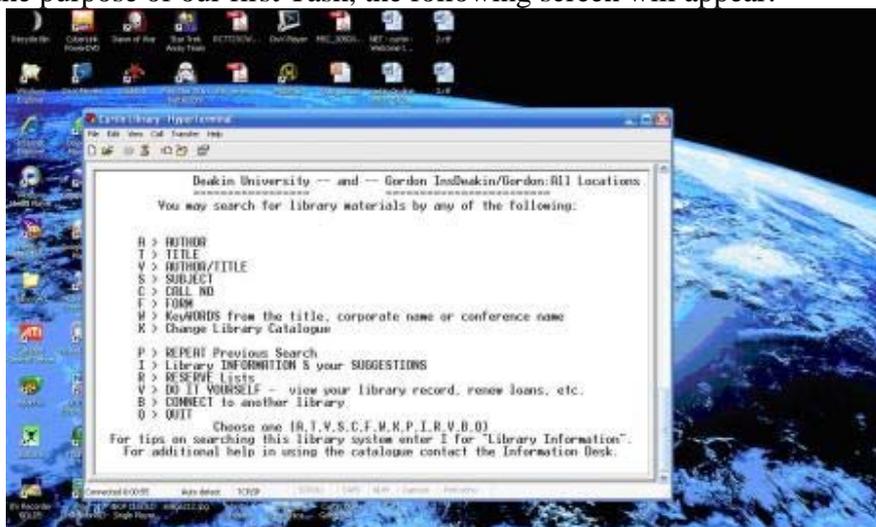


For those of you who may not have access to a broadband connection don't worry, configuring HyperTerminal the same way will still work, it just means you will have to be connected to the net already each time you want to use the program. One of the ways this program was used most often was to dial into local BBS (Bulletin Board Systems), which was the easiest way us dinosaurs from the dark ages could download graphics, programs and stuff, lol. Anyway, enough sideline history, now on with the show 😊. On the new screen you will see it asks for an address and port number. Here is where you type in the curtain address (or the name/numerical address of a Telnet site you want to visit) and unless directed otherwise by the site you are going to, leave the port number to

it's default of 23. Once you click on ok the program connects to the server and asks you the following:



Simply type V, then it will ask you to confirm yes or no, so type Y, and your connection will be completed (providing of course the site is not too busy and you are locked out, lol). For the purpose of our first Task, the following screen will appear:



Now you can browse and search the directories to your heart's content...well, to the site administrator's content anyway, as they will have chosen what options you can do from here, lol. Just remember that when you disconnect from a site using HyperTerminal the first time, use the little icon up the top of a phone hanging up. That way you'll be asked if you want to save this connection or not (that way if it's a site you want to visit again you don't have to go through the setup first).

Of course the above screen will be different depending on the site you visit, so go ahead and try HyperTerminal with the blinkenlights site in Task 2. Hopefully this is of use to you all, and that I've made it a little easier to use Telnet for you. On a side note referring to history again, you may notice on the web that BBS's are making a comeback, both in



WWW versions and also local versions that you can dial into from home. Some of the local versions never went away, lol, as most are done as a hobby by their administrators.

2.2 direct link cable connection using windows

A direct cable connection is a link between the input/output (I/O) ports of two computers by using a single cable rather than a modem or other interfacing device. In most cases, you make a direct cable connection with a null modem cable. You can use a direct cable connection to transfer information between the computers to exchange files, access resources, and so on.

To Make a Direct Cable Connection

1. Click **Start**, click **Control Panel**, and then double-click **Network Connections**.
2. Under **Network Tasks**, click **Create a new connection**, and then click **Next**.
3. Click **Set up an advanced connection**, and then click **Next**.
4. Click **Connect directly to another computer**, and click **Next**.
5. Choose the role this machine will play in the communication. If this computer has the information to which you need to gain access, click **Host**. If this computer will access information from the other computer, click **Guest**.

To Set Up the Host Computer

1. Click the connection device that you want to use for this connection (a parallel or serial port, or an infrared port), and then click **Next**.
2. Grant access to the users who are allowed to connect by selecting the appropriate check boxes, and then click **Next**.
3. Click **Finish** to end the configuration process.

To Set Up the Guest Computer

1. Type a name to identify this connection, and then click **Next**.
2. Click the connection device that you want to use for this connection (a parallel or serial port, or an infrared port), and then click **Next**.
3. Decide whether this connection will be available for all users (click **Anyone's use**), or only for you (click **My use only**), and then click **Next**.
4. Click **Finish** to end the setup process.

Troubleshooting

- To create a direct network connection that acts as a host, you must be logged on as Administrator or be a member of the Administrators group. Guest direct network connections do not require administrator-level rights.
- If you specify your connection as a host when you create it, the connection appears as **Incoming Connections** in the Network Connections folder.
- You can create multiple direct connections by copying them in the Network Connections folder. You can then rename the connections and modify connection settings. By doing so, you can easily create different connections to accommodate multiple ports, host computers, and so on.
- Direct connections can bypass authentication requirements. This is useful for devices such as handheld computers. You must configure this setting in the host incoming connection.



- If you create a direct connection by using a serial (RS-232C) cable, the port that you select in the New Connection Wizard is enabled for connections that use a null modem.
- If you are logged on to your computer as Administrator or a member of the Administrators group when you create a direct connection, you see a list of connection devices to choose from that includes all of the parallel ports for the computer, infrared ports that are installed and enabled, and COM ports. If you are logged on as a user who is not a member of the Administrators group and you create a direct connection, the list of devices includes the parallel ports for the computer, infrared ports that are installed and enabled, and only the COM ports that are configured with null modems. If you need to use a COM port for a direct connection, ask your system administrator to configure one of the COM ports on your computer with a null modem by using the Phone and Modem Options tool in Control Panel.