SYSTEM III NETWORK MANAGER
REFERENCE MANUAL

4/99, III-4

SYSTEM III™

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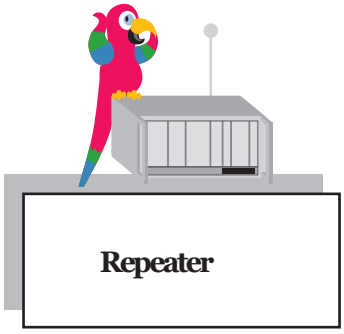
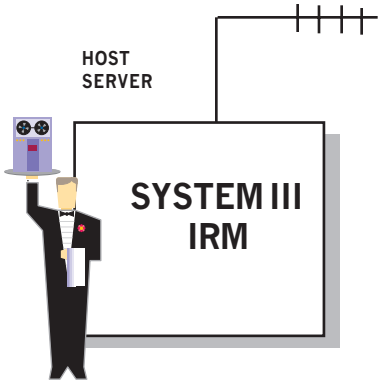
1.1 - What is a SYSTEM III Network?

THE REPEATER IS A REDUNDANT RECEIVER/TRANSMITTER, WHICH TAKES ALL OF THE RECEIVED DATA ON ONE FREQUENCY AND TRANSMITS IT OUT ON ANOTHER FREQUENCY.
THE REPEATER ALLOWS EVERY REMOTE UNIT ON A NETWORK TO "HEAR" EVERY OTHER REMOTE. IT IS LOCATED IN ONE SINGLE STRATEGIC SITE - ONE REPEATER PER NETWORK IN A METROPOLITAN AREA.

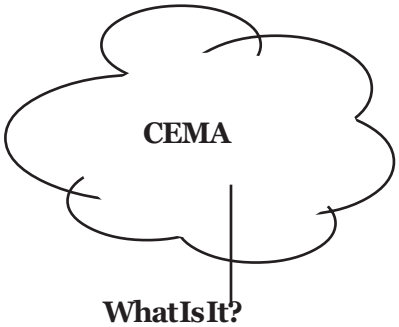
EVERY REMOTE UNIT TRANSMITS ITS DATA TO THE REPEATER, AND "HEARS" THE DATA FROM ALL OTHER UNITS ON THE NETWORK THROUGH THE REPEATER.



BY SIMPLY HAVING RADIO CONTACT TO THIS ONE STRATEGIC LOCATION, ANY UNIT HAS ACCESS TO THE COMPLETE COVERAGE AREA.



THIS UNIT REMOTELY CONNECTS YOUR TERMINAL EQUIPMENT TO THE PROCESSING CENTER.
THE UNIT IS AN INTELLIGENT RADIO MODEM THAT PROVIDES CONNECTIVITY WITH MULTIPLE REMOTE DATA PORTS.

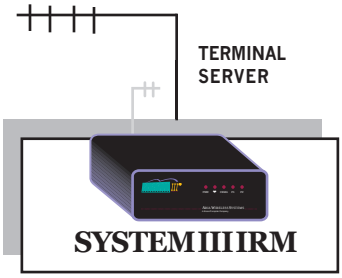


What Is It?

COLLISION ELIMINATING MULTIPLE ACCESS.
THIS PATENTED PROTOCOL IS DESIGNED TO EFFICIENTLY TRANSFER TRANSACTION-ORIENTED DATA (OCCASIONAL, SMALL BURSTS OF DATA, E.G.: CREDIT CARD AUTHORIZATION, REMOTE DATA BASE QUERY.)

How It Works

CEMA FORMS THE DATA INTO PACKETS, AND ROUTES THEM EFFICIENTLY ACROSS THE RADIO NETWORK.



THIS UNIT IS LOCATED AT YOUR TERMINAL SITE. ONE OR MORE OF THESE IRMS CAN BE MULTIDROPPED BACK TO THE PROCESSING CENTER.

What is a Protocol?

A PROTOCOL IS A SET OF RULES THAT THE COMPUTER EQUIPMENT FOLLOWS TO PASS INFORMATION BACK AND FORTH.

Network Manager

BECAUSE CEMA IS A COMPLEX NETWORKING SCHEME FOR HUNDREDS OF NODES, THE NETWORK MANAGER HELPS YOU:
- MONITOR PERFORMANCE
- TROUBLESHOOT PROBLEMS
- TRACK NETWORK USAGE

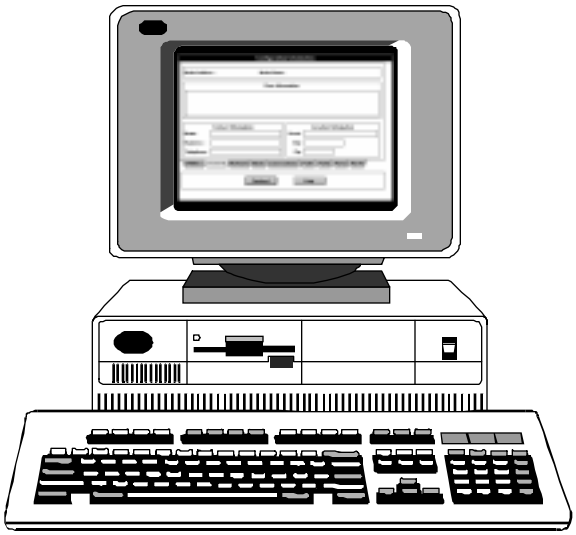
ALL EQUIPMENT CONFIGURATION AND NETWORK DIAGNOSTICS ARE DONE THROUGH THIS UTILITY.

* U.S. PATENT #4507224, MARCH 1990

1.2 - Product Features

System III Network Manager Features

- Complete Remote monitoring and control of CEMA Networks
- Remote IRM and Repeater Configuration
- On-Line Node Configuration Data Base
- Remote Software Download
- Network Node HW/SW Version Tracking
- Semantic Use of Color
- Custom Report Generation with Paradox Database
- PC Windows 3.1, 95, 98 & NT based



Description

The System III Network Manager is a full function network command and control station capable of managing Intelligent Radio Modems (IRM's) and Repeaters on as many as eight Metropolitan Area CEMA 2.0 networks. Network Manager is also capable of monitoring and collecting data on CEMA 1.7-based networks.

Network Manager software runs under Microsoft Windows 3.1, 95, 98 and Windows NT on any industry standard personal computer.

Real Time Monitoring

Network Manager provides real time monitoring of the CEMA network for performance analysis, fault diagnosis, alarms, accounting, security, and trending. It also interacts with remote IRM's to control operating modes and configure port and protocol parameters.

User Friendly

Network Manager is extremely easy to use. Windows-based implementation provides the operator with a "fill in the blanks" user interface, semantic use of color for real time displays, and multi-lingual support.

Network Manager can use any IRM or Repeater Communications Card as an access node to the CEMA wireless network, which means that the Network Manager station need not be at a fixed, unmovable location. Users may either connect the network management PC directly to an IRM serial port or remotely connect via a telephone line modem at speeds up to 19,200 baud.

Remote Query

Any IRM or Repeater can be queried remotely for configuration, statistics, and performance parameters, can be restarted, and updated with new software releases. Repeaters can be monitored to detect switch over to backup RF Units or power supplies so that corrective action can take place. IRM digital and RF hardware signals can be diagnosed and measured from the Network Manager site.

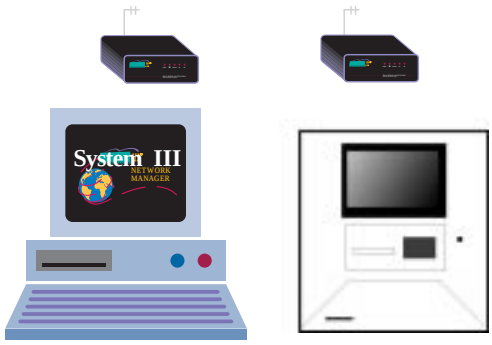
1.2 - Product Features

Management Database

Network Manager uses a Paradox-compatible database to store the operating configuration for every node on the network, as well as the long term accumulation of vital communications statistics and performance bench marks. Network Manager provides a number of standard on screen reports in chart form:

Network and node utilization,
Data and error packet totals,
Overall network availability percent
Availability percent by Node
Time-based occurrence of user selected alarm conditions.

If custom reports are needed, users of Borland's Paradox for Windows can use standard Borland report generation tools to create custom displays and reports from the network management database. The network data base information can thus be documented in ways that are uniquely tailored to each user's business.



Specifications

1. CEMA Network Version Compatibility

- Windows Based User Interface - CEMA 1.7 and CEMA 2.0
- Network Traffic Monitoring - CEMA 1.7 and CEMA 2.0
- Network Statistics Data Base - CEMA 1.7 and CEMA 2.0
- Node configuration Data Base - CEMA 2.0
- Remote Node Configuration- CEMA 2.0
- Remote Software Download - CEMA 2.0

2. Platform (One or Two monitored Networks)

- IBM Compatible PC
- 80486 or greater processor
- Minimum 8 MB RAM
- Windows 3.1 or Greater Operating Software
- VGA Monitor (1024 x 768 resolution recommended)
- Two serial ports

3. Platform (Three to Eight monitored networks)

- IBM Compatible PC
- 80486 or greater processor
- Minimum 16 MB RAM
- Windows NT Operating Software
- VGA Monitor (1024 x 768 resolution recommended)
- Three to Eight serial ports

4. Internal Data Base Compatibility

- Requires Paradox 4.0 or greater

1.3 - Getting Started

Introduction

This is a Windows 3.1 or greater based software, designed to:

- Monitor the network in real time
- Configure the System III Network
- Control node behavior (i.e: IRM, Repeater).
- Gather network behavior statistics

This software provides the only means of monitoring and managing the network.

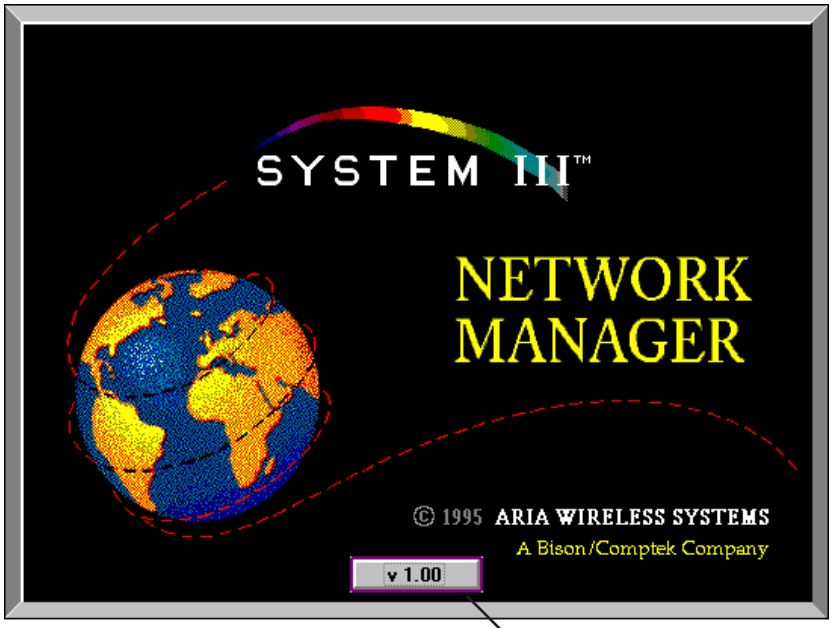
Getting Into Windows

In order to use Network Manager to its fullest capacity, be sure to familiarize yourself with the Windows environment. This manual assumes you know how to use Windows. Consult your Windows documentation for help.

Accessing the Network Manager Program

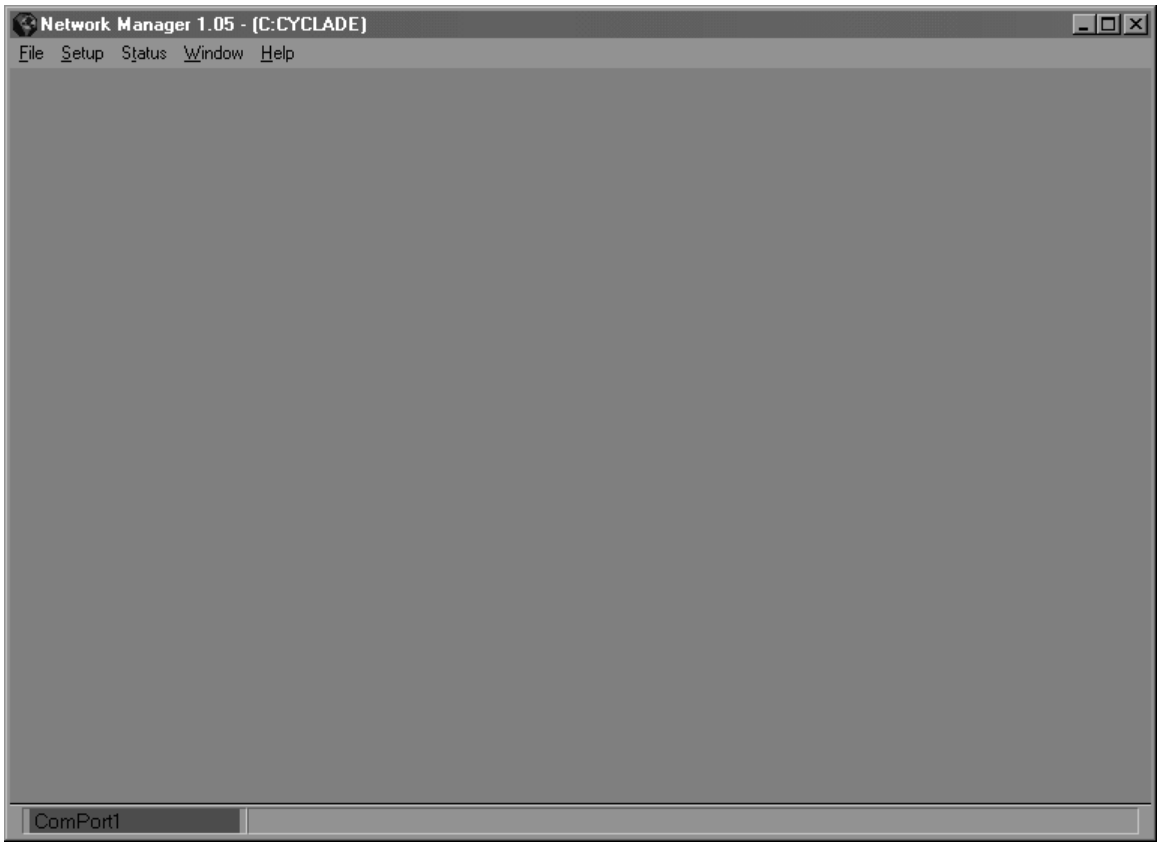
Double-click on the Network Manager Icon to open the Network Manager Program.

The Network Manager Greeting will appear:



1.3 - Getting Started

The Network Manager MAIN MENU will appear on your screen.

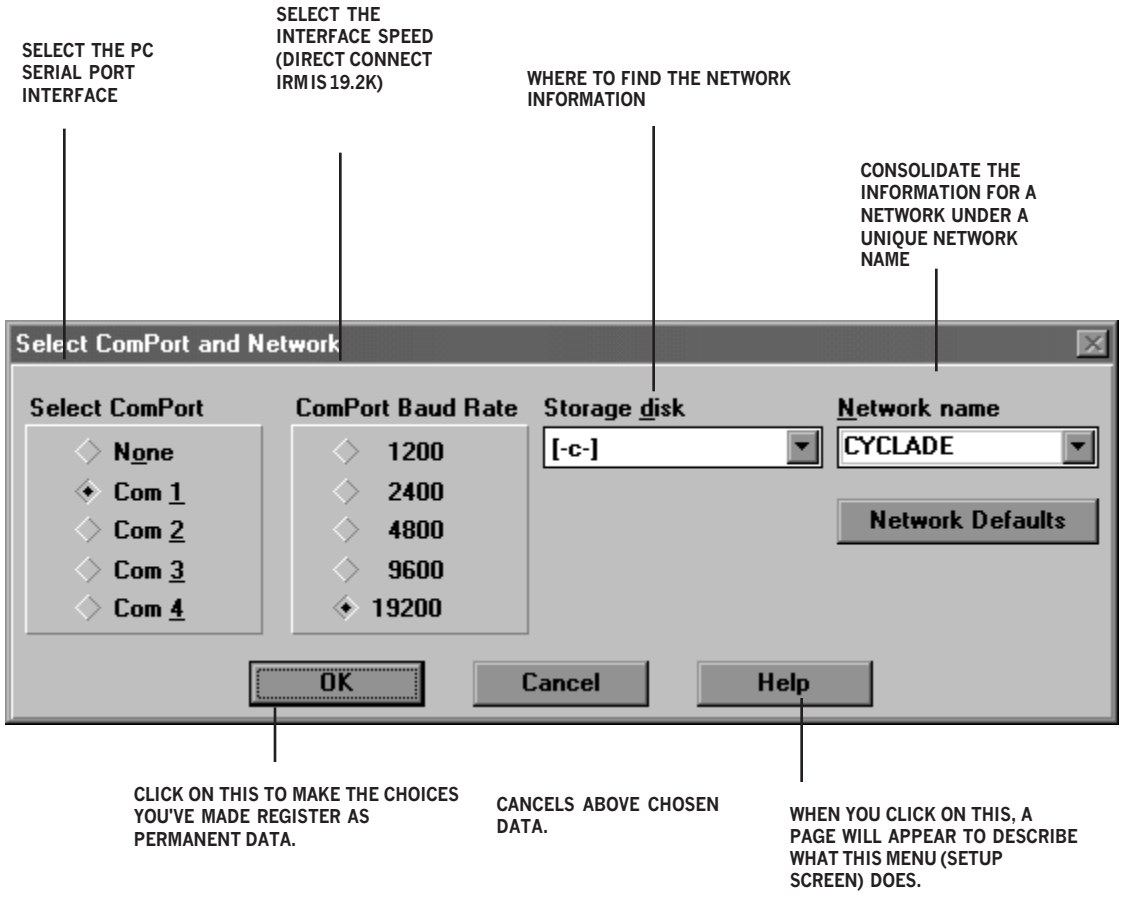


1.4 - Setup Screen

Setup

The setup menu option leads to a pop-up window entitled **Select COM Port and Network**. Click once on SETUP and this will appear.

Make your selections from the control boxes by pressing the appropriate buttons, which will blacken when pressed, but you must press the OK button to activate.



1.5 - Real Time Display

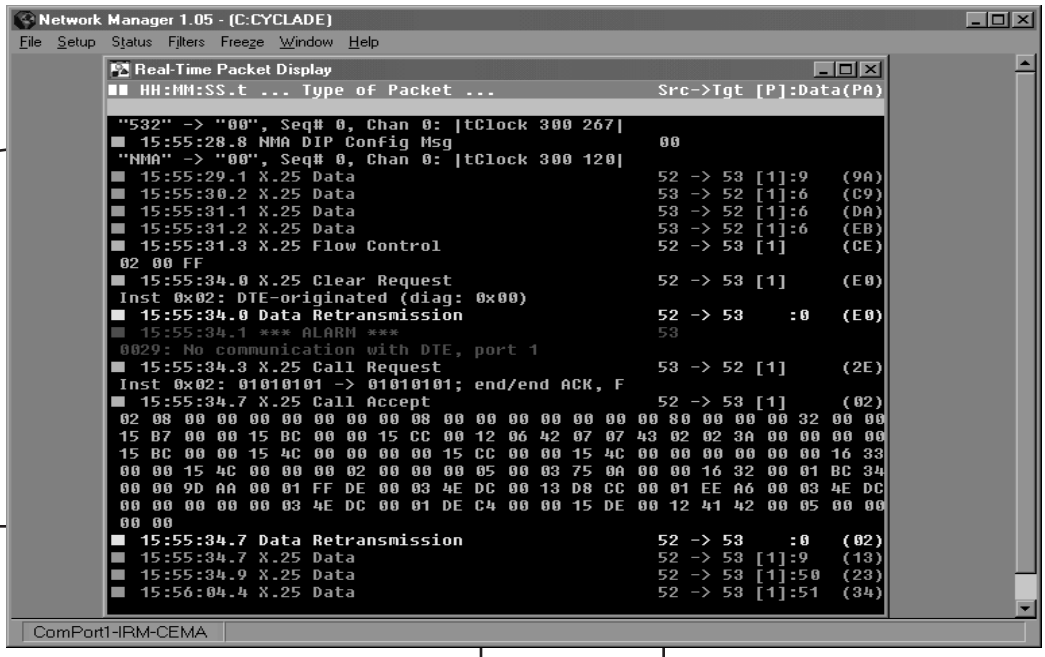
Real Time Display

The Real Time Display is a pop-up window containing the packet-based information for CEMA network protocol. This is Monitoring mode only. The FILTERS allow you to selectively monitor sub-categories. These are based on two types: Packet types, or IRM partners.

Selecting the REAL TIME DISPLAY menu will not only call up the pop-up window, but change the Main Menu selections to add 2 items: FILTERS and FREEZE.

Main Menu Real-Time Display selection

SELECTING "REAL TIME DISPLAY" FROM THE WINDOW SUB-MENU WILL SHOW THE PACKET-BASED INFORMATION, AS IT OCCURS ON THE NETWORK. ALL INFORMATION IS SAVEABLE TO DISK.



FILTERS
BY PACKET TYPE
BY LINK

THIS SELECTION ALLOWS YOU TO VIEW FILTER ACTIVITY BY PACKET TYPE *OR* LINK. (SEE FIG 5)

SEMANTIC USE OF COLOR HIGHLIGHTS PACKET TYPE.

CEMA SOURCE/ DESTINATION IS ALSO DISPLAYABLE AS MEANINGFUL TEXT.

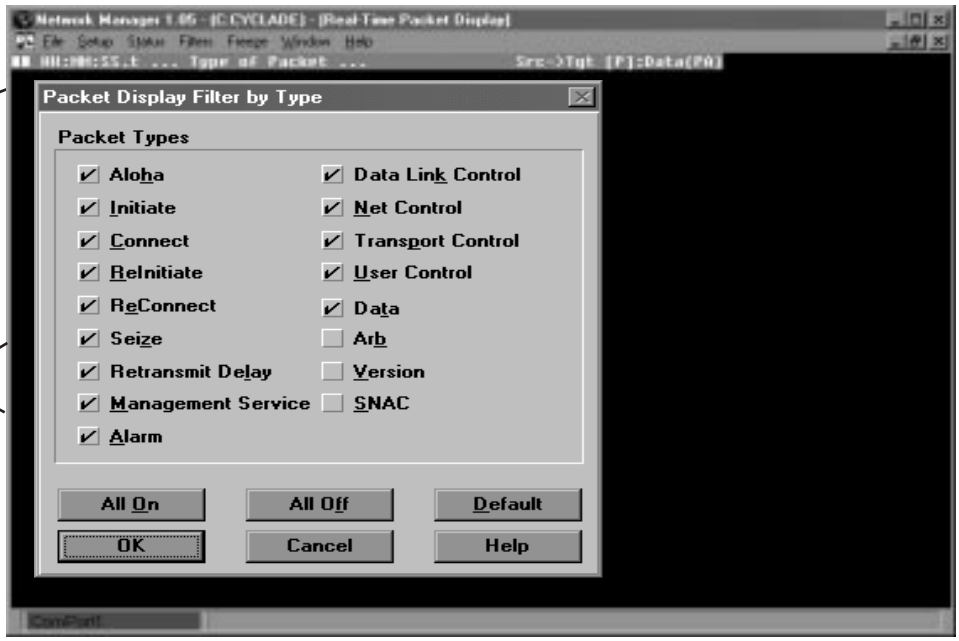
SCROLL MARK

1.5 - Real Time Display

Packet Display Filter

CHOOSING "BY PACKET TYPE" FROM THE FILTERS SUBMENU ALLOWS YOU TO SELECT SPECIFIC NETWORK TRAFFIC.

TURN ON AND OFF PACKET TYPES BY CLICKING ON DESIRED BOX. X IN THE BOX MEANS PACKET IS ON.



FREEZE

FREEZE has no sub-menus, just stops scrolling of display. Stopping the scroll activity will allow you to read the display. Press the FREEZE button again to activate scroll.

WINDOW

WINDOW pull down menu the next listed after Real time display is NODE STATISTICS.

NODE STATISTICS

NODE STATISTICS is not yet an active option. Will provide information on an individual IRM site.

NET STATISTICS

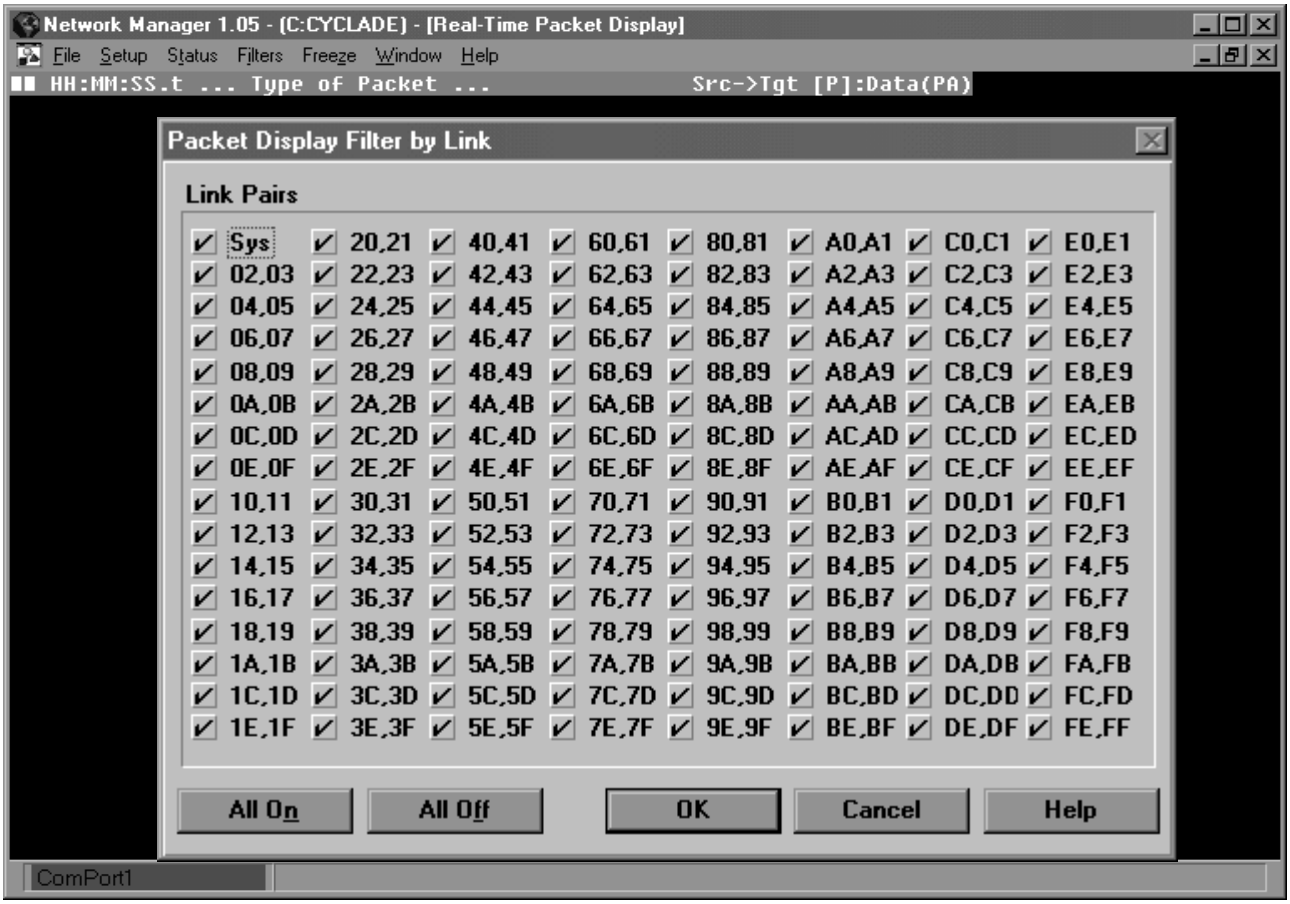
NET STATISTICS - network statistics will be available. Will give collective information on all IRMS.

1.5 - Real Time Display

Link

Link allows you to select the monitoring of traffic patterns between two IRMs.

Click on the check box to display network transmissions between link pairs.



2.1- Configurations

Configuring and operating a CEMA network can be accomplished in just a few easy steps. These steps must be accomplished in the following order only the first time, and can be augmented with additions, deletions, and changes as the network grows.

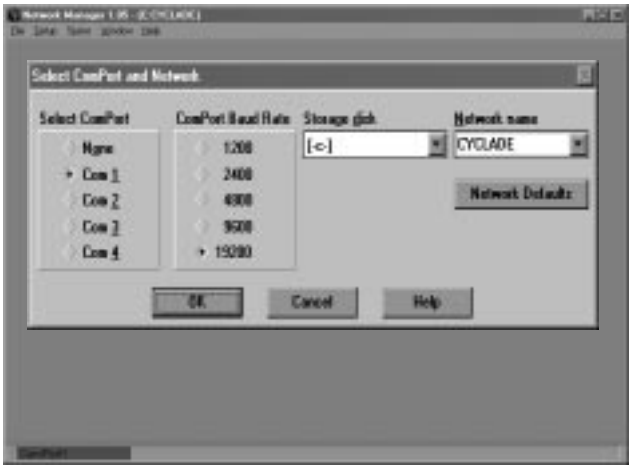
The steps are:

1. Assign a name to the Network you are building and setup the network defaults.
2. Design a Host Server to Terminal Server(s) topology and assign CEMA addresses to the IRM units and Repeater Communications Cards you will install.
3. Build and save database entries for each unit in the Network Manager's *configuration database* based on your chosen CEMA addresses.
4. Use the Network Manager Configuration capability to customize the IRMs and Repeater Communication Cards you will install. This is the step where protocols are assigned to individual ports and values are given to the radio and protocols.
5. Configure the participating IRMs and Repeater Communication Cards by connecting them, one at a time, to the PC via a straight through serial cable.

Step 1

Assign a Name to the Network you will design and build.

Under the Network Manager *Setup* pop-up window, available from the main menu bar at any time, select:
SELECT COM PORT - PC com port assigned to communicate with the IRM or Repeater Communcation Card.
PC COM PORT BAUD RATE - Select a baud rate. Unless configuring via modem, all IRMs and Repeater Communication Cards communicate at 19200 baud.



STORAGE DISK - this is the location where the database for your new network will be stored.
NETWORK NAME - Give the network a name, or select the network being augmented if one is built. This will result in a subdirectory under **\netmgr** to be built.
NETWORK DEFAULTS - If a new network is being created, network defaults should be entered. Press the *Network Defaults* button and enter the following parameters:

Transmit Frequency

Receive Frequency

Radio Preamble Characters

Network Baud Rate

Modulation Scheme

These parameters will be applied to all new IRMs and Repeater Communication Cards added to this network.

NOTE
A disk and directory other than where the Network Manager is installed cannot be used.

2.1 - Configurations

The assigned network name will remain the source and destination for all real time data, configurations, and statistics for this network. It can be duplicated and installed on another PC, or copied and sent to Aria Wireless Systems when you require technical support.

You can manage different networks on the same PC by giving them different names.

Step 2

Design the Host Server to Terminal server topology and assign CEMA addresses to the IRM units and Repeater Communication Cards you will install.

Consult Book 3, CEMA manual in the Configuration section for addressing.

Since a CEMA Wireless Network allows communication between pairs of Host Server/ Terminal Server as "logical links", designing suitable topology requires:

- A Host Server to be designated with an EVEN address in the range 02 through FE (hex).
- A Terminal Server be assigned the next contiguous ODD address.

The chosen Host Server/Terminal Server pair will be partners forever. No other IRMs or Repeater Communication Cards on the network can occupy the same addresses, and the addresses are considered *committed*.

The PC-based Network Manager database stores all information for a given IRM or Repeater Communication Card under its assigned CEMA address.

Assign an additional EVEN address for every terminal server to be linked to a single host site. The first assigned address is called the *base* address. Additional addresses are considered *auxiliary* addresses.

For example, a Host Server's assigned addresses will link up with Terminal Servers' paired addresses.

Host Server	*links to*	**Terminal Servers**
50	———	51
A0	———	A1
E2	———	E3
F4	———	F5

A single IRM Host Server can occupy up to 32 *even* CEMA addresses, communicating to 32 remote sites.

Step 3

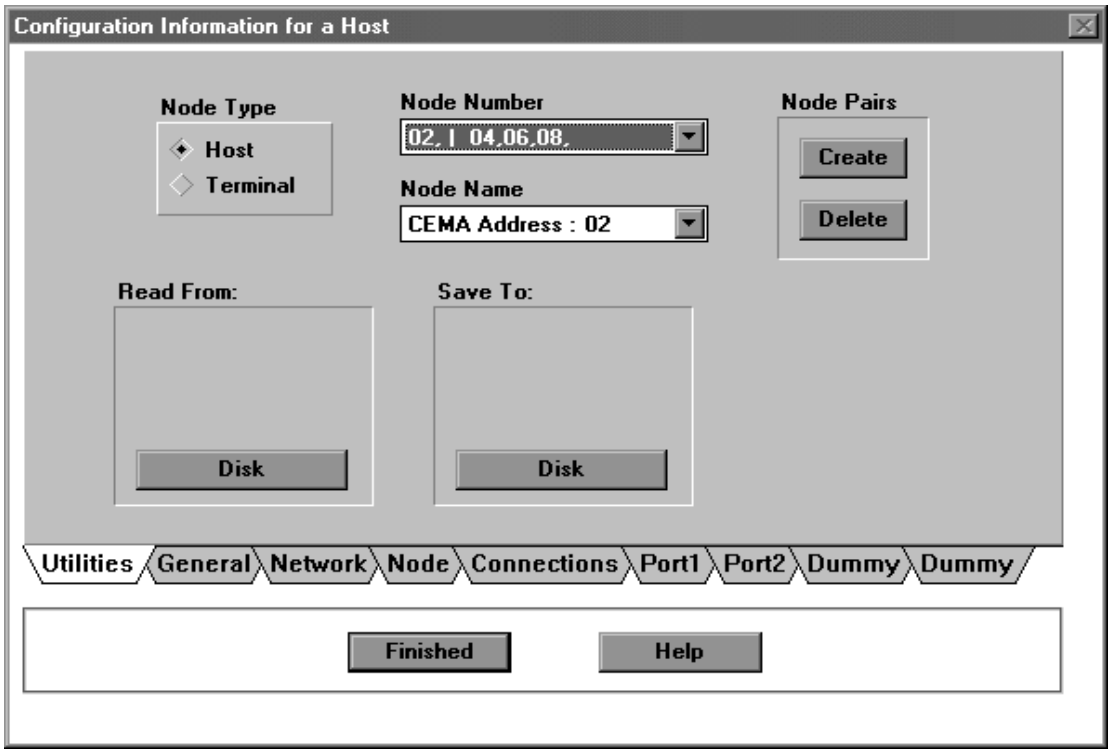
Build and Save database entries for each unit in the Network Manager's *Configuration Database*, based on CEMA addresses you've chosen.

Choose *Command and Config* from the Window pull-down menu.

After the *Command and Config* icon appears on screen, choose *Config* from the main menu bar.

2.1 - Configurations

Configuration of an IRM starts at the **Utilities** page. The Utilities page is the entrance into a "workspace", where IRM parameters can be freely edited, Host and Terminal Server pairs can be created and deleted, and communication to and from an IRM can be initiated.



Note: No changes become permanent, unless the workspace is Saved to Disk, or saved to live IRMs.

All "saved" edits reside in a Paradox-compatible database, in the subdirectory under \NETMGR\NETDATA named for the network being configured.

Creation of a "new" node pair:

On the utilities screen, under Node Type, select Host. Check the Node Number pull-down list for existing host servers in the database, given by EVEN CEMA address. Selecting the Create Node Pair button will allow for the creation of a new host base address, and an attached remote terminal server (with the next ODD address). Selecting the Save To Disk button will reserve records in the database for the specified host and terminal server pair.

Note: Additional terminal servers in the domain of a host server require that the host server be configured with an additional "auxiliary" address for each separate terminal server. Auxiliary addresses are specified on the **Node** page.

Deleting a node pair:

Select the Delete Node Pair and specify the Host Server (EVEN) address. The records will be deleted from the database.

2.1 - Configurations

Retrieving information for a node pair:

Reading from Disk, a locally-attached IRM, or a remote (over the network) IRM will fill the workspace with the chosen IRM's data.

Retrieving from Disk is fast. Retrieving from a locally-attached IRM is slower because of the serial transfer of data. Retrieving from a remote IRM is a lengthy process because of the transfer of data over the radio network.

Once information is contained in the on-screen workspace, it can be saved to disk, and will replace any existing information for that node pair. If data is saved to an IRM, it replaces all on-board parameter values in the IRM. This operation must be performed with caution.

Node Functions:

Local and remote IRMs can be reset. Select the appropriate button. The remote reset is a lengthy process because of the network transfer time.

2.1 - Configurations

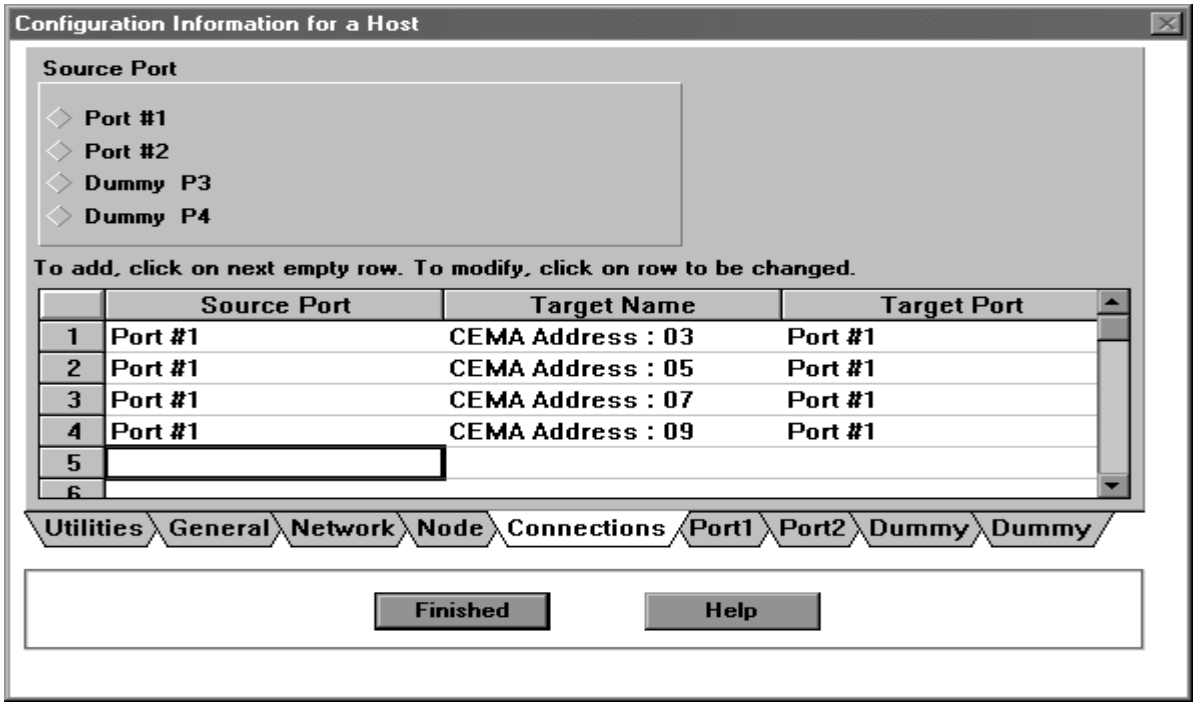
When configuring a host server, after the base and auxiliary addresses have been selected (identifying all of the remotes in the domain of a particular host), the host server port to terminal server port linkages must be specified.

Note: Any port on a host server can be linked with any port, on any terminal server.

For instance, if a host server has been designated CEMA addresses 10 and 20, then each port on the host server can be linked to any port, on terminal servers 11 and 21. The **Connections** page, for the host server configuration, is where those links are specified.

Note: These host server port to terminal server port linkages are selected only during host server, and not terminal server, configuration. The **Connections** page does not appear during terminal server configuration.

The connections are specified in a table, where the first column is the host server port, the second column is the terminal server node (selected from the domain of base and auxiliary addresses specified for the host server), and the third column reflects which terminal server port is to be linked.

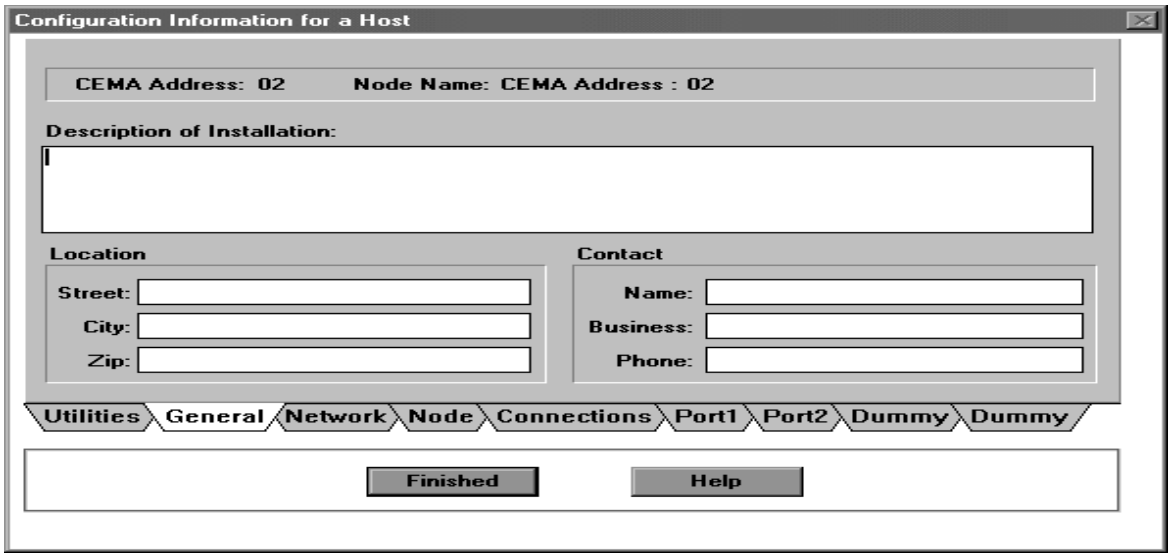


For the above table, the first connection (the first row) specifies that host server port 1 is linked to port 1 on terminal server address 3.

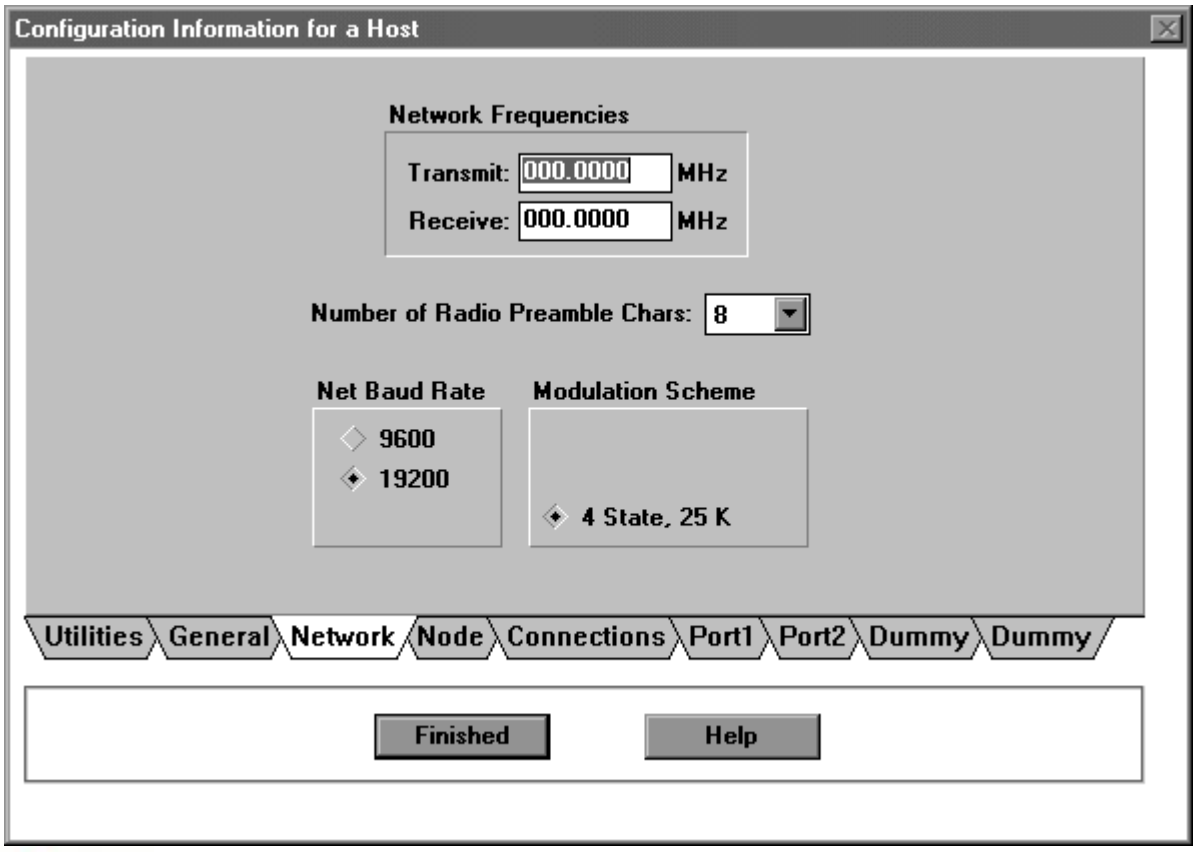
All selections are done through buttons showing all available choices in each category: Host Server Ports, Terminal Servers with the Domain, and Terminal Server Ports.

2.1 - Configurations

The General page is a screen of useful data to be entered and stored with the associated IRM paramaters in the on-board database. It is never sent to an actual IRM.

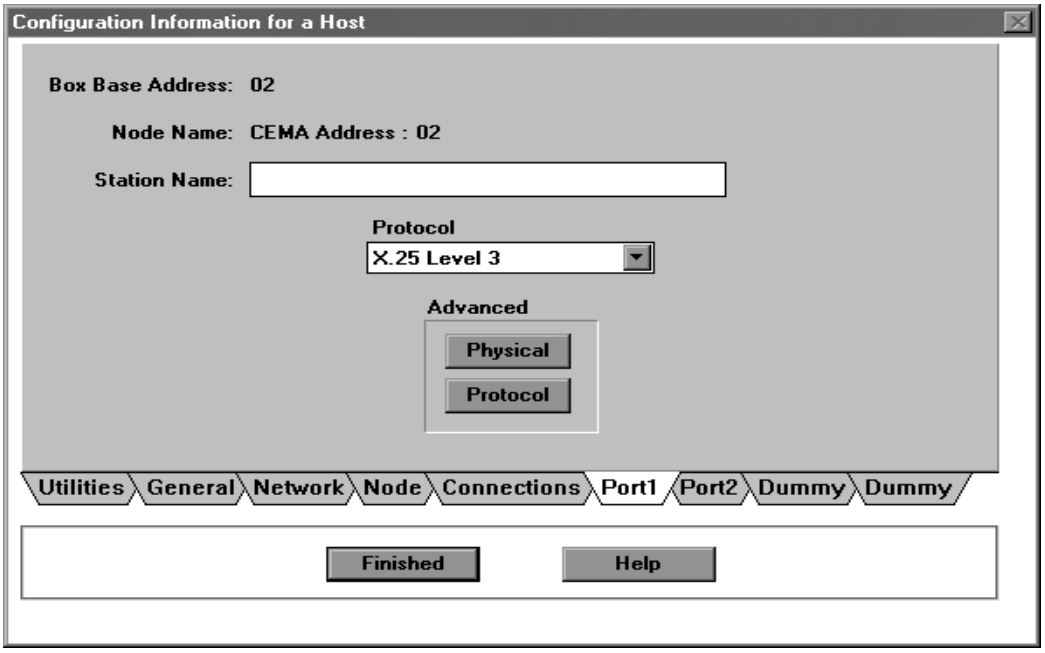


The **Network** page is critical to network and IRM functioning. All fields in the **Network** page must be filled, and must be the same for every IRM on a network.

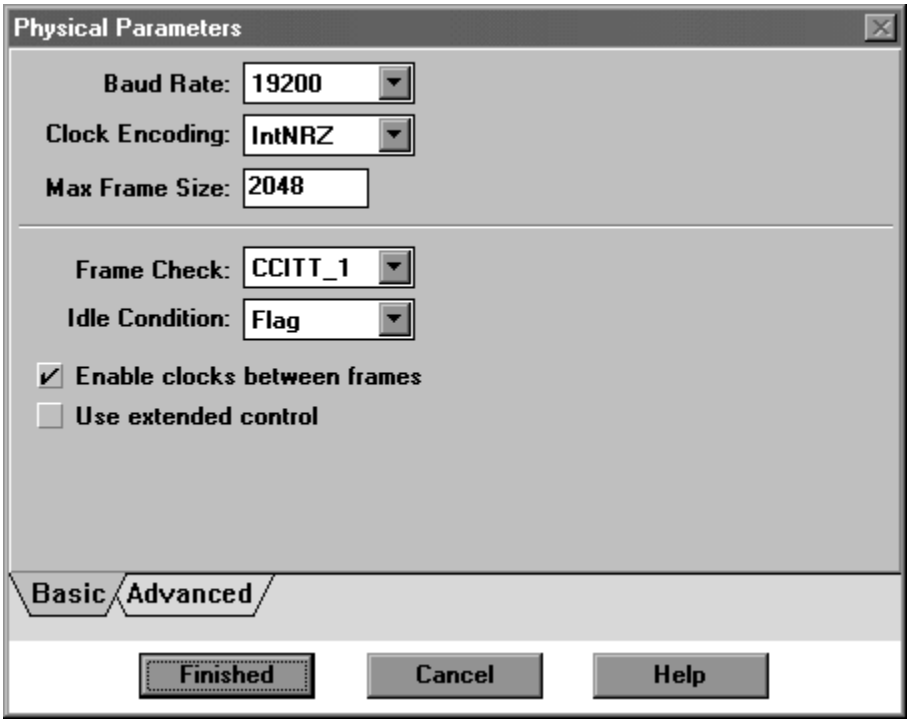


2.1 - Configurations

Once a protocol is established on the **Port** page, Physical and Protocol-related parameters must be specified by selecting the "Advanced" categories on the **Port** page.

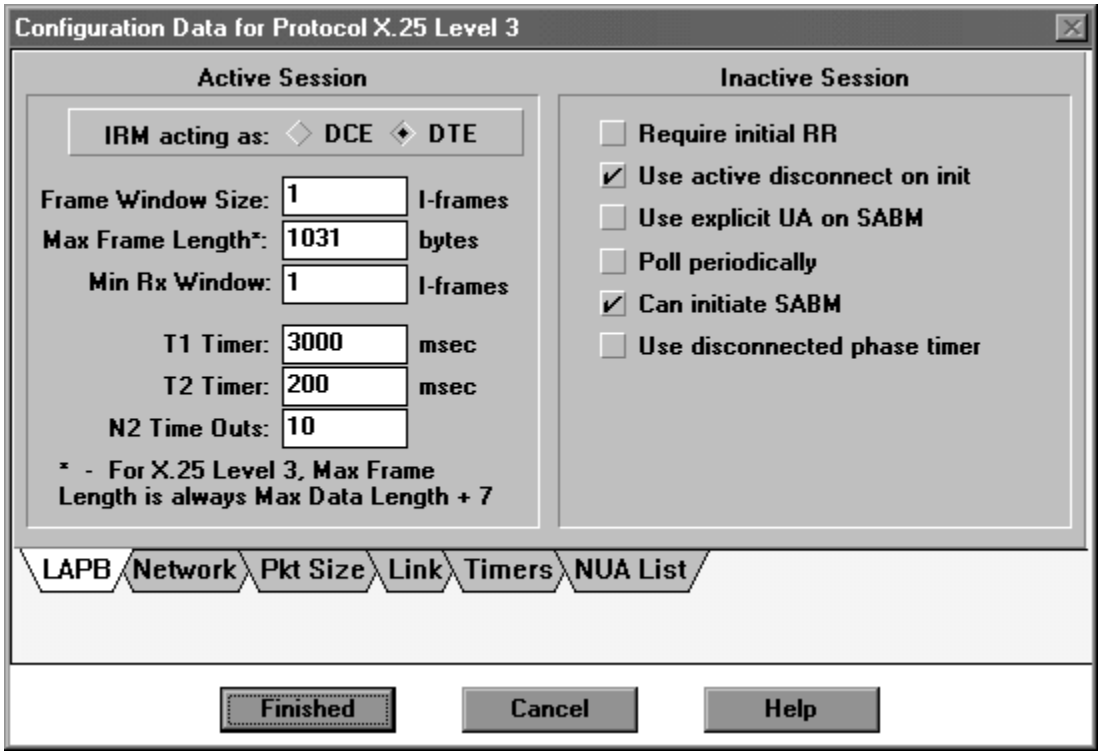


Physical parameters refer to bit, character, and asynch-oriented parameters that govern port communications, and are protocol-independent.



2.1 - Configurations

Protocol parameters refer to settings that are specific to the devices that will be connected to IRM ports. The accompanying drawing lists X.25 specific parameters. Each protocol has its own important set. In most cases, default values are intended to give the most likely values.



After all parameters have been selected, you must return to the *Utilities* page to save the current configuration. There are three options to save this information:

Save to Disk - will save the chosen configuration for furure use.

Save to Local IRM - will save the chosen configuration to the IRM attached the computer you are running Network Manager on.

Save to Remote IRM - will send the chosen configuration to a remote IRM on the CEMA network. After selecting this option, another window will appear asking the address of the remote IRM to which the configuration will be sent.

After saving to a local or remote IRM, you must do a local or remote reset, respectively, for the new parameters to take effect.