

## **Multi-plant Connectivity**

### **Introduction**

There are a number of techniques available to accomplish multiple plant connectivity with ProHelp Millennium. All of these techniques require the use of fairly sophisticated hardware and in some instances the cooperation of the local telephone company. While a lot of variations to the discussed theme are possible, two major themes will be discussed in this application note.

Multiple “plant” configurations can include multiple departments within the same building, multiple buildings located in the same complex, and multiple buildings in multiple locations, such as Cincinnati, Ohio and Atlanta, Georgia. The requirement is to install ProHelp Millennium in all of these locations, with some level of ability to get management reports, have one or more scheduling functions, and have the ability to monitor the performance of the individual plants in either an enterprise configuration or a stand alone configuration. The advantages and disadvantages of each are discussed.

### **Connectivity Media**

A number of different techniques are available in order to gain connectivity to the individual plants. The simplest of these is the dial-up modem. A user in one location can dial up the server computer in a different location using a standard 56.6KB modem and run a client application that provides “connectivity”. There are performance issues, but connectivity is accomplished. Two or more buildings located in the same complex can be connected using a fiber optic network and 100 Mb Ethernet, but connecting plants more than 2 kilometers away is quite expensive with fiber, since 2 kilometers is the maximum run length without fiber repeaters. However, if the plants or buildings are in the same complex, a fiber optic Ethernet is an excellent choice.

When discussing remote locations, there are a number of methods available with the phone companies. Frame Relay is one choice, where a company purchases a certain bandwidth of the Relay Frame. An ISDN line offers a certain amount of performance over a standard dial up modem. A T1 line may be leased, which will provide 1.544 Mb connectivity between plants. This is relatively expensive in that each plant must lease the line; typical costs are \$1500.00 per month. Higher performance can be gained by leasing a T3 line or a fractional T3, but these are quite expensive. However, for certain applications the performance can outweigh the cost, in that a T3 line works at 45 Mb.

With all of these “phone line” options, performance is an issue, but as long as the traffic is properly controlled by the routers, the throughput and performance should be acceptable. The drawback in using leased lines of any quality of course is the potential for a lost connection.

### **Millennium Application**

Configuration of ProHelp Millennium in a multi-plant environment is based on a number of decisions, the connectivity issue stated above being one of them. For this discussion, assume that

a fiber optic backbone is not viable due to the distances involved. Therefore, some connection through the phone lines must be considered.

***Method 1.***

One method of connectivity is to install a single ProHelp Millennium system for the complete enterprise. The file server is located in one of the plants, normally the corporate office, with monitoring nodes in the other plants connected through a T1 Ethernet connection. This is accomplished by the proper router hardware. The advantage of this method is that a single schedule can be created since each plant is configured as one or more departments in a corporate wide scenario. Plant wide reports are available. Real time programs can reflect the whole corporation's performance. Data storage is centralized. The biggest disadvantage to this scenario is the T1 line, which may be somewhat fragile depending on the reliability of the local telephone provider. If the T1 line goes down, communications between nodes stops. Millennium has some fail-safe facilities built in to address this situation, but there is a chance of data loss. In addition, the bandwidth of the line can be a problem depending on network traffic.

When considering this version, **Figure 1 Single Millennium Server System**, should be used as a guideline. Since this version of multi-plant connectivity utilizes a single file server, it can be somewhat less expensive than Method 2. However, this is not the recommended solution to ProHelp Millennium multi-plant installations. Method 2 is the recommended choice.

**Note: The Software License Policy for ProHelp Millennium is based on a per plant license, not an enterprise wide license.**

***Method 2.***

The second method of connectivity is to install a complete ProHelp Millennium system in each plant. A Millennium file server would be located in each plant, with additional monitoring nodes as required. Refer to **Figure 2 Multiple Millennium Server Configuration** as a guideline for this type of enterprise solution. Access to each plant can then be accomplished using dial up modems and Exceed Clients running on any Windows 95/98/NT machine. A separate icon would be required (or the appropriate path defined) for each plant. The advantage of this method is that each plant is its own entity, and all data storage and file maintenance is localized to the plant. Inter-plant Ethernet connections (ISDN Lines, T1 Lines, T3 Lines, Frame Relays) do not affect the reliability of the data). Unfortunately, a major disadvantage is the distribution of scheduling and reporting. While these can be done at the corporate headquarters, it is quite inconvenient in that each plant must be addressed separately. Real time applications only reflect a single plant and not the enterprise.

**Note: The Software License Policy for ProHelp Millennium is based on a per plant license, not an enterprise wide license.**

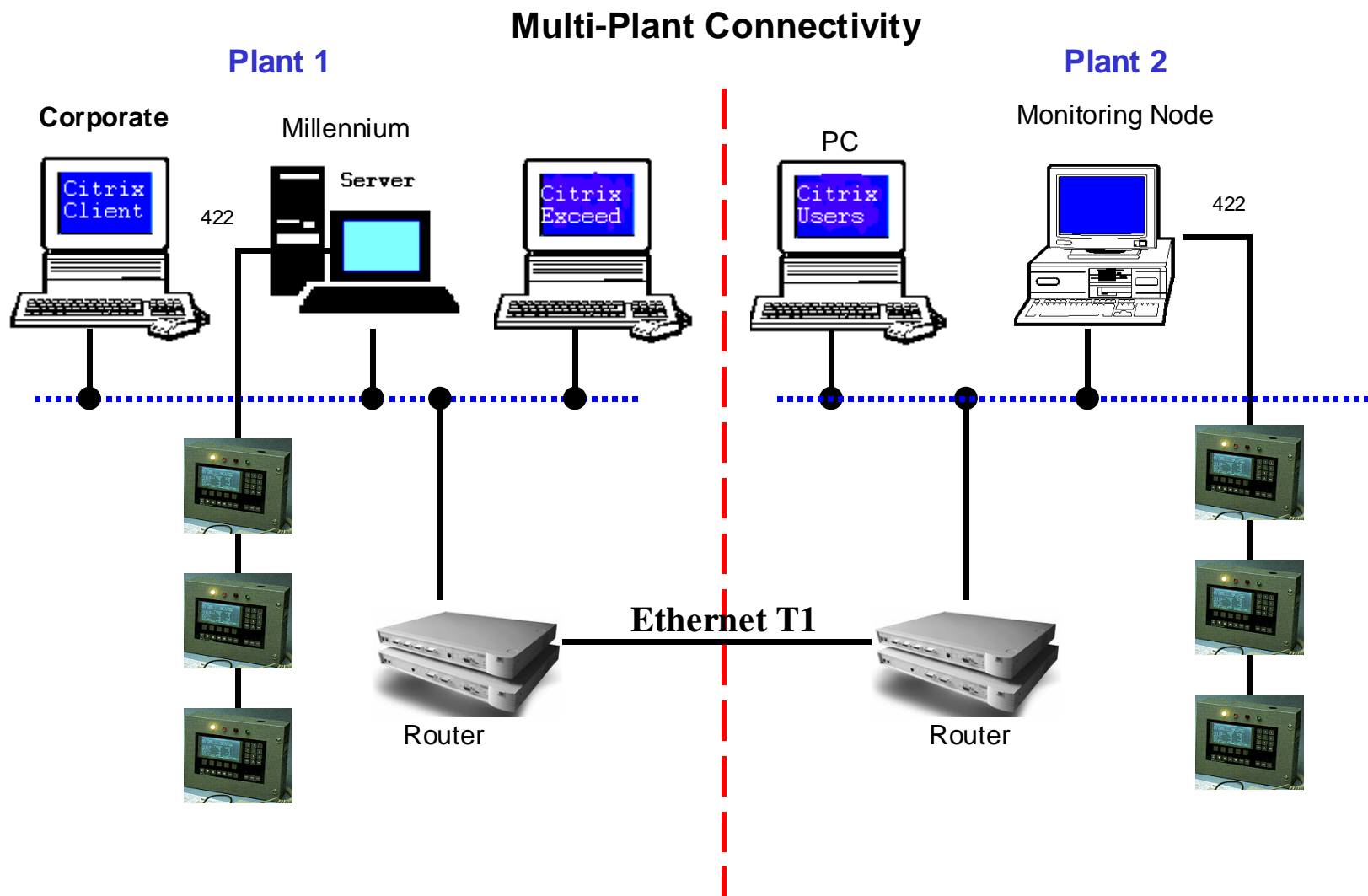


Figure 1 Single Millennium Server System

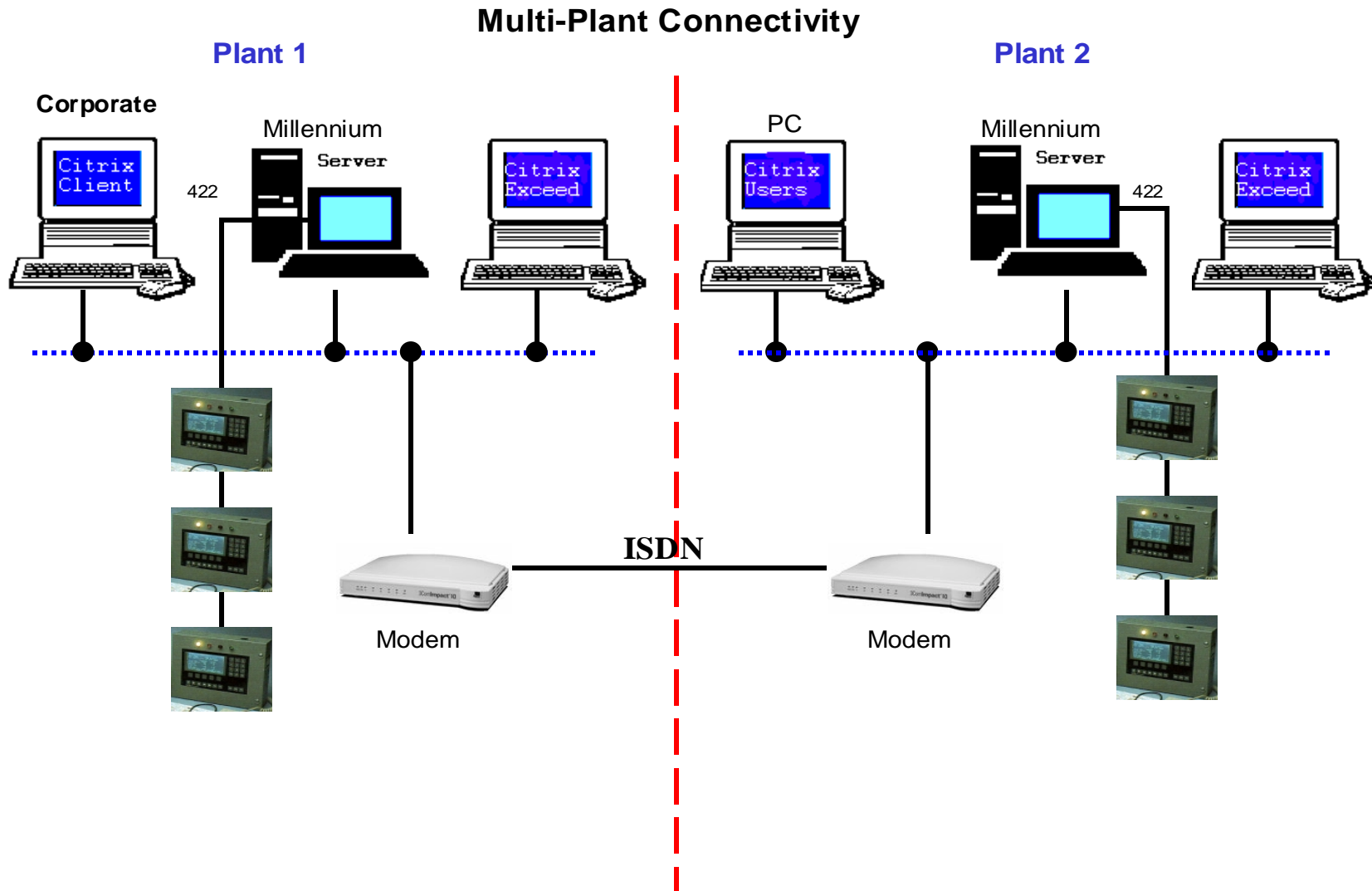


Figure 2 Multiple Millennium Server Configuration

## **Performance Issues**

As with any discussion involving multi-plant connectivity, performance issues occur because the phone company is involved. As previously stated, ISDN lines have a bandwidth of 128 KB. Frame Relay typically has a useable bandwidth of 256 KB, but typically run at 56 KB. T1 lines have a bandwidth of 1.544 MB, and T3 Line have a bandwidth of 45 MB. None of these operate at current 100 MB Ethernet speeds, although the T3 lines operate fast enough for 10 MB Ethernet connection. But again the reliability of the line is in question, especially for mission critical applications in an enterprise.

With either of the Millennium solutions proposed, the performance using any type of connection to the plant from any other plant can be enhanced by using third party software. As shown in both Figure 1 Single Millennium Server System and Figure 2 Multiple Millennium Server Configuration, Citrix software is suggested to enhance performance. A Citrix WinFrame Server resides in the same environment as the Millennium server and acts as the communications device for the enterprise, providing "thin client" connectivity. Instead of installing X-Servers on each computer requiring access to the different plants, the X-Server is installed on the Citrix Server and Citrix Clients are installed on all of the desktop computers. Citrix WinFrame is a Windows NT product that performs well in an enterprise environment with ProHelp Millennium. All the normal licensing issues apply. If an eight user ProHelp Millennium License is purchased for each plant, eight users may connect concurrently. They may connect either through Citrix Clients or X Servers. If the user computer does not physically reside on the same network as the Millennium Server, it is recommended that the Citrix WinFrame solution be deployed. Citrix is also recommended if the user is concerned with dial up connection performance using a 56.6 Kb modem (or smaller). Typical prices for a five concurrent user Citrix WinFrame is in the \$2500.00 excluding the computer.