Digivance™

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User Manual

Element Management System
for Digivance Application
Version 4.0 for SDR
P/N 1282804 ADCP-75-166

ADC®

The **Broadband** Company™

Element Management System

EMS

User Manual

ADCP-75-166

About This Manual

This manual tells how to install and use the Digivance™ Element Management System (EMS), version 4.0 for Software-Defined Radio (SDR) applications. EMS is a software application that may be used on a PC or laptop computer. EMS can also be accessed remotely using a direct data link to the computer on which EMS is running.

Revision History

Issue	Date	Reason for Change
Issue 1	4/2004	Original.

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Related ADC Publications

The following ADC publications contain information related to the Element Management System. Copies of these documents can be ordered by calling ADC Technical Assistance Center (1-800-366-3891 extension 73475, in U.S.A. and Canada; 1-952-917-3475 outside U.S.A. and Canada).

- Digivance Long Range Coverage Solution 1900 MHz System With Version 3.01 Element Management System Installation and Operation Manual (ADCP-75-153)
- Digivance Long Range Coverage Solution 800 MHz System With Version 3.01 Element Management System Installation and Operation Manual (ADCP-75-156)

STANDARDS CERTIFICATION

FCC: This equipment complies with the applicable sections of Title 47 CFR Section 22.

IC: This equipment complies with the applicable sections of RSS-131.

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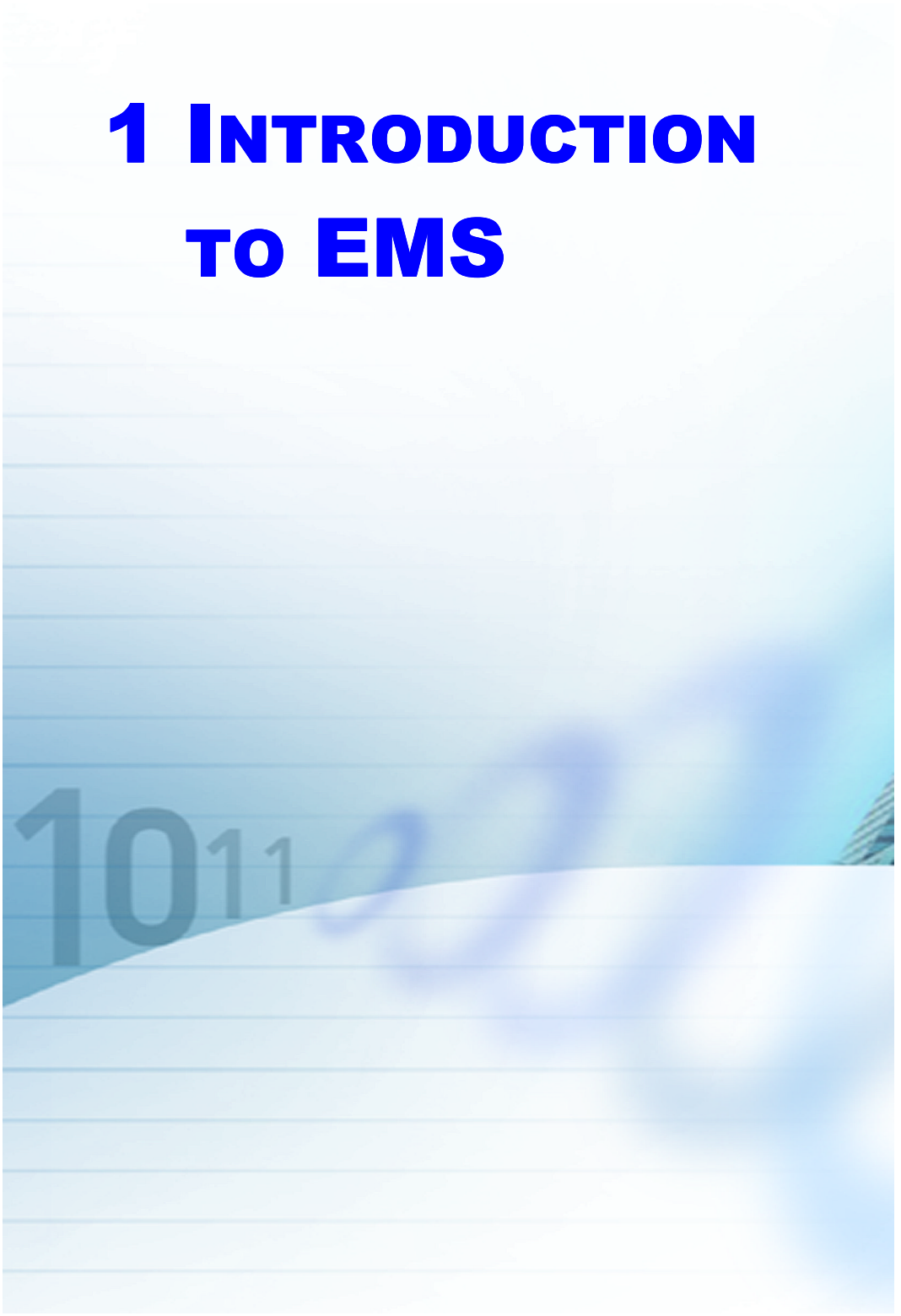

1 INTRODUCTION TO EMS

This section introduces the ADC Digivance Element Management System (EMS) for Software-Defined Radio (SDR) Application.

1.1 General Description

EMS is a software application that provides control and monitoring functions for network elements in a Digivance Long Range Coverage Solution (LRCS) network. These network elements are of two types, host units and remote units, which in an operational state exist as “host/remote pairs.” In an SDR application, the host unit consists of an ADC card in the BTS (Base Transceiver Station) server. Figure 1 shows the main components in a working system.

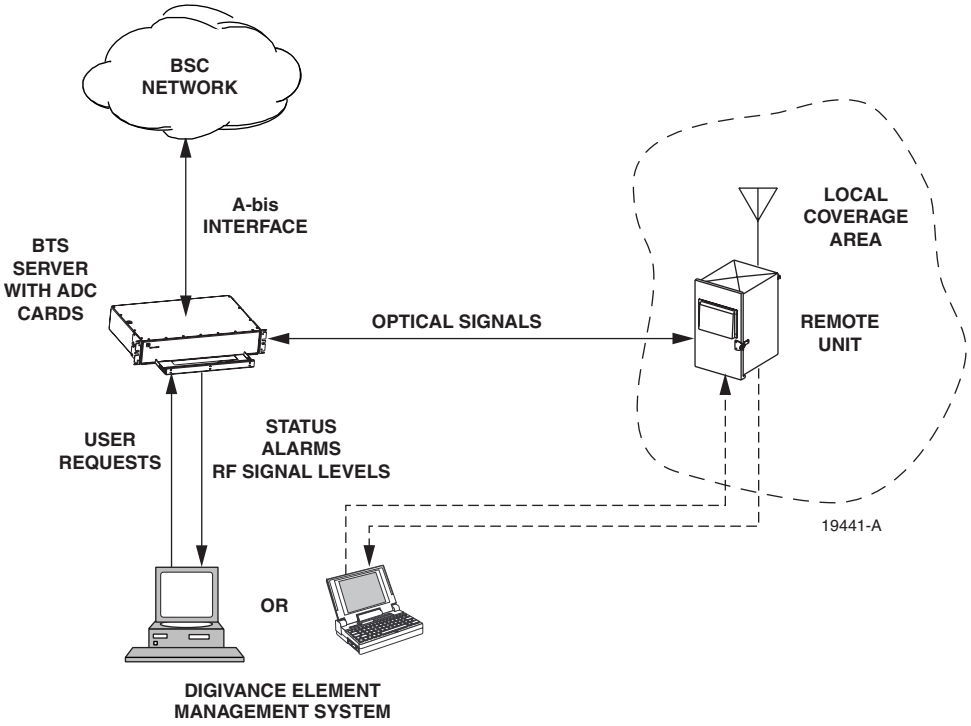

Figure 1. Network Elements in SDR Application

Figure 2 provides a closer look at a working Digivance SDR system. As shown, the Base Transceiver Station in this system is a BTS application running on the BTS server. Being software, the BTS application has the advantage that it can be programmed to process any of a range of Radio Frequency (RF) modulation types. By comparison, a hardware BTS is restricted to one modulation type.

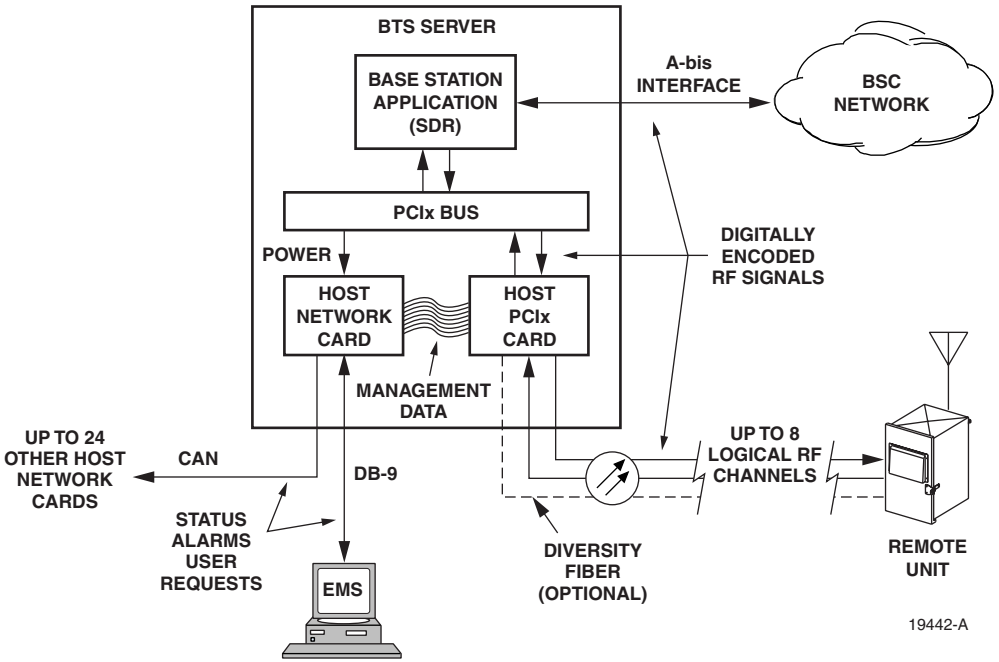

Figure 2. Closer Look at a Working System

As also shown in Figure 2, the Digivance SDR system involves two ADC cards in the BTS server: the Host PCIx Card and the Host Network Card. The Host PCIx Card is the "host unit" referred to on EMS screens. It communicates with the BTS application over the PCIx bus and, over the fiber interface, with the ADC remote unit. The Host Network Card is a communication card allowing access to the Host PCIx Card from the BTS server. The EMS computer plugs into the Host Network Card DB9 service port. The Host Network Card also provides one input and one output RJ-45 connector for connecting to other SDR host units in a Control Area Network (CAN). Up to 24 host units can be networked in this way into one EMS system. (In an EMS system consisting of a single, collocated host/remote pair, the Host Network Card can be eliminated by plugging the EMS computer into the DB9 service port on the remote unit.)

1.2 Data Flow

Data flow between a host unit and remote unit consists of at least one forward path and one reverse path. In diversity systems, there is a secondary reverse path, also. Figure 3 shows the data flow. As shown, input to the Host PCIx Card from the BTS application consists of up to eight "logical RF channels." On the card these logical channels are combined into a composite signal to the remote unit. Control data from the EMS computer is also combined into this signal. In the remote unit, digital RF data is converted to analog RF signals for the remote unit antenna. Data flow and operations in the reverse path are essentially the reverse of those in the forward path.

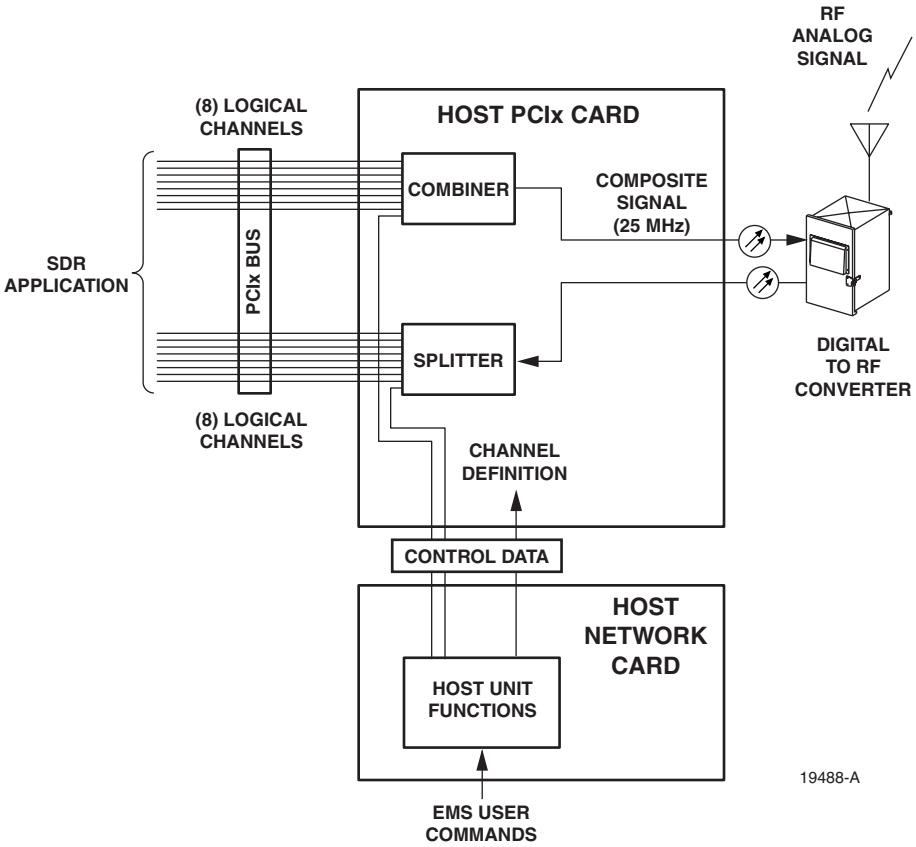

Figure 3. Data Flow

Logical RF channels are defined by user commands entered in EMS based on type of signals being received from the BTS application. User commands include RF modulation type, FCC channel number, and signal gain settings.

1.3 Wider View of SDR-Based Network

Figure 4 provides a wide view of an SDR base station system. As shown, the BTS application, running on the BTS server, is controlled over an A-bis interface by a Base Station Controller (BSC). In an SDR system deployment, the A-bis interface is over a packet switching network using Voice Over Internet Protocol (VoIP). A single BSC can control several BTS applications. The BSC, in turn, is controlled by a Message Switching Center (MSC), using a standard interface called the A-Interface. The MSC provides connectivity to the external, landline Public Switching Telephone Network (PSTN). The A-Interface can be carried over a packet switching network or over traditional T1 lines.

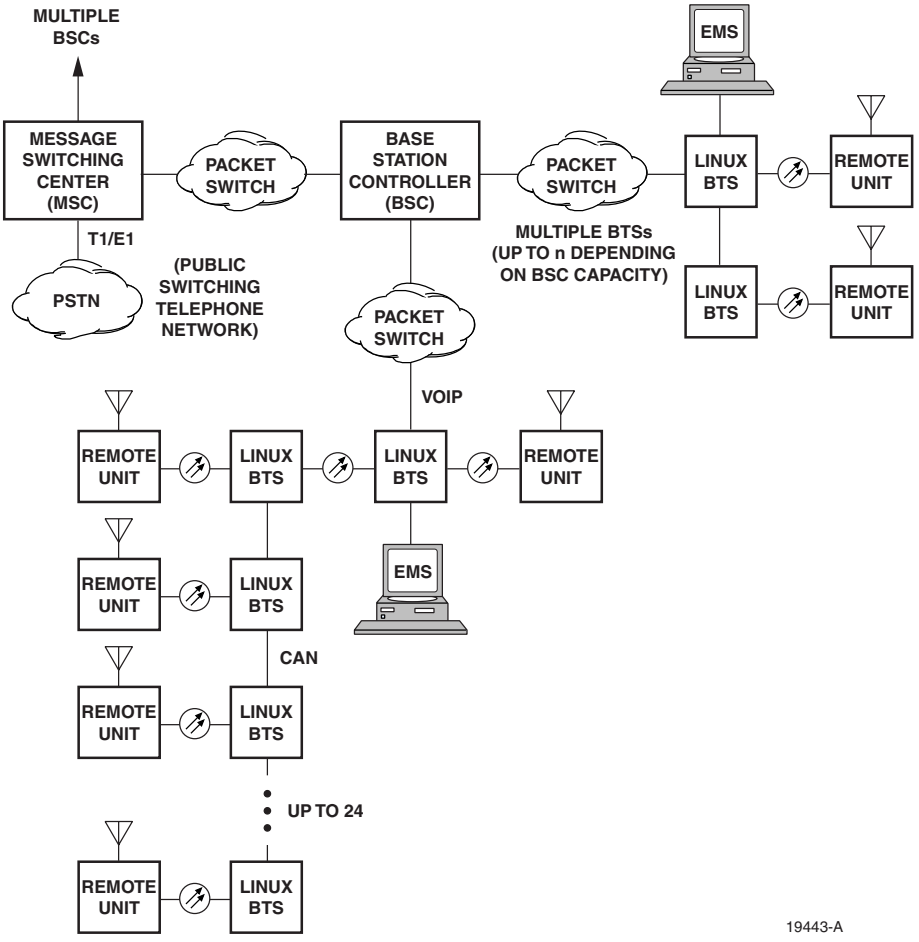

Figure 4. Wide View of an SDR Base Station System

1.4 Common Use Scenarios

This section presents three scenarios in which EMS is used.

1.4.1 Laptop Use for Installation or Routine Maintenance

In this use scenario, shown in Figure 5, an application engineer or technician carries EMS to a work site such as a telephone closet or rooftop hut and connects the EMS computer to a BTS server at that work site. This is done when the units are installed, using EMS to check and adjust operation as the units are turned up. RF signal levels can be checked, and attenuation and gain values entered.

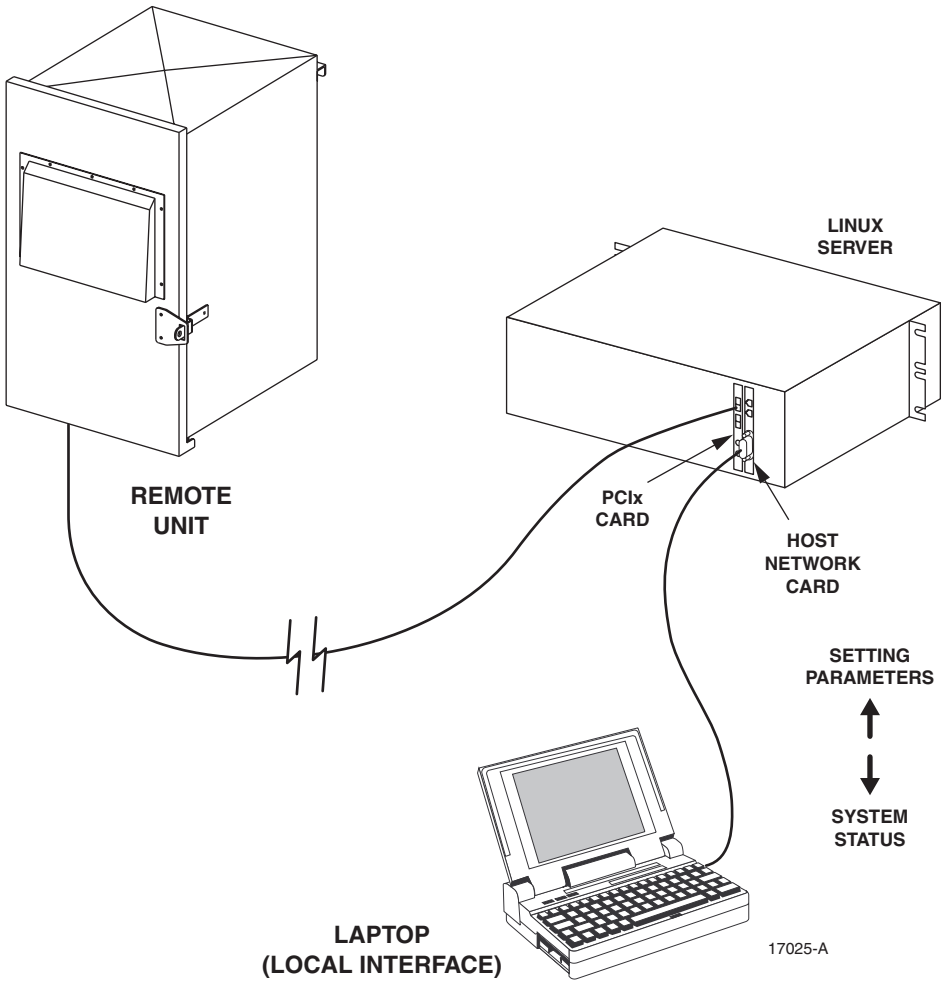

Figure 5. Laptop Use Scenario

EMS can also be used later to assist in routine maintenance or to respond to alarms and verify when the situation causing the alarms has been corrected.

1.4.2 Local Office With Multiple Hosts

In this use scenario, shown in Figure 6, EMS is permanently installed at a local office where multiple BTS servers, each equipped with ADC cards, are daisy-chained in a Controller Area Network (CAN). Each BTS server can house one host-remote pair. EMS provides monitoring of network performance and quick identification alarm conditions anywhere in the network.

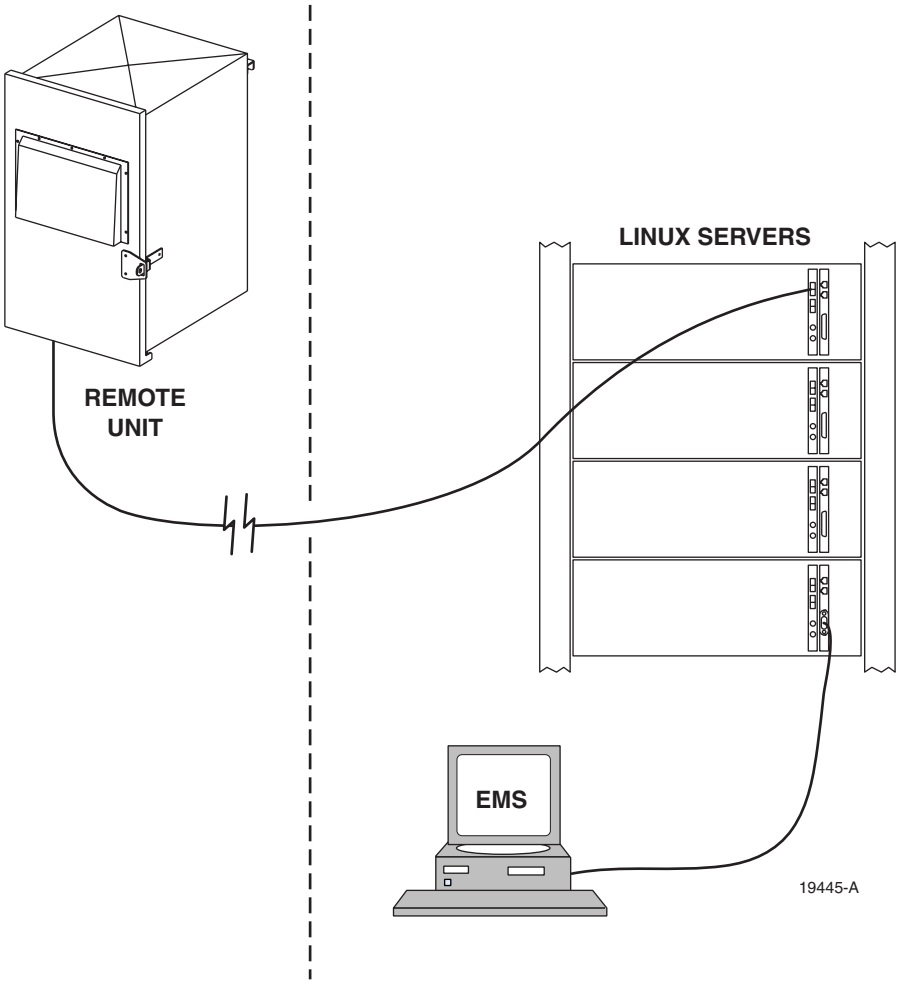

Figure 6. Local Office Scenario

1.4.3 SNMP Manager and Proxy Agents

In this use scenario, shown in Figure 7, an analyst with SNMP manager software and internet access, manages one or more EMS systems with SNMP proxy agent software and internet access. Using the SNMP manager, the analyst can request and receive individual parameter values such as voltage readouts. The analyst can also set certain parameters values such as operating mode to remotely configure host/remote pairs. The interface also provides automatic reporting of alarms.

SNMP (Simple Network Management Protocol) is a common standard for inter-network management of online devices using internet protocol (TCP/IP or UDP/IP). SNMP manager and proxy agent software are available from ADC. The ADC manager software is called "StarGazer."

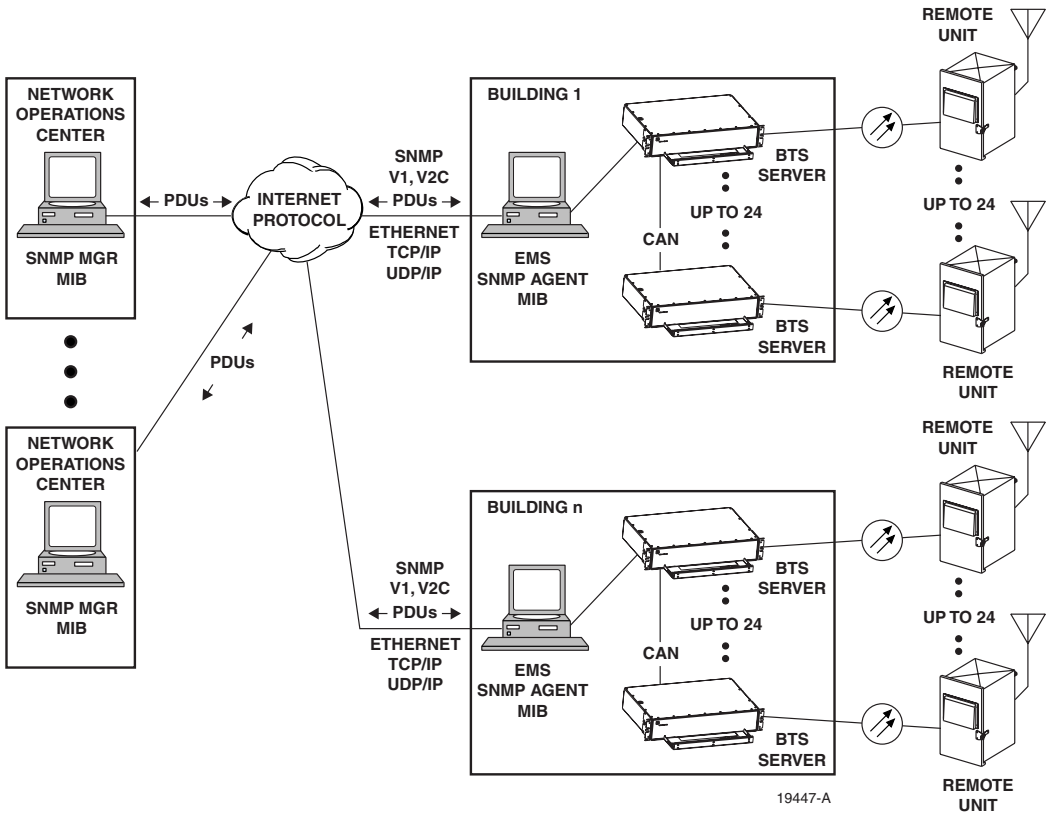

Figure 7. EMS SNMP Application