

RANGELAN2 7410

Windows CE PC Card

One Piece Wireless LAN Adapter
For PC Card Type II Slots

User's Guide

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After calling Proxim Technical Support, if your product is found to be defective, you may return the product to Proxim after obtaining an RMA (Return Materials Authorization) number from Proxim Customer Service. The product must be returned in its original packaging. The RMA number should be clearly marked on the outside of the box. Proxim cannot be held responsible for any product returned without an RMA number, and no product will be accepted without an RMA number.

FCC WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ❑ Reorient or relocate the receiving antenna.
- ❑ Increase the separation between the equipment and the receiver.
- ❑ Connect the equipment into an outlet on a circuit different from that which the receiver is connected.
- ❑ Consult the dealer or an experienced radio/TV technician for help.

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1. Introduction

Congratulations on your purchase of the RangeLAN2 7410 CE PC Card Wireless LAN Adapter. As with all members of the RangeLAN2 family, RangeLAN2 7410 is a long range, high performance, wireless LAN adapter card that is fully interoperable with the rest of the RangeLAN2 family of products.

The RangeLAN2 7410 CE PC Card is a low-priced alternative to the RangeLAN2 7400 PC Card and is designed specifically to operate in Windows CE devices offering easy installation and low power consumption. If you use a device running Windows CE, Handheld PC Professional Edition, Version 3.0 or later, or Windows CE, Handheld PC Edition, Version 3.0 or later (Windows CE OS 2.11 or later), the RangeLAN2 driver is already loaded on the device. All you need to do is attach an antenna, insert the card into the PCMCIA Type II slot, and configure an IP address. That's how simple it is! Once the card is installed, you'll be connected without wires to your network's shared resources and even the Internet. With additional software, you can even run client-server, thin-client, and database access software from your handheld PC (H/PC) while you roam within the office building. Put away your serial cable, because with the RangeLAN2 7410 CE PC Card you can also ActiveSync with a desktop computer wirelessly!

Today, Proxim is the leading supplier of spread spectrum radio networking technology for local area environments. Proxim's unmatched spread spectrum networking expertise, combined with the company's extensive experience serving the communication needs of the mobile computing user, are some of the reasons why RangeLAN2 is a market leader and why it has been chosen by more OEM integrators than all other alternatives combined.

The RangeLAN2 Family

RangeLAN2 7410 is part of a family of high-performance products that provides a complete wireless networking solution.

- **RangeLAN2 7100** is a wireless LAN adapter that fits into a standard PC/AT ISA bus slot.

- **RangeLAN2 7400** is a high performance wireless LAN adapter which fits into a PCMCIA Type II slot on a notebook, laptop, or pen-based computer.

- **RangeLAN2 7510/752x** Access Points allow easy expandibility of a wireless network by increasing range and facilitating mobility applications. Operating at the Data Link Layer (layer 2) of the OSI model, the Access Point provides protocol-independent access for RangeLAN2 devices into existing wired Ethernet LANs.

- **RangeLAN2 753x** Access Point allows seamless access for RangeLAN2 devices into existing wired Token Ring network.

- **RangeLAN2 754x** Extension Point extends the coverage area of an existing RangeLAN2 network.

- **RangeLAN2 791x** Serial Adapter is a wireless serial device which acts as a replacement for an RS-232 cable.

- **RangeLAN2 792x** Ethernet Adapter converts any Ethernet-ready device into a wireless node on a RangeLAN2 network.

The Product Package

Each RangeLAN2 7410 package comes with:

- ❑ The CE PC Card (PCMCIA Type II).
- ❑ An antenna unit (a flexible snap-on antenna).
- ❑ This RangeLAN2 User's Guide.

If any of these items are missing or damaged, please contact your reseller or Proxim Technical Support.

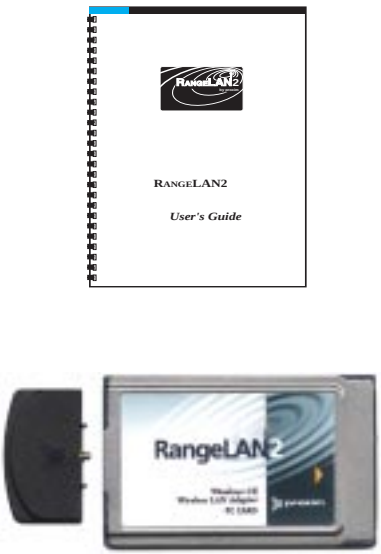


Figure 1
RangeLAN2 7410 Components

Note:

The RangeLAN2 CE PC Card does not ship with a driver diskette; many Windows CE devices already have the driver pre-loaded. Devices running Windows CE, Handheld PC Professional Edition or Handheld PC Edition, Version 3.0 or later (Windows CE OS 2.11 or later) should ship with the RangeLAN2 driver already installed. In addition, users of devices running Windows CE 2.0 can download the RangeLAN2 driver from Proxim's web site at http://www.proxim.com/windowsce.

System Requirements

To begin using the RangeLAN2 7410 CE PC Card, you need the following minimum requirements:

- ❑ A Windows CE device running Windows CE, Handheld PC Professional Edition or Handhled PC Edition, Version 3.0 or later (Windows CE OS 2.11 or later) or a Windows CE device running 2.0 that is on Proxim's list of certified devices (see below).

- ❑ At least one other RangeLAN2 product installed on the network.

RangeLAN2 Compatibility with Windows CE Devices

Windows CE handhelds running PC Professional Edition or PC Edition, Version 3.0 or later should be compatible with the RangeLAN2 CE PC Card and should have the RangeLAN2 driver pre-installed.

In addition, the RangeLAN2 CE PC Card is compatible with most Windows CE 2.0 devices. Proxim has tested several of

these devices and has compiled a list of cerified Windows 2.0 devices. This list is available on Proxim's web site at http://www.proxim.com/windowsce.

Also, even if a Windows 2.0 device has not been certified for use with the RangeLAN2 7410 CE PC Card, this does not mean that the card will not function properly in the device. If you decide to try to use the RangeLAN2 card in an uncertified device, be sure to use the driver that corresponds to the appropriate processor type used within the device. Proxim offers a Windows CE driver for the SH3 and MIPs processors. You cannot use the RangeLAN2 CE PC Card if your Windows CE 2.0 device uses a different processor. If you do not know what processor your device uses, the device's processor type is listed within the Control Panel's System icon.

Note:

Due to certain hardware restrictions, the RangeLAN2 CE PC Card is not supported for use with Windows CE devices upgraded from operating system (OS) version 1.0 to 2.0.

2. Installing the RangeLAN2 Hardware

This chapter provides guidelines for installing the RangeLAN2 7410 card and antenna. If you are using a device running Windows CE 2.0, copy the RangeLAN2 driver to the device, as described in Chapter 3, before installing the card.

Attaching the Snap-On Antenna

The flexible snap-on antenna plugs directly into the PCMCIA card and extends less than one inch. Simply attach the antenna's male connector to the gold-plated female connector on the card, as shown in figure 2 below. Note that when connecting the antenna to the card, the Proxim logo on the antenna should be facing the same direction as the RangeLAN2 label on the card.



Figure 2
Attaching the Snap-On Antenna
(Back of Card and Back of Antenna Shown)

Detaching the Snap-On Antenna

Proxim recommends that you leave the snap-on antenna attached to the card at all times to increase connector life. However, you can remove the antenna by firmly holding the card in one hand and gently pulling on the antenna with the other.

Installing the RangeLAN2 7410 Card

The exact installation procedure for the card varies depending on the model of Windows CE device you are using. The device must have a Type II PCMCIA slot. Install the RangeLAN2 7410 card by following the instructions in the hardware manual provided with your Windows CE device for general installation of PCMCIA Type II cards.

The following figure show a typical installation of the RangeLAN2 CE PC Card in a Windows CE device. Note that in order for the card to become operational, it must be inserted completely into the PC slot so that only the antenna is visible.



Figure 3
RangeLAN2 7410 Installation with Snap-On Antenna

3. Driver Installation

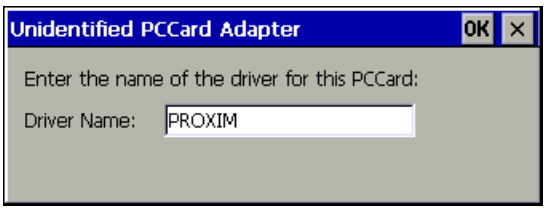
This chapter describes the installation and configuration of the RangeLAN2 driver and utilities in a Windows CE device.

Installing the Driver in Devices Running Windows CE Version 3.0 or Later

Devices running Windows CE, Handheld PC Professional Edition, Version 3.0 or later and Windows CE, Handheld PC Edition, Version 3.0 or later (Windows CE OS 2.11 or later) should ship with the RangeLAN2 driver already installed. Follow these directions to install and configure the RangeLAN2 driver.

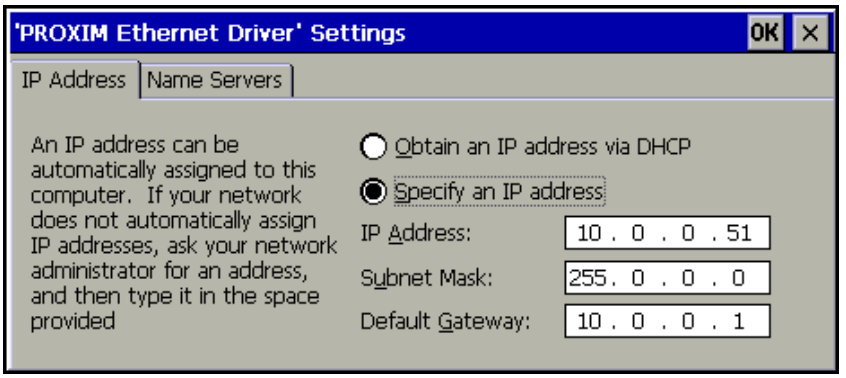
1. Insert the RangeLAN2 7410 CE PC Card into the device's PCMCIA slot.

2. For most devices, the "Proxim Ethernet Driver" Settings screen will now appear. Proceed to Step #4. However, if prompted to enter the name of the driver for the PC Card, enter "PROXIM," as shown below.



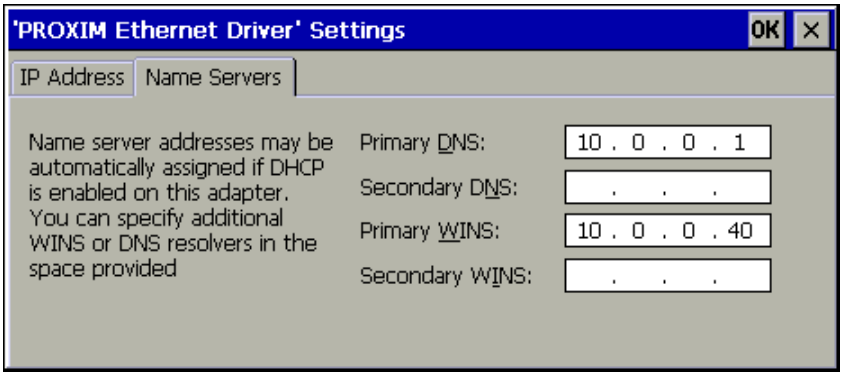
3. The "Proxim Ethernet Driver" Settings screen will now appear. If this screen does not appear, you can launch it manually by tapping the Network icon in the Control Panel.

4. The “Proxim Ethernet Driver” Settings screen, shown below, allows you to configure the TCP/IP settings for the card.



If your network has a DHCP server, the card will obtain an IP address automatically. However, if your network does not have a DHCP server, you will want to assign the card an IP address, subnet mask, and default gateway as required by the network to enable communication. Contact the network administrator for more information about your network’s IP addressing scheme.

5. Select the “Name Servers” tab when you are ready to continue. This dialog box allows you to configure the card with Primary and Secondary DNS (Domain Name System) and WINS (Windows Internet Naming Service) addresses. Contact the network administrator to find out if your network has a DNS or WINS server. If so, enter the IP addresses for these servers as shown below.

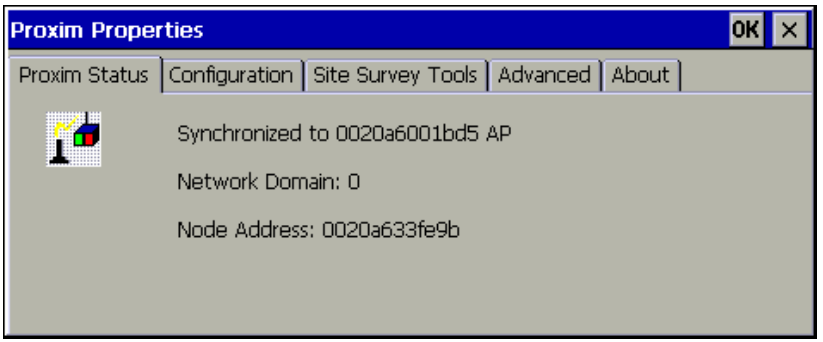


6. Select <OK> when finished. These changes will not take effect until you reinitialize the RangeLAN2 driver. This can be done either by removing and reinserting the RangeLAN2 CE card or by suspending and resuming the Windows CE device. A third alternative is to perform a soft-reset of the Windows CE device.

7. The RangeLAN2 Status Monitor icon should appear in the Windows CE System Tray as shown below:



Double-tap the Status Monitor icon to launch the Proxim Properties screen, as shown below.



If the Proxim Status screen reports that the RangeLAN2 7410 CE PC Card has successfully synchronized to a Master, the card is fully functional and ready for use.

However, if the RangeLAN2 Status Monitor has a red "X" through it or if the Proxim Status screen reports that the card could not find a Master to synchronize with, you will need to configure the RangeLAN2 parameters, Domain and Security ID, so that the card will synchronize to a Master device before it will function properly.

For more information on these RangeLAN2 parameters, see Chapter 5.

7. If you are unable to communicate with another device wirelessly after you have confirmed that the RangeLAN2 CE PC Card is synchronized to a Master and that the TCP/IP settings are correct, try performing a soft-reset of the Windows CE device. See the device documentation for information on how to perform a soft-reset. If the card is still not functional following a soft-reset, refer to Chapter 7 for troubleshooting suggestions.

Installing the Driver in Devices Running Windows CE 2.0

The RangeLAN2 driver is compatible with most Windows CE 2.0 devices. Proxim has tested these devices and provides a list of certified devices on Proxim's Windows CE web site at http://www.proxim.com/windowsce. See Chapter 1 for more information on device and driver compatibility. Follow these directions to install the RangeLAN2 driver in a Windows CE 2.0 device:

1. Download the appropriate RangeLAN2 driver for your Windows CE 2.0 device from Proxim's web site at http://www.proxim.com/windowsce. If your device has the SH3 processor, you should download SH3.EXE to a desktop or laptop computer. If your device has the MIPS processor, download MIPS.EXE.

2. Execute the downloaded file to extract the PROXIM.DLL driver.

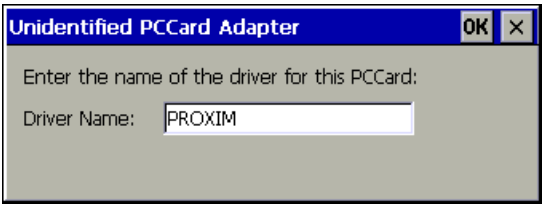
3. Copy PROXIM.DLL and the following files located on the Microsoft Windows CE 2.0 CD-ROM to the Windows CE device:

ARP.DLL
DHCP.DLL
NDIS.DLL
NETWORK.CPL

Refer to the manual that shipped with your device for instructions on how to copy files from a desktop or laptop computer to a Windows CE device. Most likely, you will need to establish an ActiveSync session over a serial or infrared port.

4. Insert the RangeLAN2 CE PC Card into the device's PCMCIA slot.

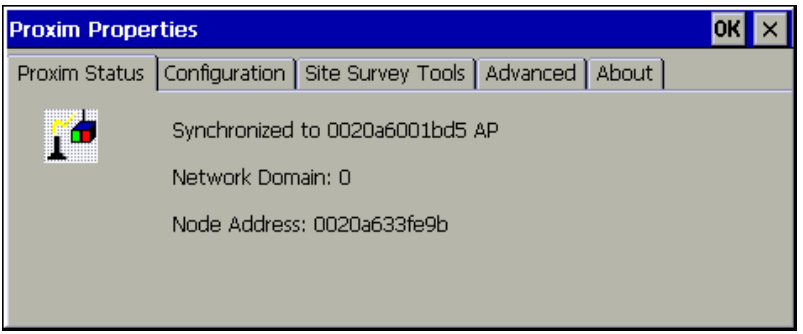
5. When prompted to enter the name of the driver for the PC Card, enter "PROXIM," as shown below.



6. The RangeLAN2 Status Monitor icon should appear in the Windows CE System Tray as shown below:



Double-tap the Status Monitor icon to launch the Proxim Properties screen, as shown below.

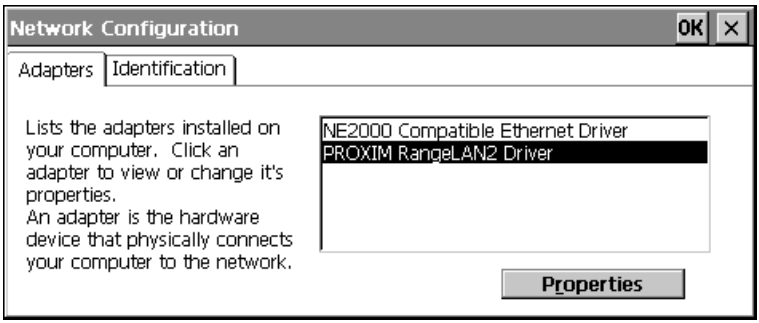


If the Proxim Status screen reports that the RangeLAN2 7410 CE PC Card has successfully synchronized to a Master, proceed to Step #7.

However, if the RangeLAN2 Status Monitor has a red "X" through it or if the Proxim Status screen reports that the card could not find a Master to synchronize with, you will need to configure the RangeLAN2 parameters, Domain and Security ID, so that the card will synchronize to a Master device before the card will function properly.

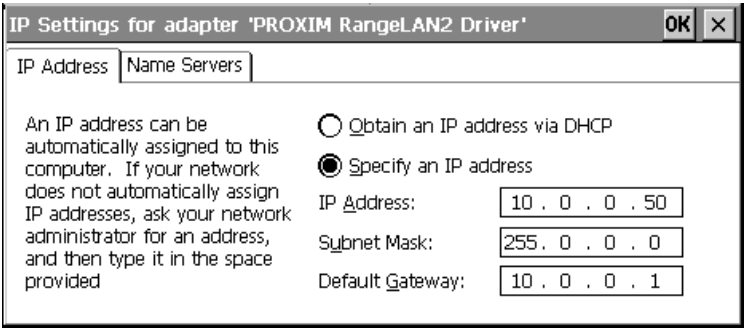
For more information on these RangeLAN2 parameters, see Chapter 5.

7. Within the Control Panel, select the Network icon to display the Network Configuration screen. Highlight the "Proxim RangeLAN2 Driver" entry and tap the <Properties> button as shown below.

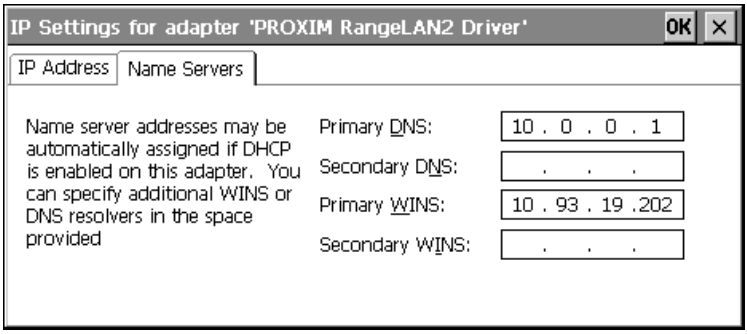


8. The "IP Settings for adapter 'Proxim RangeLAN2 Driver'" screen will now appear so that you may configure the TCP/IP settings for the card.

If your network has a DHCP server, the card will obtain an IP address automatically. However, if your network does not have a DHCP server, you will want to assign the card an IP address, subnet mask, and default gateway as required by the network to enable communication. Contact the network administrator for more information about your network's IP addressing scheme.



9. Select the "Name Servers" tab when you are ready to continue. This dialog box allows you to configure the card with Primary and Secondary DNS (Domain Name System) and WINS (Windows Internet Naming Service) addresses. Contact the network administrator to find out if your network has a DNS or WINS server. If so, enter the IP addresses for these servers as shown below.



10. Tap <OK> when finished. These changes will not take effect until you reinitialize the RangeLAN2 driver. This can be done either by removing and reinserting the RangeLAN2 CE card or by suspending and resuming the Windows CE device. A third alternative is to perform a soft-reset of the Windows CE device.

11. If you are unable to communicate with another device wirelessly after you have confirmed that the RangeLAN2 CE PC Card is synchronized to a Master and that the TCP/IP settings are correct, try performing a soft-reset of the Windows CE device. See the device documentation for information on how to perform a soft-reset. If the card is still not functional following a soft-reset, refer to Chapter 7 for troubleshooting suggestions.

4. Wireless Topologies

RangeLAN2 products look and operate similar to Ethernet products. The only difference is that a radio replaces the wire between various nodes. This means that your existing Windows CE applications that operate over Ethernet will work with RangeLAN2 without any special wireless networking software. Listed below are some of the most common configurations of a RangeLAN2 wireless network that includes the RangeLAN2 7410 CE PC Card.

Wireless Connectivity to a Desktop Computer

With a RangeLAN2 7410 CE PC Card installed in a Windows CE H/PC and a RangeLAN2 7100 ISA Adapter installed in a desktop computer, you can exchange data between your desktop PC and handheld wirelessly without any cables. Multiple Windows CE handhelds can access the same desktop PC in this configuration, although multiple Windows CE handhelds cannot communicate with each other. A laptop PC can also replace the desktop PC in this configuration.



Figure 4
Wireless Connectivity to a Desktop Computer

Wirelessly Connect to an Ethernet Network

Many companies have an existing Ethernet or wired LAN infrastructure and want to be able to extend that capability to wireless nodes. This is accomplished by attaching an Access Point to the wired LAN. This allows the wireless clients to access the network resources.

Using a RangeLAN2 Access Point and 7410 CE PC Card, you can access network resources from your Windows CE unit to read e-mail, browse the Internet, and access network server databases. Access Points are available for both Ethernet and Token Ring networks.

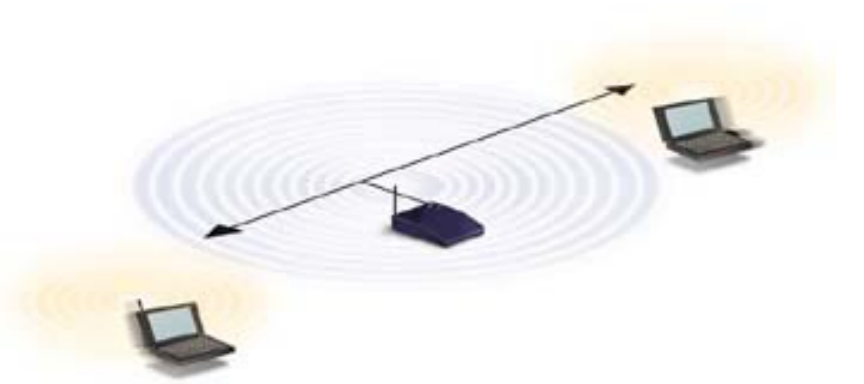


Figure 5
Single AP

For larger environments with multiple Access Points installed, RangeLAN2 products support the ability to roam from one wireless cell to another while maintaining the same network connection. The Access Points establish coverage areas or cells similar in concept to those of a cellular phone network. The mobile Windows CE device will connect with any Access Point that is within range.

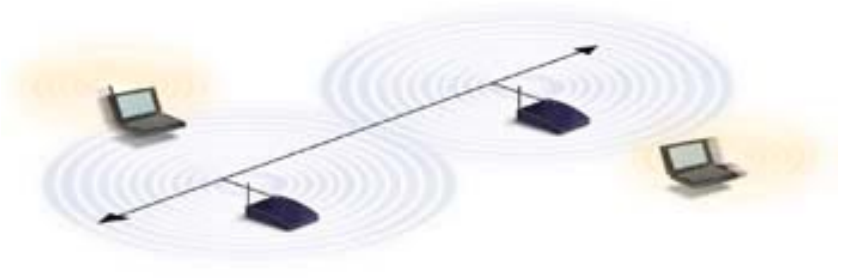


Figure 6
Roaming Between Access Points

With RangeLAN2's multi-channel architecture, Access Points can be placed within the same cell area to increase the aggregate throughput supported by the network. In addition, the overlapping cells offer redundancy of coverage required in networks where downtime is not tolerable.

Each RangeLAN2 Access Point within a roaming network must have the same Domain number and Security ID. The portable handheld PCs are equipped with RangeLAN2 7410 cards which are also set to the same Domain and Security ID. As the portable handheld *seamlessly* switches from cell to cell, its network connectivity is preserved. The user can move freely between the RangeLAN2 Access Points in the network. When the roaming handheld leaves the transmission range of one RangeLAN2 Access Point, the software automatically polls the other RangeLAN2 Access Point(s) in the same Domain to continue the network connection.

Proxim's diverse line of RangeLAN2 products allows you to customize your wireless configuration to meet your specific networking needs. For example, if you need coverage outside a building over an entire campus, the Extension Point can provide wireless network connectivity in locations previously believed to be inaccessible.

Note that the cells must overlap to ensure that there are no gaps in coverage so that the roaming devices will always have a connection available.



Note:

Roaming stations will only roam among RangeLAN2 Access Points and Extension Points with the same Domain and Security ID.

Guidelines for Roaming

- ❑ Roaming occurs between RangeLAN2 Access Points and Extension Points. It does not occur between RangeLAN2 Ethernet Adapters or RangeLAN2 7100 ISA Adapters that are installed in network file servers.

- ❑ In order for a wireless handheld to roam, all RangeLAN2 Access Points and wireless handhelds must have the same Domain and Security ID.

- ❑ All RangeLAN2 Access Points should have a unique Channel/Subchannel pair. Preferably, they should have unique Channels. Use the Subchannel only when you have used all 15 Channels in the same coverage area.

- ❑ All Windows CE devices with a RangeLAN2 7410 CE PC Card installed are configured as Stations. All of the Access Points between which wireless clients will roam must be configured as Masters.

- ❑ For contiguous coverage, the cells created by RangeLAN2 Access Points must overlap.

- ❑ Roaming will not occur across routers unless you use a third party software utility like Mobile IP.

5. Understanding RangeLAN2

This chapter lays the background for understanding how the RangeLAN2 radios communicate and describes the parameters that should be configured when a RangeLAN2 7410 is installed.

While not all of the discussed parameters apply directly to the RangeLAN2 7410, it is important to understand each one in order to properly install a RangeLAN2 network. For more information about parameters such as Station Type, Channel, and Subchannel, refer to the User's Manual included with your other RangeLAN2 products.

RangeLAN2 Radio Communication

RangeLAN2 radios use a radio technology called frequency hopping spread spectrum. This means that the radio signal is constantly moving from one frequency to another while sending packets of data. This hopping technique allows for multiple hopping patterns to be used in the same area while minimizing interference.

RangeLAN2 Masters and Stations

In order for this system to work, in each subnetwork there must be one unit that coordinates the hops. This device is called the Master. It might help you to think of the Master as the conductor of a frequency hopping orchestra. The Master keeps time so all units know when to hop and to what frequency. There must be at least one RangeLAN2 product on the network designated as the Master.

In Windows CE environments, the Master will frequently be an Access Point or a desktop computer with a RangeLAN2 7100

card installed. In a roaming environment, all RangeLAN2 Access Points will be configured as Masters.

RangeLAN2 units that synchronize to the Master and follow its signal to learn what frequency in the pattern the Master is currently using are known as Stations.

A Windows CE device with the RangeLAN2 7410 CE PC Card installed is always a Station and cannot be configured to act as a Master.

RangeLAN2 Channel and Subchannel

Each RangeLAN2 Master can select one of 15 Channels (designated 1 through 15) to establish communications with Stations. Each Channel number refers to a unique frequency hopping pattern that allows multiple subnetworks to coexist in the same air space providing a greater data rate transmission capability. Each Channel is at a different frequency at a different time. For networks with multiple Masters (like in a roaming environment), set each Master to a different channel for optimal performance.

You may think of the Channel as a pipe. In order to communicate, radios must be on the same Channel and there must be one (and only one) Master that provides the timing for that Channel. A Station receives its Channel assignment from the Master to which it is synchronized. Therefore, you cannot set the Channel number on a RangeLAN2 7410 CE PC Card because the CE PC Card is always configured as a Station.

In the event that you have more than 15 Access Points in the same area and have therefore run out of independent Channels to assign to additional Access Points, you should use the

Subchannel parameter so that Stations can easily distinguish between Access Points configured for the same Channel.

The Subchannel is a software code that is appended to each radio packet. There are 15 Subchannels, designated 1 through 15. Unlike the Channel, the Subchannel has no effect on the frequency hopping pattern; it merely allows the Stations to stay synchronized to the correct Access Point.

For example, if one Access Point is configured to use Channel 1, Subchannel 1 and a second Access Point is configured to use Channel 1, Subchannel 2, the two Access Points will share the same frequency hopping pattern (and therefore the same 1.6 Mbps pipe), but Stations will not mistakenly communicate with the wrong Access Point.

Since the RangeLAN2 7410 CE PC Card cannot be configured as a Master, you cannot configure the Subchannel for this card. The CE PC Card will receive its Subchannel assignment from the Master to which it is synchronized.

The key point to remember is that Access Points should always use independent Channels to minimize interference and increase the data rate transmission capacity. Set the Subchannel only if you have more than 15 Access Points and position two Access Points configured for the same Channel as far from one another as possible within your installation. For example, the first 15 Access Points in your installation should be assigned Channel 1 through Channel 15 and all should be configured for Subchannel 1. The 16th Access Point in your installation should be configured for Channel 1 and Subchannel 2.

RangeLAN2 7410 Software Parameters

In order for a Station to synchronize to a Master, the Station's Domain and Security ID must match those of the Master. These parameters, as well as Roam Config and Inactivity Timeout, are discussed below.

Domain

In order to establish communication between the RangeLAN2 radios, all devices, both Masters and Stations, require the same Domain number. Radios on different Domains cannot communicate with each other. The Domain is a software filter which does not affect the actual radio frequency or the frequency hop sequence used by the radios.

In general, you will want to configure all units on your wireless network to the same Domain. For larger wireless networks, use the Domain to establish roaming subnetworks throughout your building. For example, the Engineering Department may use Domain 2 and the Sales Department may use Domain 5. Then engineers can only roam within the geographical area mapped out by RangeLAN2 Access Points with a Domain setting of 2.

The Domain is a number between 0 and 15, and 0 is the default setting for all RangeLAN2 products. The Domain may be changed within the Configuration tab of the Proxim Properties utility which is described in Appendix A.

Security ID

To further improve the security of a wireless subnetwork, each RangeLAN2 product requires the same Security ID to establish radio communication. The Security ID is used on all RangeLAN2 products, both Masters and Stations. This ID is

encrypted and stored on the RangeLAN2 7410 CE PC Card itself, not in software. It cannot be accessed, but you may change it. However, if you do change it, then you will also need to change the Security ID on all of the other RangeLAN2 devices in order to reestablish communication.

The Security ID is a string of up to 20 alpha numeric characters. There are 1,048,576 unique choices for the Security ID. The default Security ID for all RangeLAN2 products is blank (an empty string).

You may change the Security ID from within the Configuration tab of the Proxim Properties utility. Refer to Appendix A for more information on how to set the Security ID.

Roam Config

The Roam Config parameter allows you to determine how tolerant a Station is to radio phenomena that can cause the unit to roam from one RangeLAN2 Access Point or Extension Point to another in order to maintain a strong wireless connection.

In areas with many RangeLAN2 Access Points (or Extension Points) that provide heavy overlapping coverage, set this parameter to Fast to maintain high throughput for each of the wireless nodes.

In most networks, set the Roam Config parameter to Normal. Wireless node throughput will not change noticeably, and an overabundance of Access Points is not required.

If the wireless coverage area provided by RangeLAN2 Access Points is sparse, set the Roam Config parameter to Slow. Wireless nodes will not roam until they are nearly out of range of the Access Point.

The Roam Config parameter may be set within the Advanced tab of the Proxim Properties utility, which is described in Appendix A.

Inactivity Timeout

To conserve battery life, the RangeLAN2 7410 CE PC Card has an inactivity doze mode. The doze mode is automatically engaged when a certain period of time has elapsed since the Windows CE device has sent or received data over the network. Once the card has entered the doze mode, it can be awakened by a Master unit attempting to send data to it. The time before dozing is calculated by adding the Inactivity Minutes and Inactivity Seconds parameters.

By default, the Inactivity Timeout is set to 1 second to maximize the battery life of a Windows CE device. Setting both Inactivity Seconds and Inactivity Minutes to 0 will prohibit the RangeLAN2 CE PC Card from entering the doze mode. Note that disabling the doze mode may dramatically decrease the battery life of a CE device. If you intend to disable the doze mode, you may want to use the CE device with AC power.

The Inactivity Timeout parameters may be set within the Advanced tab of the Proxim Properties utility, which is described in Appendix A. Also, see Chapter 6 for an important performance note regarding the Inactivity Timeout parameter.

6. Performance Hints

This section provides information on how to improve the performance of a wireless network and describes certain communication restrictions of which the user should be aware.

Microwave Ovens

Microwave ovens operate in the same frequency band as RangeLAN2. Therefore, if you use a microwave within range of RangeLAN2 you may notice network performance degradation. However, both your microwave and your RangeLAN2 network will continue to function.

Range

Every environment is unique with different obstacles, barriers, materials, etc., and therefore, it is difficult to determine the exact range that will be achieved without testing. The RangeLAN2 Site Survey Tools were developed to aid in this process. Additionally, Proxim has developed some guidelines to estimate the range that users will see when the product is installed in their facility, but there are no hard and fast specifications.

Radio signals may reflect off obstacles or be absorbed by others depending on their construction. For example, with two RangeLAN2 radios you may achieve up to 1000' in open space outdoors where the two antennas are line of sight, meaning they see each other with no obstacles between them. However, the same two units will only achieve up to 500' of range when they have to travel through the cubicles usually used in modern offices. If there are office walls to penetrate, the signal range may decrease even further to up to 300'.

Proper antenna placement can help improve RangeLAN2 performance. Keep the Access Point's antenna high above of the floor and avoid metal obstructions, like a file cabinet. Place the RangeLAN2 7100 ISA Card's antenna on top of a computer or a monitor.

A Note Concerning Peer to Peer Communications

The RangeLAN2 CE PC Card is not designed to communicate on a peer-to-peer basis with other RangeLAN2 Stations. The CE PC Card will communicate exclusively with its Master (and a wired network if the Master is an Access Point). To enable limited communication between a CE PC Card and another Station (for example, another Windows CE device or a wireless laptop), configure the Repeating parameter to enabled on the RangeLAN2 Access Point to which both devices are synchronized. Both Stations must be synchronized to the same Access Point (not a RangeLAN2 7100 ISA Card or Ethernet Adapter configured as a Master) in order to communicate.

A Note Concerning Inactivity Timeout

This note does NOT apply to users who have an Access Point installed on the RangeLAN2 network. The Access Point is designed to account for the situation described below.

In order for the doze mode to effectively conserve battery life, the RangeLAN2 CE PC Card will not emerge from doze mode in response to a broadcast packet. Therefore, users who are wirelessly connecting a Windows CE device and a desktop or laptop computer should always initiate communications from the Windows CE device. A second solution for advanced users is to configure a static ARP entry for the RangeLAN2 CE PC Card in the desktop's ARP (Address Resolution Protocol) table.

7. Troubleshooting

The RangeLAN2 7410 CE PC Card is designed to be very easy to install and operate. However, if you experience any difficulties, use the information in this chapter to help diagnose and solve the problem. If you still cannot resolve the problem, contact Proxim Technical Support as described in Appendix E, "How to Reach Technical Support."

How to Obtain Help with Your LAN Installation

If you require assistance to install your LAN, Proxim can put you in touch with a RangeLAN2 Reseller in your area. The reseller is an expert in the design, installation, and maintenance of LANs and will be able to examine your needs and recommend the most cost-effective solution for your LAN whether you are installing a new LAN or adding on to an existing one. For the location of the RangeLAN2 reseller nearest you, contact Proxim at 800-229-1630 and ask for the Sales Department.

Application Tips

Here are some valuable tips for using the RangeLAN2 7410 CE PC Card with the most popular Windows CE applications.

ActiveSync

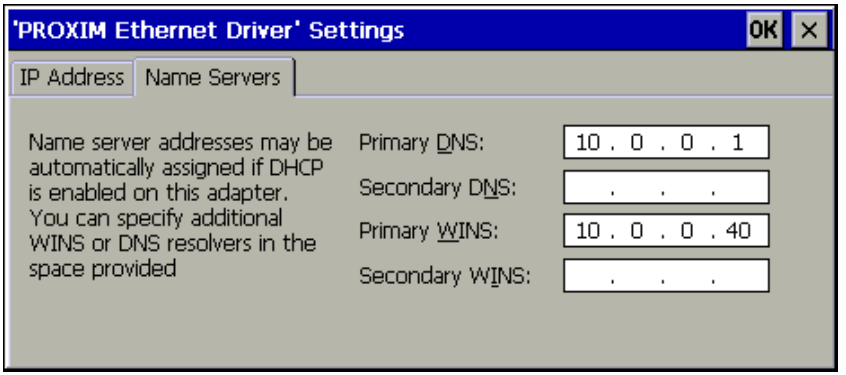
If you having a problem using ActiveSync wirelessly, review the following steps to ensure that your Windows CE device is configured correctly.

1. Before a wireless ActiveSync session can be established between a computer and a Windows CE handheld, the two devices must already have an ActiveSync partnership created using a serial cable connection.

2. Within the ActiveSync dialog box on the Windows CE device, the connection method must read “Network Connection” and the remote computer’s name should appear in the “Connect to:” box.

3. If the network does not have a WINS (Windows Internet Naming Service) server, then you must configure the Primary WINS server on the Windows CE device with the IP address of the computer with which you want to establish an ActiveSync session.

In the example below, the CE device will successfully ActiveSync with the desktop computer whose IP address is 10.0.0.40.



To configure the Primary WINS address, open the Control Panel’s Network icon and choose “Proxim RangeLAN2 Driver” or “Proxim Ethernet Driver” from the Network Configuration list. Tap the <Properties> button and then tap the Name Servers tab to display the screen shown above.

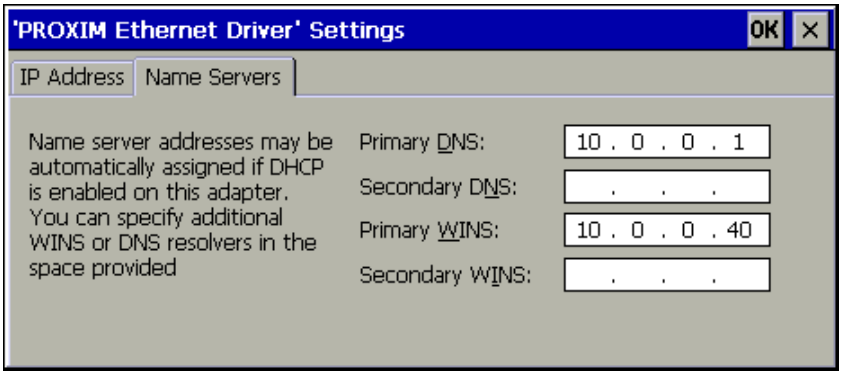
4. Confirm that you are not attempting to establish an ActiveSync session between two RangeLAN2 Stations. See the note concerning Peer-to-Peer communication in Chapter 6 for more information about this.

Pocket Internet Explorer

If the Windows CE device is unable to browse the Internet using Pocket Internet Explorer, contact your network administrator to ensure that you have the correct settings configured on the Windows CE device.

In general, you need a Primary DNS (Domain Name System) server to help resolve Internet addresses (e.g., 10.0.0.1) with Internet domain names (e.g., www.proxim.com).

To configure the Primary DNS address, open the Control Panel's Network icon and choose "Proxim RangeLAN2 Driver" or "Proxim Ethernet Driver" from the Network Configuration list. Tap the <Properties> button and then tap the Name Servers tab to display the screen shown below. In this example, the Primary DNS server has an address of 10.0.0.1.



But under all circumstances, you should consult with the network administrator to determine how your organization accesses the Internet. For example, if the network uses a proxy server, then you will need to perform some additional configurations within the Pocket Internet Explorer's Options menu before the Windows CE device will have access to the Internet.

Common Technical Support Questions

This section discusses some of the most common problems using the RangeLAN2 7410 CE PC Card and offers possible solutions.

Problem/Symptom	Possible Solution/Answer	Chapter in User's Guide
Can I use the RangeLAN2 7410 CE PC Card in my Windows CE H/PC?	All handhelds running Windows CE PC Professional Edition or Windows CE PC Edition, Version 3.0 or later should support the RangeLAN2 card and have the driver pre-installed. The RangeLAN2 card is compatible with many Windows CE 2.0 devices. Refer to Proxim's web site at http://www.proxim.com/windowsce for a list of compatible devices.	1
The RangeLAN2 driver loads successfully, but I can't communicate with the network.	Confirm that you are synchronized to an Access Point or another RangeLAN2 device configured as a Master, or you may not be in range. Run the Proxim Properties utility to determine if you are in range. Also, confirm that you have the same Domain and Security ID as the other RangeLAN2 devices on your network.	3, Appendix A
How long will my battery last when using the RangeLAN2 7410 CE PC Card?	Battery life will vary from unit to unit and depends on many factors including battery type, length of battery life without the PC Card inserted, and how frequently the PC Card is utilized. Frequent network activity will drain the battery life faster than if the card were left idle in doze mode. You need to test the battery life of your device while using it under normal operating conditions. Note that rechargeable batteries are generally more tolerant of radio operation than standard alkaline batteries.	

Problem/Symptom	Possible Solution/Answer	Chapter in User's Guide
I have copied PROXIM.DLL, ARP.DLL, DHCP.DLL, NDIS.DLL, and NETWORK.CPL to my device running Windows CE 2.0 and inserted the RangeLAN2 card into the PCMCIA slot. Nothing happens and my screen locks up.	Confirm that you have downloaded the correct PROXIM.DLL for your device's processor type (either SH3 or MIPS). Also confirm that you have copied the correct networking files from the Windows CE 2.0 CD-ROM that was shipped with your device. Finally, try a soft-reset of the unit to reset the driver.	3
The RangeLAN2 CE PC Card cannot communicate with other wireless devices.	The RangeLAN2 CE driver is not designed to support peer-to-peer communication between RangeLAN2 Stations. The RangeLAN2 CE PC Card communicates exclusively with the Master to which it is synchronized and a wired backbone (if the Master device is an Access Point). If synchronized to an Access Point, configure the Access Point so that Repeating is enabled to allow limited communication with other RangeLAN2 Stations.	6
I have a RangeLAN2 7100 Card and a RangeLAN2 7410 CE PC Card. Everything appears to be working fine, but my Windows CE handheld does not respond to pings from my desktop computers.	In order to conserve battery life, the RangeLAN2 CE PC Card does not respond to broadcast messages when in doze mode. A RangeLAN2 Access Point has a mechanism for dealing with this situation, but other Master devices, like the 7100 ISA card, do not. Therefore, when pinging from the Master desktop to a CE device, the CE device will not respond to the initial ARP broadcast packet. To work around this issue, initiate all communication from the Windows CE handheld. Alternatively, you can create a static ARP entry for the CE PC Card in the desktop's ARP table.	6

Problem/Symptom	Possible Solution/Answer	Chapter in User's Guide
My Windows CE device cannot successfully ActiveSync with my PC wirelessly.	Confirm that you have entered the PC's IP address as the Windows CE device's Primary WINS address if your network does not contain a WINS server. Also, confirm that you are not attempting to establish a session between two RangeLAN2 Stations. See the note concerning Peer-to-Peer communication in Chapter 6 for more information about this. If you still cannot ActiveSync, try resetting the RangeLAN2 driver by removing and reinserting the card, suspending the Windows CE device, or performing a soft-reset.	7
I cannot browse the Internet from the Windows CE device.	Confirm that the Windows CE device is successfully synchronized to a RangeLAN2 Access Point on the network. Also confirm that your network settings, including DNS address and Proxy server settings (if applicable) are configured correctly. Contact your network administrator for assistance with the configuration of TCP/IP parameters.	7
Can I use the RangeLAN2 7410 CE PC Card in a Windows CE palmtop?	No. The RangeLAN2 CE PC Card can only be used in devices which have a Type II PCMCIA slot.	
Is there any other way for the CE device to access network resources besides using ActiveSync?	Microsoft provides several utilities to Windows CE developers that can increase the network capabilities of your Windows CE device. Refer to Microsoft's Windows CE web site for more information.	

Other

If there is additional information that becomes available after the printing of this manual, it will be posted on Proxim's Technical Support web site at http://www.proxim.com/support/.

A. Proxim Properties Utility

This appendix describes the features of the Proxim Properties utility and the RangeLAN2 Status Monitor which are installed with the RangeLAN2 7410 CE PC Card driver. These tools allow for easy configuration and management of the RangeLAN2 7410 CE PC Card. Each screen of the Proxim Properties utility is described below.

RangeLAN2 Status Monitor

Each time the RangeLAN2 7410 CE PC Card is inserted in a Windows CE device that has the RangeLAN2 driver installed, the Status Monitor will appear in the Windows CE System Tray. This icon will change to indicate whether or not this node is within range of and synchronized to a RangeLAN2 Master.

When within range, the icon will look like this:



You should note that when the RangeLAN2 CE PC Card roams from one Master Access Point to another, there will be no corresponding change to the Status Monitor icon.

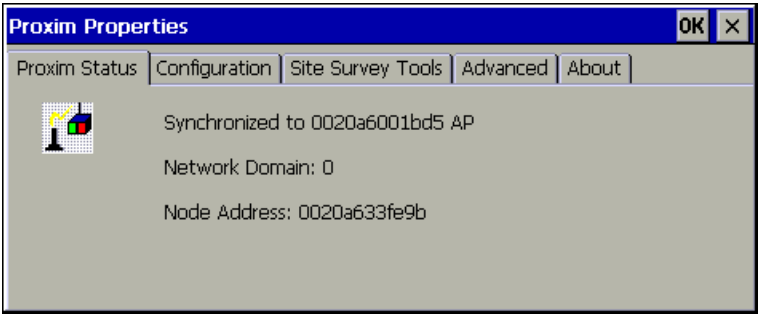
When not in range or not in synchronization, the icon will have a red “X” through it:



Double-tap the icon to launch the Proxim Properties utility.

Proxim Status

The Proxim Properties utility opens to display the Proxim Status screen, as shown below.



The first line of the Proxim Status screen displays the Master Name and the node (or MAC) address of the RangeLAN2 Master to which the card is synchronized. The node address is a unique 48-bit identifier that is assigned to each networking product by the hardware manufacturer. The node address for all RangeLAN2 products begins with the prefix *0020a6*.

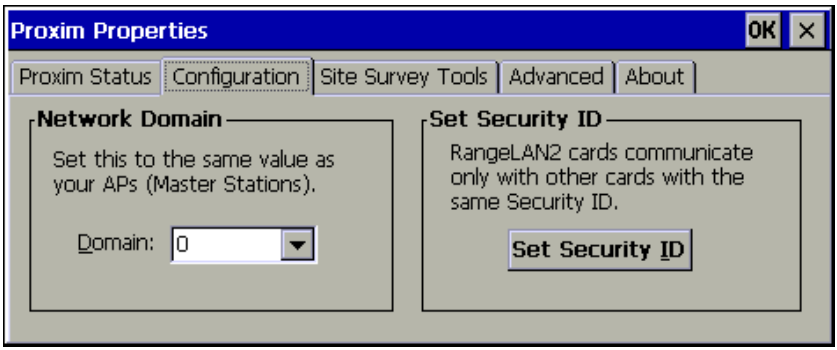
The second line displays the current Domain setting for the card.

The third line displays the node address for the RangeLAN2 7410 CE PC Card installed in the device.

Note that if the card is not currently synchronized to a RangeLAN2 Master, the following message will appear on the Proxim Status screen: “Could not find a Master to synchronize with. Verify that your Domain and Security ID match those of a Master.”

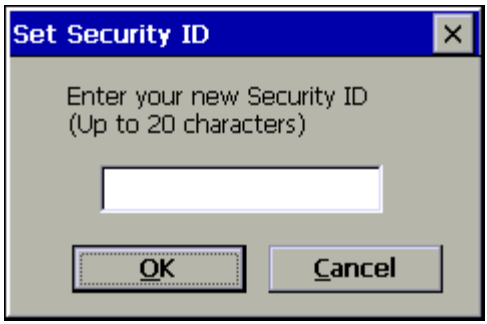
Configuration

Select the Configuration tab to change the card's Domain and Security ID. These values must match the settings of a RangeLAN2 Master in order to establish communication. For more information on these parameters, refer to Chapter 5.



Note that changes to the Domain setting will not take effect until after you have tapped the <OK> button in the upper-right hand corner of the Proxim Properties menu.

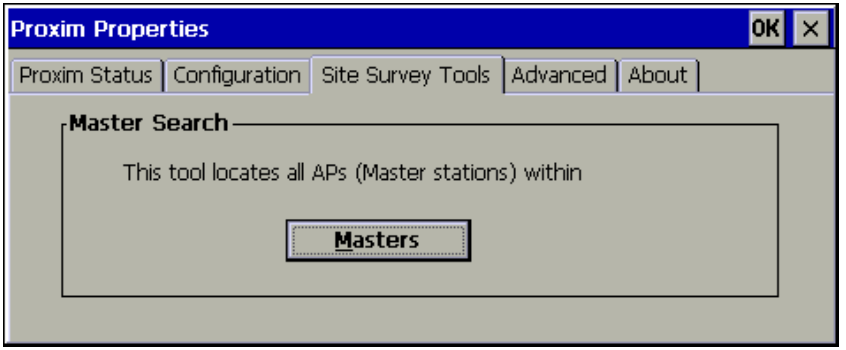
To change the Security ID, tap the <Set Security ID> button to display this screen:



Enter the new Security ID and tap <OK> for the change to take effect. To return the Security ID to default settings, leave the Security ID field blank and choose <OK>.

Site Survey Tools

The Site Survey Tools allow users to determine the appropriate number and placement of Access Points for their wireless networks. In addition, the Site Survey Tools can be used to locate RangeLAN2 Masters and to help diagnose connectivity problems. Tap the Site Surveys Tools tab to display the following screen:

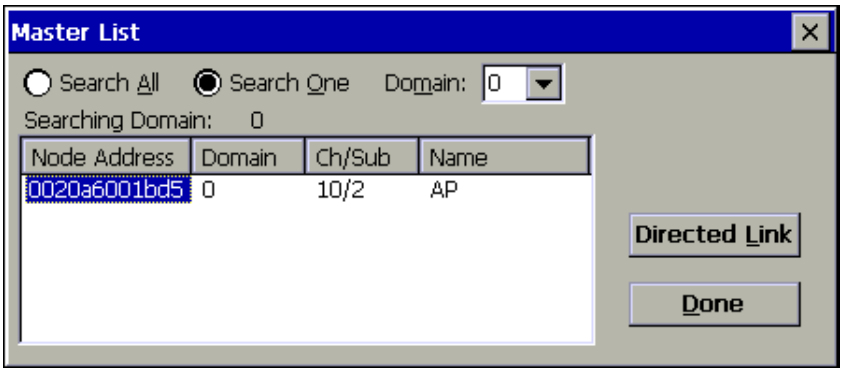


The Site Survey Tools include the Master Search and Directed Link utilities.

Master Search

If you use the Roaming feature of the RangeLAN2 family, you may be interested in knowing which Master units are within range. The Master Search tool will display all of the Masters within range along with their node address, Domain, Channel, Subchannel, and Master Name.

To display the Master List, tap the <Masters> button within the Site Survey Tools screen, as shown below.



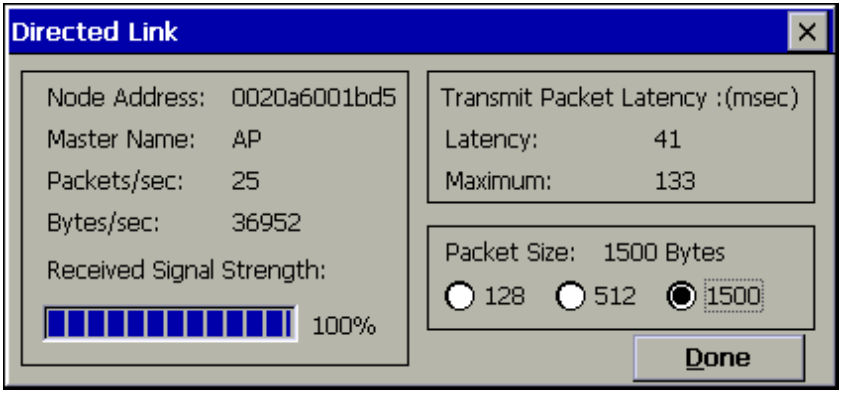
The Master Search tool also allows you to search for RangeLAN2 Masters on all Domain or on one specific Domain.

Directed Link

The Directed Link tool allows the user to perform a test of the link quality between the RangeLAN2 7410 CE PC Card and one of the Master units within range. Note that the performance of the selected Master may decrease for the duration of the test.

To perform a Directed Link test, highlight the node address of one of the Masters in the Masters List and tap the <Directed Link> button, as shown above.

The following screen will appear:



The left-hand column of the Directed Link screen lists the node address and Master Name of the RangeLAN2 Master participating in the test. Below this information appears the Packet/sec, Bytes/sec, and Received Signal Strength statistics which provide an indication of the link quality between the surveying machine and the selected Master. These statistics will fluctuate in value during the test.

The Packets/sec rate represents the number of packets exchanged between the radios each second. The Bytes/sec rate represents the number of bytes exchanged between the radios each second. These values essentially display the same information in two different units of measure. The Packets/sec rate is the Bytes/sec rate divided by the number of bytes contained in each packet. By default, the packet size is 1500 bytes, but you may alter the packet size to either 128 or 512 bytes in the lower right-hand column of the Directed Link screen. As the packet size decreases, the number of Packets/sec will increase since the radios can exchange smaller packets more quickly than larger packets. You can vary the packet sizes to better simulate network performance.

Received Signal Strength indicates how strong a signal was received from the Master unit. The Received Signal Strength is represented by a bar graph and displays a value between 0 and 100%. It is not necessarily indicative of the strength of the radio link or the amount of data exchanged between the radios as it is possible to have a low Received Signal Strength and an acceptable Packets/sec rate.

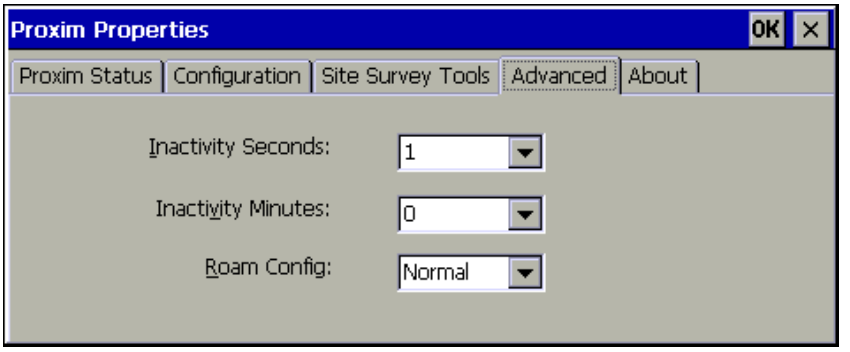
The upper right-hand column of the Directed Link screen displays information on Transmit Packet Latency. Latency is the amount of time it takes for the RangeLAN2 7410 card to send a packet to the Master and receive an acknowledgment back. The Latency statistic displays the latency associated with the last packet sent. The Maximum statistic displays the maximum latency time associated with any single packet since the Directed Link test began.

Note that the values obtained in the Directed Link test are not indicative of actual data throughput but are provided to display the strength of the connection between the two radios for site surveying and troubleshooting purposes.

To perform a site survey with this tool, Proxim recommends that you follow the site survey procedures outlined in the RangeLAN2 Technical Training Guide. If you would like to learn more about how to perform an effective site survey, you should consider signing up for a RangeLAN2 Technical Training class in your area. Refer to Proxim's web site at http://www.proxim.com/support/ for more information.

Advanced

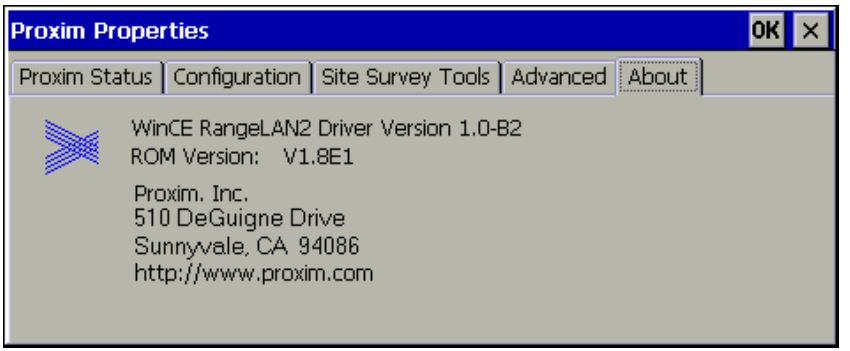
Select the Advanced tab to change the card's Inactivity Seconds, Inactivity Minutes, and Roam Config settings. For more information on these parameters, refer to Chapter 5.



Note that changes to these settings will not take effect until after you have tapped the <OK> button in the upper-right hand corner of the Proxim Properties menu.

About

Select the Advanced tab to view information about the RangeLAN2 7410 CE PC Card and driver, including the driver version and radio ROM version. If you contact Proxim Technical Support, a representative may ask you for this information.



B. Glossary

Access Point — An internetworking device that seamlessly connects wired and wireless networks together.

Bandwidth — The size (in Hertz) of the frequency range that a signal transmission occupies. Typical narrow band signals occupy a 25 KHz bandwidth. The RangeLAN2 signal occupies a 1 MHz bandwidth.

Channel — In RangeLAN2 networks, the channel refers to the frequency hopping sequence the card follows.

CSMA/CA — (Carrier Sense Multiple Access/Collision Avoidance) — CSMA is a protocol in which each node senses whether or not a channel is in use before attempting to transmit information. CA is an optimization by which channel time is reserved to avoid collisions.

Frequency Hopping — A spread spectrum technique by which the band is divided into a number of channels and the transmissions hop from channel to channel in a pre-specified sequence.

Interference — A situation that occurs when an unwanted RF signal occupies the same frequency band as a desired signal.

Roaming — To lose synchronization to one Access Point and become synchronized to a second Access Point, which is connected to the same Ethernet backbone, while maintaining uninterrupted network connectivity.

Spread Spectrum — A radio data transmission modulation technique by which the transmitted signal is spread over a band-width wider than the information bandwidth. Spread spectrum bands are designated by the FCC and require no user license.

C. Parameters

Parameter Name	Range	Default
Domain	0-15	0
Security ID	0-20 characters	blank
Roam Config	Slow, Normal, Fast	Normal
Inactivity Minutes	0-60	0
Inactivity Seconds	0-4, and 5-55 in increments of 5	1

D. Specifications

The following technical specification is for reference purposes only. Actual product's performance and compliance with local telecommunications regulations may vary from country to country. Proxim, Inc. will only ship products that are type approved in the destination country.

Bus Interface	PCMCIA 2.0, Type II slot
Range	Up to 500' Indoors Up to 1000' Outdoors
Data Rate	1.6 Mbps
Media Access Protocol	OpenAir CSMA/CA
Ethernet compatibility	Ethernet packet types and Ethernet addressing
Frequency Band	2.4-2.483 GHz (in the U.S.) (spread spectrum frequency hopping)
Independent Channels	15
Output Power	100 mW
Size	PCMCIA Type II card

E. How to Reach Technical Support

If you're having a problem using RangeLAN2 7410 and can't resolve it with the information in Chapter 7, gather the following information and contact Proxim Technical Support:

- ❑ What kind of network are you using?
- ❑ What were you doing when the error occurred?
- ❑ What error message did you see?
- ❑ Can you reproduce the problem?
- ❑ What version of the RangeLAN2 driver are you using?

You can reach Proxim Technical Support by voice, fax, email, or mail:

Tel: 800-477-6946 or 408-731-2640
Fax: 408-731-3676
Web: http://www.proxim.com
Email: support@proxim.com

Proxim, Inc.
Attn: Technical Support
510 DeGuigne Drive
Sunnyvale, CA 94086

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