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6.1 Overview

The 9150 can operate as an access point device between IEEE 802.11 wireless and wired networks. Using IEEE 802.11 protocol, the 9150 provides a transparent bridge between Teklogix or client terminals and a network controller or host. For an overview of IEEE 802.11, please refer to "IEEE 802.11 Protocol" on page 10. For operation as an access point, the parameters in the following pages must be set appropriately.

Note: *The 9150 main parameters should first be set up as described in Chapter 3: "9150 Main Configuration".*

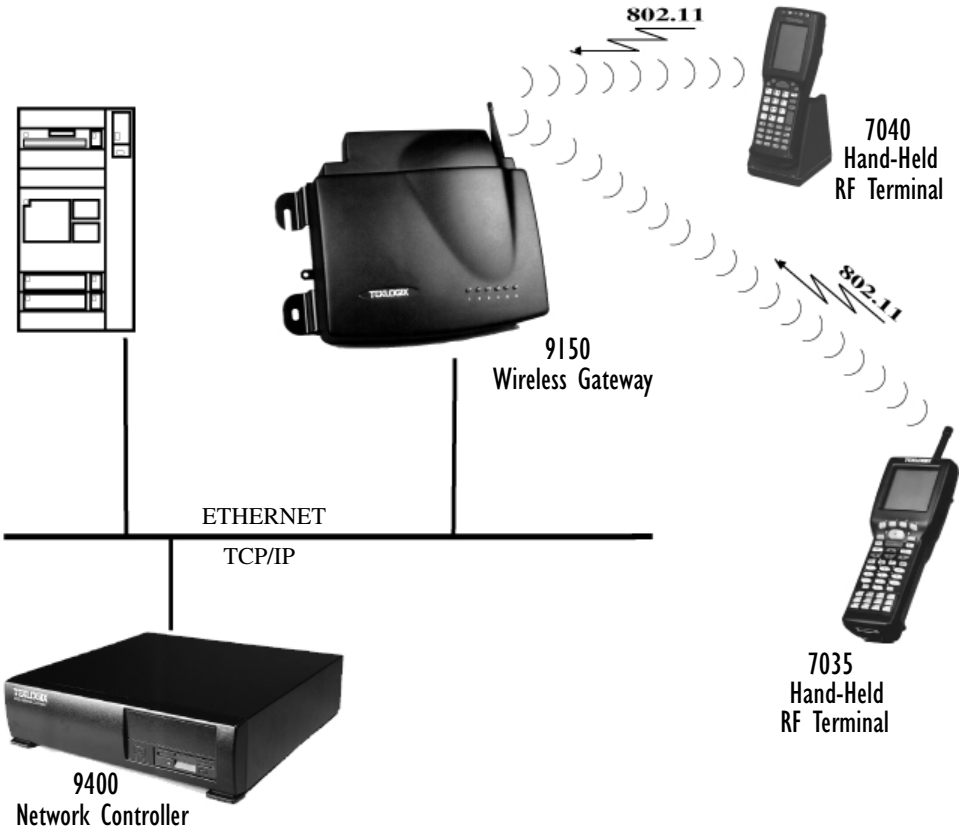
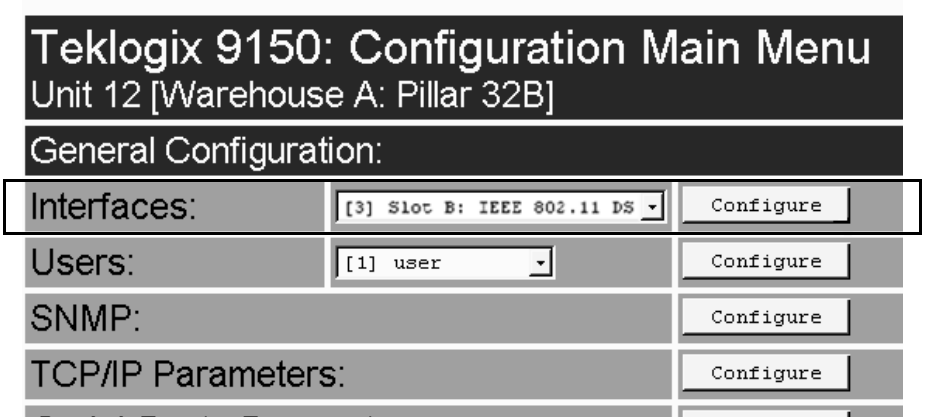


Figure 6.1 9150 Access Point Configuration

6.2 Interfaces

The pull-down menu shown for the *Interfaces* option indicates which interfaces have been detected in use by the 9150, including one of two 802.11 PCMCIA radios:

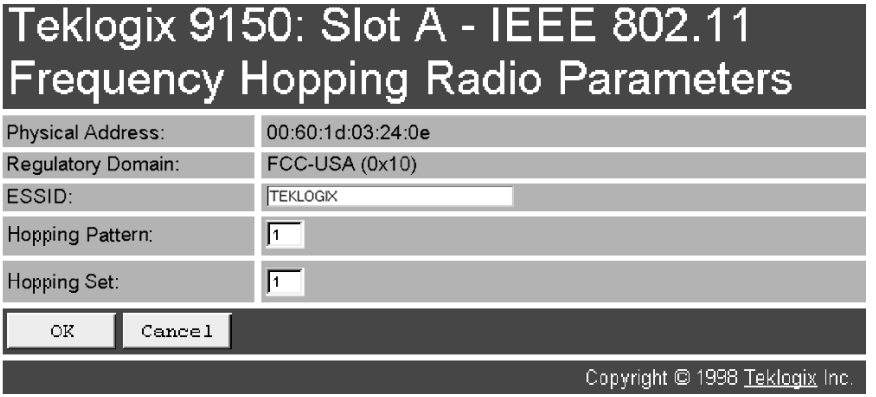
- IEEE 802.11 FH: Proxim RangeLAN802 IEEE 802.11 FHSS 2.4 GHz.
- IEEE 802.11 DS: Lucent WaveLAN IEEE 802.11 DSSS 2.4 GHz.



Selecting a radio type from the drop-down list and entering "Configure" will open the radio parameters page for that radio.

6.2.1 IEEE 802.11 (Frequency Hopping Radio Parameters)

When the Proxim RangeLAN802 IEEE 802.11 FHSS 2.4 GHz PCMCIA card is installed in the 9150, the following radio parameters page is opened:



Physical Address

This parameter shows the hardware address (MAC address) of the radio card. A globally unique MAC address is assigned to each card by the card manufacturer. *The value cannot be changed.*

Regulatory Domain

The regulatory domain value identifies the regulatory body's country code for the RF regulations with which the radio complies. For the USA, the regulatory body is the FCC, for Canada it's Industry Canada, and for Europe it's ETSI. The hex value in brackets beside the name is the code (as specified in the IEEE 802.11 standard) for that domain. The country codes that are decoded into a name are listed below. For other country codes the name portion will be replaced with "Unknown".

Regulatory Body	Domain Code	Country
FCC-USA	0x10	USA (for DS radios this is also the code used for Canada)
Industry Canada	0x20	Canada (currently only for FH radios, this may change in the future)
ETSI-Europe	0x30	Most of Europe
Spain	0x31	Spain
France	0x32	France
MKK-Japan	0x40	Japan

ESSID

This is the *Extended Service Set Identifier* parameter. The ESSID is an alphanumeric character string of **up to 32** characters and is case-sensitive. If your network includes devices that use the DOS ODI Driver, select alphabetical characters in uppercase only to allow the DOS ODI devices to connect to the network as well. *The ESSID should be the same for all devices in a system.*

Hopping Pattern

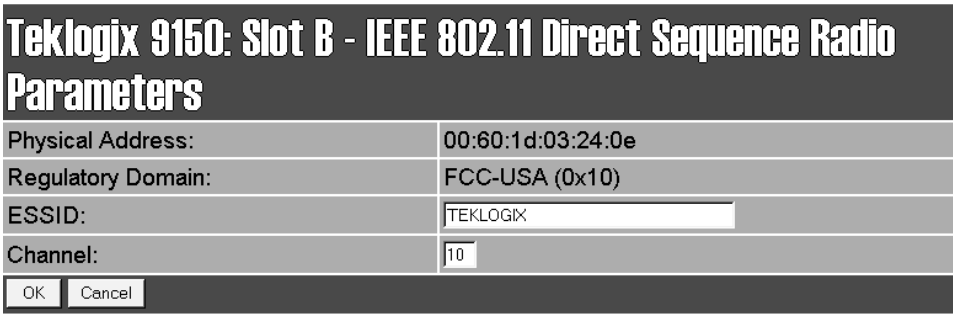
The combined settings for the *Hopping Pattern* and *Hopping Set* parameters determine the operating channel for a radio using frequency hopping. Please refer to your network administrator for details.

Hopping Set

The combined settings for the *Hopping Set* and *Hopping Pattern* parameters determine the operating channel for a radio using frequency hopping. Please refer to your system administrator for details.

6.2.2 IEEE 802.11 (Direct Sequence Radio Parameters)

When the Lucent WaveLAN IEEE 802.11 DSSS 2.4 GHz PCMCIA card is installed in the 9150, the following radio parameters page is opened:



Physical Address

This parameter shows the hardware address (MAC address) of the radio card. A globally unique MAC address is assigned to each card by the card manufacturer. *The value cannot be changed.*

Regulatory Domain

The regulatory domain value identifies the regulatory body's country code for the RF regulations with which the radio complies. For the USA, the regulatory body is the FCC, for Canada it's Industry Canada, and for Europe it's ETSI. The hex value in brackets beside the name is the code (as specified in the IEEE 802.11 standard) for that domain. The country codes that are decoded into a name are listed on page 127. For other country codes the name portion will be replaced with "Unknown".

ESSID

This is the *Extended Service Set Identifier* parameter. The ESSID is an alphanumeric character string of **up to 32** characters and is case-sensitive. If your network includes devices that use the DOS ODI Driver, select alphabetical characters in uppercase only to allow the DOS ODI devices to connect to the network as well. *The ESSID should be the same for all devices in a system.*

Channel

This parameter sets the operating channel for this radio, as determined by the system administrator. For a listing of the allowable channels for each country, please see "PC Card Radios" on page 145.

6.3 MAC Bridge Parameters

The MAC Bridge parameters consist of protocol filters which direct the 9150 to forward or discard frames that contain a known protocol type. This enables the 9150 to be selective of what type of frames will be bridged over the radio, in order to limit the amount of data on busy networks. Filtering frames is based on the protocol information in the frame. This is discussed in detail in "Protocol Filters" on page 133.

The *MAC Bridge Parameters* page is entered from the Access Point Configuration menu on the first page.

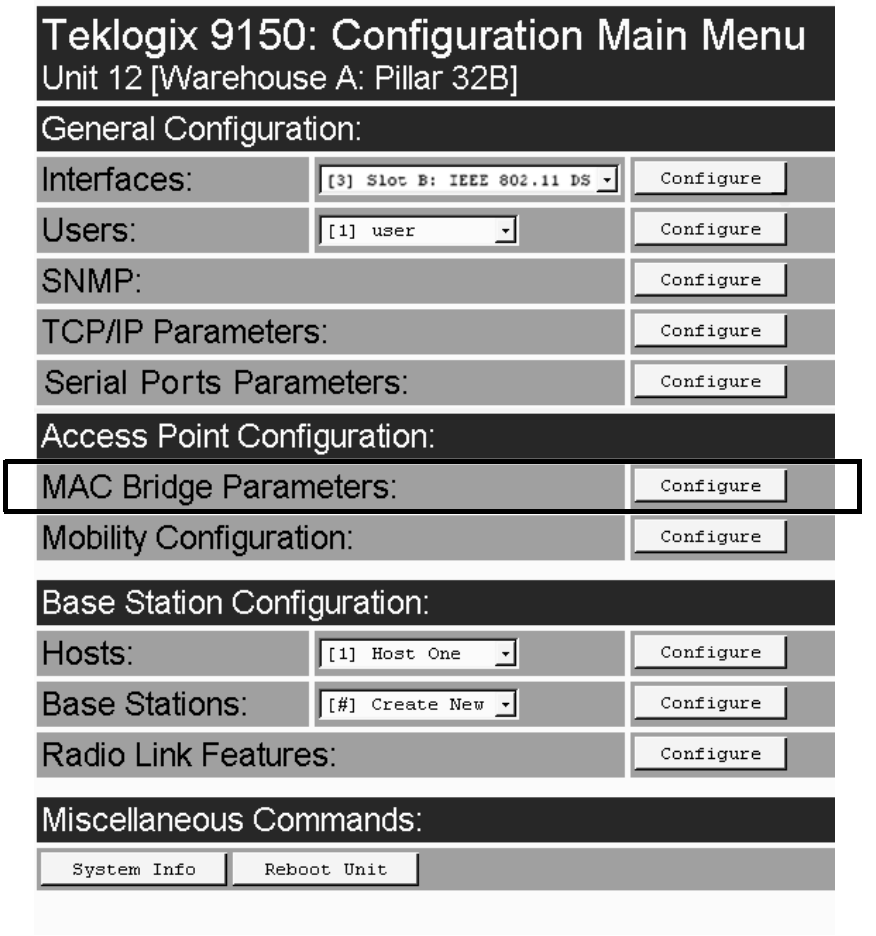


Figure 6.2 below charts the pages for the MAC bridge filters. Entering "OK" or "Cancel" in the individual Filter pages will return you to the *Bridge Parameters* page.

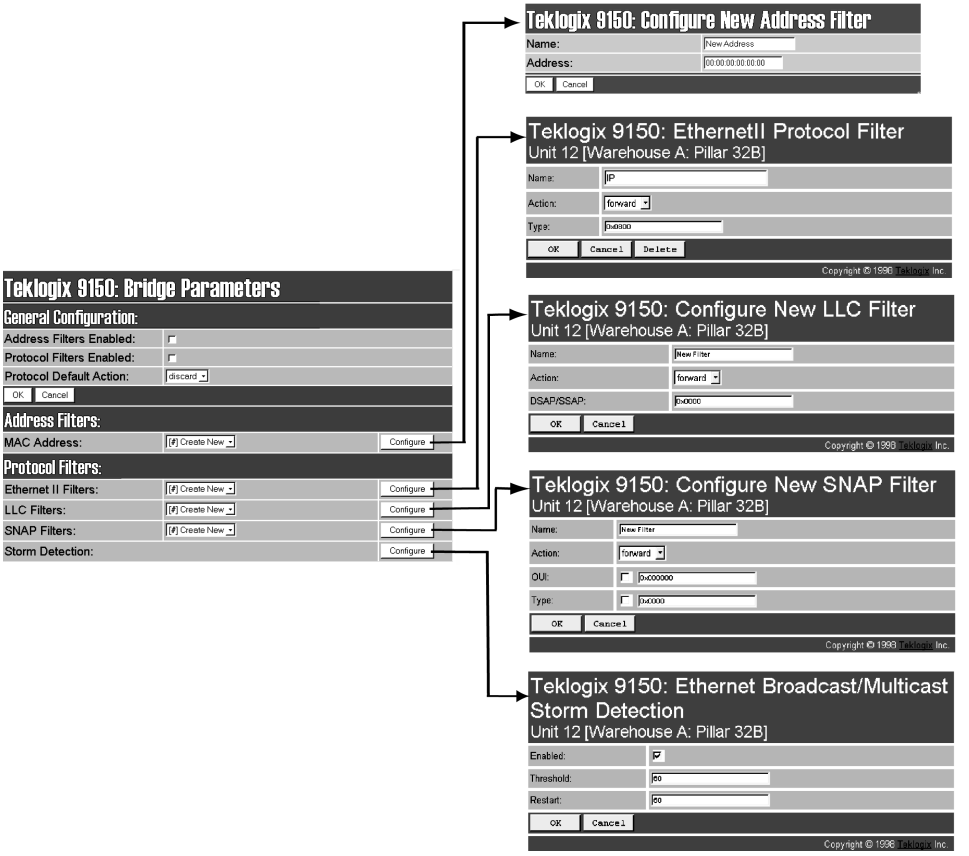
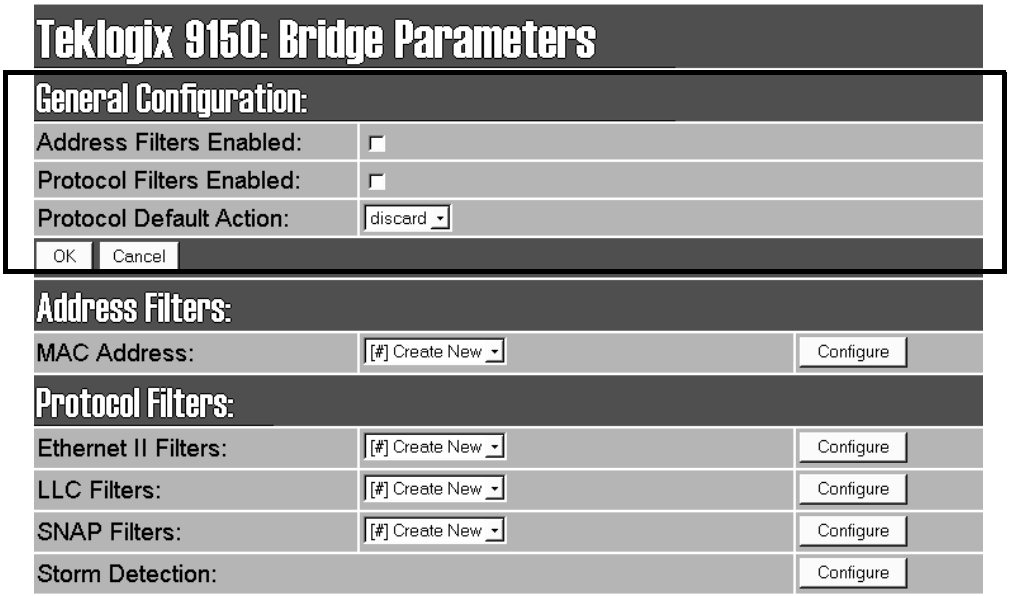


Figure 6.2 Overview Of MAC Bridge Configuration Menus

6.3.1 General Configuration



Address Filters Enabled

The checkbox in this parameter enables or disables the *Address Filters* function. If filtering is **enabled** (√), the 9150 can filter out frames based on destination MAC addresses. The list of MAC addresses for filtering is set by the *Address Filters* option on page 132. Frames are filtered and either forwarded or discarded, depending on the rest of the settings in this configuration. If filtering is **disabled**, no filtering will be done based on MAC addresses.

Protocol Filters Enabled

The checkbox in this parameter enables or disables the *Protocol Filters* function. If filtering is **enabled** (√), frames are filtered and either forwarded or discarded, depending on the rest of the settings in this configuration. If filtering is **disabled**, no filtering will be done based on protocol frames.

Protocol Default Action

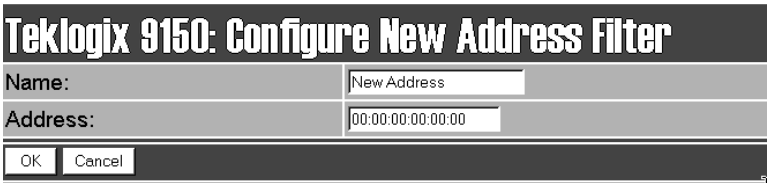
This parameter determines which *Protocol Default Action* (*discard* or *forward*) will be performed when the *Protocol Filters* are **enabled**. Each Protocol Filter (see page 133) also has a *forward/discard* action associated with it. If a frame does not match any of the filters set in the *Protocol Filters* configuration, then it will take the *Protocol Default Action* selected in this parameter.

For example, the *Protocol Default Action* may be to *discard* all frames. If a type field is **matched** in the configuration database, and the Filters action is *forward*, the frame will be passed on. If the field **is not matched**, then the frame will be discarded. Therefore if you want only IP frames forwarded, after selecting the appropriate IP Type in the Ethernet II Filters (see page 136) the *discard* setting here will drop all frames containing other protocol types.

Important: *If* Protocol Filters Enabled *is* ***checked****, and the* Protocol Default Action *is* ***discard****, an HTTP browser will not be able to access the 9150's configuration pages unless an ARP filter is defined to forward ARP packets. To do this, configure* Ethernet II Filters *to* ***forward*** *protocol type* ***0x0806*** *(ARP) packets (see page 136). Alternatively, you can create a static entry in the ARP table on the computer that is running the browser.*

6.3.2 Address Filters: MAC Address

The 9150 can use a list of destination MAC addresses to filter out frames. The MAC addresses are those of any terminals associating with the 9150. If *Address Filters* on page 131 is **enabled**, then any frame destined for any address in the list will be forwarded. If an address is not on the list when *Address Filters* is **enabled**, the frame will be discarded. Addresses are added to the filter list by entering the "Configure" dialogue box from the *Bridge Parameters* menu.



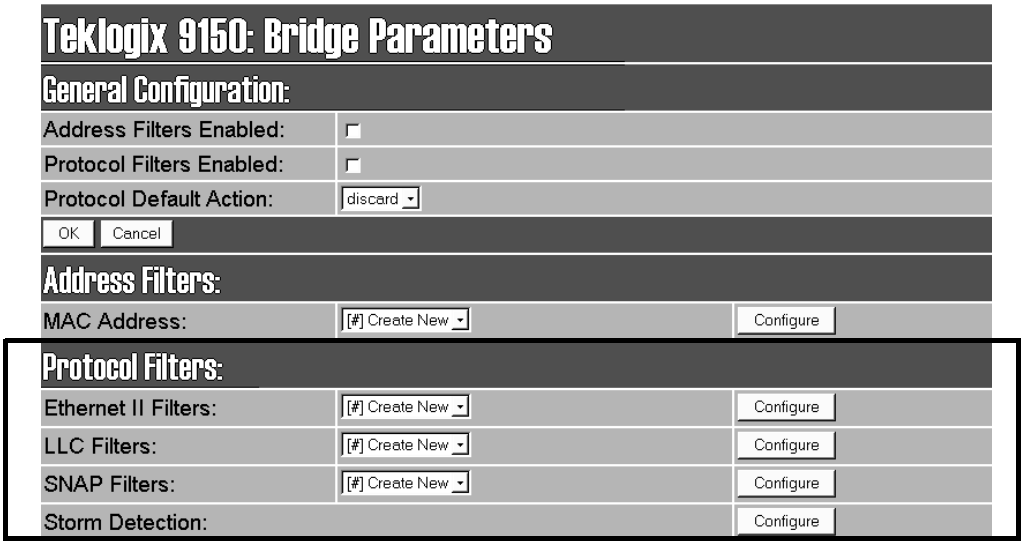
Name

This is any name you wish to use to describe this terminal.

Address

This parameter provides the corresponding MAC address for the terminal.

6.3.3 Protocol Filters



When the 9150 receives frames, it can forward or discard the messages by filtering the protocol Type fields encapsulated in the frame. The filtering is done on three types of Ethernet headers: Ethernet II, LLC and SNAP.

Figure 6.3 on page 134 illustrates the Ethernet header formats. The parameters to configure these filters are described in the sections which follow.

Notes:

1. *Although both LLC and SNAP headers are filtered on Ethernet and Token Ring networks, Ethernet headers are not filtered on Token Ring.*
2. *Throughout these menus, the values for all the protocol types are, by convention, entered in hexadecimal, preceded by "**0x**".*

The fields for a basic IEEE 802.3 Ethernet frame consist of a six-byte destination MAC address, followed by a six-byte source MAC address, and a two-byte protocol Type. The final fields in a frame are the Data field and the FCS field (Frame Check Sequence, or CRC). If the Type field contains a value that is greater than or equal to

"0x0600", it is assumed to be the protocol identifier for an Ethernet II header. This field is used to determine which protocol is being used in the frame, and this is what can be filtered (see "Ethernet II Filters" on page 136).

If the protocol Type is less than "0x05DC", then the value is interpreted as a Length field instead. It is assumed that an IEEE 802.2 Logical Link Control (LLC) header is to follow the Length. This header consists of the **D**estination **S**ervice/**S**ource **S**ervice **A**ccess **P**oint (DSAP/SSAP) and Control fields (see "LLC Filters" on page 137).

If the DSAP and SSAP are both "0xAA", and the Control field has a value of "0x03", the LLC header will be followed by an extension which is a SNAP header. The SNAP header includes the Organizational Unit Identifier (OUI) and the protocol type (see "SNAP Filters" on page 138).

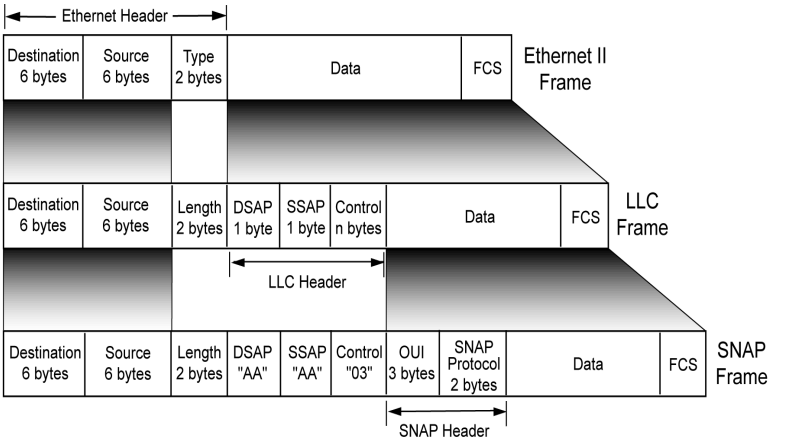
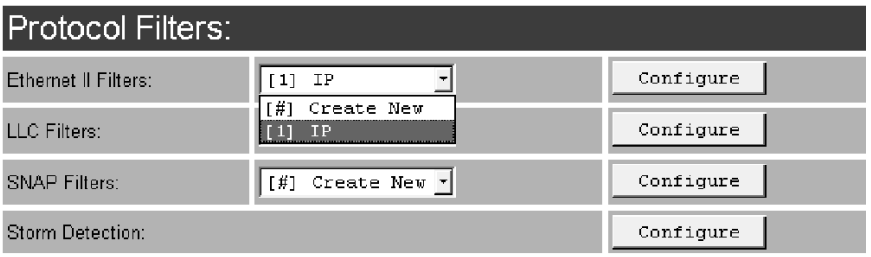


Figure 6.3 Ethernet Frame Types

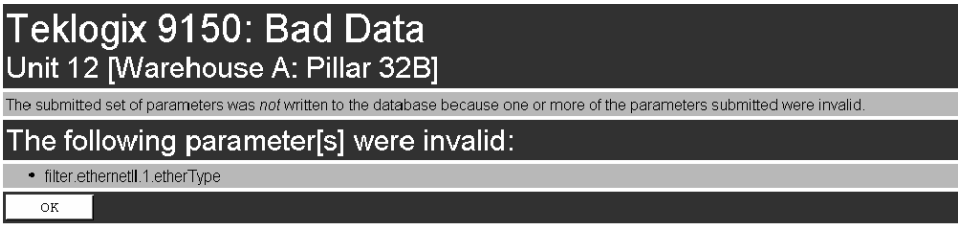
The listboxes in the *Protocol Filters* option show the protocol filters already set in the configuration database. Selecting a protocol name and then opening the "Configure" dialog box gives a list of parameter settings that can be modified or deleted for that protocol.

Figure 6.4 Protocol Filters Main Menu And Sub-menus

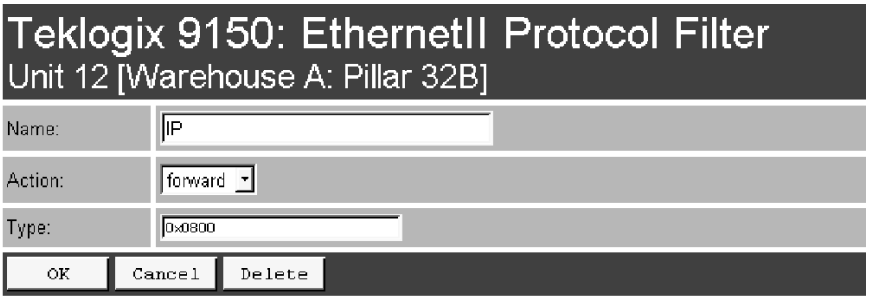
New filters can be added by selecting "[#] Create New" in the listbox before entering the "Configure" dialog box.



If a hexadecimal number is entered that is outside the minimum or maximum allowable value for these parameters, you will receive an alert that the Type value is invalid for the specified protocol.



6.3.3.1 Ethernet II Filters



Note: *This parameter is only valid for Ethernet networks. Ethernet II headers are not filtered on Token Ring networks.*

Name

This is any name you wish to use to describe this Ethernet II filter.

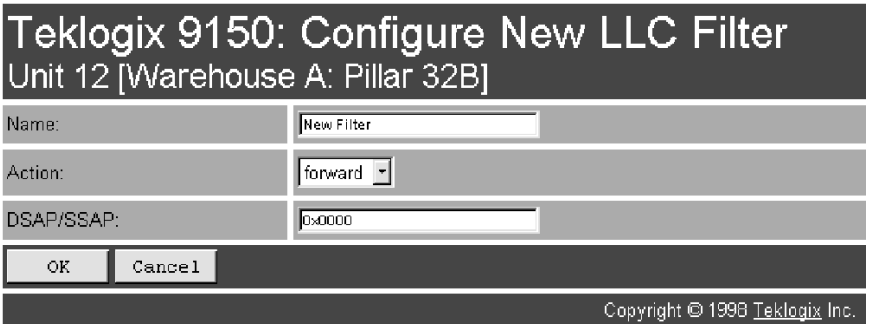
Action

This parameter can be set to either *forward* or *discard* frames with protocol types that match this filter.

Type

The value entered in this parameter must be a four-digit hexadecimal number ranging from **0x0600** to **0xFFFF**, which represents the Ethernet II protocol type you wish to filter. For example, if you only use TCP/IP, create two protocol filters, one to forward IP (Type 0x0800) and the other to forward ARP (Type 0x0806). For a listing of Ethernet II types, see "Ethernet II Types (RFC 1700)" on page B-1.

6.3.3.2 LLC Filters



Name

This is any name you wish to use to describe this LLC filter.

Action

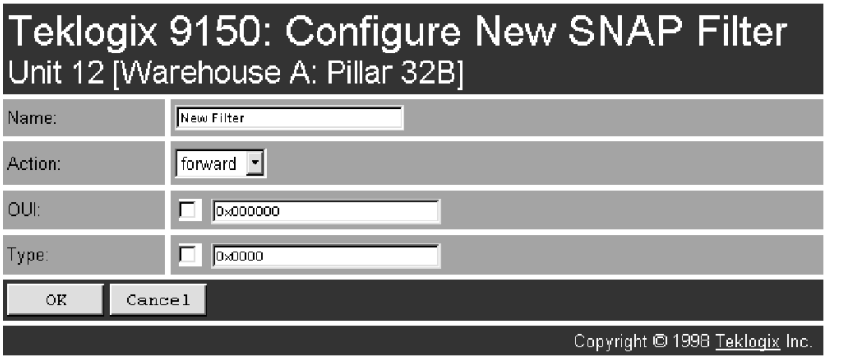
This parameter can be set to either *forward* or *discard* frames with protocol types that match this filter.

DSAP/SSAP

The value entered in the ***D**estination **S**ervice/**S**ource **S**ervice **A**ccess **P**oint* (DSAP/SSAP) parameter must be a four-digit hexadecimal number ranging from **0** to **0xFFFF**, where the first pair of digits is the DSAP and the last pair is the SSAP.

For a listing of DSAP/SSAP types, see "DSAP/SSAP Types" on page B-14.

6.3.3.3 SNAP Filters



Name

This is any name you wish to use to describe this SNAP (**S**ub**N**et **A**ccess **P**rotocol) filter.

Action

This parameter can be set to either *forward* or *discard* frames with protocol types that match this filter.

OUI

The value entered in this parameter must be a six-digit hexadecimal number ranging from **0** to **0xFFFFFF**, which is the **O**rganization **U**nique **I**dentifier. When this parameter is **enabled** (√), the OUI will be filtered.

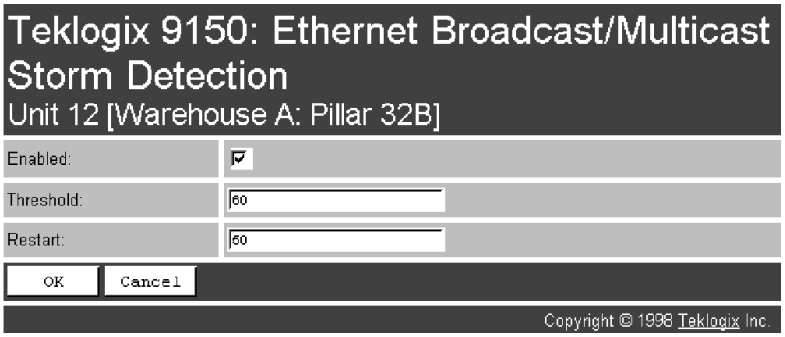
Type

The value entered in this parameter must be a four-digit hexadecimal number ranging from **0** to **0xFFFF**, which represents the SNAP type you wish to filter. When this parameter is **enabled** (√), this Type will be filtered.

For a short listing of OUI values, see "OUI Values" on page B-15.

6.3.3.4 Storm Detection

This filter parameter can prevent broadcast/multicast storms from spreading throughout the network. Network storms can burden radio traffic with unnecessary data transmissions.



Enabled

This parameter enables (√) or disables the Storm Detection filters.

Threshold

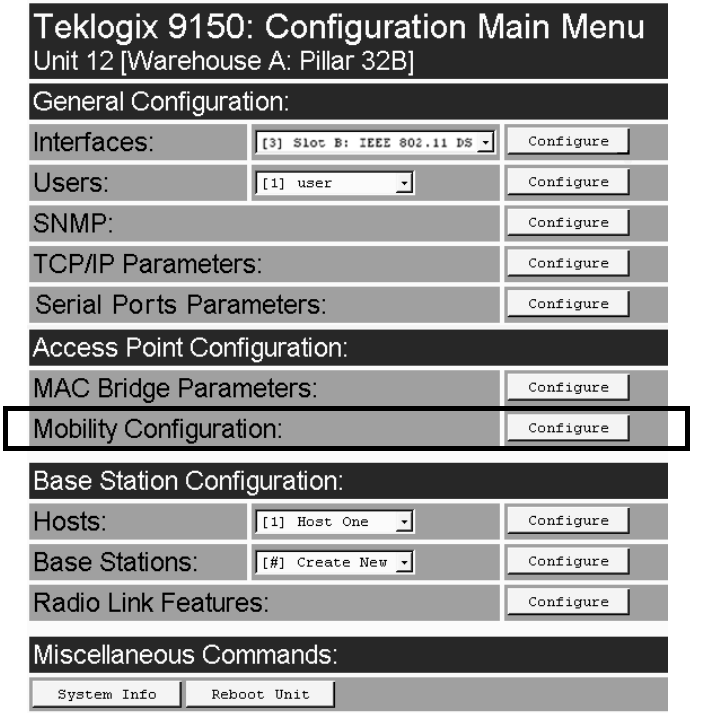
The maximum number of broadcast/multicast frames that should be received in one second is defined in this parameter. When that threshold is exceeded, a broadcast storm is declared. Every broadcast/multicast frame received will be discarded until it is determined that the storm is over (see *Restart*, below). Setting the value for *Threshold* is determined by the characteristics of your network.

Restart

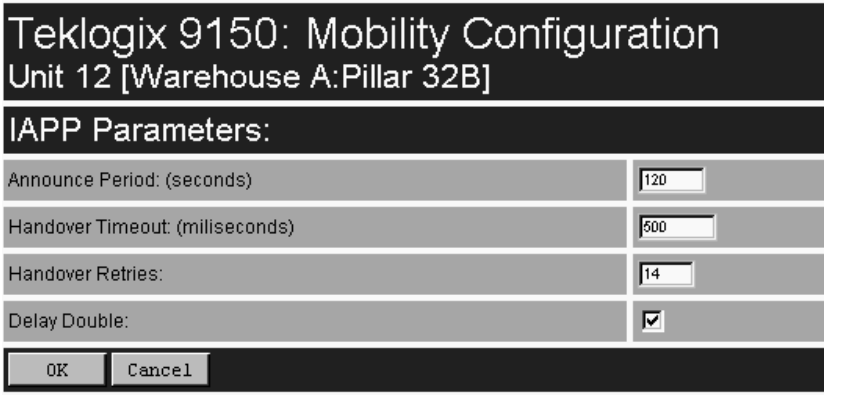
The broadcast storm is determined to be over when the number of broadcast frames received for a one second period is less than or equal to the value entered in this parameter. Setting the value for *Restart* is determined by the characteristics of your network.

6.4 Mobility Configuration

The *Mobility Configuration* page is entered from the *Access Point Configuration* menu on the first page.



Going to the *Mobility Configuration* page opens the *IAPP Parameters* options.



The Inter-Access Point Protocol (IAPP) is an extension to the IEEE 802.11 protocol. In a multiple-9150 system, IAPP facilitates roaming of mobile stations among the 9150s, and enables communication and awareness between the 9150s. Every terminal is associated with one 9150, but it can reassociate with another 9150 to maintain uninterrupted communications. The association is "handed over" from one 9150 to the next. The newly-associated 9150 will receive the terminal's data frames and pass them onto the LAN. Returning frames are no longer accepted by the original 9150, which has disassociated from that terminal. Returning frames are now accepted by the newly-associated 9150 and passed over the RF to the terminal. To implement these procedures and coordinate the 9150s, IAPP specifies two message types: *Announce* and *Handover*.

In IAPP *Announce* procedures, when the 9150 is initialized, it sends an IP multicast message to inform the other 9150s in the network that it has become active. It also informs the other 9150s of its continued operation ('alive' status) by periodically multicasting the Announce beacon.

The *Handover* protocol is intended to inform the old 9150 that a terminal has been associated with a new 9150, and to update the filter tables of intermediate MAC-bridges to correctly forward frames destined for the terminal. The newly-associated 9150 sends a Handover request to the old 9150, which disassociates itself and acknowledges the request.

Important: *These parameters are set with optimum default values. Do not adjust these values without discussing the effects with your Teklogix representative.*

6.4.1 IAPP Parameters

Announce Period

The *Announce Period* parameter indicates the number of seconds between Announce broadcasts. For further information, see "Mobility Configuration" on page 140.

Handover Timeout

If there is no response to the Handover request by the 9150 within the time specified in the *Handover Timeout* parameter, the request is retransmitted. If no response is received after a number of retries (set in the *Handover Retries* parameter, below), the 9150 will complete the reassociation procedure itself. For further information, see "Mobility Configuration" on page 140.

Handover Retries

This parameter sets the number of times the 9150 will transmit a Handover request to the disassociated 9150, before it completes the association transfer itself. See also *Handover Timeout*, above.

Delay Double

The *Delay Double* parameter doubles the amount of Handover Timeout between Handover Retries. For example, if the first retry is after 500 milliseconds, the next Handover request is sent after 1 second, followed by a retry after 2 seconds, etc.