

Hotwire™ 5446 RTU Setup

Firmware Update Description, 5446 RTU Release 2.04.03

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Paradyne's IP Injection Tool

The IP Injection Tool is an alternative to SNMP NMS to update the Hotwire™ 5446 RTU's (Remote Termination Unit) IP routing table. The IP Injection Tool uses the SNMP agent in the 5446 RTU to manage IP address and subnet mask information.

This document contains information that been added to the Hotwire Models 8540 and 8546 DSLAM (Digital Subscriber Line Access Multiplexer) system as a result of Hotwire 5446 RTU Firmware Release 2.04.03.

This document replaces Appendix E, *5446 RTU Setup*, in Document No. 8000-A2-GB20-30, *Hotwire DSLAM for 8540 and 8546 DSL Cards User's Guide*.

Hotwire Firmware Version Numbers

For compatibility with Hotwire 8540/8546 DSL Card Firmware Release 2.04.02, the DSLAM system must have the following (or higher) versions of firmware:

Component	Firmware Version Number
5216/5246 RTU	1.01.05
5446 RTU	2.04.03
5446 RTU IP Injection Tool*	1.1.1
8000 MCC Card	2.03.12
8100/8200 IPC	3.2.3
8540/8546 DSL Card	2.03.12
OpenLane™ DCE Manager	4.0
OpenLane™ DCE Manager for HP OpenView for Windows	2.0

* The IP Injection Tool 1.1.1 contains a new MIB that is not compatible with the prior release. Update all locations of the IP Injection MIB in the network at the same time to avoid incompatibility during Hotwire 5446 RTU setup.

Branding

Branding is a method of marking hardware platforms and software loads to ensure that compatible software is loaded. For example, an 8540 or 8546 DSL card can become an 8510 card or an 8510 card can become an 8540 or 8546 card.

Branding allows the firmware to be changed as shown in the table below.

From Model Number	To/From Model Number
5446 RTU*	5620 RTU
8000 MCC Card – IP Complex	8000 MCC Card – IP Conservative
8540 DSL Card	8510 DSL Card
8540 DSL Card	8546 DSL Card
8546 DSL Card	8510 DSL Card
* You must upgrade your 5446 RTU firmware to version R2.02.07 or higher before you can migrate to the 5620 RTU. If you do not, unexpected errors will occur.	

There are no restrictions on the number of upgrades, i.e., you can upgrade any number of cards with one copy of the new firmware.

Hotwire 5446 RTU Setup Overview

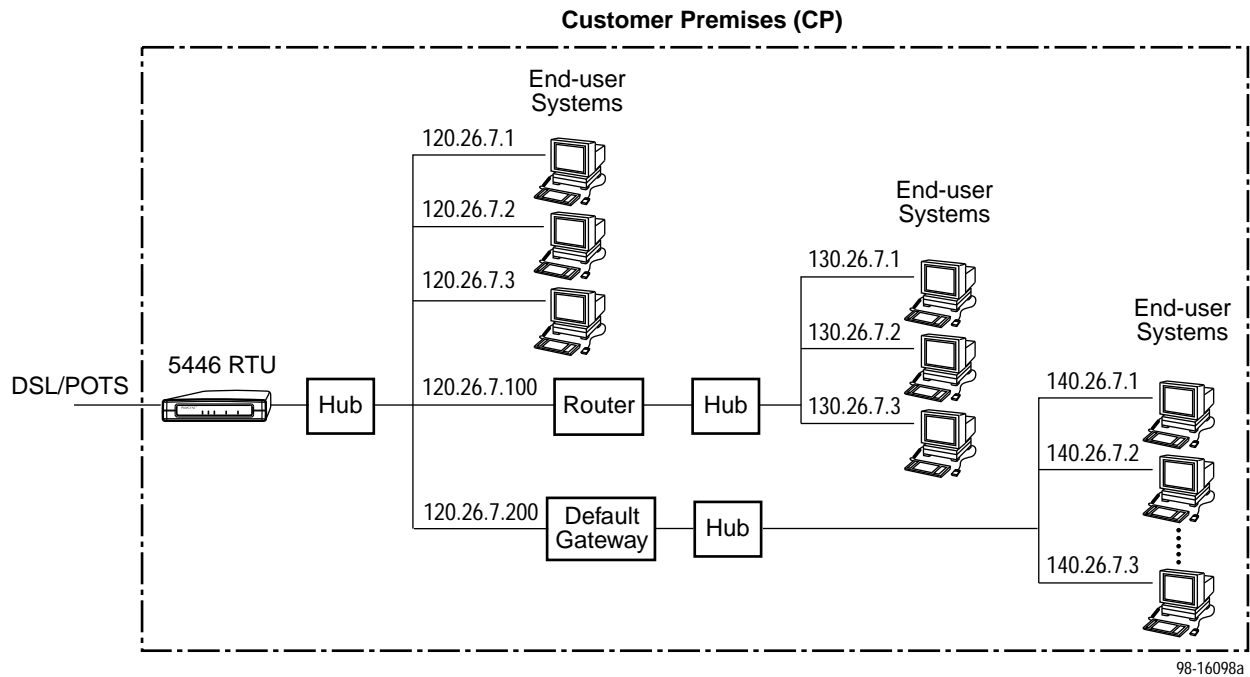
The Hotwire 5446 RTU supports various customer premises distribution networks that contain IP forwarding devices or routers, in addition to locally attached hosts or subnets. The Hotwire 5446 RTU has an IP Routing Table that is updated through an SNMP agent. The configuration table contains IP address and subnet mask information.

The network service provider for the 5446 RTU provisions the IP address information into the 5446 RTU's configuration table. The 8546 DSL card interoperates with the 5446 RTU. An NMS communicates via SNMP to Get or Set objects within the SNMP agent's control to update the IP configuration table. The 5446 RTU supports MIB objects relative to their RFC description.

5446 RTU Next-Hop Router Support

The 5446 RTU now includes support for next-hop routers and a default gateway. The following illustration includes connections using hubs. A host (end-user system) or router can also be connected directly to a 5446 RTU by using an Ethernet crossover cable.

For more information about the Hotwire 5446 RTU installation, see Document No. 5446-A2-GN10, *Hotwire 5446 RTU Customer Premises Installation Instructions*.



IP Injection Type	IP Address	Network Mask	Next-Hop Router
Host	120.26.7.1	255.255.255.255	0.0.0.0
Host	120.26.7.2	255.255.255.255	0.0.0.0
Host	120.26.7.3	255.255.255.255	0.0.0.0
Host	130.26.7.1	255.255.255.255	120.26.7.100
Host	130.26.7.2	255.255.255.255	120.26.7.100
Host	130.26.7.3	255.255.255.255	120.26.7.100
Default Gateway	0.0.0.0	0.0.0.0	120.26.7.200

Figure 1. IP Routing Table Example

NOTES:

- If a Default Gateway is defined, all packets not destined for an entry in the IP Routing Table are sent to the Default Gateway. The Host devices (end-user systems) attached to the default gateway are not configured in the IP Routing Table (refer to IP addresses starting with 140 in Figure 1).
- The Host devices attached to the Next-Hop Router are configured once in the IP Routing Table with the Next-Hop Router field (refer to IP addresses starting with 130 in Figure 1). The Host entry can also specify a remote subnet, as needed.

Accessing the Hotwire 5446 RTU IP Injection MIB

The IP Injection Tool provides the ability to use the SNMP agent in the 5446 RTU to manage IP address and subnet mask information. There are three methods available to update the 5446 RTU IP configuration table:

- Paradyne's IP Injection Tool
- NMS DCE Manager
- MIB Browser

The IP Injection Enterprise MIB must be used to finalize the 5446 RTU setup.

Downloading the IP Injection Tool

This tool is available from Paradyne's World Wide Web site. The program is in a zip file that expands to three disks. This tool can be loaded on a PC with Windows 95 or Windows NT 4.0. The PC must be connected to the management interface for the MCC card (*e1a*).

► Procedure

To download the Hotwire 5446 RTU IP Injection Tool:

1. Access the Paradyne World Wide Web site:
<http://www.paradyne.com>
2. Select:
Service & Support → *Management Info. Base* → *Hotwire DSL* → *ipinject.exe*
3. Follow the steps for your program to unzip the IP Injection Tool. If you have:
 - Winzip: Extract the files
 - PKunzip: Unzip using the **-d** option to create three disks
4. Double-click on Disk 1, and then double-click on **Setup.exe**.
5. At the prompt: Do you wish to install Microsoft OLE Automation?
 - Windows 95 platform: select Yes
 - Windows NT 4.0 platform: select No

Accessing the IP Injection Tool

Once the program is successfully installed, an icon labeled Paradyne IP Injection Tool is created. The Paradyne IP Injection Tool input screen appears when the tool is accessed. Access the online Help file on this screen for further information.

If a previous version of the IP Injection Tool is running, exit the tool and reopen the latest version.

Type	IP Address	Network Mask	Status	Next Hop Router
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NOTES:

- Before using this tool, you must know the RTU Network Access Provider (NAP) and have established an active DSL link to the RTU. The NAP IP Address is also known as the Peer IP Address when configuring the corresponding port on the 8600/8800 DSL card.
- The new IP Injection Tool version 1.1.1 is not compatible with 5446 RTU release 2.02.07, and the new Next-Hop Router and Default Gateway fields will not appear. Use IP Injection Tool version 1.1.0 with 5446 RTU release 2.02.07.
- After initial installation, do a Get All so the IP Injection Tool will know the firmware level of the 5446 RTU.

IP and Device MIBs Supported

The IP Injection MIB provides the capability to inject IP address information for hosts, applications, networks, or a local device. The following pdn-IP Injection Objects (pdn-common 11) contain IP address information. Information built from this table includes:

- **Host IP Routing.** Displayed in the MIB II IP Route Table as read-only.
- **Service IP Address.** Displayed in the MIB II IP Address Table as read-only.

The IP Injection Table supports:

- One NAP IP Address injected as the Peer IP Address from the Hotwire DSLAM system. The NAP IP Address cannot be added, deleted, or changed from SNMP.
- Four service domain IDs.
- Thirty-two Host Routes, Routers, and/or Subnets.
- One Default Gateway.

Configuration Requirements

Host routes use the IP address assigned to the end-user systems supported by the 5446 RTU. Service domain IDs use the IP address information pertaining to the 5446 RTU within the service domain.

Refer to *IP Injection Group Objects (ipInjectionTable 1)* on page 10 for IP Injection group object details.

There must be three entries in the 5446 RTU IP configuration table:

- **NAP address.** This address is automatically injected across the DSL link from the DSLAM and cannot be modified.
- **Host address.** This is the IP address of the end-user system connected to the 5446 RTU and is the same IP address configured for the DSL port card. The address could also be a subnet address.
- **Service domain address.** This is the IP address for the 5446 RTU in the service provider domain.

The IP Injection MIB has been revised to provide the fields necessary to configure the operational parameters for default gateway and next-hop router support. In addition to maintaining the previous capabilities of the 5446 RTU, the following additions have been made to the IP Injection MIB:

- **Default Gateway.** A new IP InjectionType has been added to the MIB structure, defaultGateway(5). The default gateway is used for any downstream traffic that does not meet any existing forwarding policies. Only one default gateway is used and is not included in the maximum of 32 locally attached hosts. The ipInjectionNHRAddr (*ipInjectionEntry 5*) object is used to enter the IP Address of the default gateway. If a default gateway is not configured, the traffic is dropped.

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- **Next-Hop Router.** The `ipInjectionNHRAddr` (*ipInjectionEntry 5*) object has been added to the MIB. When the value of `ipInjectionType` is set to `host`, then this object may contain the IP address of a:
 - Next-Hop Router for a defined host or subnet, or
 - Default gateway used for downstream traffic when the destination is unknown.

NOTE:

Up to 32 host entries for end-user systems can be specified. Of the 32 entries, each can be statically provisioned with a Next-Hop Router. The 5446 RTU continues to support a mix of dynamic and statically assigned addresses.

Network Management Systems

OpenLane DCE Manager, one of Paradyne's Network Management Systems, communicates via SNMP to the RTU to update the IP configuration table. Display of the remote RTU and the use of the injection tool are features of this product.

The NMS workstation is typically connected to a router and the NMS can easily access devices on other subnets. If the NMS is connected to other hardware, such as a hub, then the explicit routes to the other subnets must be defined on the system that has the NMS.

To create the routes that would be discovered with a router connection, the DCE Manager must have access to the MCC backplane s1b subnet in the DSLAM. The MCC card acts as the gateway to add the first route to gain connectivity to the DSL cards and remote RTUs. Open a DOS window and enter the command `Route`.

Windows 95 syntax example:

- NMS = 135.90.51.1
- MCC card = 135.90.51.220 on the same subnet as the NMS 130.90.51
- DSL card = 135.90.52.10 on subnet 135.90.52
- 5446 RTU = 135.90.52.12 on the same subnet as the DSL card 135.90.52

Windows 95 route statement for the NMS at 135.90.51.1:

```
route add 135.90.52.10 135.90.51.220
route add 135.90.52.12 135.90.51.220
```

Using a MIB Browser

Use a MIB browser to access the `ipInjectionTable`. The Enterprise IP Injection MIB OID (Object ID) is 1.3.6.1.4.1.1795.2.24.2.11.

► Procedures

From an SNMP workstation:

1. To load the IP Injection MIB, access the Paradyne World Wide Web site:
`http://www.paradyne.com`
2. Select the Paradyne Enterprise MIB:
Service & Support → *Management Info. Base* → *Hotwire DSL*
3. After the `pdndce.mib` appears, save the MIB file in the NMS MIB directory with other MIB files by either:
 - Clicking the right mouse button on `pdndce.mib` and selecting:
Save As
 - Clicking the left mouse button on `pdndce.mib` and selecting:
File → *Save Link As*
4. Enter the IP address of the 5446 RTU.
5. Press Options to change Set Community to Private.
6. Locate the MIB group `pdn-ipinjection`.

From a MIB Browser:

1. To load the IP Injection MIB, access the Paradyne World Wide Web site:
`http://www.paradyne.com`
2. Select the Paradyne Enterprise MIB:
Service & Support → *Management Info. Base* → *Hotwire DSL*
3. Using the MIB Browser, click on `pdndce.mib` and save the MIB file in the NMS MIB directory.
4. Compile the MIB Browser.
5. Select the MIB.
6. Do a single set with a unique entry containing the required fields.

Refer to the *IP Injection Group Objects (ipInjectionTable 1)* on page 10 for IP injection group objects and settings.

MIB Browser Techniques

There are two MIB browser techniques. The Enterprise MIB allows the use of a null entry or a table index. Use a MIB browser to access the ipInjectionTable.

► Procedures

Using the null entry:

1. Change the Null entry by entering the IP address (ipInjectionAddress).
2. Change the mask by entering a subnet mask (ipInjectionMask).
3. Change the Type to Service Provider or Host (ipInjectionType).
4. Select Set.
5. Do a Get or Query to verify before continuing to the next entry.

NOTE:

If a null entry does not appear, the table is full. Delete entries from the table by setting the ipInjectionStatus to invalid.

Using the table index:

1. Enter the three fields into the Index:
 - ipInjectionType
 - ipInjectionAddress
 - ipInjectionMask
2. Enter the ipInjectionStatus value.
3. Select Set.

IP Injection Tool Group Objects Table

IP Injection Group Objects (ipInjectionTable 1) (1 of 2)

Object	Description	Setting/Contents
ipInjectionType (ipInjectionEntry 1)	<p>Indicates the type of IP address for each entry.</p> <p>Changing the NAP IP address resets the database and any of the following entries are cleared:</p> <ul style="list-style-type: none"> ■ serviceProvider(3) ■ host(4) ■ defaultGateway(5) 	<ul style="list-style-type: none"> ■ null(1) – Use to add a new row. Defaults: <ul style="list-style-type: none"> – Address: 0.0.0.0 – Mask: 255.255.255.255 – Status: static ■ nap(2) – Network Access Provider IP entry. Cannot be added, modified, or deleted from SNMP. ■ serviceProvider(3) – Device IP address in the Network Service Provider domain. ■ host(4) – Host IP entry for local hosts, local subnets, remote subnets, and next-hop router IP address. ■ defaultGateway(5) – Default gateway IP entry.
ipInjectionAddr (ipInjectionEntry 2)	<p>Specifies the IP address for the first object's entry of IP Injection Type.</p> <ul style="list-style-type: none"> ■ null(1) – Null entry used to add a row to create an entry. ■ nap(2) – Device IP address in the NAP domain. ■ serviceProvider(3) – Device IP address in the Network Service Provider domain. ■ host(4) – Host IP address entry for locally attached host, local subnet, remote subnet, and next-hop router IP address. 	<p>IP address for the NAP or service provider (NSP):</p> <ul style="list-style-type: none"> ■ nnn.255.255.255 – Range for the first byte <i>nnn</i> is 001 to 223, with the exception of 127. Range for the remaining three bytes is 000 to 255. <p>IP address for Host Route:</p> <ul style="list-style-type: none"> ■ nnn.255.255.255 – Range for the first byte <i>nnn</i> is 001 to 239, with the exception of 127. Range for the remaining three bytes is 000 to 255. <p>IP Injection type of Default Gateway:</p> <ul style="list-style-type: none"> ■ 0.0.0.0 – Default IP address. Cannot be changed.
ipInjectionMask (ipInjectionEntry 3)	<p>The subnet mask must be contiguous and left-justified. When an arbitrary mask is not supported, the SNMP agent constructs the value of the ipInjectMask based on the ipInjectionAddr entry as Class A, B, or C.</p>	<p>The subnet mask entry cannot be 0.0.0.0 for IP Injection type of NAP, Host, and service provider. When the IP Injection Type is default gateway, the subnet mask defaults to 0.0.0.0 and cannot be changed.</p>

IP Injection Group Objects (ipInjectionTable 1) (2 of 2)

Object	Description	Setting/Contents
ipInjectionStatus (ipInjectionEntry 4)	Specifies the address status of static or dynamic. When the 5446 RTU is reset, static addresses are saved and dynamic addresses are not saved.	Type of static or dynamic addressing for each entry. The default is static(1) . <ul style="list-style-type: none"> ■ static(1) – Static addresses are assigned for the duration of the service subscription. For an ipInjectionType of serviceProvider(3), static(1) is the required entry. ■ dynamic(2) – Dynamic addresses are only assigned for the duration of the application session. ■ invalid(3) – Used to delete an entry from the table.
ipInjectionNHRAddr (ipInjectionEntry 5)	When using a Next-Hop Router, the IP address of the router is entered. This entry is only valid when ipInjectionType is set to host(4) or defaultGateway(5) . When the ipInjection type is set to defaultGateway(5) : <ul style="list-style-type: none"> ■ The Default Gateway IP address is entered in the Next-Hop Router field. ■ The IP address and subnet mask default to 0.0.0.0. No other entry is valid. ■ Next-Hop Router is the IP address of the locally attached host (route) that downstream traffic is forwarded to when the destination is unknown. 	The Next-Hop Router field is used to provide: <ul style="list-style-type: none"> ■ The IP address of a Next-Hop Router for a specific defined host or subnet. ■ Locally-attached default gateway router for downstream traffic when the destination is unknown.

Viewable 5446 RTU ARP Table

The Viewable ARP Table is a standard MIB-2 object that should come with most browsers. This allows you to use the MIB browser to do an query on the 5446 RTU to retrieve ARP cache information.

To view the ARP Table, use the standard MIB-2 OID 1.3.6.1.2.1.4.22.

Ordering Information

Contact your sales or service representative to order product documentation about the Hotwire system.

Paradyne documents are also available on the World Wide Web at:

<http://www.paradyne.com>

Select *Service & Support* → *Technical Manuals*

Document Feedback

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