

# Installation Guide Supplement for Cisco Fax Server

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## Overview

This document is designed to assist and guide the reader through the deployment models and procedures required for the Cisco Fax server solution. The material in this document is provided in addition to the Cisco Fax Server documentation provided on CD with the product, also available online at [http://www.cisco.com/en/US/products/ps6178/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps6178/tsd_products_support_series_home.html).

## Product Overview

The Cisco Fax Server is a comprehensive network fax solution for creating, sending, receiving, and managing faxes directly from a user's desktop computer. Cisco Fax Server features and intuitive design make faxing as easy as printing to a network printer.

The Cisco Fax server solution consists of

- A Cisco Media Convergence Server
- Captaris Rightfax 9.0
- An IP enabled Brooktrout Fax PCI board.

The Cisco fax server manages network print queues assigned to faxing, converts outgoing faxes, schedules outgoing faxes, and routes incoming faxes. Routing can be optimized with Intelligent Least-cost Routing™ rules. The server consists of several services that run on one server computer or several networked computers to distribute heavy workloads.

## Server Selection

The Cisco Fax Server can be installed on any supported Cisco Media Convergence Server (MCS). The following table shows the number of available PCI slots in each MCS model. Currently only two Brooktrout TR1034 cards can be deployed per server for a maximum of 60 channels (if two 30 channel E-1 cards are used).

MCS-7815-I1-ECS1	5 x Full PCI Slots
MCS-7825-H1-ECS1	1 x Full @ 133Mhz/64
MCS-7835-H1-ECS1	2 x Full @ 133Mhz/64
MCS-7835-I1-ECS1	2 x Full @ 133Mhz/64
MCS-7845-H1-ECS1	1x Full @ 133, 2x100Mhz
MCS-7845-H1-ECS2	1x Full @ 133, 2x100Mhz
MCS-7845-I1-ECS1	2xFull @ 133Mhz
MCS-7845-I1-ECS2	2xFull @ 133Mhz

The fax server is licensed on a per-channel basis. The default service license ships with a single channel license. You will need additional channel licenses for each concurrent fax connection. This is in addition to the number of fax channels enabled in the firmware of any installed fax boards. There is no restriction on the number of users defined on one fax server.

## Brooktrout Fax Board

You should be aware of the following information when installing the fax server. The fax server requires a PCI Fax board for all modes of operation, ISDN and IP.

A fax board may be operated in ISDN mode or IP mode, but not both. One fax server may contain a maximum of two boards operating in different modes.

Your fax board will have been shipped with either a T1 or E1 presentation; an Ethernet interface for IP operation; and 4,8,12,16,20,24, or 30 enabled fax channels.

When operating in IP mode the fax board may send and receive faxes from and to multiple T.38-enabled Cisco routers. The board firmware will be licensed for the ordered number of concurrent fax transmissions. The fax server must also have licensed fax channels to support all of the enabled channels across all accessible fax boards.

Fax boards may be locally installed in the fax server or installed in remote board servers. (Refer to fax server documentation for more information on remote board servers.) For fax board installation, refer to the documentation that accompanied your fax board.

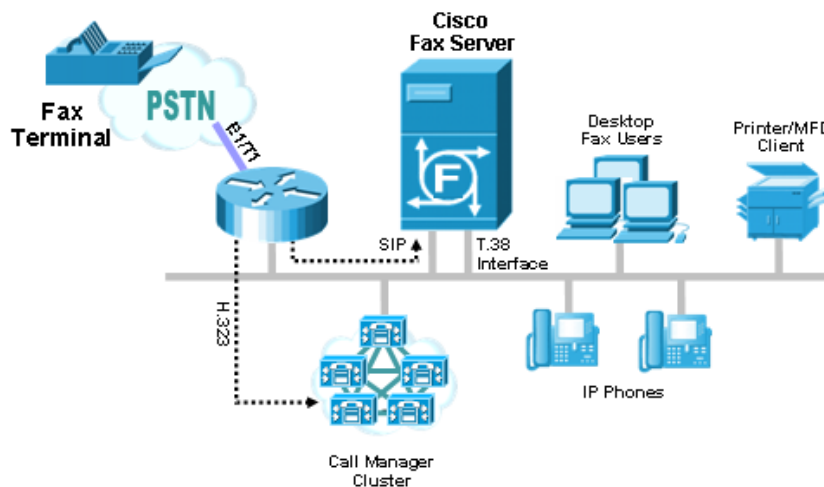
## Deployment Models

### Operation Modes

The Cisco Fax Server can be operated using any of several different models, depending on your voice and data deployment requirements. The server can be operated in a full Fax over IP model where all faxes are delivered by Cisco routers using the fax server's two Ethernet interfaces (IP). The fax server can also be deployed with an ISDN interface to the PSTN/voice network and an IP interface to your data network. A third hybrid of the two previous models may have to be used if your server is deployed in a country using ISDN overlap sending, and you want to deploy voice and fax on the same PSTN incoming trunks by using MGCP Protocol.

### IP T.38 Fax Relay

When deployed in this model, all fax traffic to the fax server is over IP. A Brooktrout fax board is required for this deployment. This deployment uses two Ethernet interfaces on the fax server.



The Ethernet interface on the MCS server is used for call control using SIP, and the Ethernet interface on the Brooktrout board is used for media (FoIP UDP packets). Both Ethernet interfaces on the fax Server **MUST** be connected to the IP network. **WE** recommend that the two interfaces be connected to the same IP subnet. The E1 / T1 interface on the fax server is **NOT** connected.

A Cisco router is used to terminate PSTN calls and forward them to the fax server. The PSTN interface (ISDN PRI, ISDN BRI, or POTS) must be under IOS call control. The PSTN interface must not be controlled directly by CallManager using MGCP. If it is necessary to route calls to CallManager and the fax server, the CallManager connection must use H.323 signaling.

Suitable routers include, Cisco 1760, 1800, 2600, 2800, 3600, 3700, and 3800. The CCM module for the 6500 Chassis can also be used. The AS5xxx access server range should not be deployed with the Cisco Fax Server.

The Fax server can route faxes using Calling Line ID (CLI). This is the recommended routing method. The CLI can be used to match a fax destination on the fax server. This destination could be a Cisco Unity<sup>®</sup> mailbox, an SMTP mailbox, a network printer, or another multifunction device such as a supported document copier. The CLI will be matched to an SIP IP dial-peer on the router, and a connection is made to the Fax Server using T.38.

The initial call setup request must use G.711; during call setup T.38 will be negotiated. Call attempts using G.729 will be rejected by the fax server.

In a deployment with Cisco CallManager and Cisco Fax Server, two ranges of DDI numbers would be used for voice and fax. The Cisco router will match the CLI to either the fax server with a SIP IP dial-peer or Cisco CallManager with an H.323 IP dial-peer.

Example:

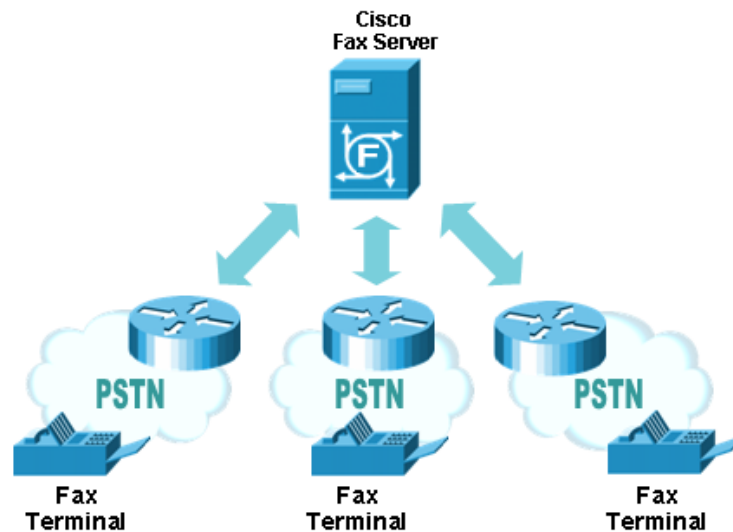
Organization has the following DDI Block: 408 902-(3000 thru 3199)

Cisco CallManager is using 408 902 (3000 thru 3099)

Cisco Fax Server is using 408 902 (3100 thru 3199)

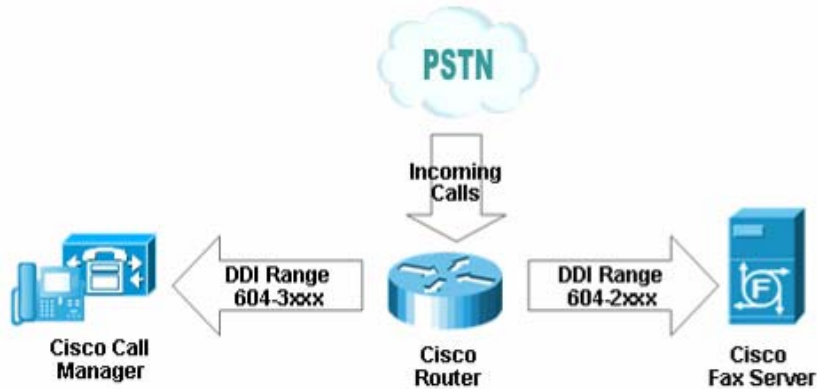
In this example a user could be allocated **408 902 3011** for their IP phone,  
and **408 902 3111** for their fax extension.

One Cisco Fax Server can be peered with multiple Cisco routers. This provides a centralized fax routing hub for inbound faxes. This may be used to provide least cost outbound fax routing, either geographically or based on service provider. Using a fax hub also provides consolidated reporting of faxing activities.



## IOS Configuration (T.38 Mode)

The following is an example configuration showing a Cisco router with a BRI VIC being used as a T.38 fax gateway into the Cisco Fax Server. The configuration uses two DDI number ranges. They are using 604-3xxx numbers for voice calls and 604-2xxx for fax calls. The router will set up calls to Cisco CallManager using H.323 and to Cisco Fax Server using SIP.



```

version 12.3
!
hostname Fax_Switch
!
isdn switch-type basic-net3
!
The initial call setup from the router to the Fax server must attempt a G.711 call. The
actual negotiated call will use T.38. The voice class below will be used for the fax server
dial-peer.
!
voice class codec 99
codec preference 1 g711alaw
codec preference 2 g711ulaw
!
interface FastEthernet0/0
ip address 10.10.10.10 255.255.255.0
duplex auto
speed auto
!
interface BRI 1/0
no ip address
isdn switch-type basic-net3
isdn incoming-voice voice
!
voice-port 1/0/0
!
voice-port 1/0/1
!
voice-port 1/1/0
!
dial-peer voice 3000 voip
description This is the Fax dial-peer
destination-pattern 6043...
voice-class codec 99
  
```

```
session protocol sipv2
session target ipv4: 10. 10. 10. 20
session transport udp
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback none
!
```

If the gateway is also to be used to connect to Cisco CallManager, the following dial-peer could be added.

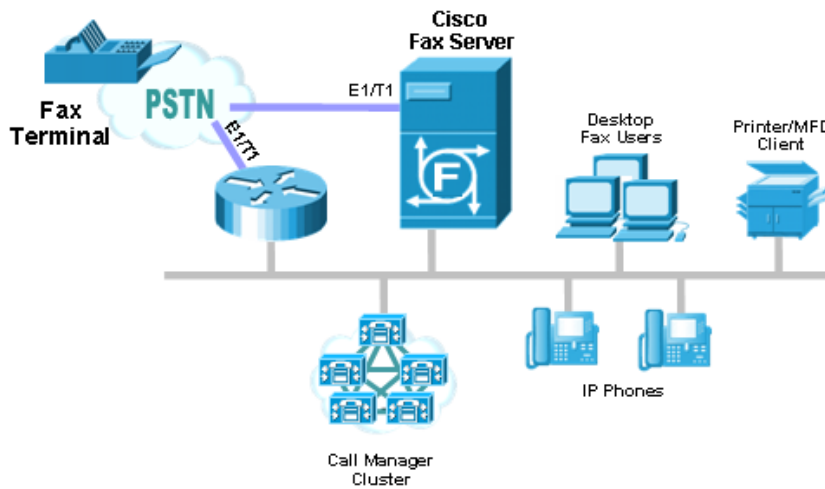
```
dial-peer voice 2000 voip
description Dial-Peer to Call manager
destination-pattern 6042...
session target ipv4: 10. 52. 200. 201
codec g711ulaw
```

The following dial-peer is used to route calls to the PSTN (access code = 9)

```
dial-peer voice 8000 pots
destination-pattern 9T
no digit-strip
port 1/0/0
!
sip-ua
```

## ISDN E1/T1 Direct Connection

When deployed in this model, all fax traffic to the fax server uses the ISDN interface. The IP interface is used for management, client access, and distribution of faxes to messaging servers and printers. A Brooktrout fax board is required for this deployment. The ISDN interface is connected directly to the PSTN. The Brooktrout ethernet card interface is *not* connected in this deployment.



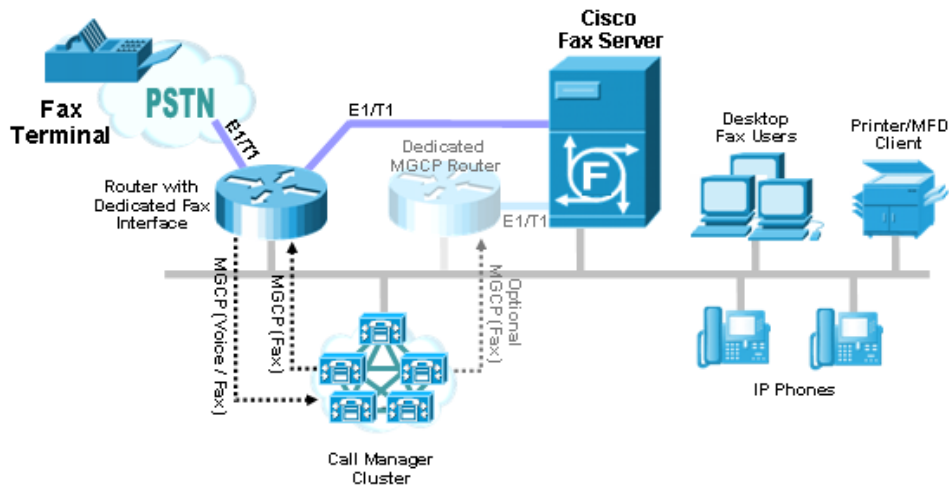
Fax Call routing uses Calling Line ID (CLI). Because the fax server is directly connected to the PSTN, the fax server will receive call setup information containing the CLI. Further information on this deployment model can be found in the Cisco Fax Server documentation.

## IOS Configuration

No IOS configuration required.

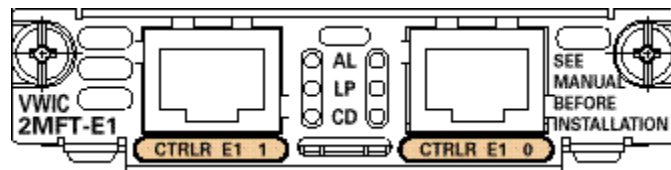
## ISDN/MGCP Cisco Fax Relay Mode

This mode of operation is designed for deployment in environments where mixed voice and fax traffic share an E1 trunk that is connected to the PSTN network and that uses ISDN overlap sending for signaling. When deployed in this model, all fax traffic to the fax server uses the Brooktrout board ISDN interface. Call signaling for the fax call setup will first traverse the Cisco CallManager cluster using MGCP. For this configuration, either an additional ISDN E1/T1 interface is required in the PSTN router, or an additional router with an ISDN E1/T1 interface is required to service the fax server.



ISDN call control is passed directly to Cisco CallManager in this deployment so no additional configuration beyond an IOS/CCM MGCP configuration is required. Cisco fax relay is used for calls between the two router E1 interfaces (these may be on the same router). The call media will travel directly between the two E1 interfaces over the IP network.

An example of a suitable module for this purpose is a VWIC-2MFT-E1 as shown below. This provides two E1 ports and can be used either directly in or via a high-density voice module depending on the router model.



ISDN call control is passed directly to Cisco Call manager in this deployment, therefore only a basic IOS configuration is required. Cisco fax relay will be used for calls between the two E1 ports and these may be on the same router. The call media will travel directly between the two E1 interfaces over the IP network.

Packet voice/fax is sensitive to time delays. To prevent mismatches and data slips, you must synchronize data flows to a single clock source, known as the network clock. When a network clock is configured on a gateway, the router externally clocks one E1 or T1 port, and then passes that clock signal across the backplane to another T1 or E1 port on another WIC or network module slot. Use of a network clock on a gateway is configured by naming the network modules and interface cards that are participating in network clocking, and then selecting a port to act as the source of timing for the network clock.

The router's E1 or T1 port connected to the Brooktrout card should be configured as network side.

## IOS Configuration

To enable Call Manager MGCP call control, enter the following configuration commands. For detailed configuration, refer to the IOS configuration guide.

```
ccm-manager mgcp
ccm-manager config server [IP Address of Call manager]
ccm-manager config
```

## Clocking (TDM backplane capable routers)

Three commands configure network clocking: network-clock-participate, network-clock-select, and clock source (digital ports only).

The network-clock-participate command configures the specified router slot to take its clock from the network clock; that is, this command identifies the slots that get their timing from the AIM.

The network-clock-select command configures a port in one of the participating slots to be a source for the network clock, and assigns it a priority level. This command is repeated for each port that you want to act as a primary or backup source for the network clock. The highest priority level indicates the port that you want to be the primary source of timing for the network clock. If the highest-priority port becomes unavailable, the second-highest priority level takes over automatically as the network clock, and so forth for the lower-priority levels. The clocking is provided to the AIM, which then provides it to participating slots in the router.

The network clock source must be derived from an external source, from either PSTN or PBX clocks over trunk lines. For digital voice ports, the clock source command in controller configuration mode configures the type of timing (internal or from the line) for each port that you designate as a primary source or backup for the network clock. This step does not apply to analog voice ports.

In the example below, the Cisco router has a WIC with dual E1 ports in slot 0. Port 0 is connected to the PSTN, and Port 1 is connected to the Brooktrout card.

In Config mode:

```
network-clock-participate wic 0

network-clock-select 1 E1 0/0/0

controller E1 0/0/1
    clock source internal
```

You can check that your clocking is correct using the “show network-clocks” command.

When you view the E1/T1 controllers now, using the “show controller e1” or “show controller t1”, you can see the clock sources for each interface. You should also check on this display whether the router is experiencing Slips, as this indicates a clocking issue.

## Cisco CallManager Port configuration

Configure the gateway and create route patterns directly for fax number ranges at the E1 or T1 connected to the Cisco Fax Server as described in the CallManager documentation.

The screenshot shows the Cisco CallManager Administration web interface. At the top, there is a navigation menu with items: System, Route Plan, Service, Feature, Device, User, Application, and Help. Below the menu is the header "Cisco CallManager Administration" with the tagline "For Cisco IP Telephony Solutions" and the Cisco Systems logo. The main heading is "Gateway Configuration" with a link "Back to Find/List Gateways".

The configuration details for the gateway are as follows:

- Product: Cisco 2821
- Protocol: MGCP
- MGCP : RTR2820
- Status: Ready
- Buttons: Update, Delete, Reset Gateway
- Domain Name\*: RTR2820
- Description: RTR2820 Gateway
- Cisco CallManager Group\*: Default

Below the configuration fields is a table for "Installed Voice Interface Cards" and "Endpoint Identifiers".

Installed Voice Interface Cards		Endpoint Identifiers	
Module in Slot 0	NM-4VWIC-MBRD		
Subunit 0	VWIC-2MFT-ET	(0/0/ 0) E1PRI	(0/0/ 1) E1PRI
Subunit 1	< None >		

The E1 or T1 connected to the Cisco Fax Server should be configured for protocol-side Network as shown below.

Interface Information	
PRI Protocol Type*	PRI EURO
Protocol Side*	Network
Channel Selection Order*	Top Down
Channel IE Type*	Use Number when 1B
PCM Type*	A-law
Delay for first restart (1/8 sec ticks)	32
Delay between restarts (1/8 sec ticks)	4
<input checked="" type="checkbox"/> Inhibit restarts at PRI initialization	
<input type="checkbox"/> Enable status poll	

## MGCP Fax Configuration

To complete the configuration, issue the following IOS fax commands. These IOS commands configure the router to use Cisco fax relay rather than T.38 and limit the fax connection speed to 14400 baud.

```
mgcp fax rate 14400  
mgcp fax t38 inhibit
```

## Configuring Fax Server for FoIP operation

The following section supplements the Cisco Fax Server Fax Board Guide at [http://www.cisco.com/en/US/products/ps6178/products\\_installation\\_and\\_configuration\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps6178/products_installation_and_configuration_guides_list.html). For all ISDN (E1 and T1 modes) configurations, refer to the fax board guide. For FoIP (T.38 mode) use the following instructions:

### Configuring the Board Server

1. T.38 Fax Over IP (FOIP) capability is supported on RightFax version 9.0 and higher.
2. You must use a supported Brooktrout TR1034 series digital board. (See list of compatible boards below.)
3. T.38 Fax Over IP uses the Ethernet network interface of the fax board and the Ethernet network interface of the host server (used for SIP - Session Initiation Protocol call setup and teardown).
4. When a T.38 compatible fax board is added to the BoardServer configuration, you must use the Brooktrout Configuration Tool to configure the board. (See procedures below.)
5. The TR1034 Ethernet network interface must be configured to use static IP information (address, subnet, broadcast address & gateway). This is configured in the Brooktrout configuration tool. The Brooktrout network interface and the Cisco Gateway must be on the same subnet.
6. The IP-PSTN Gateway (Cisco router) must have firmware compatible with the T.38 protocol, and the router must be correctly configured to send and receive FoIP traffic to the TR1034 fax board on the RightFax Server. (See list of Brooktrout-compatible IP-PSTN Gateway routers below.)
7. Any RightFax features requiring the playing of voice files (e.g. Human Answered Fax, Docs-On-Demand) are not supported with the TR1034 configured for T.38 FOIP.

### T.38 Compatible Boards:

TR1034+P4H-T1-1N  
TR1034+P8H-E1-1N  
TR1034+P8H-T1-1N  
TR1034+P10H-E1-1N  
TR1034+P16H-E1-1N

TR1034+P16H-T1-1N  
TR1034+P20H-E1-1N  
TR1034+P24H-T1-1N  
TR1034+P30H-E1-1N

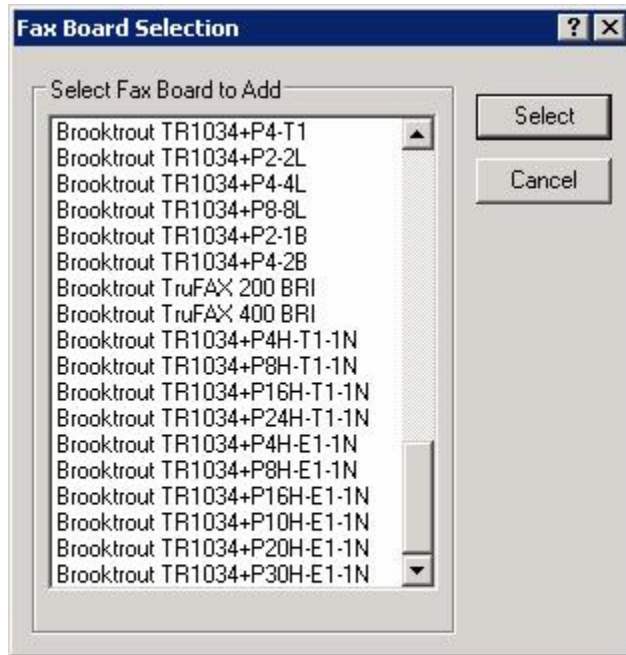
NOTE: Any digital TR1034 board which is listed as '0N' instead of '1N' (e.g. TR1034-P24H-T1-0N) can be upgraded to '1N' by contacting Captaris Sales and purchasing a TECUPDATE license.

The TECUPDATE procedure is currently available on the Captaris website (<http://www.captaris.com>), under Support/Downloads.

TR1034 series without '0N' (e.g. TR1034-P24H-T1) cannot be updated to support T.38 protocol.

## **INSTALLATION PROCEDURES:**

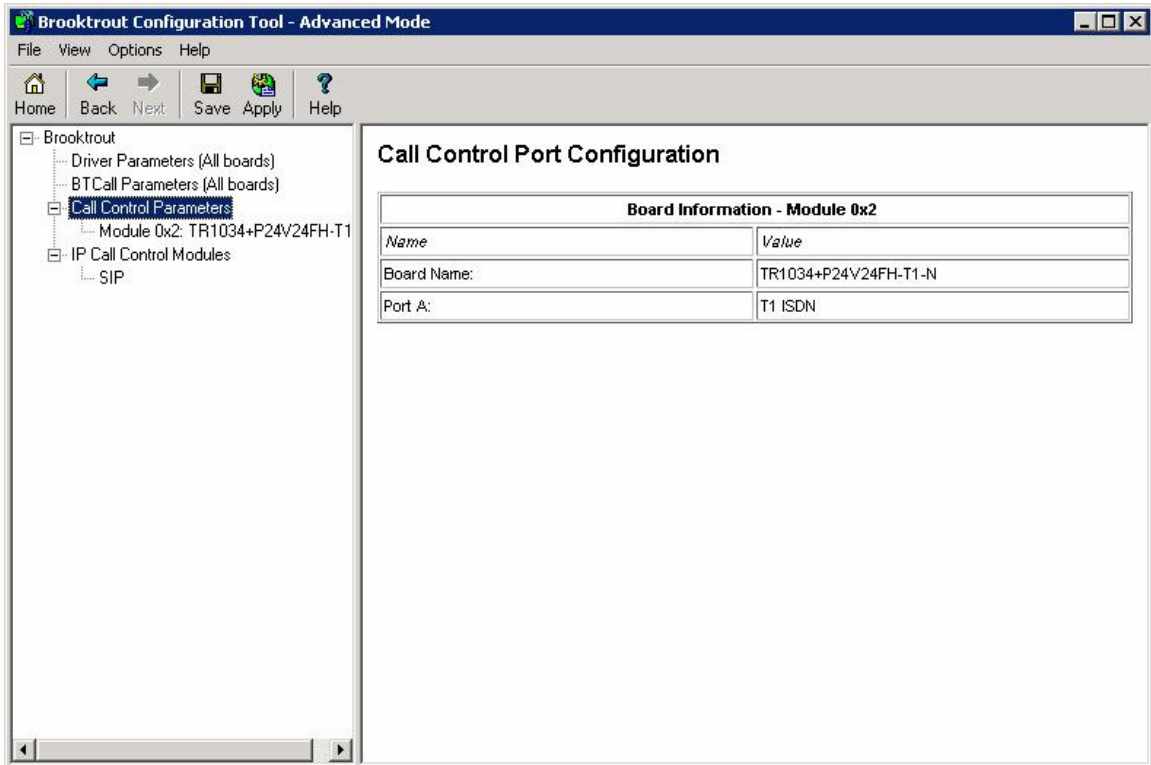
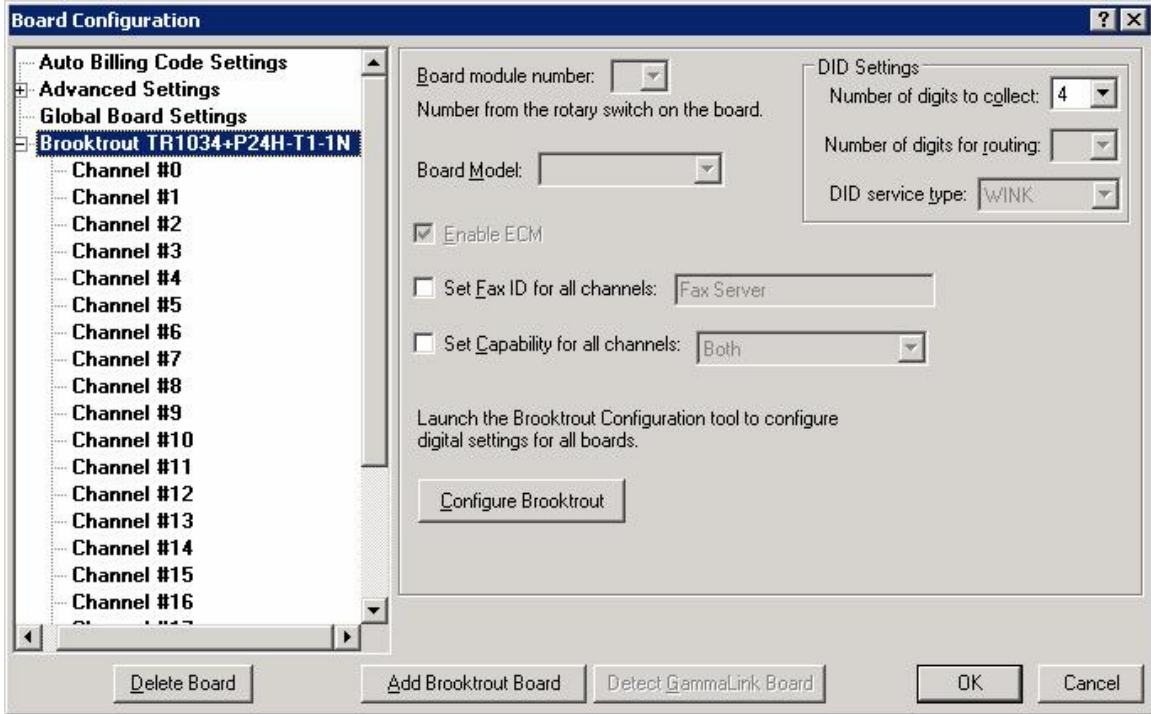
1. Install the fax board drivers and the fax board according to the RightFax Version 9.0 Fax Board Guide. This is available as 'Fax Board Guide.pdf' on the \rightfax\docs folder on the RightFax Server, or on the RightFax 9.0 CDs.
2. Open the RightFax BoardServer Module from Enterprise Fax Manager and click Configure BoardServer (highlight 'RightFax Boardserver' under the Legacy dropdown).
3. Select a new Brooktrout board from the Fax Board Selection dialog box in the BoardServer Control Panel.



4. Click Configure Brooktrout. This launches the Brooktrout Configuration Tool.

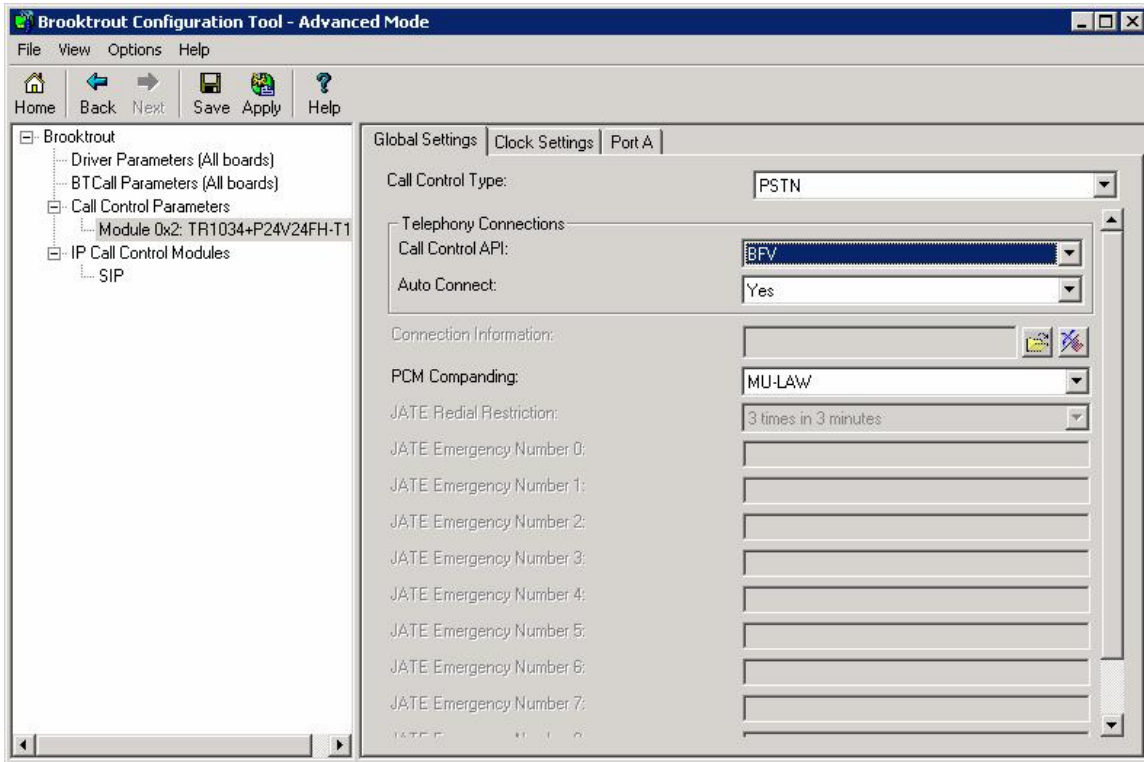
NOTE: The Rightfax Boardserver Module must be stopped before launching the Brooktrout Configuration Tool. Launching the Brooktrout Configuration Tool while the BoardServer is running will result in an error similar to the following:  
Error 01/17/05 15:27:19: BfvSessionAttach for module 0x2 failed (Misc error: Resource busy.)

NOTE: When a Brooktrout IP-enabled board is added to a machine and being used for T.38 Fax over IP, the Brooktrout Configuration Tool must be used. All IP configurations are adjusted using the Brooktrout Configuration Tool. In addition, all non-IP (PSTN) boards located in the same computer must be configured using the Brooktrout tool.

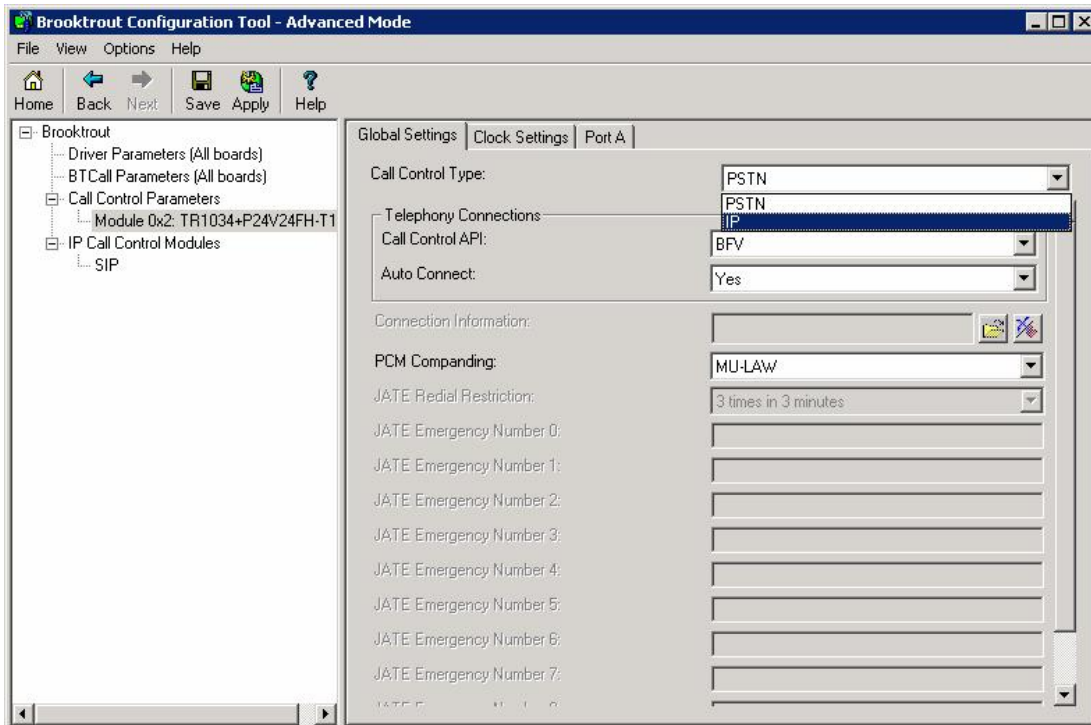


Brooktrout Configuration Tool

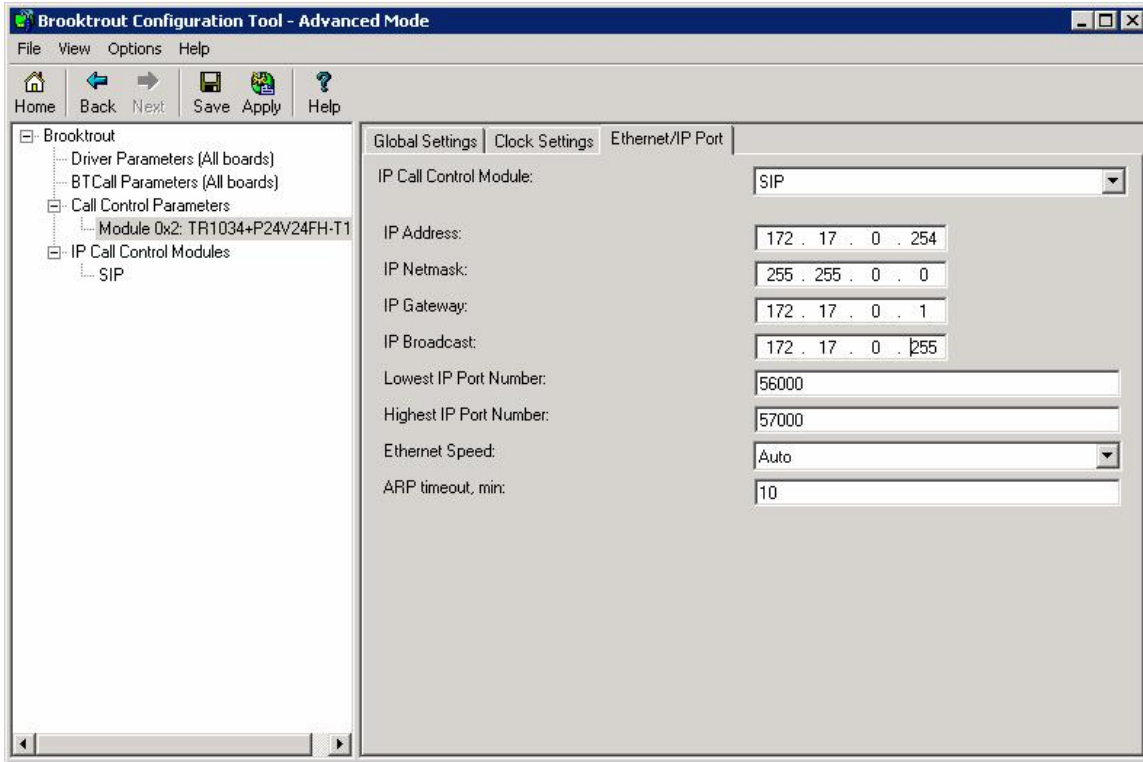
5. Under Call Control Parameters, highlight the board module number to configure.



6. Enable IP Call Control (see below).

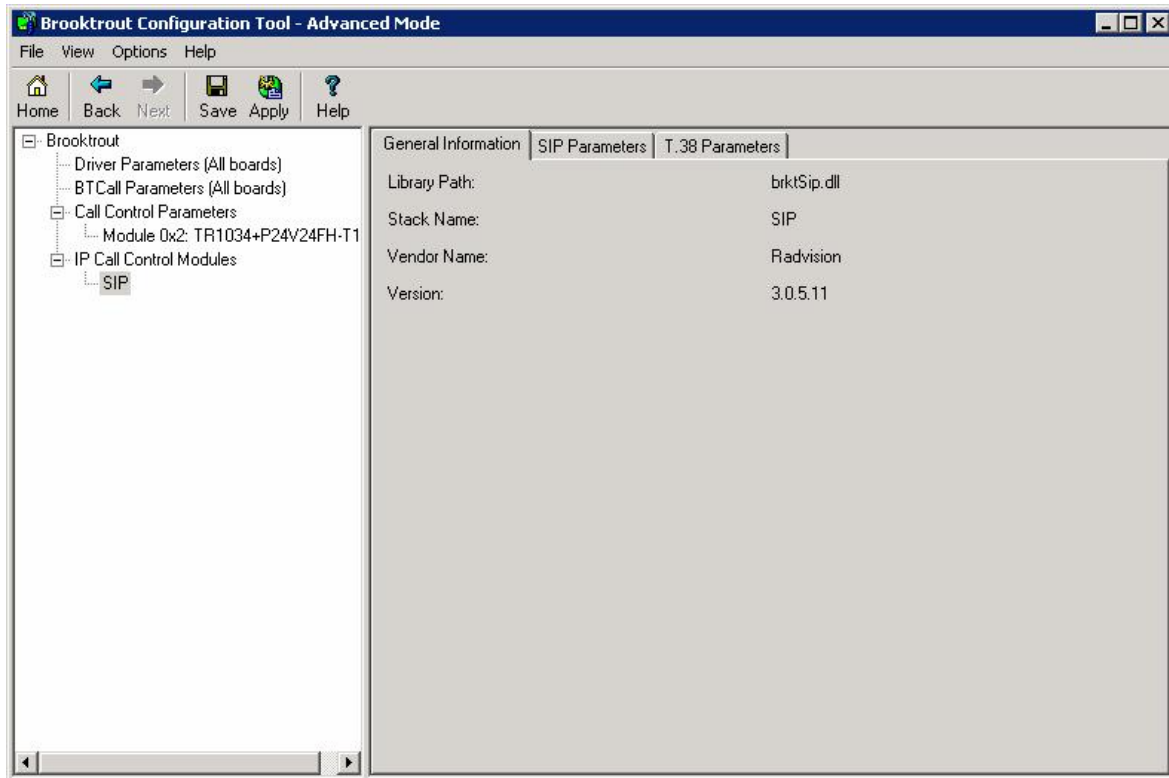


When Call Control Type is set to 'IP', the Ethernet/IP Port tab is displayed. The TR1034 board requires static IP configuration for the IP address, netmask, and broadcast address.



7. Under IP Call Control > SIP Parameters, accept the defaults, or modify as necessary.

NOTE: The T.38 parameters do not require any modification.

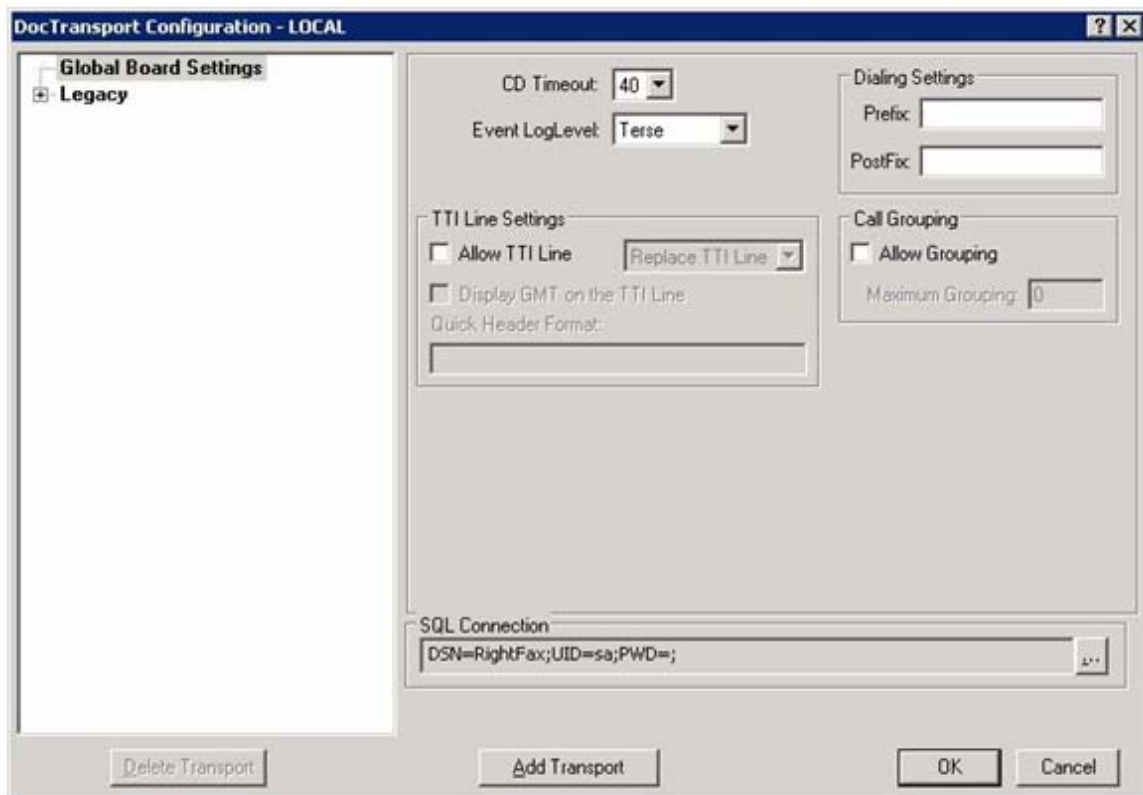


8. Modify the Callctrl.cfg file, located in RightFax\RFBoard\Boston, by changing the following values: (NOTE: You can see the settings in the T.38 Parameters tab, but they cannot be changed easily from the tab).

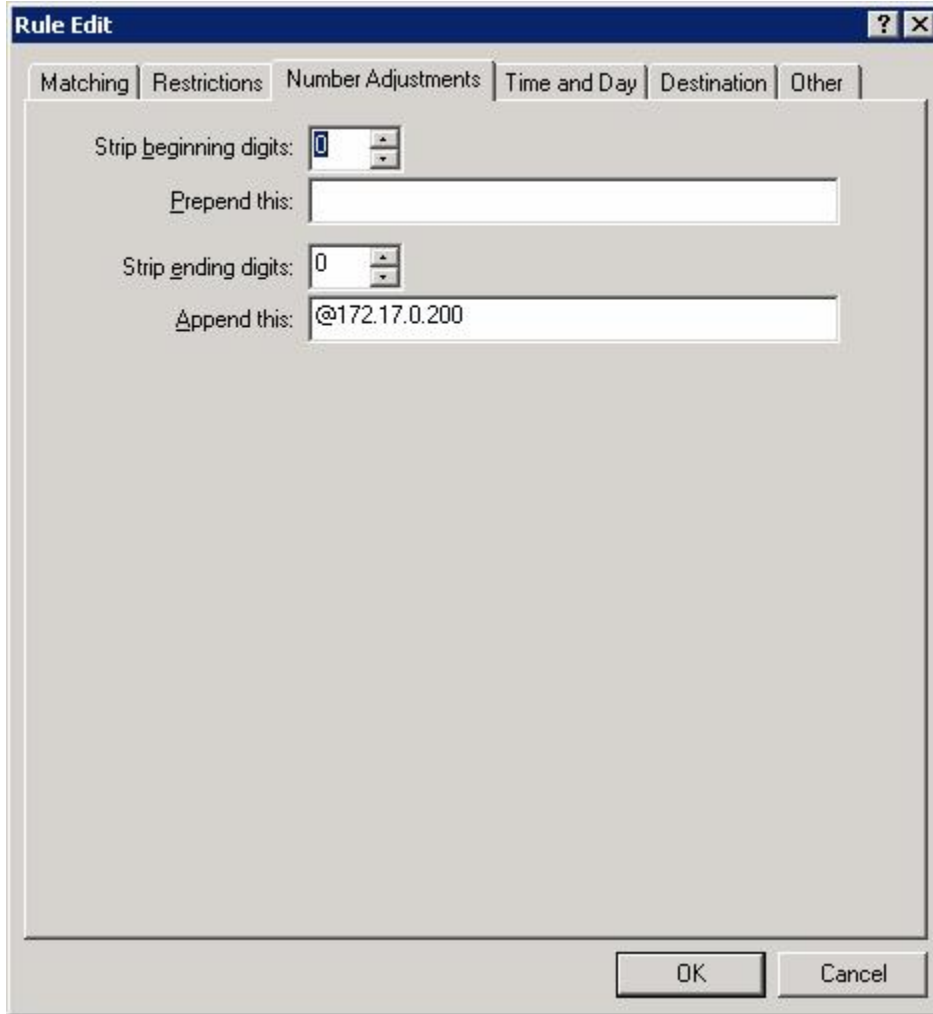
```
t38_max_buffer = 200  
t38_max_datagram_recv = 72  
t38_max_datagram_send = 72
```

After all configuration is complete and you have a working configuration, we recommend that you make a backup of the callctrl.cfg file, and mark the live file “read-only,” to prevent accidental changes.

9. Open DocTransport, and select Global Board Settings. Remove the dialing prefix 'ww'. The 'ww' digits cannot be processed by the IP board.



10. Add a dialing rule, or rules, as necessary, which will append @ip.of.the.cisco to any faxes getting routed via the Cisco router. On the Number Adjustments tab, append @<the IP address of the Cisco router>:



11. On the Other tab, configure the Range of Channels, if needed. If IP boards and non-IP boards co-exist in the same machine, specify the Range of Channels for the IP boards.

NOTE: Faxes sent via IP must be sent via IP channels.

**Rule Edit** [?] [X]

Matching | Restrictions | Number Adjustments | Time and Day | Destination | Other

Special Actions

No Special Action

Send on Specific Range of Channels:

Start Channel: 0

End Channel: 23

Disallow Sending

Delay Fax:

Delay Until (HHMM): 0000

Priority Delta: 0

Extra Rule Weight: 0

Rule Disabled?

Comment:

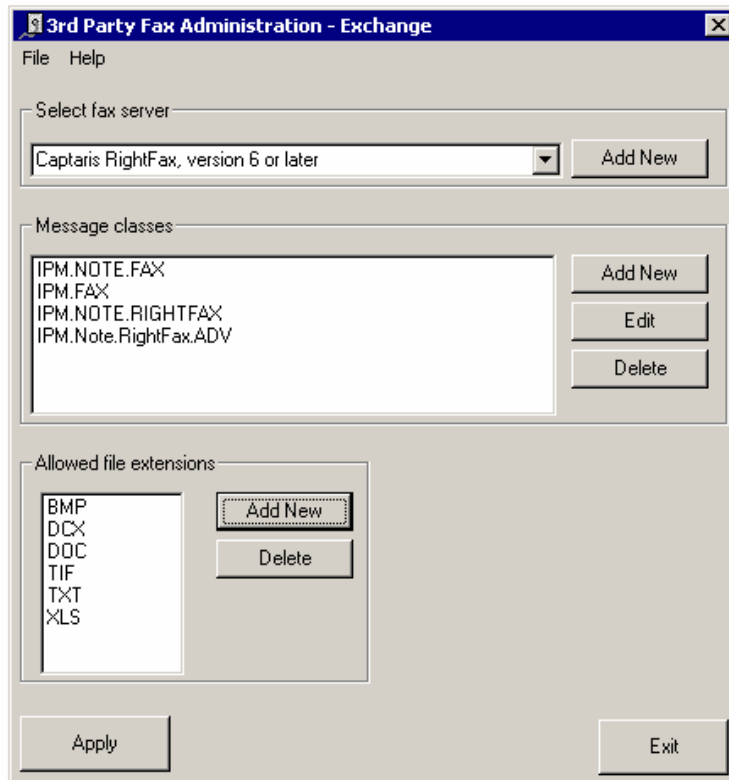
\_\_\_\_\_

OK Cancel

## Integration with Cisco Unity

### Using 3<sup>rd</sup> Party Fax Tool

The Third Party Fax Administration tool allows you to configure Cisco Unity® to work with the Cisco Fax Server as well as external fax servers that support Exchange or Domino. It also allows you to determine which file attachments are allowed to be forwarded to the fax server when faxing an e-mail from the telephone interface.



The image above shows the tool running on a Cisco Unity server connected to an Exchange mail store. If you are connected to Domino, it will look considerably different (see the Domino section below).

NOTE: After making any changes to the fax settings in Cisco Unity versions prior to 4.0(1), it is necessary to restart Cisco Unity before the changes will take effect. For Cisco Unity 4.0(1) and later, a restart is not necessary.

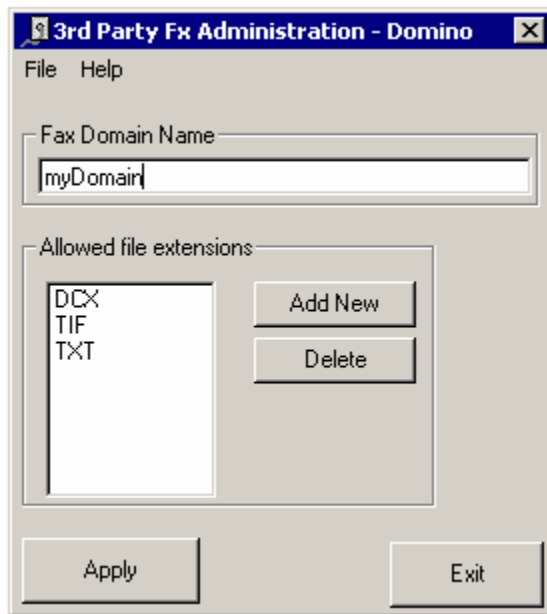
### Fax with Exchange

In the case of Exchange, you typically need to run the tool, select which fax server you are running on your network, and click the "Apply" button. This will configure the registry properly for Cisco Unity to recognize faxes in users' inboxes from that fax server.

Select Captaris Rightfax, because the Cisco Fax Server is an OEM version of that.

## Fax with Domino

Domino does not use message classes to identify messages in the user's message store as faxes. Instead fax messages are sent to a special domain address that identifies them as faxes. All fax servers that support Domino follow this model. As such, the only things you need to configure for when using Domino are the name of the domain where fax messages need to be sent so that they'll reach the fax server, and the allowed file extensions.



## Fax Domain Name

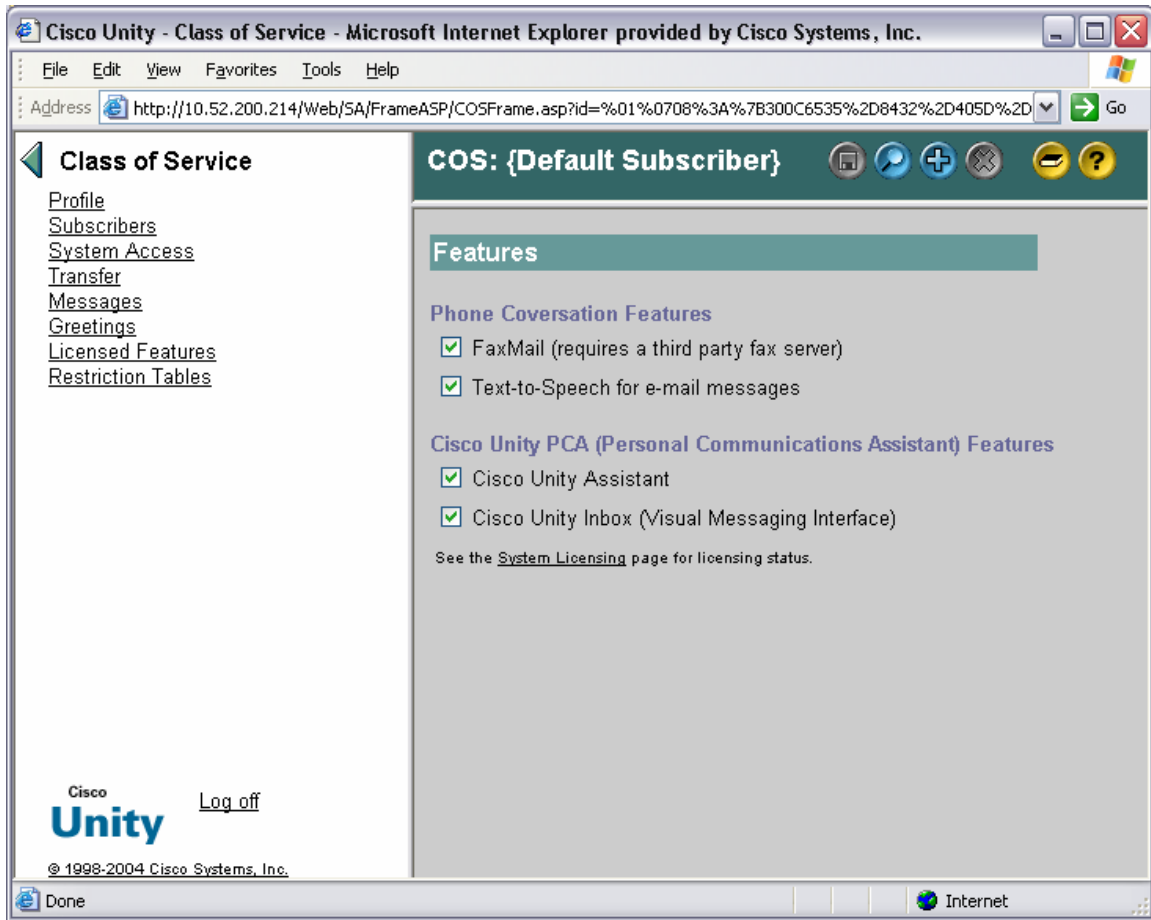
When you configure your fax server with Domino, it is necessary to define a domain name where faxes are routed so that they will be delivered to the fax server for outbound processing. Typically the full e-mail address would look like "Jsmith@myCompany.com@FaxDomain". Messages to this address go out through the fax server.

Cisco Unity needs to know the fax domain name (the "FaxDomain" in the address above). To set this, type the domain name (do not include the "@" sign) and click the "Apply" button. This writes the information into the registry where Cisco Unity can read it during startup.

## Enabling FaxMail in Cisco Unity

The FaxMail feature enables fax functionality on your Cisco Unity Server.

To allow subscribers to manage their fax messages over the phone, you must enable FaxMail in their Class of Service (COS). To allow subscribers to have their e-mail messages delivered to a fax machine, you must check the check boxes for both Text to Speech for E-Mail Messages and for FaxMail.



More Information is available at:

[http://www.cisco.com/univercd/cc/td/doc/product/voice/c\\_unity/unity40/sag/sag405/ex/sag\\_0110.htm](http://www.cisco.com/univercd/cc/td/doc/product/voice/c_unity/unity40/sag/sag405/ex/sag_0110.htm).