Mediatrix®

EMPOWERING THE EDGE OF THE IP NETWORK

Configuration Notes 246

Mediatrix 4400 Digital Gateway
ISDN Telephones

December 22, 2006

0246

Table of Contents

Introduction

This document outlines the configuration steps to set up one Mediatrix® 4400 digital gateway to provide voice over IP (VoIP) connectivity to ISDN telephones in a corporate network environment.

Mediatrix 4400 Digital Gateway Overview

These configuration notes apply to the Mediatrix 4400 Series digital gateway products. The Mediatrix 4400 Series Digital Gateways allow enterprises to lower communications costs over any IP link. The platform features ISDN BRI interfaces. They provide an ideal solution for enterprise voice applications or for connecting to a service provider's broadband access.

Mediatrix® 4400 digital gateways are fully scalable in terms of number of ports and functionalities. They currently come in the following models:

Model	Interfaces	VoIP Call Capacity
Mediatrix 4401	1 BRI port	up to 2
Mediatrix 4402	2 BRI ports	up to 4
Mediatrix 4404	4 BRI ports	up to 8

The Mediatrix digital gateways link any standard BRI connection to the IP network and deliver the clarity of toll quality voice for a comprehensive VoIP solution.

T.38 FoIP, fax bypass, and modem bypass capabilities ensure that the Mediatrix digital gateways seamlessly transport voice and data services. The Mediatrix digital gateways offer flexibility and scalability for VoIP network integration and low bandwidth voice.

With configurable NT/TE BRI ports, call-switching, and user programmable call routing (including caller/called ID), Mediatrix digital gateways integrate smoothly into existing PBX and PSTN networks.

Key Features:

- Voice Routing
- Fax over IP support, including T.38
- Proven voice algorithms implemented on dedicated DSP for enhanced voice quality
- Up to 8 simultaneous calls
- SNMPv3 and web management
- Configuration file encryption
- Automatic firmware and configuration file download
- Optional PSTN Bypass feature
- Optional Power Over Ethernet
- Optional Power Feeding Module for BRI phones

Deployment Scenario

Description

This document outlines the configuration steps to set up one Mediatrix® 4402 digital gateway to provide voice over IP (VoIP) connectivity to ISDN telephones in a corporate network environment. The Mediatrix 4402 is used to connect the ISDN telephones to an existing VoIP network. The configuration starts with the Mediatrix 4402 default configuration but can be easily customized for the 4404 and 4401, so from now on, the device will be referred to as the *Mediatrix 4400*. The following is the network topology to which we will refer in our sample deployment.

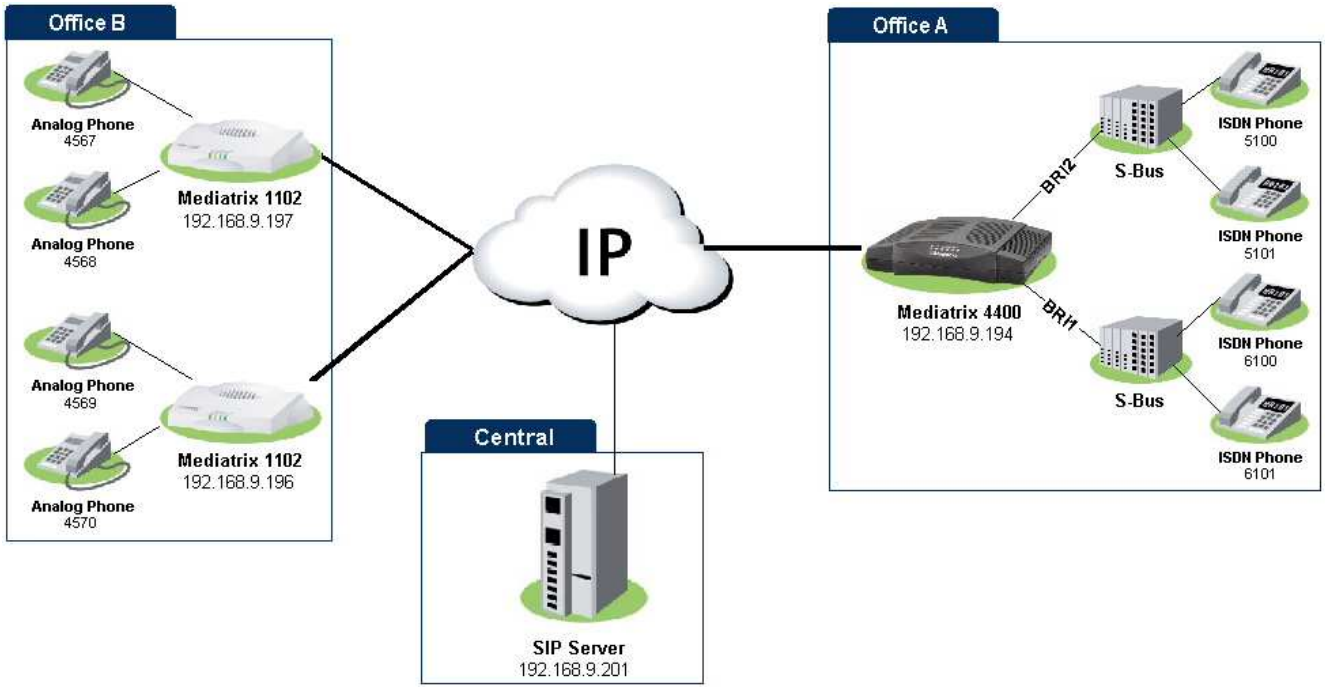


Figure 1 - Network Topology

Note: The network addresses and phone numbers shown above are sample values that will most probably vary in your specific setup. In the following pages, when referring to such a sample value, it will be visually outlined (e.g., ***192.168.9.194***), so whenever you see parameters outlined in that fashion, you should replace them with the values that are appropriate for your specific setup.

Objectives

The steps described in the following pages will show you how to setup the Mediatrix 4400 so it can:

A. receive calls from the ISDN phones and route them to a remote branch through the VoIP network. (e.g., from Office A to Office B):
   1. a user from Office A picks up an ISDN phone and dials a number.
   2. the Mediatrix 4400 forwards the call to the appropriate Mediatrix 1102.
   3. the Mediatrix 1102 makes the appropriate analog phone ring.
   4. a user in Office B picks up the analog phone and the call is established.

B. receive calls from remote branches through the VoIP network and route them on one of the local branch's ISDN phones (e.g., from Office B to Office A):
   1. a user from Office B picks up an analog phone and dials a number.
   2. the appropriate Mediatrix 1102 routes the call to the Mediatrix 4400.
   3. the Mediatrix 4400 decides to which ISDN BRI interface route this call (based on dialled number).
   4. the appropriate ISDN phone rings.
   5. a user from Office A picks up the ISDN phone and the call is established.

Assumptions

This configuration note focuses on configuring the Mediatrix 4400, and assumes that:

- the phone numbers of the ISDN phones in Office A correspond to registered users in the SIP server (without authentication).
- the Office B setup is functional, and the SIP users are correctly registered to the SIP server.

Steps

This configuration note will guide you through the following steps:

1. Physical connection of the Mediatrix 4400 to the network and ISDN phones.
2. IP address discovery or configuration.
3. Web interface access.
4. SIP configuration.
5. ISDN configuration.
6. Call routing configuration.
7. Basic call establishment.

Configuration of the Mediatrix 4400 Digital Gateway

Physical Connection of the Mediatrix 4400 to the Network and ISDN Phones

Please refer to the Mediatrix 4400 Quick Start booklet (packaged with the Mediatrix 4400) for instructions on hardware installation.

The Mediatrix 4400 Quick Start booklet can also be found online on the Mediatrix Download Portal at https://support.mediatrix.com/DownloadPlus/Download.asp.

IP Address Discovery or Configuration

The purpose of this section is to be able to contact the Mediatrix 4400's management interface to start with unit configuration.

Once the physical connection is complete and the Mediatrix 4400 is powered up, the first thing to do is find out the IP address the Mediatrix 4400 is using. The Mediatrix 4400's IP address can be set either dynamically or statically. The default behaviour of the Mediatrix 4400 is to try to obtain a dynamic IP address through DHCP.

Dynamic IP Address Discovery

Before connecting the Mediatrix 4400 to the network, Mediatrix strongly suggests that you reserve an IP address in your DHCP server for the unit you are about to connect. DHCP servers reserve IP addresses for specific devices by using a unique identifier for each device. The Mediatrix 4400's unique identifier is its media access control (MAC) address. The MAC address appears on the label located on the bottom side of the unit.

If you have not reserved an IP address, you can discover which IP address has been assigned to the Mediatrix 4400 by either:

- consulting your DHCP server's logs to find out details on the DHCP lease that was given to the Mediatrix 4400.
- using a network packet sniffer (e.g., Ethereal) to examine the DHCP messages exchanged between the Mediatrix 4400 and your DHCP server while the Mediatrix 4400 boots up.

Default Static IP Address Configuration

If there is no DHCP server in your network, then the IP address has to be configured statically. The first thing to do is set the Mediatrix 4400 to its known default static IP address. You can do this by using the Mediatrix 4400's partial reset feature (see the section Further Information and Configuration for more details).

1. Once the Mediatrix 4400 has finished booting up (the *Power* LED is lit, not blinking), insert a small, unbent paper clip into the RESET/DEFAULT hole located at the rear of the Mediatrix 4400 to press the RESET/DEFAULT button. The *Power* LED will start blinking, and after a few seconds, all the LEDS will start blinking. Release the paper clip after all the LEDs start blinking and before they all stop blinking (between 7-11 seconds).

After a partial reset is performed, the Mediatrix 4400 uses the default IP address 192.168.0.1. From now on, you can optionally change the Mediatrix 4400's IP address (see section Further Information and Configuration for more details).

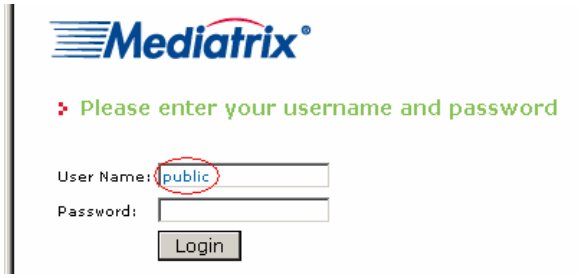
Web Interface Access

The purpose of this section is to log in to the Mediatrix 4400's web interface.

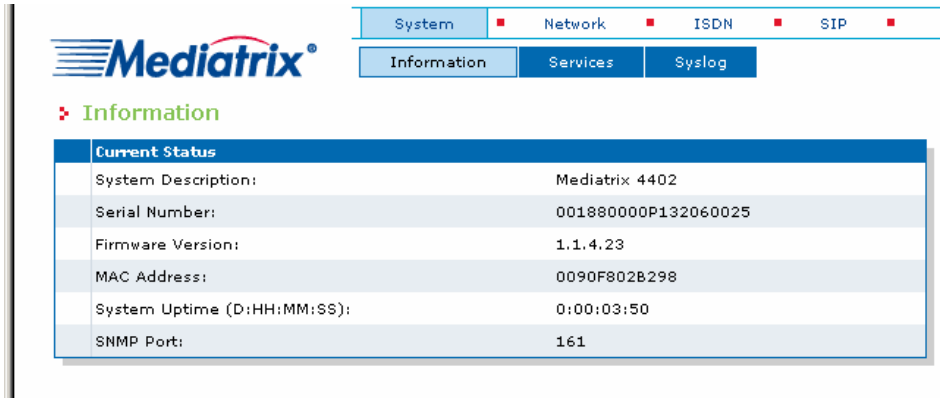
The Mediatrix 4400's web interface may be used to view the status of the Mediatrix 4400 and set its numerous parameters.

1. In your web browser's address field, type ***192.168.9.194*** (or the address of the Mediatrix 4400). The PC you use must be connected to the same subnet as the Mediatrix 4400 or to a network where it can reach the Mediatrix 4400's IP address. The following window appears:

2. Enter the user name **public**. Leave the *Password* field empty.



3. Click **Login**.



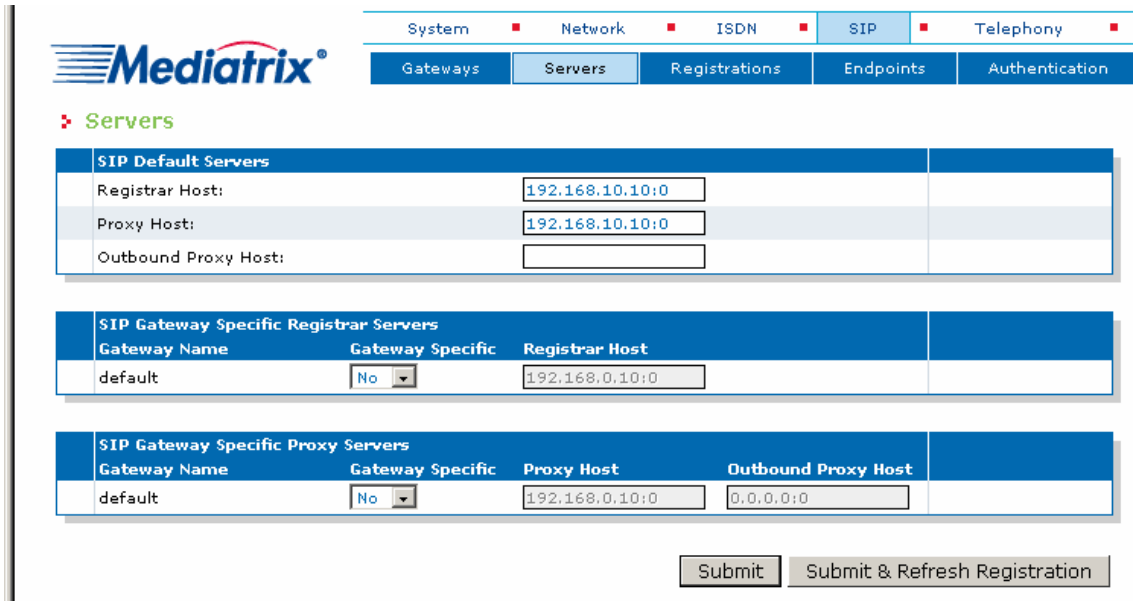
You now have access to the Mediatrix 4400's configuration web interface.

SIP Configuration

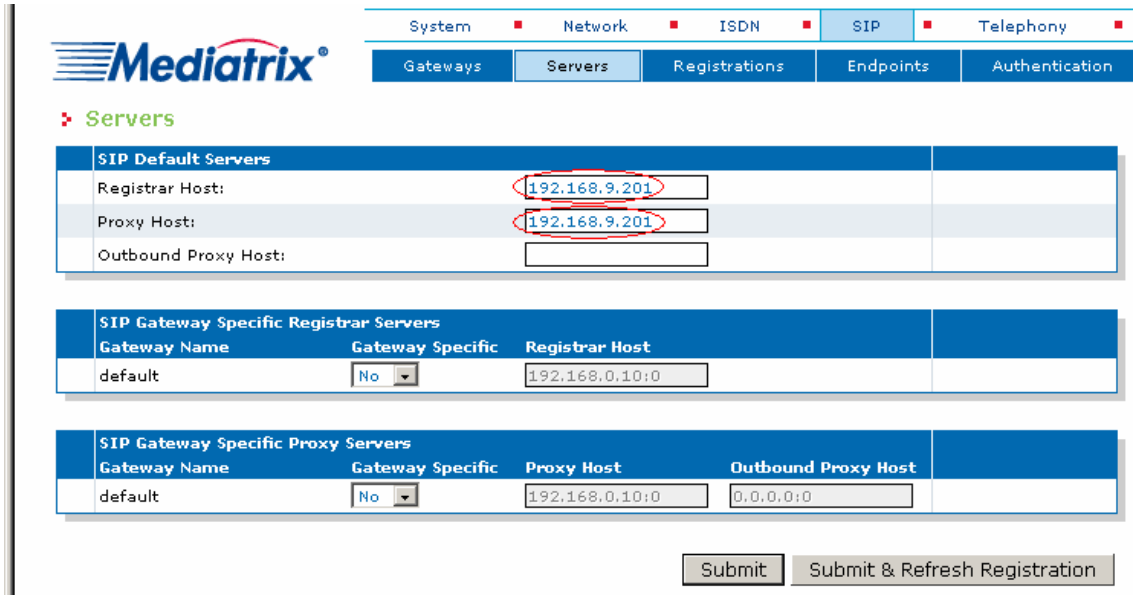
The purpose of this section is to setup the Mediatrix 4400 to use your SIP server for registration and call routing, and to tell the Mediatrix 4400 to register SIP users for all the ISDN phones that are connected to it.

The SIP configuration tells the Mediatrix 4400 which SIP servers, parameters, and phone numbers to use. The following steps configure the Mediatrix 4400 as illustrated in the sample network topology.

1. Click the **SIP** menu, then the **Servers** sub-menu. The following window appears:

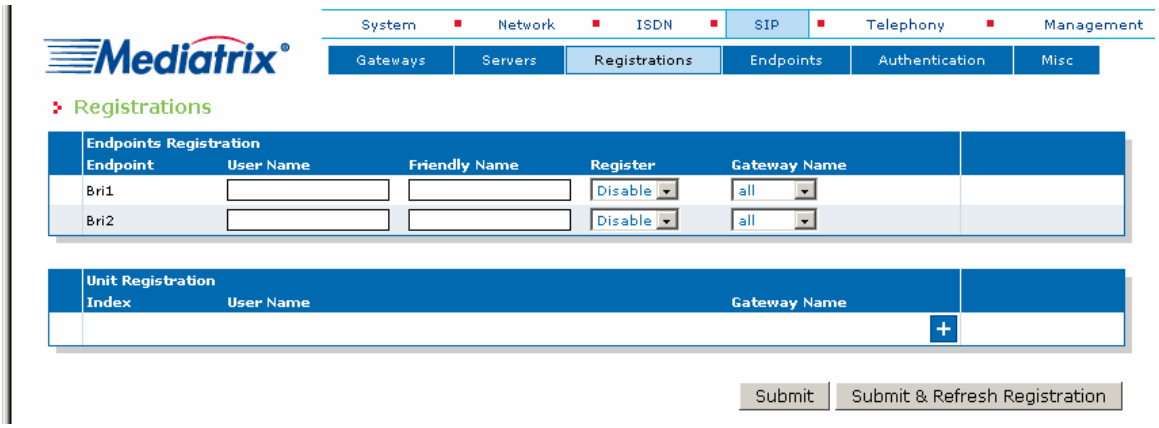


2. Set the *Registrar Host* field to the address of the central SIP Server ***192.168.9.201***.
3. Set the *Proxy Host* field to the address of the central SIP Server ***192.168.9.201***.



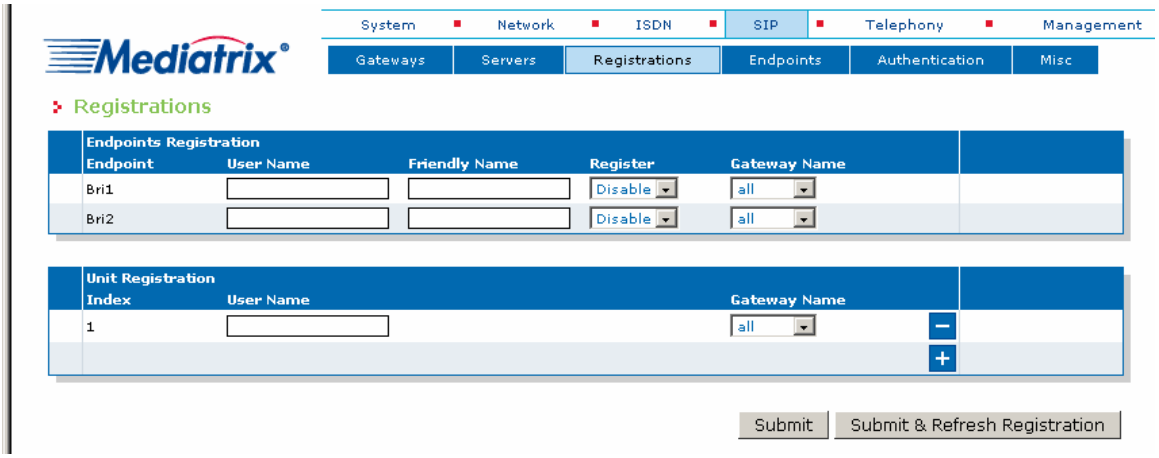
4. Click **Submit** to save the configuration changes. The Mediatrix 4400 is now configured to use your SIP server.

5. Click the **Registrations** sub-menu. The following window appears:

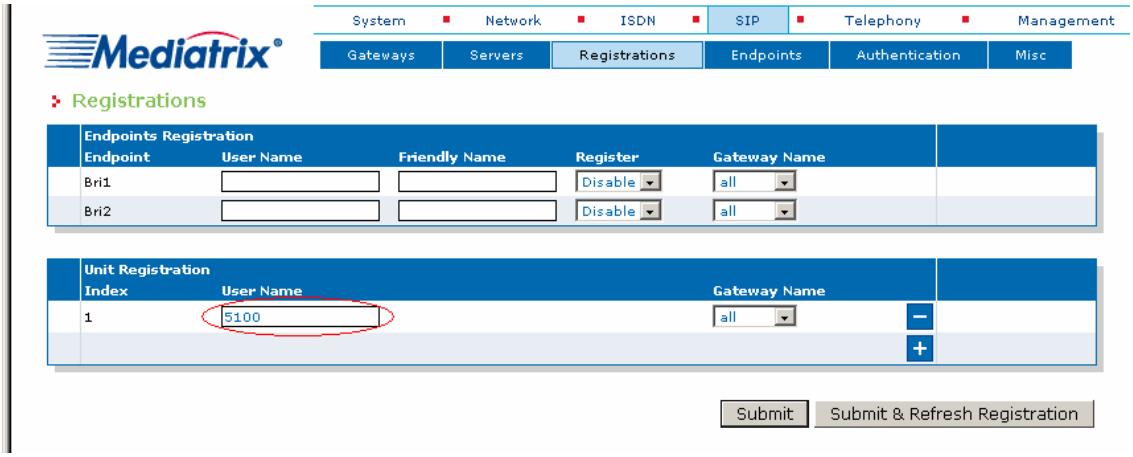


In this window, you can enter the phone numbers of the ISDN phones to be registered in the SIP server.

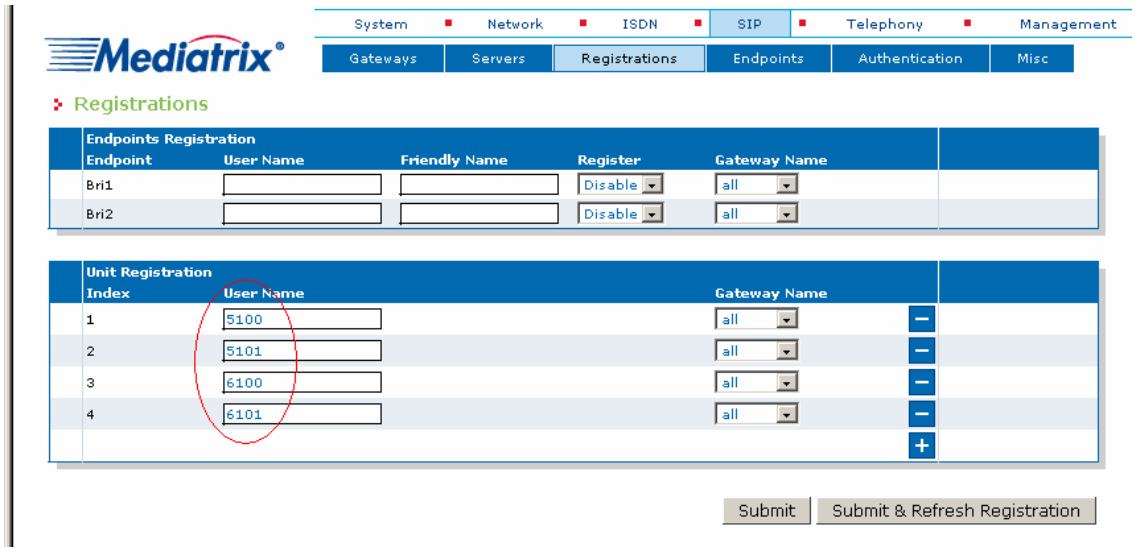
6. Click the + button at the bottom right of the *Unit Registration* section. An empty entry appears in the section.



7. Enter the phone number of the first ISDN phone from Office A of the sample network topology (Figure 1) in the *User Name* field (***5100*** in our example).



8. Repeat steps 6 and 7 for all of the ISDN phones from Office A of the sample network topology (Figure 1). At the end of the process, the *Unit Registration* section looks like the following:



9. Click **Submit & Refresh Registrations**. This saves the configuration in the Mediatrix 4400 and causes it to send the appropriate SIP REGISTER messages to the SIP server so each ISDN phone has a registered SIP user associated with it.

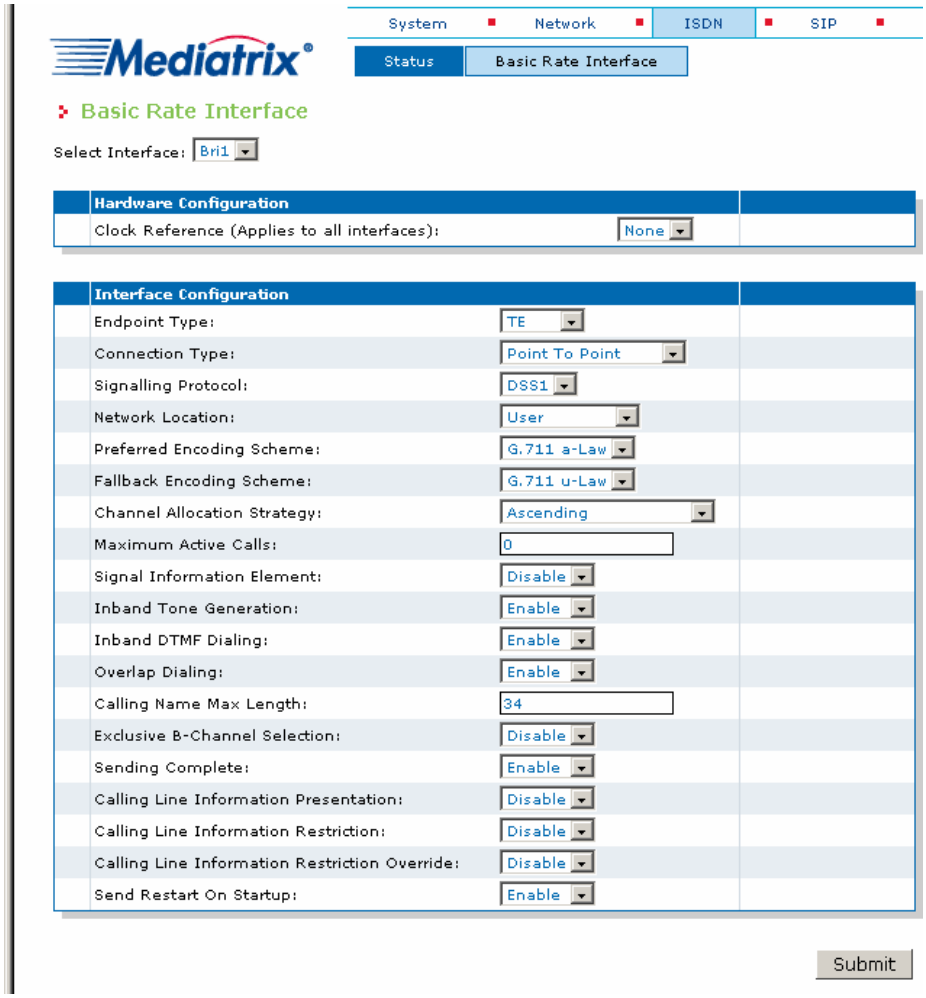
10. OPTIONAL STEP: if your SIP server requires SIP authentication, further configuration steps are necessary so the Mediatrix 4400 has all the needed information to authenticate to the server (see the section Further Information and Configuration for more details).

ISDN Configuration

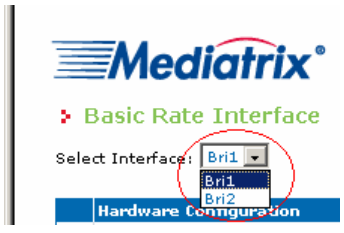
The purpose of this section is to configure the Mediatrix 4400's ISDN BRI interfaces in Network mode (NT) for a point-to-multipoint line, and to enable ISDN power feeding if your setup requires it.

The ISDN configuration tells the Mediatrix 4400 how its ISDN BRI interfaces should behave. You must configure the ISDN parameters of the Mediatrix 4400 digital gateways for each interface you intend to use.

1. Click the **ISDN** menu, then the **Basic Rate Interface** sub-menu. The following window appears:

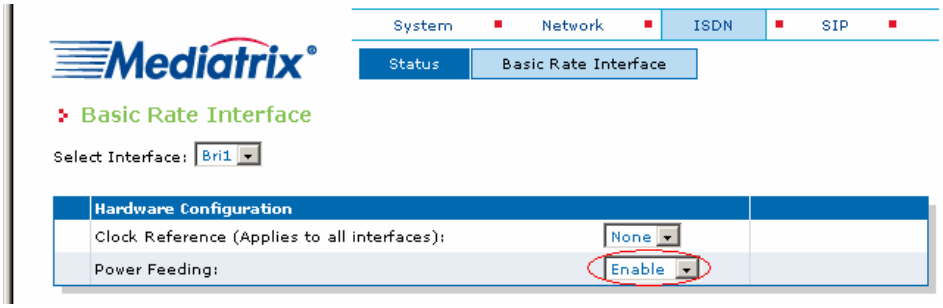


2. Select the interface for which you want to apply the changes in the *Select Interface* drop-down menu. Depending on the model of Mediatrix 4400 you are using, you may have 1, 2, or 4 interfaces available in the drop-down menu.

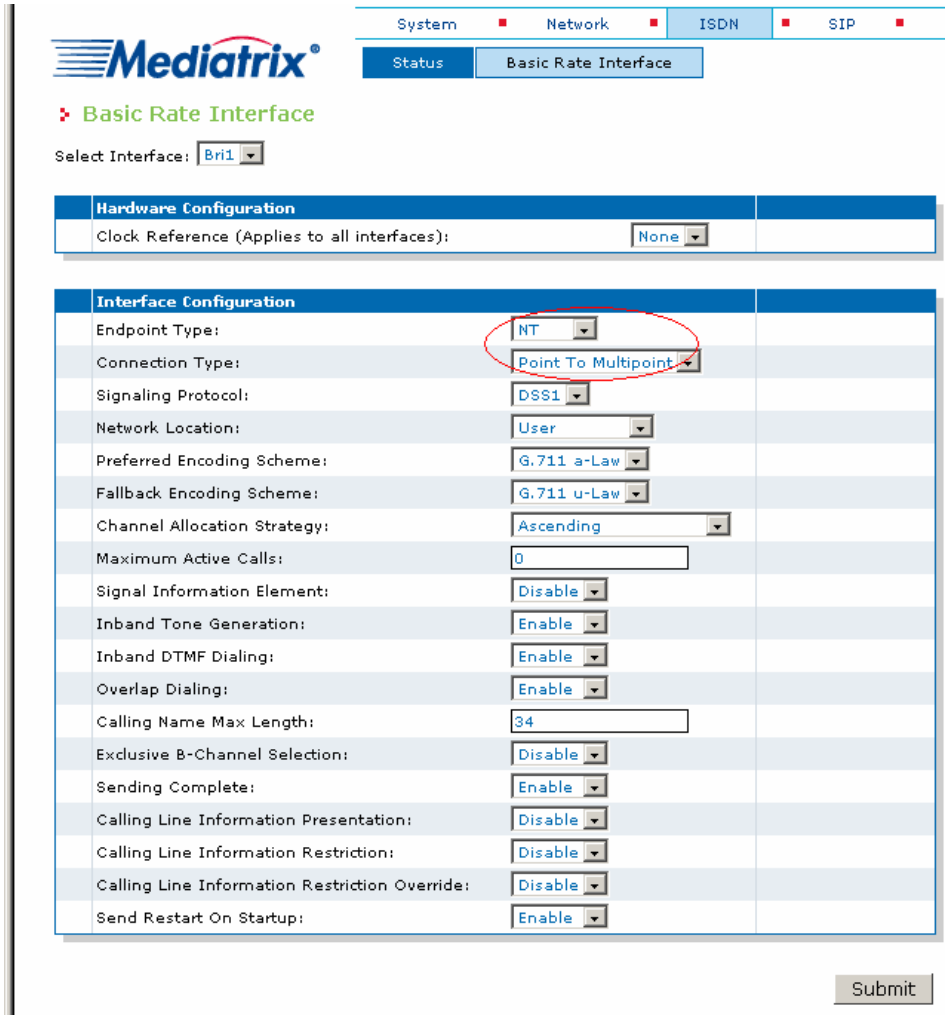


NOTE: Depending on the model of Mediatrix 4400 you are using, there may or may not be a *Power Feeding* field in the *Hardware Configuration* section.

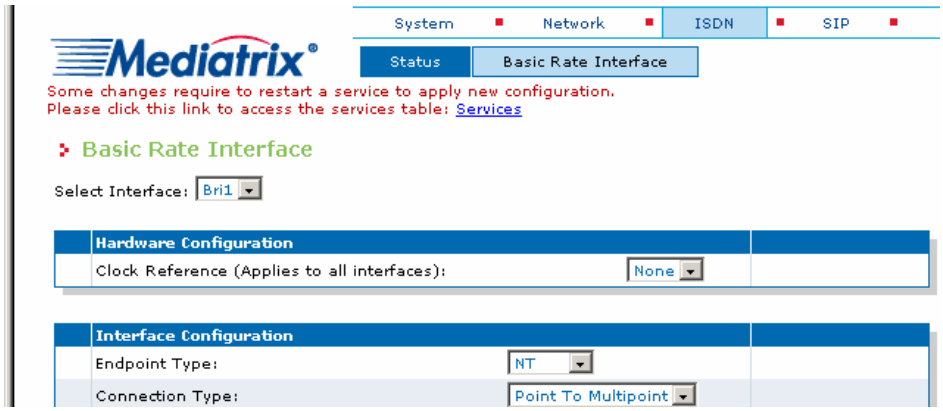
3. OPTIONAL STEP: if your setup requires the Mediatrix 4400 to feed power to the ISDN BRI phones, set the *Power Feeding* field to **Enable**.



4. In the *Interface Configuration* section, set the *Endpoint Type* field to **NT** and *Connection Type* field to **Point to Multipoint**. Leave all other parameters to their default values.



5. Click **Submit** to apply the configuration changes made to this interface. The following message appears at the top of the window:



6. The parameters that have just been configured require a restart of the ISDN service. A service is a logical grouping of features. Restarting a service is a required mechanism for certain elements in the configuration. However, you can finish with the ISDN configuration steps before doing that. Once the ISDN configuration is over, follow the instructions from Appendix A - Restarting a Service to restart the ISDN service as required.
7. Repeat steps 2 to 5 for all of the ISDN BRI interfaces listed in the *Select Interface* field.
8. Restart the ISDN service as described in Appendix A - Restarting a Service.

Call Routing Configuration

The purpose of this section is to configure the Mediatrix 4400's call router so it can route calls to/from the VoIP network and the ISDN phones as described in the Deployment Scenario section.

You must configure the call router parameters of the Mediatrix 4400 digital gateways so that the calls can properly terminate. Remember that the purpose of this configuration note is to achieve the sample deployment scenario shown in Figure 1. Your specific setup may vary.

Planning the Call Router

The goal of planning the Call router configuration is to summarize the rules incoming calls will follow when passing through the Mediatrix 4400.

This is:

- Call sources and destinations.
- Calls allowed and rejected.
- Call properties manipulations.
- All routing possibilities.

Before going further with the configuration steps, you should refer back to the two types of calls described in the Deployment Scenario section.

The most basic call scenario implies at least configuring *Routes*, and this is what is needed in the sample Deployment Scenario.

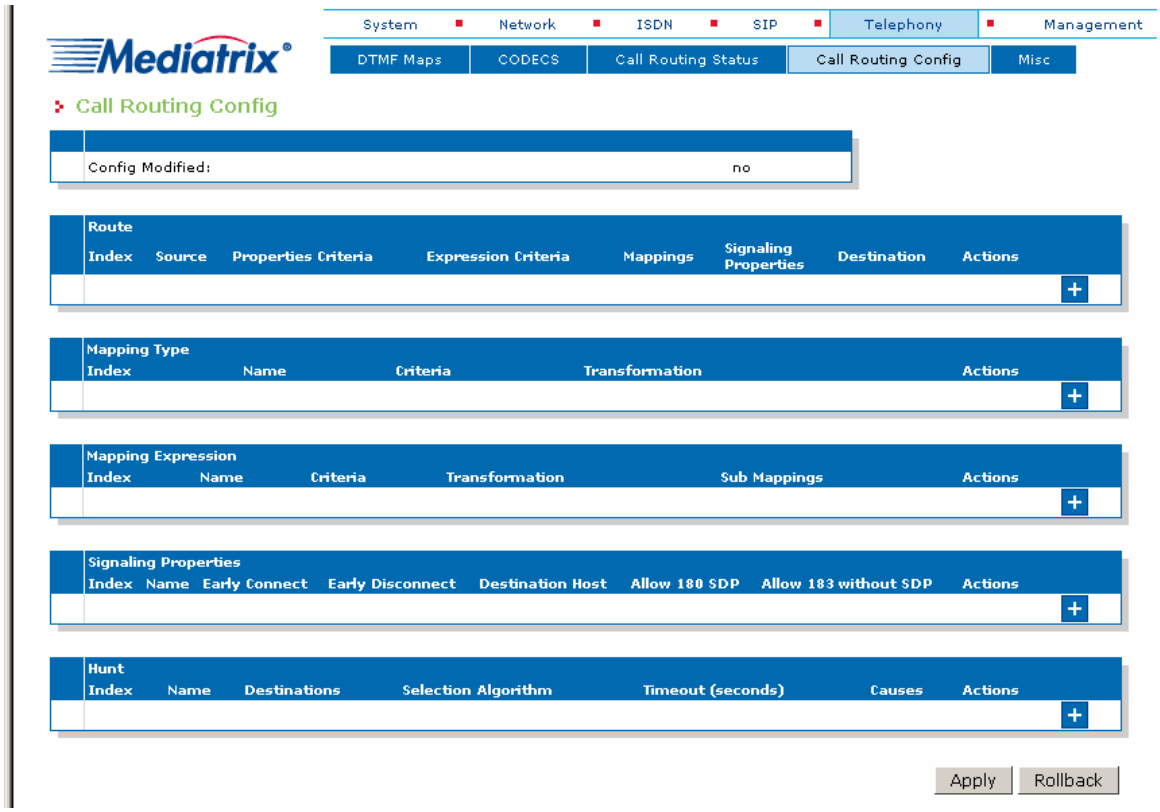
- A Route is a virtual connection made inside the Mediatrix 4400 between call sources and destinations. Routes are part of the Mediatrix 4400's Route table. When a call comes in, the Mediatrix 4400 uses its Route table to decide to which destination route the call according to criteria specified in each route.

Configuring the Call Router

Route

The purpose of this subsection is to configure the Mediatrix 4400 so it makes virtual "connections" between call sources and destinations.

1. Click the **Telephony** menu, then the **Call Routing Config** sub-menu. The following window appears.

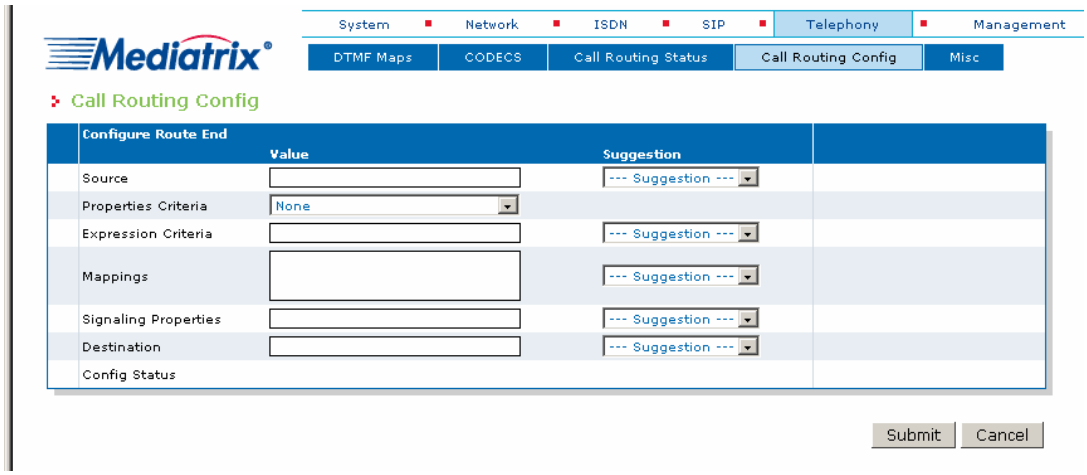


You will now create 4 routes in the call router:

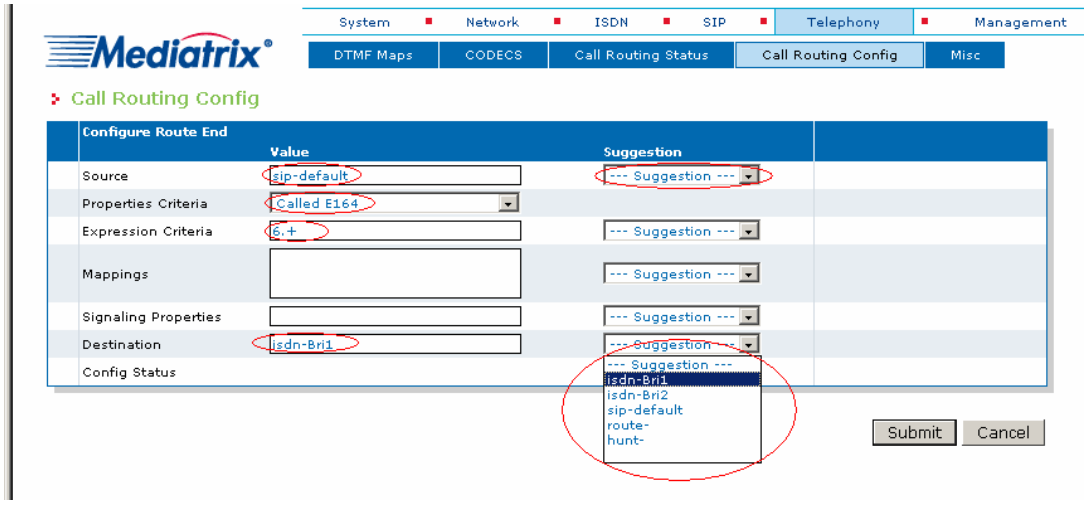
- 1 route to forward incoming calls with called phone number starting with digit ***6*** from SIP to the BRI1 interface.
- 1 route to forward incoming calls with called phone number starting with digit ***5*** from SIP to the BRI2 interface.
- 1 route to forward incoming calls from the BRI1 interface to SIP.
- 1 route to forward incoming calls from the BRI2 interface to SIP.

2. Locate the *Route* section at the top of the window.

3. Click the + button at the bottom right of the *Route* section. The following window appears.

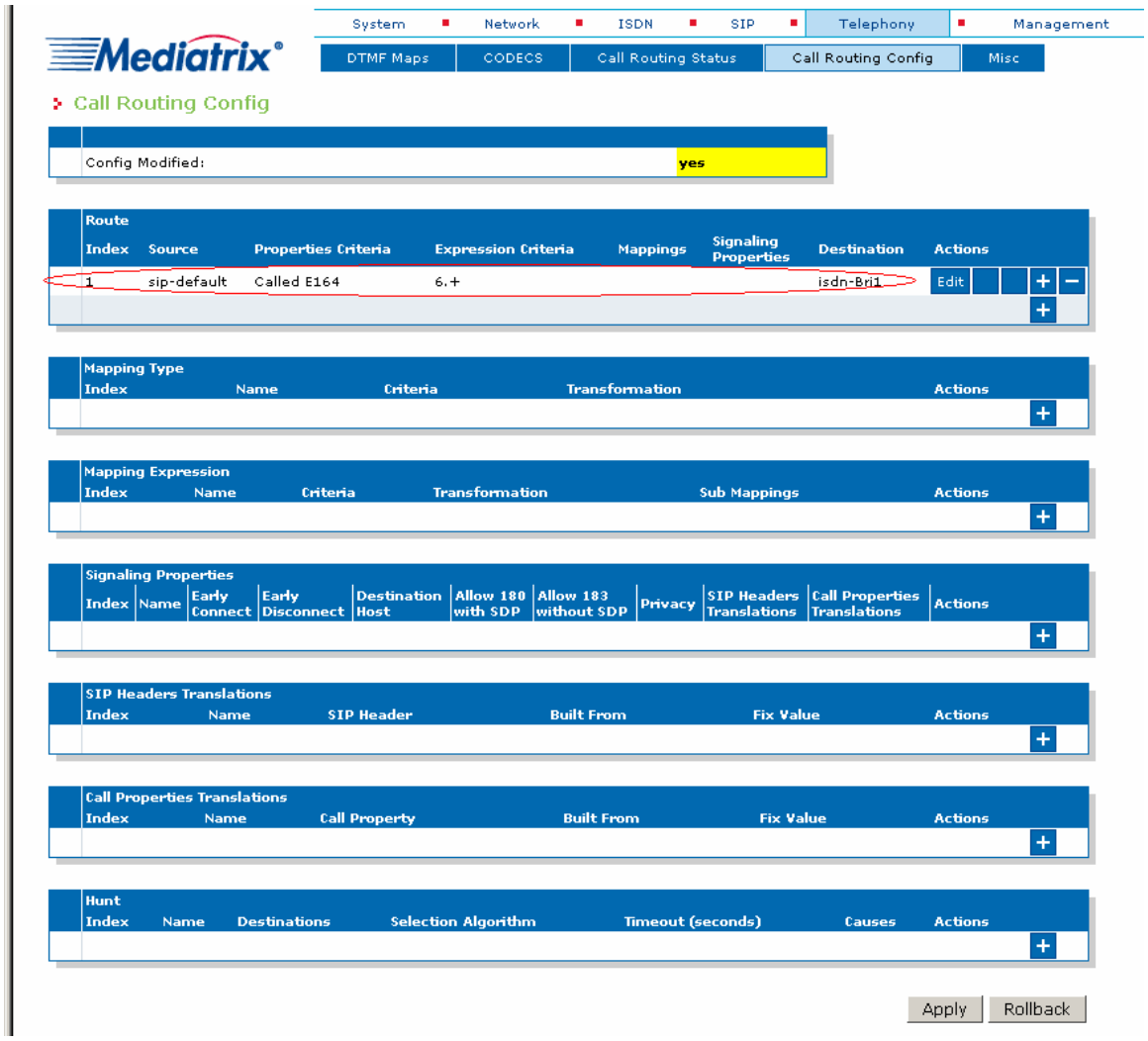


4. To create a route from SIP (**sip-default**) to ISDN BRI1 (**isdn-Bri1**), set the *Source* field to **sip-default** and the *Destination* field to **isdn-Bri1**. Set the *Properties Criteria* field to **Called E164** and the *Expression Criteria* field to ***6.+***. You can use the fields' associated *Suggestion* drop-down lists to help you fill them.



This route forwards all incoming SIP calls to the ISDN BRI1 interface if the dialed number (E164) starts with the digit ***6***. This will satisfy half of call scenario B described in the Deployment Scenario section, where SIP users from Office B call ISDN phones from Office A (those with phone numbers ***6100*** and ***6101***). If the phone numbers in your specific scenario differ, you can modify the contents of the *Properties Criteria* and *Expression Criteria* fields to suit your needs. The *Expression Criteria* field uses the regular expressions syntax to specify criteria (see the section Further Information and Configuration for more details).

5. Click **Submit** to apply changes and save the new route.



6. You are brought back to the **Call Routing Config** sub-menu, and you can see the route you just created in the *Route* section.

   You can also see a yellow *Yes* that warns you that the configuration has been modified but not applied (i.e., the **Call Routing Status** differs from the **Call Routing Config**). The *Call Routing Config* sub-menu is a working area where you build up a Call Router configuration. While you work in this area, the configured parameters are saved but not applied (i.e., they are not used to process incoming calls). The yellow *Yes* flag warns you that the configuration has been modified but is not applied. You will apply the configuration later when it is complete.

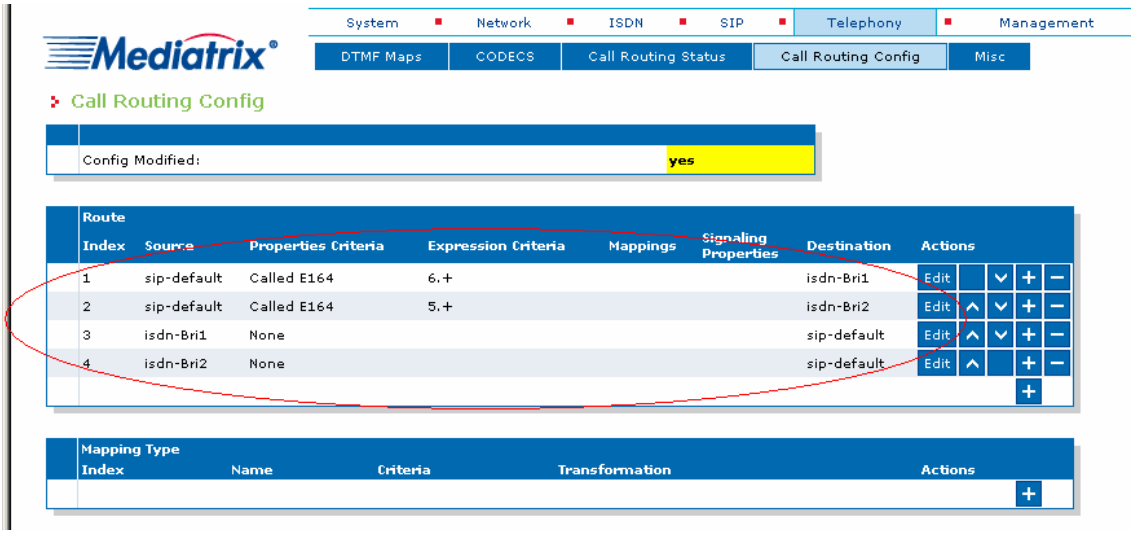
7. Repeat steps 3 to 6 to create an additional route from *Source* **sip-default** to *Destination* **isdn-Bri2** with *Properties Criteria* **Called E164** and *Expression Criteria* ***5.+***.

   This route will satisfy the other half of call scenario B described in the Deployment Scenario, where SIP users from Office B call ISDN phones from Office A (those with phone numbers ***5100*** and ***5101***).

8. Repeat steps 3 to 6 twice to create two additional routes:
   - one from *Source* **isdn-Bri1** to *Destination* **sip-default** (leave *Properties Criteria* **None** and *Expression Criteria* empty).
   - one from *Source* **isdn-Bri2** to *Destination* **sip-default** (leave *Properties Criteria* **None** and *Expression Criteria* empty).

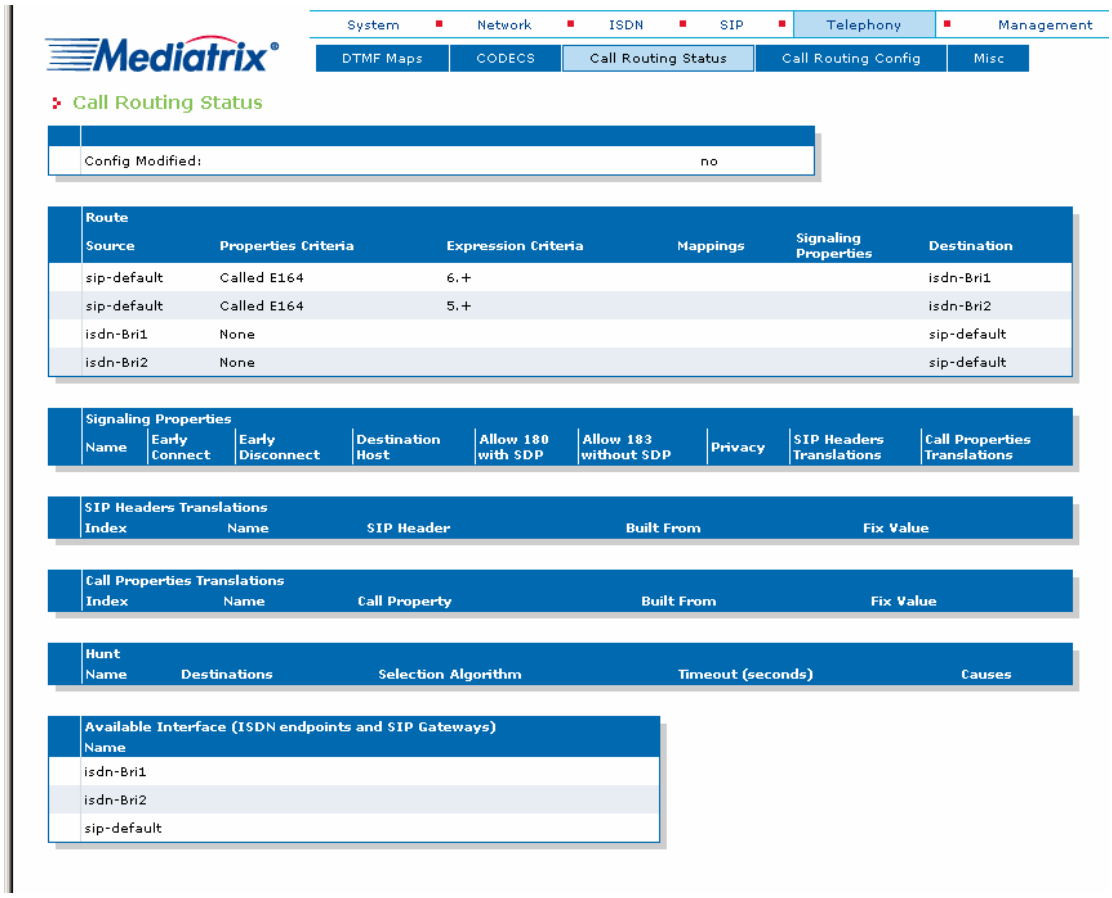
   These routes will satisfy call scenario A described in Deployment Scenario, where ISDN phones from Office A call SIP users from Office B.

9. After completing all the route configuration steps, you will see your four routes.



10. Click **Apply**. This applies all the parameters from **Call Routing Config** to the system. You can also see that the yellow *Config Modified* **yes** flag is cleared.

11. The call routing parameters can be seen in the **Call Routing Status** window.



The configuration note has prepared the system to perform calls in both directions.

Basic Call Establishment

Once this configuration procedure is completed, you are ready to start making basic calls through your new Mediatrix 4400, considering that the rest of your network's setup is configured properly.

Perform Basic Call (Scenario A)

- Pickup the ISDN phone that has the phone number ***5100***.
- Dial ***4567***.
- The analog phone number ***4567*** rings.
- Pick up the analog phone number ***4567***.
- The call is established.
- Hang up both phones to end the call.

Perform Basic Call (Scenario B)

- Pick up the analog phone number ***4567***.
- Dial ***5100***.
- The ISDN phone number ***5100*** rings.
- Pickup the ISDN phone number ***5100***.
- The call is established.
- Hang up both phones to end the call.

Further Information and Configuration

You can refer to the following documents/sections for further information on configuration parameters and features used in this configuration note.

All documents are available online on the Mediatrix Download Portal at https://support.mediatrix.com/DownloadPlus/Download.asp.

1- For more information on the Partial Reset feature, and on what to do after performing a Partial Reset to recover a unit with which you have lost contact, refer to the *Partial Reset* section of the *Mediatrix 4400 Digital Gateway Software Configuration Guide*.

2- For more information on configuring level 2 network links, level 3 network interfaces and IP addresses, refer to the *Interfaces Configuration* section of the *Mediatrix 4400 Digital Gateway Software Configuration Guide*.

3- For more information on configuring the Mediatrix 4400's ISDN BRI interfaces in TE or NT mode and additional parameters such as ISDN power feeding, refer to the *ISDN Configuration* section of the *Mediatrix 4400 Digital Gateway Software Configuration Guide*.

4- For more information on configuring the Mediatrix 4400 to work with SIP servers that require SIP authentication, refer to the *SIP Authentication* section of the *Mediatrix 4400 Digital Gateway Software Configuration Guide*.

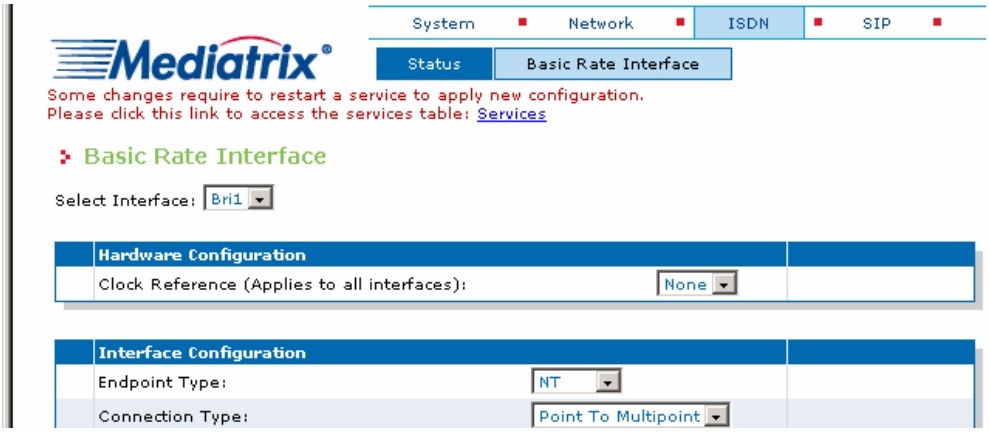
5- For information on how to configure the Mediatrix 4400 so it processes dialed DTMFs according to specific dialing plans, refer to the *DTMF Maps Configuration* section of the *Mediatrix 4400 Digital Gateway Software Configuration Guide*.

6- For more information on call routing including routes, criteria, mappings, signaling properties, and hunts, refer to the *Call Router Configuration* section of the *Mediatrix 4400 Digital Gateway Software Configuration Guide*.

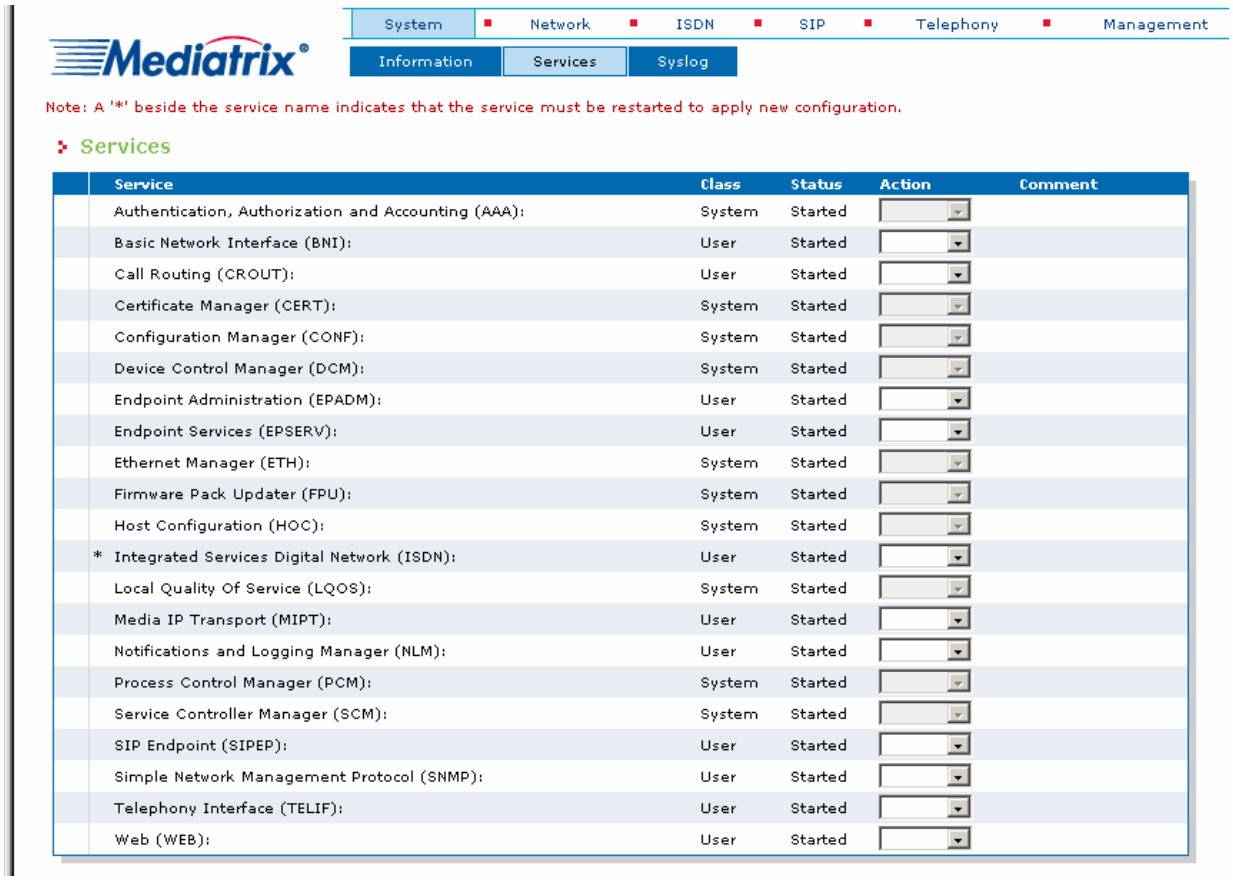
Appendix A - Restarting a Service

The Mediatrix 4400's features are divided in logical entities called *Services.* Some parameters in the Mediatrix 4400 require that the service to which they belong be restarted when they are configured in order for their new configuration value to be correctly applied. When this happens (usually after you click a **Submit** button), a message and a **Services** link are displayed at the top of the window stating that a service must be restarted.

In this example, a parameter of the ISDN service requires that this service be restarted.

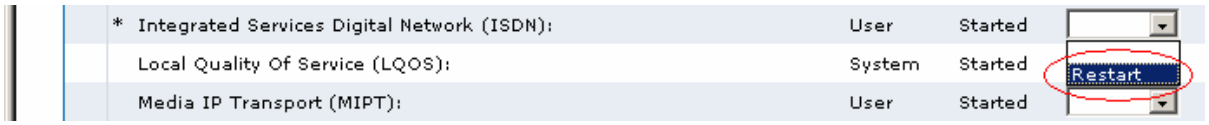


1. Click the **Services** link, which brings you to the **Services** page. In this page, each service that requires to be restarted has a "*" besides its name, as illustrated in the following window.

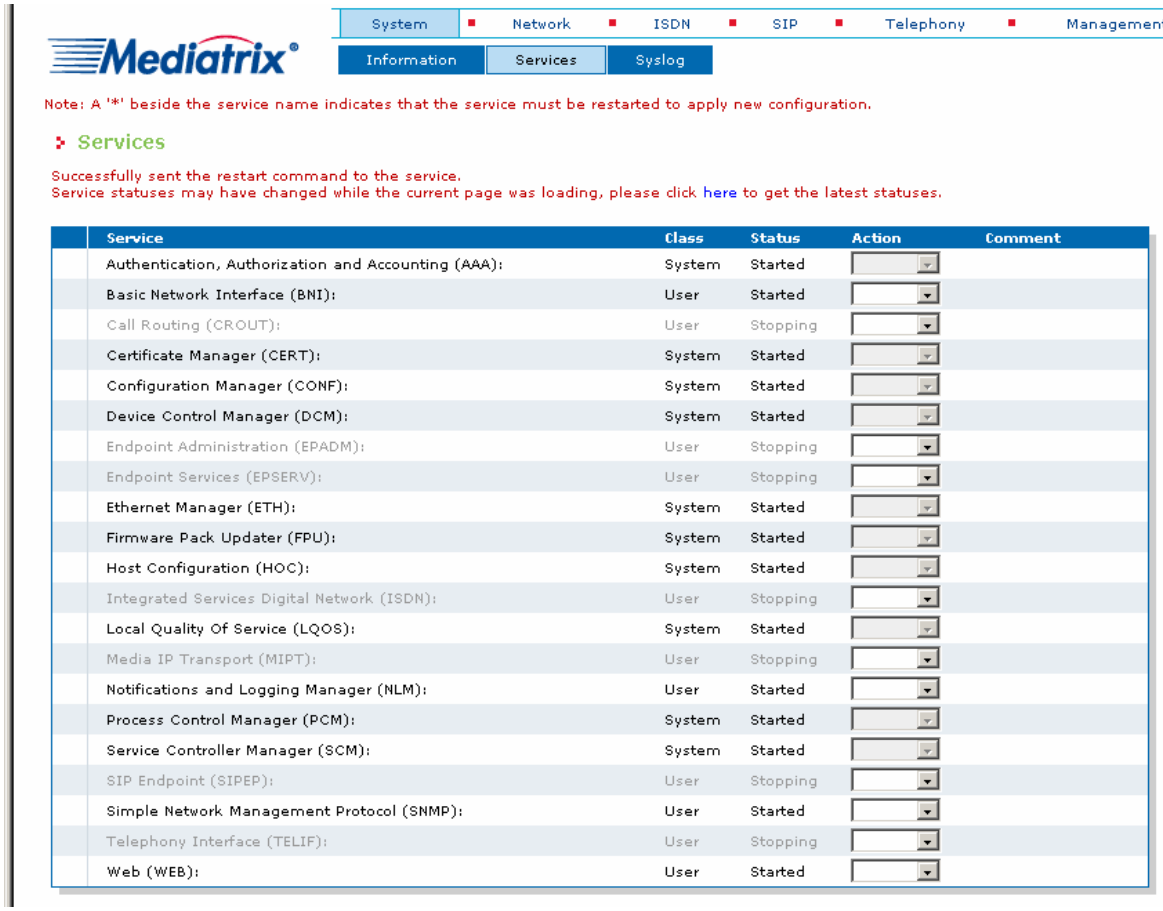


	Service	Class	Status	Action	Comment
	Authentication, Authorization and Accounting (AAA):	System	Started		
	Basic Network Interface (BNI):	User	Started		
	Call Routing (CROUT):	User	Started		
	Certificate Manager (CERT):	System	Started		
	Configuration Manager (CONF):	System	Started		
	Device Control Manager (DCM):	System	Started		
	Endpoint Administration (EPADM):	User	Started		
	Endpoint Services (EPSERV):	User	Started		
	Ethernet Manager (ETH):	System	Started		
	Firmware Pack Updater (FPU):	System	Started		
	Host Configuration (HOC):	System	Started		
*	Integrated Services Digital Network (ISDN):	User	Started		
	Local Quality Of Service (LQOS):	System	Started		
	Media IP Transport (MIPT):	User	Started		
	Notifications and Logging Manager (NLM):	User	Started		
	Process Control Manager (PCM):	System	Started		
	Service Controller Manager (SCM):	System	Started		
	SIP Endpoint (SIPEP):	User	Started		
	Simple Network Management Protocol (SNMP):	User	Started		
	Telephony Interface (TELIF):	User	Started		
	Web (WEB):	User	Started		

2. Restart each service that has a "*" besides its name by clicking the **Restart** action so it correctly applies its new configuration.



3. Restarting a service may require other services to be restarted. This is why you would see a few services go from the stopping to starting to started states, even if you only restarted one service. The displayed status may be refreshed at any time by clicking the **Services** submenu or the **here** link.



Thank you for using Mediatrix solutions!