



DVX-7090 VoIP Router

User's Guide

D-Link Voice System DVX-7090

VoIP Router for organizations

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1 INTRODUCTION

1.1 DOCUMENT PROFILE

This manual describes the D-Link DVX-7090 VoIP Router and explains how to configure and operate it.

1.2 AUDIENCE

This document is intended for computer systems specialists tasked with deployment and configuration of the DVX-7090 VoIP Router. The readers of this document are assumed to be familiar with the concepts of IP telephony and principles of networking. The system administrator who configures the VoIP Router must have a working knowledge of regular expression.

1.3 TYPOGRAPHICAL CONVENTIONS

The conventions used in this document are described in the table below.

Table 1: Conventions

Convention	Description
Note: <i>text</i>	Important information requiring special attention
NAT	Words highlighted by grey background represent names of configuration parameters when they appear in the text of the document
<i>0011</i>	Digits in bold italics denote numbers of a dialing sequence
Match	Column title of a tabular form
.wav	Bold face letters are used to indicate names of programs, directories and files

1.4 DOCUMENT STRUCTURE

Here is a brief synopsis of the chapters in this document:

Chapter 1 describes the purpose and structure of the document

Chapter 2 gives an overview of the product hardware and software components, details the product's features and specifications.

Chapter 3 describes how to install and connect the DVX-7090 VoIP Router.

Chapter 4 shows you how the system administrator can use the Router's web interface for the purposes of configuration

Chapter 5 introduces some configuration tips

Chapter 6 describes the application interface accessible to extension subscribers

2 PRODUCT OVERVIEW

The DVX-7090 VoIP Router is a packet telephony switching system with a full range of features typical for traditional PBXs and a number of additional capabilities.

The DVX-7090 VoIP Router is an affordable branch exchange solution for geographically distributed organizations that eliminates the need to have two separate networks for voice and data and allows telephone communications over the same line that subscribers use for Internet access.

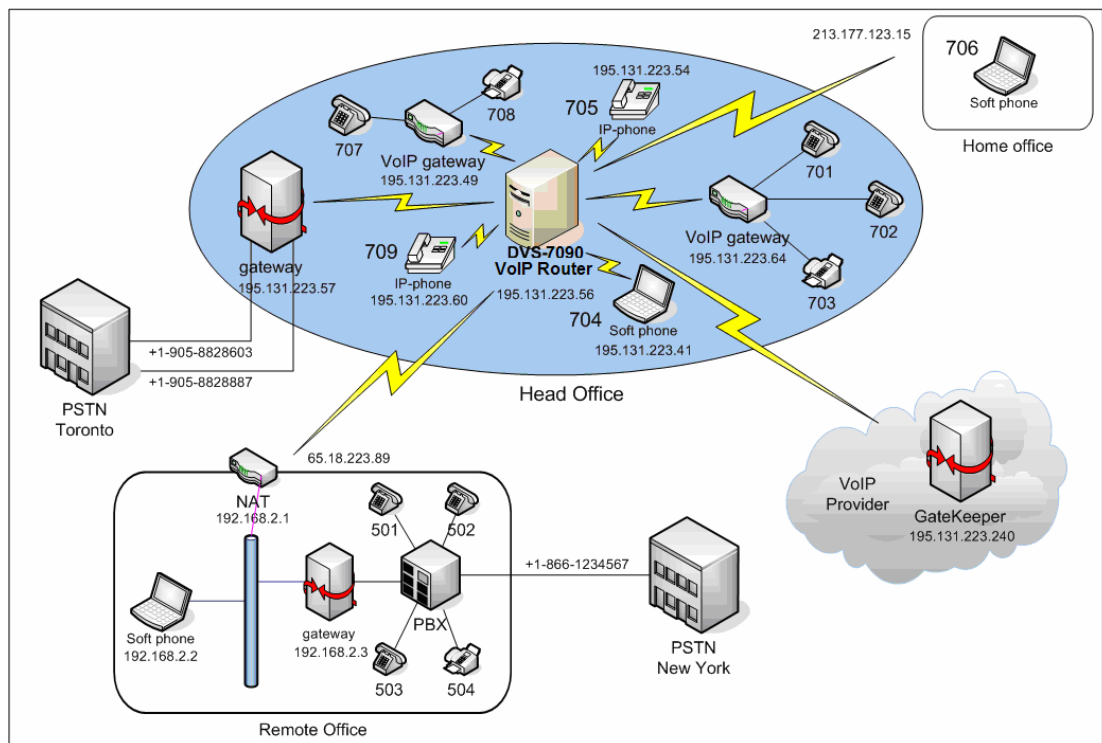


Fig. 1 DVX-7090 deployment in a geographically distributed organization

2.1 HARDWARE

The hardware specifications of DVX-7090 are as follows:

- Form Factor: Standard industrial 19" 1U rackmount
- Processor: VIA C3 1 GHz
- System Memory: 1 144-pin SODIMM, up to 256MB
- Storage: 1 CompactFlash type II 512 MB card
- 4 10/100Base-TX Ethernet ports

2.2 SOFTWARE

The DVX-7090 software has a modular structure that includes five functional components:

- Control Unit (CU),
- Switching Unit (SU),
- Database server (DBS) and
- Web-interface (WI).

Fig. 2 presents a block diagram of the D-Link VoIP Router software

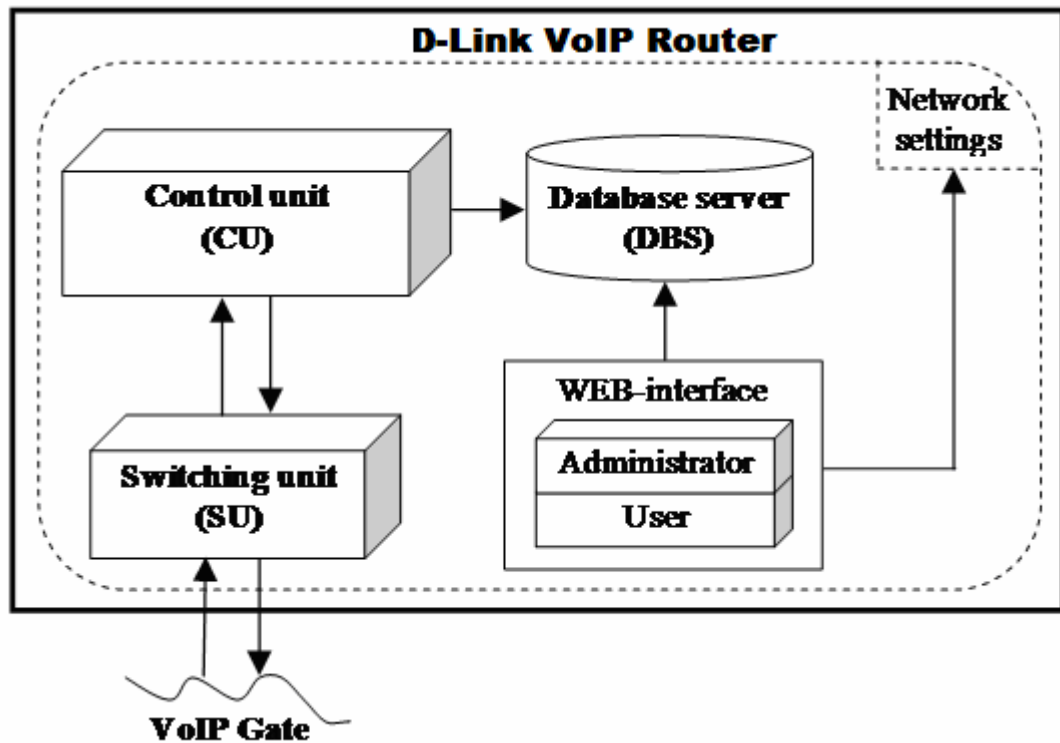


Fig. 2 Block diagram of D-Link VoIP Router software modules

The CU is the Router's backbone element that functions as a server intended for user authentication and authorization, control of the SU, and interaction with the database server (DBS).

The SU is an integration of:

- a stateful softswitch that transparently supports the SIP and H.323 signaling protocol
- an RTP/RTCP proxy for conversion and reassembly of IP packets without modification of their contents (i.e. without codec conversion)
- a media proxy for full conversion of media streams
- an audio file recording and playback utility (.wav format)
- a SIP registrar
- a SIP client for registering to remote SIP registrars/proxy servers
- an H.323 gatekeeper
- a RAS client for registering to H.323 gatekeepers/proxy servers

The DBS is a suite of XML files. The DBS is a repository of data used to store and provide access to user records, the routing table, information about gateways and the system configuration.

2.3 ROUTER FEATURES

The DVX-7090 VoIP Router allows:

- Call holds
- Call transfer
- Conditional and unconditional call forwarding
- Conference calls (max. 3 participants in the current version of the software)
- Voice to email delivery
- Direct Inward System Access (DISA)
- Call pick up
- Call waiting
- Impersonate function
- Group calls
- Codec conversion

2.4 PROTOCOLS AND STANDARDS

VoIP protocols:

- H.323 v.2
- SIP
- H.245 v.7
- H.225 v.4
- RTP/RTCP
- T.38
- SDP

Supported voice encoding algorithms (codecs):

- G.729
- G.729A
- G.723.1 5.3 kBit/s
- G.723.1 6.4 kBit/s
- G.711 mU-Law
- G.711 A-Law
- GSM 06.10-FR

3 INSTALLATION AND CONNECTION

Prepare a Windows workstation connected to the local area network. You will need the workstation to access the newly installed Router.

To install and power on your DVX-7090 VoIP Router, proceed as follows:

1. Unpack the supplied Router and install the box at a location of your choice
2. Connect the DVX-7090 VoIP Router to the LAN switch through the Ethernet port (port 2 in Fig. 3)



Fig. 3 DVX-7090 front panel

3. The Windows workstation that you have prepared and the VoIP Router box must be on the same network. To ensure this, create a network alias for subnet 192.168.224.0 on the Windows workstation (see section 5.10 for details).
4. Switch on the Router. It takes some 30-40 seconds to load and start the VoIP Router applications.
5. Start the Internet Explorer web browser on the Windows workstation and enter the URL <http://192.168.224.226> to access the Router's logon page.
6. To log in with the administrator's permissions, enter the default login and password – admin, qwerty.
7. Configure the system as described in Ch. 4 and Ch. 5 of this guide
8. When through with the configuration, reboot the VoIP Router by clicking the button on the page 'Configuration' of the Web interface.
9. Switch off the VoIP Router box and unplug the networking cable from the Ethernet port (see port 2 in Fig. 3)
10. Plug in the networking cable into the WAN port (port 1 in Fig. 3) to make the VoIP Router accessible at URL http://<WAN_IP> where <WAN_IP> is the assigned IP entered in the field IP address of the WAN settings dialog.

Now you can use any web browser to access the DVX-7090 Router and configure the system working remotely.

4 CONFIGURATION

Start your web browser and enter <http://192.168.224.226> on the address line to access the logon page of the Router's web interface.



Fig. 4 DVX-7090 logon page

The initial logon credentials that provide access to the administration interface of your system are admin, qwerty. If the entered login name and password are correct, you will be displayed with the main page of the Web interface.

Make sure that the change of the initial access password is the first procedure that you perform.

Note: *The no-activity timeout for the web interface is 20 min. On timeout expiration the user is returned to the logon page.*

4.1 CONFIGURING NETWORKING PROPERTIES

The page with the Router's networking properties is the first page displayed on entry to the system.

To access the page with the Router's global settings from anywhere else in the web interface,

click the tab **Configuration**. The DVX-7090 VoIP Router entry page is shown in Fig. 5

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Configuration Users Gateways Services Routes

WAN Settings
 Use DHCP
 IP address: 148.92.148.227
 Netmask: 255.255.255.0
 Default Gateway: 148.92.148.1
 Hostname: dlink-pbx-227
 Domain: meranks.ks
 DNS: 168.148.132.8
 SSL: No

Use NTP
 NTP Servers: pool.ntp.org, ntp0.zenon.net, ntp.globe.cz
 Timezone: Europe, Moscow
 Date (dd/mm/yyyy): 23 / 8 / 2006
 Time (hh:mm): 9 : 44

SMTP Server
 IP address: mail.systems.com
 Port: 25
 Source: dlink@meranks.ks

Change password
 Old password:
 New password:
 Confirm password:

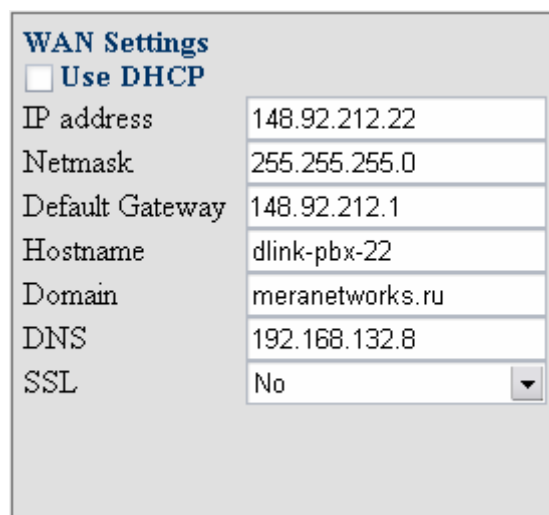
SIP registrar
 Name: REGISTRAR-SIP
 Unicast port: 5060
 Multicast port: 5060

H.323 gatekeeper
 Name: REGISTRAR-H323
 Unicast port: 1719
 Multicast port: 1718

Submit Reboot

Fig. 5 Networking configuration page

The configuration box **WAN Settings** allows you to configure the Router's WAN properties and define the following parameters:



The image shows a 'WAN Settings' dialog box. It has a title bar and a checkbox labeled 'Use DHCP' which is currently unchecked. Below the checkbox are several text input fields and one dropdown menu. The fields are: 'IP address' with the value '148.92.212.22', 'Netmask' with '255.255.255.0', 'Default Gateway' with '148.92.212.1', 'Hostname' with 'dlink-pbx-22', 'Domain' with 'meranetworks.ru', and 'DNS' with '192.168.132.8'. The 'SSL' field is a dropdown menu currently set to 'No'.

Field	Value
Use DHCP	<input type="checkbox"/>
IP address	148.92.212.22
Netmask	255.255.255.0
Default Gateway	148.92.212.1
Hostname	dlink-pbx-22
Domain	meranetworks.ru
DNS	192.168.132.8
SSL	No

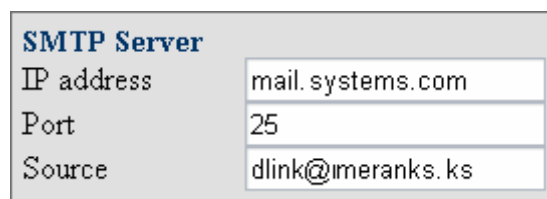
Fig. 6 WAN settings dialog box

- **Use DHCP** select this checkbox if you wish to engage dynamic IP address assigning and enable DHCP
- **IP address** – IP address of the WAN interface in the common dot-separated format
- **Netmask** – subnet mask of the WAN interface
- **Default Gateway** – IP address of the LAN's border router
- **Hostname** – the name of the host
- **Domain** – domain name
- **DNS** – IP address of the DNS server
- **SSL** is a combo box that allows you to choose between encrypted and unencrypted connections with the VoIP Router. In case of remote system administration select **Yes** for encrypted connection. If you administer the system locally, you connection may be unencrypted and you may wish to select **No**.

Note: Remember selecting *Yes* in the *SSL* combo box slows down operation of the web interface

The configuration form **SMTP Server** allows you to configure the e-mail defining the following parameters:

- **IP address** – IP address (or DNS name) of the SMTP server
- **Port** – SMTP server connection port
- **Source** – email address of the DVX-7090 Router that will appear on the **From:** line of email letters with sound files

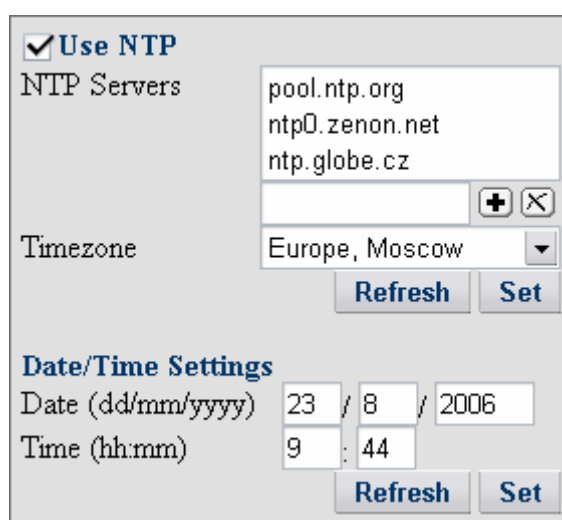


The image shows a configuration window titled "SMTP Server". It contains three input fields: "IP address" with the value "mail.systems.com", "Port" with the value "25", and "Source" with the value "dlink@imeranks.ks".

Fig. 7 SMTP server settings box

Note: *It is assumed that the configured SMTP Server does not require authorization.*

The date-time dialog box allows you to set the current date and time.



The image shows a configuration window for date and time settings. At the top, there is a checked checkbox labeled "Use NTP". Below it is a list of "NTP Servers" containing "pool.ntp.org", "ntp0.zenon.net", and "ntp.globe.cz". There is an empty input field with "+" and "X" buttons next to it. Below the list is a "Timezone" dropdown menu set to "Europe, Moscow", with "Refresh" and "Set" buttons. The "Date/Time Settings" section has "Date (dd/mm/yyyy)" set to "23 / 8 / 2006" and "Time (hh:mm)" set to "9 : 44", with "Refresh" and "Set" buttons.

Fig. 8 Date and time setting box

Use NTP. Select the checkbox **Use NTP** if you wish to use automatic time synchronization and configure NTP time servers. Deselect the checkbox when you plan to make manual date-time setting. A deselected **Use NTP** checkbox makes the NTP servers list, the entry line and Timezone combo box dimmed and inaccessible.

Note: *If your system is very slow or too fast in time (about one hour and more) it advisable that you set the time manually before selecting the Use NTP checkbox.*

Timezone. Use the Timezone combo box to select the time zone where the DVX-7090 Router resides.

To add an NTP server to the list of time synchronization servers, type the server name in the edit box above the Timezone combo box and click the add button **+** located to the right of the edit box. Click **Set** to validate the newly made entry.

Note: *After clicking the button **Set** you will be alerted to pending system restart inevitably caused by date/time modifications.*

Click **Refresh**, to remove the latest erroneous entry from the list of NTP servers.

When setting the date and time manually, enter the current date and time in the respective boxes and click **Set**. Click **Refresh** whenever you want to update the date-time setting or remove an erroneous entry.

The purpose of the dialog **Change password** is self-explanatory. A change of the access credentials set by the manufacturer (admin, qwerty) should be the first procedure you perform on your newly deployed system.

The image shows a dialog box titled "Change password". It contains three text input fields stacked vertically. The first field is labeled "Old password", the second "New password", and the third "Confirm password".

Fig. 9 Change password dialog

The configuration boxes **SIP registrar** and **H.323 Gatekeeper** allow you to specify the name of the SIP registrar and H.323 gatekeeper correspondingly and configure unicast and multicast ports for receipt of user registration requests.

The image shows two configuration boxes. The top one is titled "SIP registrar" and has three fields: "Name" (SIP-REGISTRAR), "Unicast port" (5060), and "Multicast port" (5060). The bottom one is titled "H.323 gatekeeper" and has three fields: "Name" (H323-GATEKEEPER), "Unicast port" (1719), and "Multicast port" (1718).

Fig. 10 SIP registrar and H.323 gatekeeper configuration boxes

Fill the edit boxes with the necessary data and click **Submit** to accept the changes.

When through with changing the access password, click **Reboot** to restart the system.

4.2 CONFIGURING USER ENDPOINTS

Click the tab **Users** to access the page that displays the table of configured users.

Configuration		Users		Gateways		Services		Routes	
Filter									
Phone			Name			Group			
<input type="text"/>			<input type="text"/>			<input type="text"/>			
New user		Refresh		Show <input type="text" value="10"/> users per page.					
Enabled	Edit	Phone	Name	Address	Groups	Status	Action		
<input checked="" type="checkbox"/>		50399	IDPH-120s	148.92.212.238	Groups	Registered			
<input checked="" type="checkbox"/>		1234	1234	148.92.212.237	Groups				
<input checked="" type="checkbox"/>		5901	5901	148.92.212.235	Groups				
<input checked="" type="checkbox"/>		701	701	148.92.212.49	Groups				
<input checked="" type="checkbox"/>		702	702	148.92.212.49	Groups				
<input checked="" type="checkbox"/>		5924	Akimov Yuriy	10.1.1.35	Groups				
<input checked="" type="checkbox"/>		124	Alexander Ivanov	148.92.212.112	Groups				
<input checked="" type="checkbox"/>		5974	Alexander Rumyantkov	10.1.1.98	Groups				
<input checked="" type="checkbox"/>		5953	Alla Elagina	10.1.1.73	Groups				
<input checked="" type="checkbox"/>		5922	Anikin Andrey	10.1.1.70	Groups				
1 2 3 4 5 6 7 8									
New user		Refresh							





Fig. 11 Table of configured user extensions

You can change the quantity of records displayed simultaneously by entering the desired number of records in the text box **Show** **users per page** above the table and clicking **Refresh**.

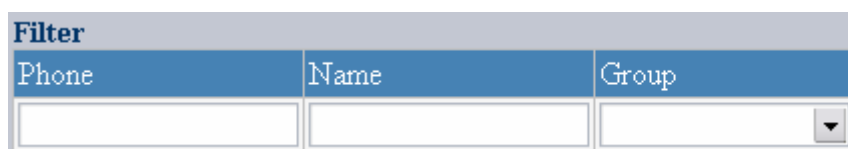
You can skip directly to any portion of the records or page through the displayed listing successively by clicking the page numbers on the blue bar under the table.

The table columns present the following data and control elements:

- **Enabled** shows a dimmed checkbox that indicates the active or inactive status of the user record
- **Edit** contains , the Edit button. Click this button to edit the record.
- **Phone** shows the phone number of the user
- **Name** presents the user’s name in the system
- **Address** displays the user’s IP
- **Groups** includes **Groups**, the button that invokes the groups dialog
- **Status** shows the registration status of registering endpoints. The valid values are:

- **Registered** – the endpoint is successfully registered with the system;
 - **Unregistered** – the endpoint is unregistered;
 - **In-call** – the endpoint has established a connection with a remote party;
 - **Failed** – unsuccessful endpoint registration.
 - empty field - no successful endpoint registration has occurred
- **Action** includes two buttons –  and .
 -  is the button that you click to make a duplicate of the record
 -  is the delete button used to remove the record.

You may wish to use the filter located on top of the Users table (see Fig. 12) to display selective listings of configured extensions. User records can be filtered by the phone number, subscriber’s name or the group the user belongs to and by any combination thereof.



Filter		
Phone	Name	Group
<input type="text"/>	<input type="text"/>	<input type="text"/>

Fig. 12 Search filter of Users page

When you intend to have displayed only those user records where the extension number starts with 5, enter 5 in the field **Phone** and click **Refresh**. When it is necessary to further narrow the search and display only user records that have phone numbers starting with 509, enter 509 in the field **Phone** and click **Refresh**.

You can perform search by a digit or digits the phone number starts with and cannot search by digits occurring in the middle or in the end of the number. You cannot enter regular expressions in the filter field **Phone** either.

The search argument entered in the field **Name** is an alphabetic character or several characters that can be found as a substring occurrence within a name string. The performed exact-match search is case insensitive. For example, if you enter the letter A in the **Name** field and click **Refresh** the search will return all user records where the user name includes characters A and a, regardless of their number and position within the name string.

The search argument in the filter field **Group** is one selected from the drop-down list.

While using the filter you can define any single search argument, any combination of two arguments (phone and name, phone and group, name and group) and all three arguments simultaneously.

Click **New user** to bring up the user configuration form and configure the endpoint properties. The user configuration form is shown in Fig. 13

The screenshot shows a web-based configuration interface for a user. At the top, there are navigation tabs: Configuration, Users (selected), Gateways, Services, Routes, Groups, and Prompts. The main content area is divided into several sections:

- Enabled:** A checked checkbox.
- Basic settings:** Text fields for User name (New User), Phone number (12345), Signaling (sip), IP Address, IP Port, E-mail, Pin code, and Web password.
- Registration:** An unchecked checkbox with fields for Login, Password, and TTL.
- General options:** A series of dropdown menus for NAT (direct), Fax T.38 (true), Convert (none), Repack (none), DTMF Options (RFC2833), Early Connect (false), and Proxy RBT (false).
- SIP options:** Dropdown menus for Ringback Tone (emulate), Allow Sip Redirect (true), and Allow noproxy (false).
- Codecs configuration:** A table with columns for Codec, FPP, and Action. It lists several codecs like G.729A, G.729, G.723, G.711-aLaw, G.711-uLaw, and GSM 06.10 with their respective FPP values and action icons.
- Forward options:** A table with columns for Enabled, Fwd Condition, Source, Activity Schedule, Fwd Number, and Actions. It shows a rule for 'Busy' with a source of '*' and a time schedule from 00:00 to 23:59.

At the bottom of the form, there are buttons for 'Apply' and 'Discard'.

Fig. 13 User configuration form

The configuration form comprises five types of configuration parameters:

- Basic settings (User name, Phone number, Signaling, IP address, IP Port, E-mail Pin-code, and Web password)
- Registration settings (Login, Password, Web password)
- General options (NAT, Fax T.38, Convert etc.)
- SIP options (Ringback Tone, Allow SIP Redirect, Allow noproxy)
- H.323 options (Tunneling, Fast Start, Multiple Fast Start, Ext, T.38 compatibility, Start H.245)
- Codec capabilities (Codec, FPP)

The checkbox **Enabled** in the upper left corner of the form can be selected or deselected to make the record active or inactive. You may wish to make the user record inactive to temporarily disable the extension and avoid the necessity to configure the user record anew when need be. The DVX-7090 Router ignores disabled user records.

4.2.1 USER BASIC SETTINGS

To configure the user basic attributes:

1. Type the user's name in the text field **User name**
2. Enter the user's extension number in the edit box **Phone number**
3. Select the signaling standard that the endpoint supports (h.323 or sip) from the drop-down list of the combo box **Signaling**
4. Enter the IP address of the user's terminal in the text field **IP address**
5. Enter a signaling port in the edit field **IP port**

Note: You may skip entering an IP address and port if the checkbox **Registration** is selected, meaning that the endpoint being configured is a registering entity

6. Type the user's email address in the **E-mail** edit field as the destination for voice messages delivered by the DVX-7090 Router Voice-to-email mechanism.
7. Enter the user's PIN-code in the edit field **Pin code** to grant the user access to the Impersonate functionality.
8. Enter the user's personal password in the **Web password** field to provide for remote access to the User's Interface.

Fig. 14 presents an example of completed basic user settings.

<input checked="" type="checkbox"/> Enabled	
User name	1234
Phone number	1234
Signaling	sip
IP Address	213.92.223.237
IP Port	5060
E-mail	alex.ivanov@mera.ru
Pin code	1234
Web password	1234

Fig. 14 User basic settings

4.2.2 REGISTRATION SETTINGS

Select the checkbox **Registration** if you wish to configure the user's terminal as a registering endpoint. With the checkbox selected, enter a registration login and password in the appropriate fields. Use the field **TTL** to configure time-to-live for the endpoint registrations.

Note: With the **Registration** checkbox selected you need to fill the field **Password** only if the registering endpoint is capable of secure authentication..

<input type="checkbox"/> Registration	
Login	
Password	
TTL	

Fig. 15 Endpoint registration data

4.2.3 USER NAT-, FAX-RELATED AND SIGNALING-DEPENDENT SETTINGS

If necessary, configure other user endpoint properties that include the parameters shown in Fig. 16:

General options		General options	
NAT	direct	NAT	direct
Fax T.38	true	Fax T.38	true
Convert	none	Convert	none
Repacketize	none	Repacketize	none
DTMF Options	RFC2833	DTMF Options	RFC2833
H.323 options		SIP options	
Tunneling	true	Ringback Tone	emulate
Fast Start	true	Allow Sip Redirect	true
Multiple Fast Start	true	Allow noproxy	false
Ext T.38 compatibility	false		
Start H.245	alerting		
Early Connect	false		

Fig. 16 NAT-, fax-related and protocol-specific settings

The combo box **NAT** serves to select a NAT traversal policy and offers triple choice:

- **direct** means that call packets will go direct without enabling NAT traversal
- **forced** stands for the NAT traversal function enabled
- **detect** denotes automatic detection of NAT presence

Select **direct** when you are positive that communication with the endpoint you are configuring does not involve network address translation (NAT). Select the option **forced** when it is known that the endpoint sits behind a NAT router. Select **detect** when unsure about the situation with NAT.

FAX T.38 allows you to enable/disable T.38 fax support.

The **Convert** combo box offers three options:

- **none** (no codec conversion is performed even if the call originator and terminator have a common codec capability)
- **adaptive** (the DVX-7090 Router performs codec conversion when necessary, i.e. when the calling and called endpoints feature no common codec capabilities)
- **forced** (the DVX-7090 Router always performs conversion of media even when a common capability exists)

Note: *The use of codec conversion should be judicious as codec conversion is very demanding in terms of the system computing power and takes toll on voice quality. The option **adaptive** is the best choice as with **adaptive** selected the Router tries to put the call through without conversion and automatically engages the codec converter when the call is impossible otherwise. The option **forced** is for extraordinary cases when two endpoints cannot communicate otherwise even with a common codec capability.*

The **Repacketize** control allows you to manage repacketization of media streams that may be necessary to improve the quality of speech and remedy possible silence suppression incompatibility occurring occasionally in terminal equipment. The options of the Repacketize drop-down list include:

- **none** disables repacketization of media streams
- **incoming** (enables repacketization of ingress media)
- **outgoing** (enables repacketization of egress media)
- **both** (enables repacketization of ingress and egress streams)

DTMF Options the DTMF Options combo box is used to select a type of DTMF digits payload. The available options include:

1. **RFC2833** for all terminal equipment types
2. **INFO V.1** for CISCO SIP terminals
3. **INFO V.2** for Nortel SIP terminals

Dealing with H.323 Options:

Tunneling enables/disables encapsulation of H.245 messages

Fast Start enables/disables FastStart

Multiple FastStart. With **Multiple FastStart** set to 'true' the system includes FastStart in every packet

Ext T.38 compatibility

This parameter is intended to overcome slight incompatibilities that frequently exist in vendor-specific implementations of the H.323 standard. For example, setting **Ext T.38 compatibility** to **true** ensures trouble-free interoperation of Vocaltec endpoints with the DVX-7090 Router.

Start H.245 has three options:

- **callproceeding**
- **connect**
- **alerting**

that help you define which of the above H.225 messages will trigger establishment of the H.245 control channel

Early Connect – this flag is used to ensure smooth interoperation with endpoints that do not exchange capabilities (codecs etc.) until the arrival of CONNECT. Select **true** to provide for an early CONNECT message.

Dealing with SIP Options:

Ringback Tone is used to configure the RBT capability for the endpoint. If the terminal you are configuring is capable of generating RBT, select **local**, otherwise select **emulate**.

Allow SIP Redirect allows/disallows SIP redirection

Allow noproxy when set to **true** enables signaling proxy only and direct flow of media streams. The value **false** enables full proxy, which involves proxy operation for both signaling and media packets.

Note: Remember that the setting of the parameter **Allow noproxy** must be the same for both the calling and the called endpoint

4.2.4 CALL FORWARD DIALOG

Forward options					
Enabled	Fwd Condition	Source	Activity Schedule	Fwd Number	Actions
Add new					

Fig. 17 Call forward configuration form

To configure conditional and unconditional call forwarding:

1. Click **Add new**

Forward options								
Enabled	Fwd Condition	Source	Activity Schedule			Fwd Number	Actions	
<input checked="" type="checkbox"/>	Busy	.*	<input type="checkbox"/> Time	From 00:00	To 00:00	<input type="checkbox"/> Days		<input type="button" value="X"/>
Add new								

2. Select a condition (**Busy**, **No answer**, **Unreachable**, **Unconditional**) that will cause call forward using the combo box in the column **Fwd Condition**
3. If the forward rule being configured applies to a particular calling number only, type the necessary calling number in the edit box **Source**. Alternatively, you can write a regular expression that covers a series of numbers.

Leave the edit box intact if the calling number is of no importance for the call forward you are configuring.

4. When necessary, you can limit call forward to a particular time period and day or days of week.

To define a call forwarding period, select the checkbox **Time** (in the column **Activity Schedule**) and specify the period start and end time in the edit boxes **From** and **To** respectively. To specify on what days call forwarding will take place, select the checkbox **Days** and select call forward days on the drop-down menu invoked by a click on the appearing down-arrow button.

<input type="checkbox"/> Monday
<input type="checkbox"/> Tuesday
<input type="checkbox"/> Wednesday
<input type="checkbox"/> Thursday
<input type="checkbox"/> Friday
<input checked="" type="checkbox"/> Saturday
<input checked="" type="checkbox"/> Sunday

5. Type in the forward number in the text box **Fwd Number** of the form and click **Apply** to validate the changes you have made to the record.

4.2.5 CODEC CAPABILITY SETTINGS

The add-new-user dialog appears with all codecs in place and frame-per-packet settings done (see Fig. 18.) If you wish to delete unnecessary codecs, click the delete button .

To add to the codec capability of the user's terminal, click **Add codec** and select the required codec from the drop-down list of codec options.

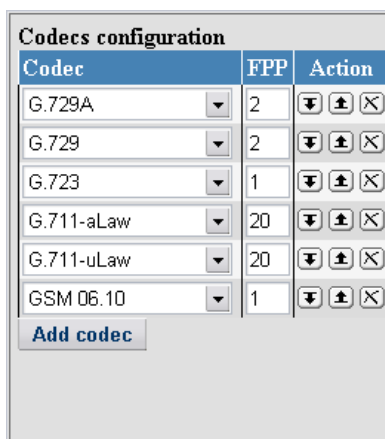


Fig. 18 Codecs options

Enter a number of frames per packet in the neighboring edit box **FPP** with due regard to the endpoint capability and buffer size. Information about codec frame sizes is given in the table below.

Table 2 Frame sizes by codecs

Codec	Frame size
G.729	10 ms
G.729A	10 ms
G.723	30 ms
G.711-aLaw	1 ms
G.711-uLaw	1 ms
GSM 06.01	20 ms

Therefore, if an endpoint can accept no more than, say, 60ms worth of audio per packet, for G.711 you can enter the value 60; for G.723 it will be 2 ($60/30 = 2$); for G.729 it would be 6 ($60/10 = 6$).

Note: Please, remember that for G.711 codecs it makes sense to enter “frames per packet” values in multiples of ten only.

You can increase/decrease codec precedence in the table by clicking up- and down-arrow buttons.

Click to move the codec record up one line and increase the codec precedence.

Click to move the codec record down one line thus decreasing the codec precedence.

Click to delete the codec record.

To add the new user record to the population of configured users, click . Click , to cancel the made changes.

4.2.6 DEFAULT USER

The Default user account is the only preconfigured user account that exists in the system at the time of the first startup.

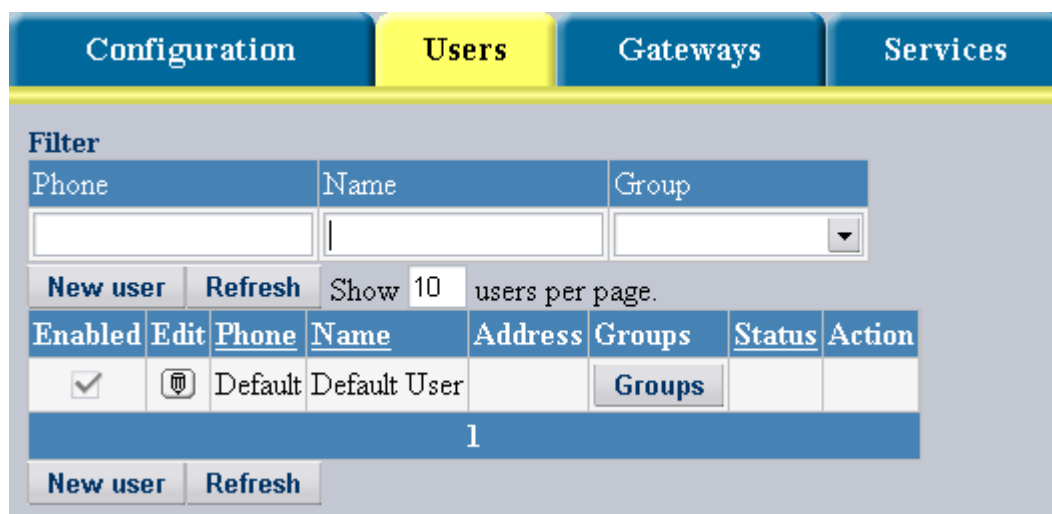


Fig. 19 Users table on first start

The existence of the Default user record is a must therefore you cannot delete this record. The system uses the Default user account whenever a call comes originated by a user not registered with the system.

4.3 CONFIGURING GATEWAYS

To access the page Gateways, press **Gateways**. The page presents a table of configured gateways as shown in Fig. 20

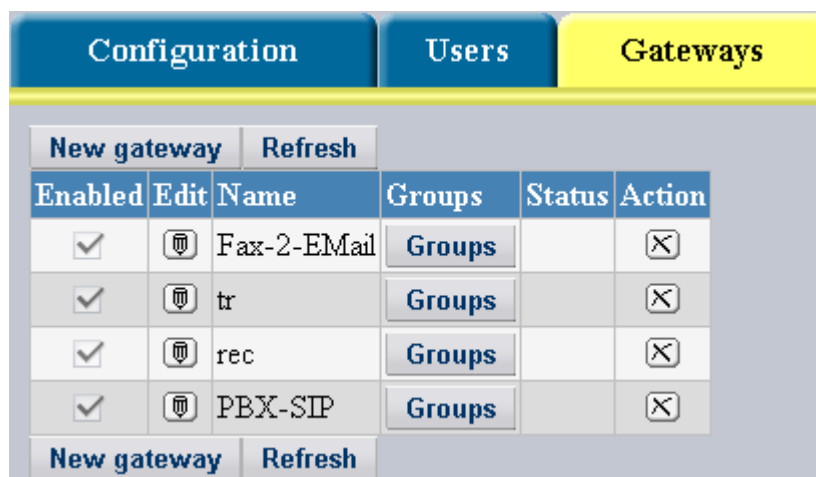


Fig. 20 Table of gateways

The columns in the gateways table present the following information:

- **Enabled** contains a dimmed checkbox that shows if the gateway record is activated or inactive
- **Edit** contains , the Edit button. Click this button to edit the record.

- **Name** shows the name the gateway is assigned in the system
- **Groups** includes **Groups**, the button that invokes the groups dialog
- **Status** shows the gateway's current registration status. Possible values include:
 - **Registered** – the gateway is successfully registered with the DVX-7090 Router
 - **In Call** – the gateway is handling calls
 - **External** – the DVX-7090 Router is registered to the gateway
 - **Both** – combination of **Registered** and **External**
- **Action** incorporates the button **X** that you click to delete the record.

The parameters on the gateway configuration form are similar to those on the user configuration page. The gateway configuration form is presented in Fig. 21

The screenshot shows a web-based configuration form for a gateway. It is divided into several sections:

- Enabled:** A checked checkbox. Below it are fields for Gateway name (New Gateway), Signaling (sip), IP Address, and IP Port.
- Caller IDs:** Three unchecked checkboxes: Relay Incoming, Trust Incoming, and Send.
- Registration:** An unchecked checkbox. Below it are fields for Login, Password, and TTL (120).
- Register with GK/registrar:** A checked checkbox. Below it are fields for Server name, Address, Port, Login, Password, TTL (120), Security type (H323Alias), and Endpoint type (terminal).
- General options:** A section with several dropdown menus: NAT (direct), Fax T.38 (true), Convert (adaptive), Repacketize (none), DTMF Options (RFC2833), Early Connect (false), and Proxy RBT (true).
- SIP options:** Three dropdown menus: Ringback Tone (emulate), Allow Sip Redirect (true), and Allow noproxy (false).
- Codecs configuration:** A table with columns for Codec, FPP, and Action. It lists several codecs with their respective FPP values and action buttons (down, up, delete).

Codec	FPP	Action
G.729A	2	↓ ↑ X
G.729	2	↓ ↑ X
G.723	1	↓ ↑ X
G.711-aLaw	20	↓ ↑ X
G.711-uLaw	20	↓ ↑ X
GSM 06.10	1	↓ ↑ X

Fig. 21 Gateway properties form

The parameters on the gateway configuration form fall under five categories:

- Basic gateway settings (Gateway name, Signaling, IP Address, IP Port)
- Gateway registration settings (Login, Password and TTL)

- Parameters for DVX-7090 Router registrations with external registrars (**Login**, **Password**, **Port**, **TTL**, **Security type**, **Endpoint type**)
- NAT-, fax-related and signaling-dependent settings
- Codec capability settings

4.3.1 BASIC GATEWAY SETTINGS

Basic gateway settings include the following configuration parameters:

Fig. 22 Basic gateway attributes

Note: The name entered in the field **Gateway name** is used as the gateway's identifier in registrations to a remote gatekeeper/SIP registrar. So, make sure the configured gateway name matches the registration name on the remote GK/SIP registrar.

The checkbox **Enabled** activates/deactivates the gateway record in the system.

Gateway name is a text box for entering the gateway's identifier.

Signaling is a combo box used to select the gateway's signaling standard.

Use the **IP Address** edit box to enter the gateway's IP.

Enter a listening port number in the **IP Port** edit field.

The checkboxes under the name **Caller IDs** have the following intent:

- Use a selected checkbox **Relay Incoming** to indicate the call source gateway from which the Router may accept the caller's ID for further relay to destination.
- Use a selected checkbox **Trust Incoming** to indicate a gateway as a trusted source from which caller's IDs are acceptable for the purposes of the Impersonate function.
- Use a selected checkbox **Send** for gateways on the outgoing call leg to allow them to pass the caller's ID further to the destination.

4.3.2 REGISTRATION SETTINGS

The screenshot shows a configuration panel titled "Registration" with a checkbox. Below the checkbox are three text input fields labeled "Login", "Password", and "TTL".

Fig. 23 Gateway registration panel

This category of settings is used to configure the registration parameters of the gateway that include:

- the checkbox **Registration**. A selected checkbox means that the gateway being configured will register to the DVX-7090 Router.
- **Login** is a text box for the gateway’s registration name
- **Password** is an edit field for password entries.
- **TTL** is a box for registration time-to-live data.

4.3.3 D-LINK DVX-7090 ROUTER REGISTRATION SETTINGS

The screenshot shows a dialog box titled "Register with GK/registrar" with a checked checkbox. Below the checkbox are several fields: "Server name", "Address", "Port", "Login", "Password", "TTL" (with the value "120"), "Security type" (with a dropdown menu showing "H323Alias"), and "Endpoint type" (with a dropdown menu showing "terminal").

Fig. 24 DVX-7090 Router registrations dialog

Use this category of settings to configure the Router registration parameters that enable the system to register to remote gatekeepers and SIP registrars.

The registration parameters include:

- checkbox **Register with GK/registrar**. The checkbox allows/disallows the DVX-7090 Router registration to external servers. Select this checkbox to activate the sub-form and configure the Router’s external registration data.
- **Server name**. Use this edit field to enter the name of the gatekeeper or SIP registrar server the Router is expected to register to.
- **Address** is a box for entering the IP address where the Router should send registration requests
- **Login** provides a text box for the Router’s registration name
- **Password** is an edit field for registration password entries
- **Port** is a field for entering a port number for registration exchange

- **TTL** provides an edit box for entering a time-to-live registration period in seconds
- **Security type** is a combo box with types of logon credentials encryption:
 - o H323Alias – login and password are transmitted unencrypted as plain text
 - o CRYPTO-TOKEN – encrypt the logon credentials using the MD5 algorithm
 - o CHAP – CHAP encryption of data
- **Endpoint type** is a combo box used to define how the DVX-7090 Router will register to the remote registrar/gatekeeper, as a terminal or as a gateway

4.3.4 GATEWAY NAT-, FAX-RELATED AND TYPE-OF-SIGNALING PROPERTIES

The area of the form that serves to configure the gateway NAT- and fax-related options as well as pertinent signaling protocol parameters is illustrated in Fig. 25

Note: *Actually the web interface displays either the H.323 options form or the SIP options form in accordance with the type of signaling selected in the combo box **Signaling** (see Fig. 22)*

General options	
NAT	direct
Fax T.38	true
Convert	none
Repacketize	none
DTMF Options	RFC2833

H.323 options	
Tunneling	true
Fast Start	true
Multiple Fast Start	true
Ext T.38 compatibility	false
Start H.245	alerting
Early Connect	false

General options	
NAT	direct
Fax T.38	true
Convert	none
Repacketize	none
DTMF Options	RFC2833

SIP options	
Ringback Tone	emulate
Allow Sip Redirect	true
Allow noproxy	false

Fig. 25 Gateway NAT, fax and signaling options

The gateway settings shown in Fig. 25 are identical to the similar parameters appearing on the User configuration form. Refer to 4.2.3 for a detailed explanation of the configuration parameters.

4.3.5 GATEWAY CODEC CAPABILITY SETTINGS

The gateway codec capability parameters are identical to those described for the User configuration page (see 4.2.5)

4.4 CONFIGURING DVX-7090 SERVICES

To access the services page, click the tab **Services**. The page presents a table view similar to that illustrated in Fig. 26










Configuration		Users	Gateways	Services	
New service		Refresh			
Enabled	Edit	Name	Command	Groups	Action
<input checked="" type="checkbox"/>		Voice 2 eMail	Voice Mail		
<input checked="" type="checkbox"/>		Pick up neighbor's call	Pick Up		
<input checked="" type="checkbox"/>		DISA 1	DISA	Groups	
<input checked="" type="checkbox"/>		Impersonate	Impersonate		
New service		Refresh			

Fig. 26 Table of services

The intent of the table columns is as follows:

- **Enabled** contains the checkbox **Enabled** that shows if the service is available in the system.
- **Edit** contains the edit button . Click this button to change the voice prompt or prompts associated with the service.
- **Name** shows a descriptive name of the service
- **Command** presents the command associated with the service
- **Action** contains the delete button 


To add a new service, click .

Fig. 27 New service dialog

The displayed new-service configuration form is shown in Fig. 27.

Note: The way the invoked new-service configuration form looks depends on what service you are configuring. The *Prompts configuration* dialog is displayed only when *DISA* and *Impersonate* commands are selected in the combo box *Command*. The dialog *Forward options* appears only when configuring *DISA* and *Group call* services.

1. Select the checkbox **Enabled** to make the newly created record active
2. Type in the service name in the text box **Service name** overwriting the default name **New Service**
3. Use the combo box **Command** to select a command that the DVX-7090 Router will execute when the service you are configuring is addressed. The drop-down list includes the following commands:
 - **Group Call**
 - **Voice Mail**
 - **DISA**
 - **Auto redial**
 - **Pick Up**
 - **Impersonate**

Refer to 4.4.1 for more information about the commands

4. When dealing with configuration of *DISA* and *Group call* you may wish to arrange for call forward selecting the **attendant** forwarding condition for *DISA* and **unconditional** or **no reply** for the *Group call* service.
5. When through with configuring the service record click **Apply** to add the service record to the table.

Whenever necessary click to refresh the view.

Click to remove unneeded records only. Whenever it is required to disable a service record for some time, deselect the checkbox **Enabled** to save the trouble of configuring the service anew.

4.4.1 COMMANDS THAT INVOKE SERVICES

The items that populate the drop-down list of the combo box **Command** are actually command options that cause execution of a certain algorithm.

Table 3 Commands and invoked algorithms (services)

Command	What the system does in response
Group Call	generates simultaneous calls to all group members
Voice to eMail	<ol style="list-style-type: none"> 1. plays a voice prompt inviting the caller to leave a message after the tone 2. records the message 3. convert the recorded message into a .wav sound file and 4. sends the file to the callees's email address
DISA	allows access to a set of functions and services configured for this particular type of the inward system access
Auto redial	keeps dialing the required number until the call is answered
Pick Up	Connects the line to the member user who dialed the Pick Up number
Impersonate	<ol style="list-style-type: none"> 1. prompts the caller to dial Pin code 2. authenticates the caller 3. gives the caller access to the system according to the rights and privileges characteristic of the user's account

4.5 CONFIGURING THE ROUTING TABLE

Preparation of the routing table essentially means creation of call handling rules. Click the tab

Routes

to access the configuration page illustrated in Fig. 28

Configuration		Users	Gateways	Services	Routes	Groups	Prompts			
New route		Refresh								
Enabled	Edit	Name	Criteria	Match	Pattern	Result	Command	Argument	Groups	Action
<input checked="" type="checkbox"/>		Voice 2 eMail	Source Destination	. ^009\$	^(*)\$ ^(*)\$	\$1 \$1	Service	Voice 2 eMail	Groups	
<input checked="" type="checkbox"/>		DISA main	Source Destination	. ^799\$	^(*)\$ ^(*)\$	\$1 \$1	Service	DISA 1	Groups	
<input checked="" type="checkbox"/>		Impersonate	Source Destination	(*) ^777.*\$	^(*)\$ ^777(*)\$	\$1 \$1	Service	Impersonate	Groups	
<input checked="" type="checkbox"/>		Ivanov gw	Source Destination	. ^111(*)\$	^(*)\$ ^111(*)\$	\$1 \$1	Dial Gateway	PBX-SIP	Groups	
<input checked="" type="checkbox"/>		Pick Up	Source Destination	. ^888(*)\$	^(*)\$ ^888(*)\$	\$1 \$1	Service	Pick up neighbor's call	Groups	
<input checked="" type="checkbox"/>		Route to local users	Source Destination	. .	^(*)\$ ^(*)\$	\$1 \$1	Dial User		Groups	
<input checked="" type="checkbox"/>		Fax-2-EMail	Source Destination	. ^008(*)\$	^(*)\$ ^008(*)\$	\$1 \$1	Dial Gateway	Fax-2-EMail	Groups	
New route		Refresh								

Fig. 28 Routing table





The columns of the routing table have the following meaning:

- **Enabled** contains a checkbox. A selected checkbox identifies a call handling rule currently in effect. A deselected checkbox disallows the DVX-7090 Router to apply the rule.
- **Edit** contains the Edit button. Click this button to edit the record
- **Name** shows the descriptive name of the routing rule.
- **Criteria** indicates two rule application criteria – the source and destination number.
- **Match** displays match regular expressions for the source and destination number.
- **Pattern** includes cells for regular expressions that set the number transformation pattern.
- **Result** is a box for a regular expression defining the number translation result.
- **Command** presents the command that the System executes during implementation of the routing rule. The list of possible commands includes:
 - Continue
 - Restart
 - Reject
 - Dial user
 - Dial gateway

- Service

- **Command argument** shows the name of the invoked service (when the command is Service) or the name of the target gateway (when the command is Dial gateway).
- **Groups** includes the button **Groups** that invokes the groups dialog. To include the rule you are configuring into a group, select the necessary checkbox in the displayed groups dialog box and click **Apply**.


Note: The configured rule will apply only if the call originator and the rule belong to the same access group.

- The column **Action** displays the following buttons:
 -  – move the record one line up (see 4.5.2)
 -  – move the record down one line (see 4.5.2)
 -  – duplicate the record.
 -  – delete the record.

To add a new rule to the routing table, click **New route**.

To update the table view, click **Refresh**.

click  to delete the record

click  to duplicate the record

The DVX-7090 Router processes call handling rules in the table in the order of precedence; therefore, the rule that is higher in the table takes precedence of the rule located closer to the table bottom.

4.5.1 COMMANDS EXECUTED DURING ROUTING

The items on the drop-down list of the combo box **Command** on the routing rule form fall under two categories – the commands pertaining to the routing process and call handling commands

Table 4 Commands executed during call routing

Routing control commands		
Command	What the system does in response	
Continue	Goes to the next routing rule. The command Continue is commonly used to resume routing after number transformation.	
Restart	Goes to the first rule in the table	
Call handling commands		
Command	Argument	What the system does in response
Reject		Rejects the call
Dial User		1. Compares the destination number against the database of configured extensions 2. if the matching number is found, dials the extension number, otherwise 3. executes Continue
Dial Gateway	GW name	Sends the call to the specified gateway

Service	Service name	Provides the specified service
---------	--------------	--------------------------------

4.5.2 WHY POSITION OF ROUTING RULES IN THE TABLE IS IMPORTANT

The Router picks rules in the routing table one by one starting from the topmost.

The Router applies (executes) the routing rule only if all of the below conditions are met:

- The routing rule is enabled;
- The source and destination numbers of the call match the respective numbers specified in the routing rule
- The rule and the calling party belong to the same group

The Router goes to the next record in the table, if at least one of the above conditions is not met.

Configuration		Users	Gateways	Services	Routes	Groups		
New route		Refresh						
Enabled	Edit	Name	Criteria	Match	Pattern	Result	Command	Argument
<input checked="" type="checkbox"/>		External calls	Source	.*	^(.*)\$	\$1	Dial Gateway	Gateway 225
			Destination	.*	^(.*)\$	\$1		
<input checked="" type="checkbox"/>		Voice 2 eMail	Source	.*	^(.*)\$	\$1	Service	Voice 2 eMail
			Destination	^009\$	^(.*)\$	\$1		
<input checked="" type="checkbox"/>		DISA main	Source	.*	^(.*)\$	\$1	Service	DISA 1
			Destination	^799\$	^(.*)\$	\$1		

Fig. 29 Why position of routing rule in the table matters

Consider the case when the routing rule for egress calls is positioned on the topmost line of the table (see Fig. 29.) As the destination number condition is always met the Router will send all calls regardless of the destination number to the gateway intended for traffic leaving the system. Actually, it will never come to comparing the call destination number against the numbers defined in the routing records positioned under the rule for outgoing calls.

By this means a routing rule that allows any source and any destination number placed ahead of all other routing rules in the table makes all other destination numbers, i.e. extensions and services, unreachable.

Note: Always position the routing rule based on the regular expression ‘.’ for the source and destination numbers on the bottom line of the table.

4.6 GROUPS AND GROUPING

4.6.1 GENERAL

In the DVX-7090 Router you can do grouping based on access to the Router’s features and an organizational principle.

Grouping allows you to economize on the configuration effort, and is a prerequisite to some of the Router functions and services (for example, pick up and group calls.)

You need to specify groups when you configure users, services and routes.

Users. By including the user into this or that group you define what Router features and functions will be accessible to the user and what incoming calls the user can answer (from the standpoint of the pick up capacity and group calls.)

When you configure services (e.g. DISA and Group call) you need groups to indicate the target for second leg calls that the Router generates

When you configure routes for the routing plan you need groups to define what users are allowed to send calls along the configured routing path.

The two types of groups currently available in the DVX-7090 Router are **access** and **pickup**. A group of the type **access** allows access to the selected DVX-7090 Router service. A group of the type **pickup** allows members to pick up calls intended for other members of the group. Additionally, group calls are possible only with groups of the type **pickup**.

4.6.2 CONFIGURING GROUPS

To configure groups, go to the Groups page by clicking the tab **Groups**.

The Groups page displays a table of configured groups similar to that presented in Fig. 30

Configuration							Users	Gateways	Services	Routes	Groups	Prompts
New group							Refresh	Submit				
Enabled	Name	Type	Transfer	Forward	Conference	Call Waiting	Action					
<input checked="" type="checkbox"/>	Pickup	pickup					<input type="checkbox"/>					
<input checked="" type="checkbox"/>	Restricted	access	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
<input checked="" type="checkbox"/>	All	access	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
<input checked="" type="checkbox"/>	Marketing and sales	pickup					<input type="checkbox"/>					
New group							Refresh	Submit				

Fig. 30 Table of existing groups

You can use the table for adding new groups and editing the existing ones.

The purpose of the table columns is as follows:

- **Enabled** contains the checkbox **Enabled** that shows if the group record is active in the DVX-7090 Router. Deselect the checkbox to deactivate the group record.
- **Name** is the group’s name that describes either the nature of grouping or the group make up. For example, the group name **Only Transfer** in the table presented in Fig. 30 describes the services accessible to the group members. Another possible name is **Marketing and Sales** (see Fig. 30) indicating the organization unit the members of which can use the Pick up functionality etc.
- **Type** is a combo box with a list of existing group categories.
 - **access**. Groups of the type ‘access’ categorize users by accessibility of services

- **pick up**. Groups of the type 'pickup' include members with the capability to perform call pick up and group call recipients.
- **Transfer** contains a checkbox selection/deselection of which allows/disallows access to the call transfer service.
- **Forward** contains a checkbox selection/deselection of which allows/disallows access to the call forwarding service
- **Conference** contains a checkbox selection/deselection of which allows/disallows access to the conferencing service.
- **Call Waiting** contains a checkbox selection/deselection of which allows/disallows access to the call waiting service. Call Waiting is a feature that allows the user to be notified of an incoming call during a call session already in progress, and gives the user the ability to answer the second call with the first call placed on hold.

Note: *The Conference service is accessible only to users with access to call transfers.*

- **Action** contains the button (Delete)

Click to refresh the table view.

To configure a new group:

1. Click to add an empty group record to the table (see Fig. 31)



Fig. 31 Adding a group

2. Type in the group name in the column **Name** replacing the default name **Group #...** with a name string of your choice.
3. Select the group type in the combo box **Type**
4. Select the necessary checkboxes that allow the services and function of the System.
5. Click to confirm the changes you have made

4.7 MANAGING VOICE PROMPTS

Voice prompts management consists in an authorized person (system administrator or user) replacing the default prompts with customized ones.

Prompt management rights of users vary with the type of the user account in the system. The system administrator has access to all prompts and can replace default prompts with customized ones. After replacement the prompts newly added by the administrator become default.

In the D-Link DVX-7090 Router extension subscribers have access to and can customize only some of the system prompts, i.e. those essential for and connected with operating their own extensions (the Line busy prompt, the No answer prompt, the Voice to email greeting etc.). User-customized prompts remain operational only as long as the user needs them. A user can always revert to default prompts configured by the system administrator.

Click **Prompts** to access the Prompts page that displays the table of prompts currently available in the system (see Fig. 32)

The table of current prompts shows the name of the event or digit the prompt refers to and displays two buttons in the column Action.

























Prompt name	Action
User is busy	 
User no answer	 
User is not available	 
Voice mail	 
DISA	 
DialTone	 
EnterPersonalNumber	 
EnterPersonalAccessNumber	 
InvalidNumber	 
IncorrectAccessNumber	 
Music on hold	 

Fig. 32 Table of available prompts

The right-arrow button  serves to play the prompt or display the name of the prompt file. With MIME type associations properly set in the web browser the selected **.wav** prompt file will be played, otherwise the file dialog will be displayed inviting you to save the sound file.

If you wish to replace a prompt with one of your own click  on the line of the prompt you intend to change.

The upload dialog will appear above the Prompts table (see Fig. 33.)

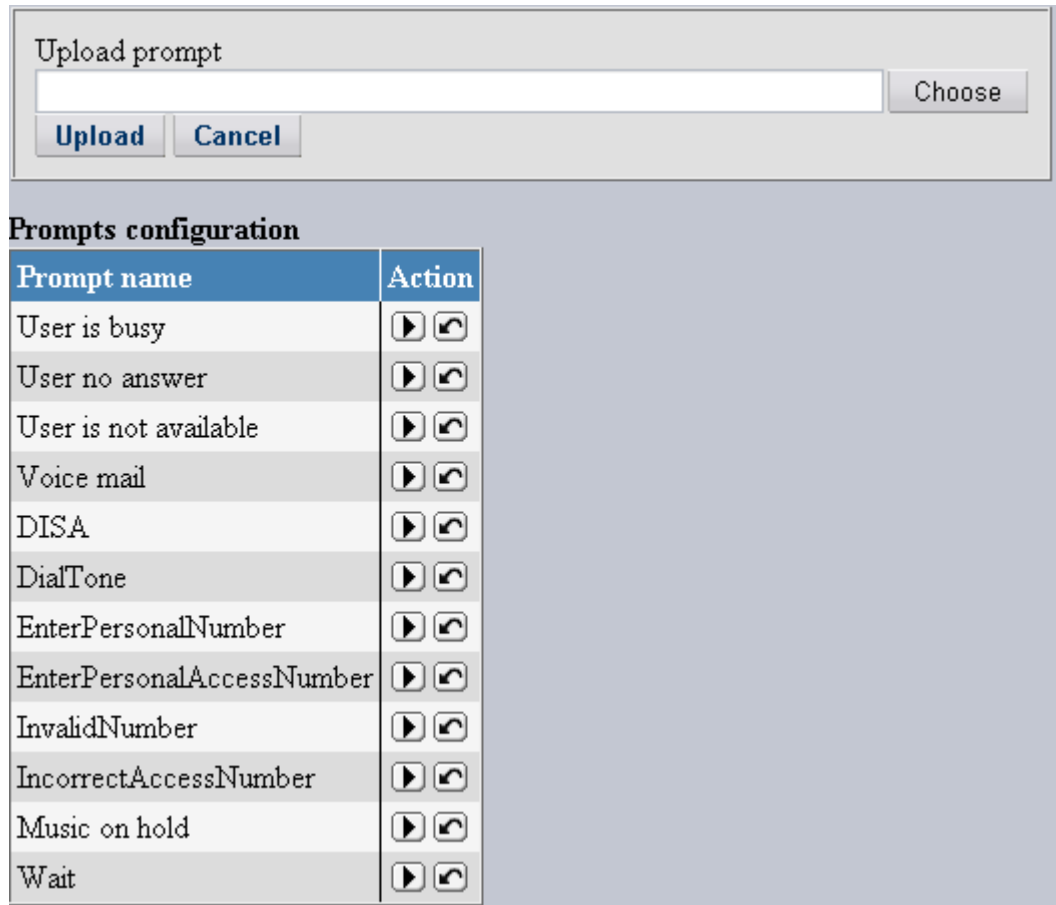


Fig. 33 Prompt upload dialog

Click to open the file dialog, find the **.wav** file with the necessary prompt and click .

The prompt file must be a valid **.wav** file with voice encoded using the PCM codec (PCM – 16 bits mono, 8 KHz). PCM encoding can be done with the help of the standard Microsoft recorder utility that comes with the operating system.

Note: *The uploaded custom prompt overwrites the current sound file and becomes the default prompt in the system. You can revert to the default prompt supplied by your system manufacturer only if you saved the prompt file before replacing it with a prompt of your own.*

4.8 CDRs AND LOGS

4.8.1 CALL DETAIL RECORDS (CDRs)

The DVX-7090 Router writes information about calls to files comprised of CDRs (Call Detail Records). The system generates two types of CDRs:

- User CDRs that contain information about calls involving the user extension. A user CDR provides data about the call originator and destination, date and time of the call session start and end, call disconnect reason etc. Each new call entails creation of a new record with call details.
- Administrator CDRs. Administrator CDRs include summarized call data for all users configured in the system. The files with CDR summaries are kept for a month. At the end of the month period the system starts a new file, archives the current CDR file and sends it to the email address, specified in the **Email CDR to** field.

4.8.2 VIEWING CDRs

The administrator can view CDRs on the CDRs page of the administrator’s web-interface.

Click the CDRs tab to access the CDRs page.

The screenshot shows a web interface titled "CDR List". At the top, there is a "CDR" dropdown menu currently set to "2006, August (current)". To the right of the dropdown is an "Actions" button with a refresh icon. Below the dropdown is a "Refresh" button. Underneath is a section titled "Current CDR" which contains a table with the following data:

Date	Source	Destination	Duration	Reason
2006/08/03 , 04:32	599909	5904	00:00:01	Normal call termination
2006/08/03 , 04:32	599909	5904	00:00:01	Normal call termination
2006/08/03 , 04:32	599909	5904	00:00:04	Normal call termination
2006/08/03 , 04:32	599909	5904	00:00:04	Normal call termination
2006/08/03 , 04:39	599909	5904	00:00:18	Normal call termination
2006/08/03 , 04:39	599909	5904	00:00:18	Normal call termination
2006/08/04 , 03:59	599909	5904	00:00:07	Normal call termination
2006/08/04 , 03:59	599909	5904	00:00:07	Normal call termination
2006/08/04 , 06:59	599909	5904	00:00:06	Normal call termination
2006/08/04 , 06:59	599909	5904	00:00:06	Normal call termination
2006/08/04 , 07:01	599909	5904	00:00:06	Normal call termination
2006/08/04 , 07:01	599909	5904	00:00:06	Normal call termination
2006/08/07 , 05:53	124	50399	00:00:00	Destination out of order
2006/08/07 , 05:53	124	50399	00:00:00	Destination out of order
2006/08/07 , 06:08	124	50399	00:00:00	Destination out of order
2006/08/07 , 06:17	124	50399	00:00:00	NotAcceptableHere
2006/08/07 , 06:17	124	50399	00:00:00	NotAcceptableHere
2006/08/07 , 06:20	50399	124	03:09:21	Normal call termination
2006/08/07 , 06:20	50399	124	03:09:21	Normal call termination
2006/08/11 , 07:55	50399	111124	00:00:00	Destination out of order

At the bottom of the table, there are pagination controls showing "1 2 3 4 5".

Fig. 34 CDRs look up page

The CDRs page includes two elements, a drop-down list of CDR files (**CDR files list**) and a table of records of the CDR file currently open (**Current file CDRs**).

The table **Current file CDRs** displays CDRs of the currently open file only and disappears whenever any CDR file other than the currently open is selected from the drop-down list.

The column names of the table **Current file CDRs** have the following intent:

Date shows the date and time of the call.


Source presents the caller's number

Destination displays the number of the called party

Duration provides information about the in-call time in the hh:mm:ss notation

Reason shows the disconnect reason for the call. The disconnect reason is output as a verbal interpretation of a Q931 disconnect cause code or SIP disconnect response where no applicable Q931 code is found.

The underlined column name is an indication that you can click the name to sort the table records accordingly. For example, by clicking the name **Date** you have the table records sorted by dates.

If you wish to view call detail records from any other CDR file you must download it first. Click the download button  next to the selected CDR file to download it to your workstation. CDR files are plain text files that can be viewed in any text editor.

An individual call detail record consists of a number of semicolon-delimited fields that provide the following data:

1. SETUP Time
2. CONNECT Time
3. Disconnect Time
4. Calling Number
5. Caller's name
6. Called number
7. Callee's name
8. Call type (incoming/outgoing)
9. Disconnect Cause Code
10. Disconnect cause description

Below is an example of a CDR extracted from a CDR file:

128000314450000000;128000314480000000;128000314650000000;50399;DPH-120s;124;PBX-SIP;outgoing;16;Normal call termination

The time data (fields 1 through 3) is presented as the Windows File Time

Note: *Windows file time is a 64-bit value that represents the number of 100-nanosecond intervals that have elapsed since 12:00 midnight, January 1, 1601 A.D. (C.E.) Coordinated Universal Time (UTC). Windows uses a file time to record when an application creates, accesses, or writes to a file.*

Any user configured in the system can view CDRs pertaining to the user's extension number by clicking **Statistics** on the User's personal page (for more information see ch. 6 [User Interface](#)):

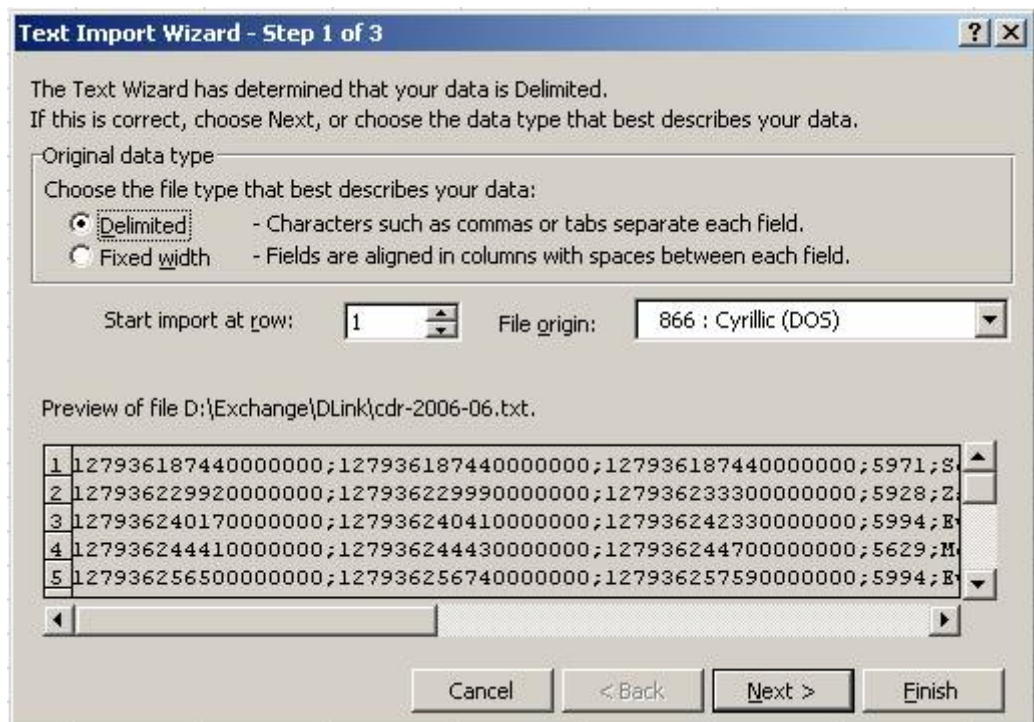
Time	Direction	Remote number	Remote party name	Reason	
04/21/2006 13:14:11	outgoing	88312788872	sipnet.ru	Normal call termination	⊗
04/21/2006 12:04:47	outgoing	88312788872	sipnet.ru	Normal call termination	⊗
04/20/2006 18:25:49	outgoing	88312788872	sipnet.ru	Normal call termination	⊗
04/20/2006 17:26:05	outgoing	88312788872	sipnet.ru	Normal call termination	⊗

Fig. 35 User CDRs

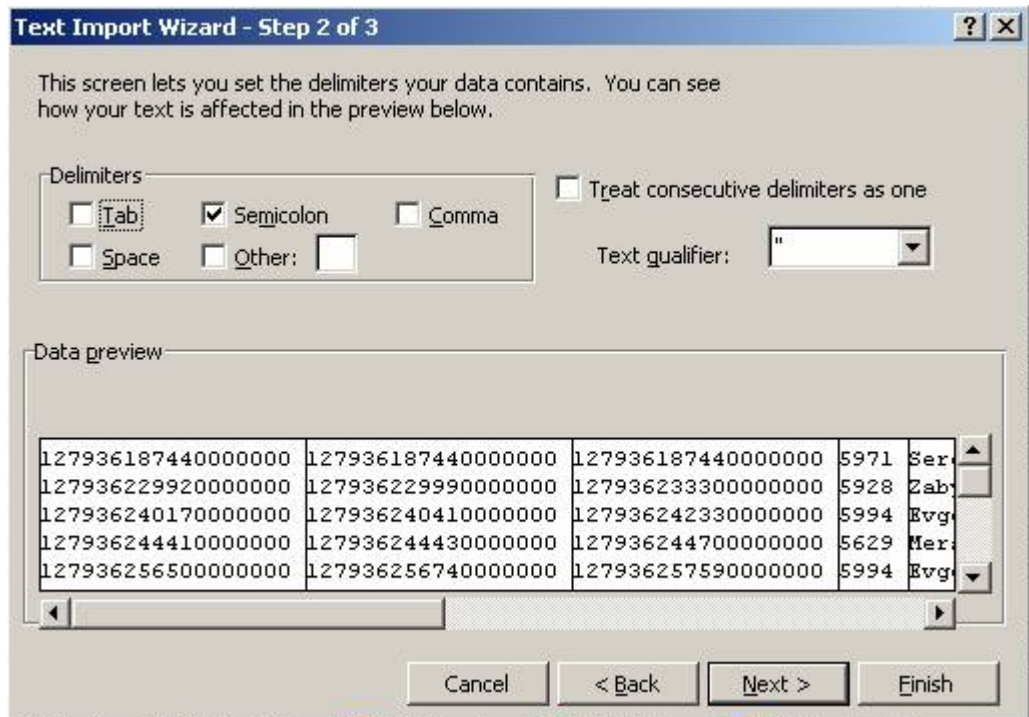
User CDRs are call detail records that include information about the date and time of the call, call direction (incoming or outgoing), the other call party's name and number, and the call's disconnect reason.

You can view downloaded CDR data in Microsoft Excel. To view a downloaded CDR file in Microsoft Excel:

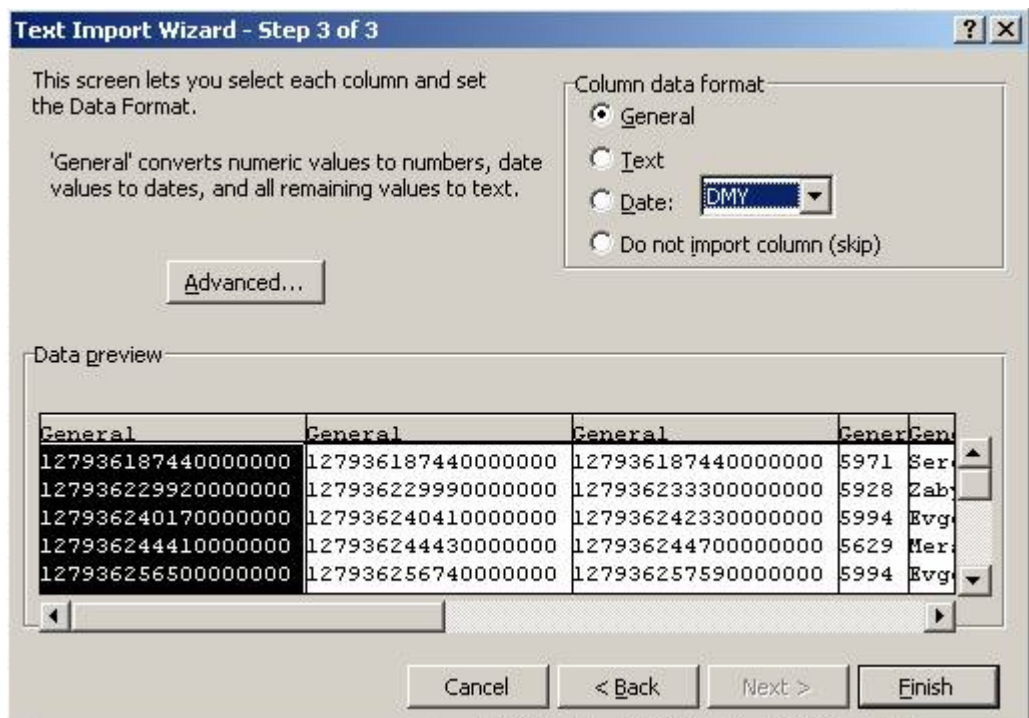
1. Start Excel
2. Click File → Open
3. Find the downloaded CDR file you wish to inspect
4. As the CDR file is in plain text format, Excel will automatically start the text import wizard



5. In the text-import wizard select the Delimited radio button to indicate that the CDR file has delimited contents
6. Click Next to display the next dialog of the wizard and select the checkbox Semicolon. Additionally deselect the checkbox Tab if it is selected. This done, click Next again.



7. The text-import wizard will display the next dialog where you may wish to specify the type of data column-wise. It is advisable to leave the type of data General as it appears in all the columns of the table, though.



8. Click Finish to complete the data import procedure.

The result of the import is shown in Fig. 36

	A	B	C	D	E	F	G	H	I	J	K	L
1	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
2	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
3	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
4	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
5	1,28E+17	1,28E+17	1,28E+17	5902	Gateway 2	300	300	incoming	16	Normal call termination		
6	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
7	1,28E+17	1,28E+17	1,28E+17	5902	Gateway 2	300	300	incoming	16	Normal call termination		
8	1,28E+17	1,28E+17	1,28E+17	5902	Gateway 2	300	300	incoming	16	Normal call termination		
9	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
10	1,28E+17	1,28E+17	1,28E+17	112	112	300	300	incoming	16	Normal call termination		
11	1,28E+17	1,28E+17	1,28E+17	112	112	300	300	outgoing	16	Normal call termination		
12	1,28E+17	1,28E+17	1,28E+17	112	112	300	300	incoming	16	Normal call termination		
13	1,28E+17	1,28E+17	1,28E+17	112	112	300	300	outgoing	16	Normal call termination		
14	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	Sample G	outgoing	27	Destination out of order		
15	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	Sample G	outgoing	27	Destination out of order		
16	1,28E+17	1,28E+17	1,28E+17	300	300	50399	Sample G	outgoing	27	Destination out of order		
17	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	Sample G	outgoing	27	Destination out of order		
18	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	incoming	16	Normal call termination		
19	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	outgoing	16	Normal call termination		
20	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	incoming	16	Normal call termination		
21	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	outgoing	16	Normal call termination		
22	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	incoming	16	Normal call termination		
23	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	outgoing	16	Normal call termination		
24	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	incoming	16	Normal call termination		
25	1,28E+17	1,28E+17	1,28E+17	50399	50399	300	300	outgoing	16	Normal call termination		
26	1,28E+17	1,28E+17	1,28E+17	50399	Gateway 2	300	300	incoming	16	Normal call termination		
27	1,28E+17	1,28E+17	1,28E+17	50399	ADV-SIP	300	300	incoming	16	Normal call termination		

Fig. 36 CDR file data imported to Excel

Note: The function for calculating the duration of a call session is $= (Cn - Bn) / 10,000,000$ (seconds), where n denotes the number of a row of cells. For example, the duration of the call session shown in the first row of the table in Fig. 36 is $(C1 - B1) / 10,000,000 = 19$ sec.

4.8.3

LOGS

In addition to CDR files the DVX-7090 Router writes log files designed to keep track of the system operation and events.. A log is a runtime journal with a listing of all events that occur on the server during operation of the DVX-7090 Router. The log files are necessary for debugging purposes.

The Router generates four types of logs:

- Control unit log is a file containing messages generated by the CU during operation. The file name format is **Logic-<YYYY-MM-DD>-<hh-mm-ss>.log**, where **YYYY-MM-DD** is the year, month and date of the file creation, **hh-mm-ss** is the hour, minute and second of the file creation, **.log** is the filename suffix.
- CU protocol log is a file of messages exchanged by the CU and SU during operation. The file name format is **Protocol-<YYYY-MM-DD>-<hh-mm-ss>.log**.
- Switching unit log includes event messages generated by the SU during operation. The file name format is **trace-<YYYY-MM-DD>-<hh-mm-ss>.log**.
- SU protocol log comprises signaling messages exchanged by the SU and H.323 or SIP endpoints. The file name format is **log-<YYYY-MM-DD>-<hh-mm-ss>.log**.

When addressing the customer support service, attach the pertinent four log files to the bug report.

Note: CDR and log files take up quite a large amount of disk space. So, at the expiry of a certain period of time the system archives the logs and saves the archive to the Router flash drive.

Click **Logs** to access the Logs page (see Fig. 37):

The screenshot shows the 'Logs' page with the following elements:

- Navigation tabs: Configuration, Users, Gateways, Services.
- Log management form:
 - Keep Logs for: 8 days
 - Keep User CDRs for: 8 days
 - Keep Administrator CDRs for: 6 months
 - Email CDR to: [empty field]
 - Submit button
- Log filters: CU log, CU protocol, SU log, SU protocol.
- Control Unit Logs section:
 - Buttons: Refresh, Remove all
 - Table:

Date	File name	Action
2006.08.29 13:16:48	Logic-2006-08-29-13-16-48.log	[Dropdown] [X]
1		

Fig. 37 Logs page

The Logs page consists of two parts: the CDRs and logs management form and the table of log files.

To configure a rotation period for CDR and log files fill in the following fields of the CDRs and logs management form:

Keep Logs for is an edit box for setting a rotation period for log files. The recommended value for this parameter is 7.

Keep User CDRs for provides a box for entering a rotation period for files with user CDRs.

Keep Administrator CDRs for is a field for setting storage time for administrator CDR files.

Email CDR to is an edit field for the destination e-mail address to which the system will send administrator CDRs archives after the expiry of the keeping time configured in the **Keep Administrator CDRs** field.

The table of files is designed for viewing log file listings. The table is comprised of the following columns:

Date – the column of file creation time stamps in the YYYY.MM.DD hh:mm:ss format.

File name – the column for log file names.

Action contains two buttons and . Use to download the selected file to your workstation, use to delete the selected file.

Note: *Deletion of the currently open log file is impossible.*

The button refreshes the table view.

The button deletes all files from the table.

4.8.4 VIEWING LOGS

Log files are necessary for debugging purposes. In case of a addressing to the customer support service you can attach a log file to the bug report.

To view a list of the desired log files click the respective button (, , ,). For example, Fig. 38 shows a list of CU protocol logs:

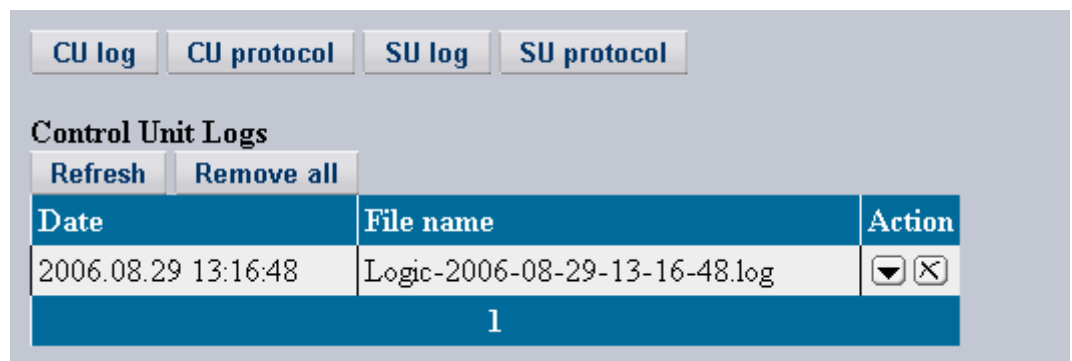


Fig. 38 A list of control unit protocol logs

To download a file from the table click , specify the destination directory and save the file to your computer. Now you can view the downloaded log file in any plain text editor.

Note: *CDR and log files are written in UNIX format and have UNIX end-of-line characters, so some text editors (such as Notepad) may display them incorrectly. Use either the Windows WordPad or Unix text editors (for example, vi or emacs) to view the downloaded files.*

To delete the selected file, click .

4.9 SOFTWARE VERSION MANAGEMENT

The DVX-7090 Router features a flexible software version management mechanism that allows you to:

- upload SW upgrades obtained from the manufacturer's site
- preserve preferred SW versions
- remove obsolete and unused application releases
- select a version that most suits your operational needs at the moment
- switch between the application releases whenever you find it opportune

You can have up to 4 software versions on the system simultaneously.

To add another SW version (an upgrade or a steady, proven release) click **Update** to access the SW management page (see Fig. 39).

Configuration **Users** **Gateways** **Ser**

Download database **Upload database** **Factory reset**

Application updates

Active	Date	Name	Action
<input type="radio"/>	10/11/2006 12:29:27	App20060929_6470_1	<input type="checkbox"/>
<input type="radio"/>	10/05/2006 19:25:44	App20061006_6470_2 (previous)	
<input checked="" type="radio"/>	10/07/2006 15:22:40	App20061008_6470_3 (current)	

Add new **Refresh** **Submit**

Operating System updates

Date	Name
09/19/2006 14:28:51	Sys20060919_ntp_mono

OS update **OS rollback**

Fig. 39 Software management page

The SW release that you plan to add to your current population of the DVX-7090 Router versions must be on the workstation you are using for administration at the moment.

You can have no more than 4 Router software versions on the system. For this reason, if you already have 4 SW versions on the DVX-7090 Router host you need to remove at least one before you can add another.

Click on the line of the version you wish to remove.

You cannot delete the current and the previous version, this is why the delete button is present on topmost lines of the table.

Click **Add new** to bring up the upload dialog (see Fig. 40).

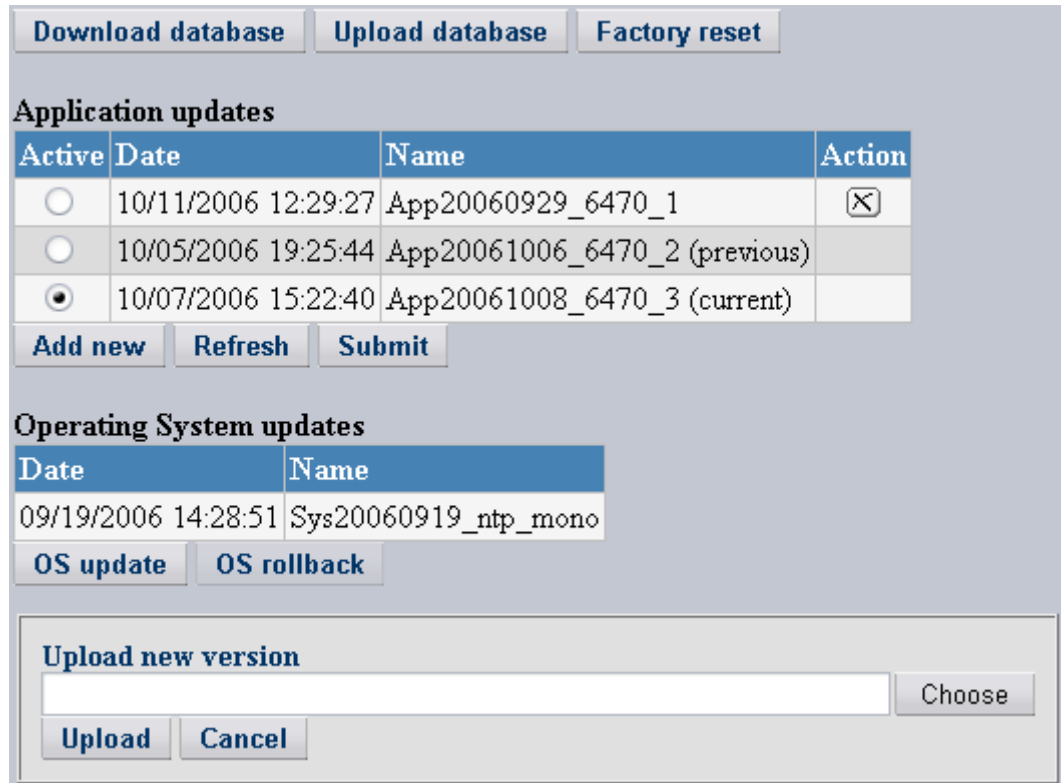
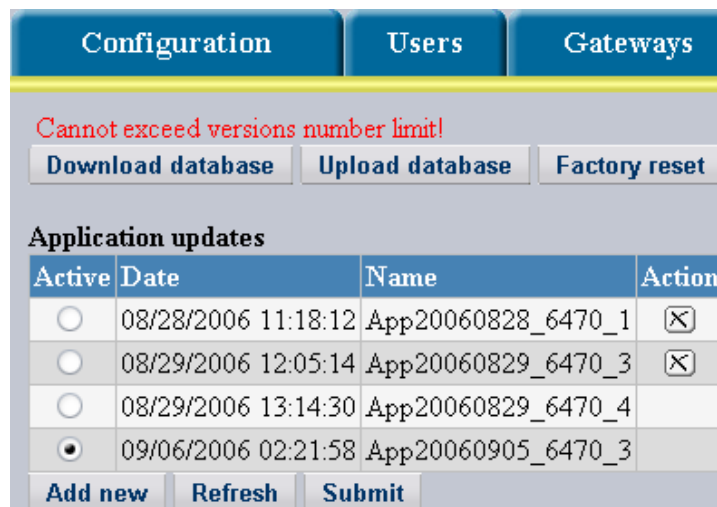


Fig. 40 Version upload dialog box

Click **Choose** to display the file dialog and find the SW update on the host you are using to access the Router.

Click **Upload** to upload the update to the Router host server.

If there is not enough free disk space, an error message appears above the table of versions:



Delete one of the earlier versions to be able to add a new one.

When the newly uploaded version appears in the table of versions, chose a version selected to be operational at the moment and click **Submit** for the made changes to take effect.

The button **Download database** allows you to make backups of the current configuration database and save them to your computer.

The **Upload database** button allows you to upload the saved version of the configuration database to the Router host.

The **Factory reset** button allows you to cancel all the application settings and revert to the 'ex-works' configuration. Current settings will be removed from the database.

To update the operating system:

1. download an update OS image from the site of the DVX-7090 Router manufacturer
2. logon to the DVX-7090 Router and click the tab **Update** to access the software management page
3. Click **OS update** to invoke the SW upload dialog, and you will be displayed with the warning as shown in Fig. 41

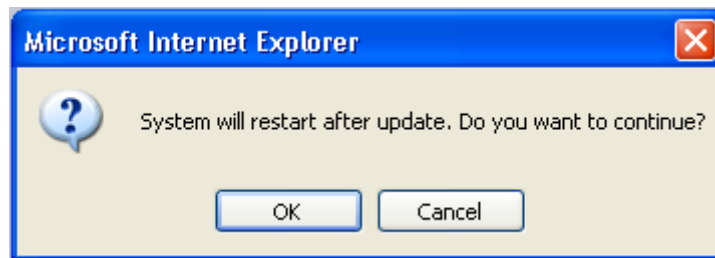


Fig. 41 System restart warning

4. Click the OK button to go on with the OS update procedure, and the Router will produce the OS update upload dialog (see Fig. 42)

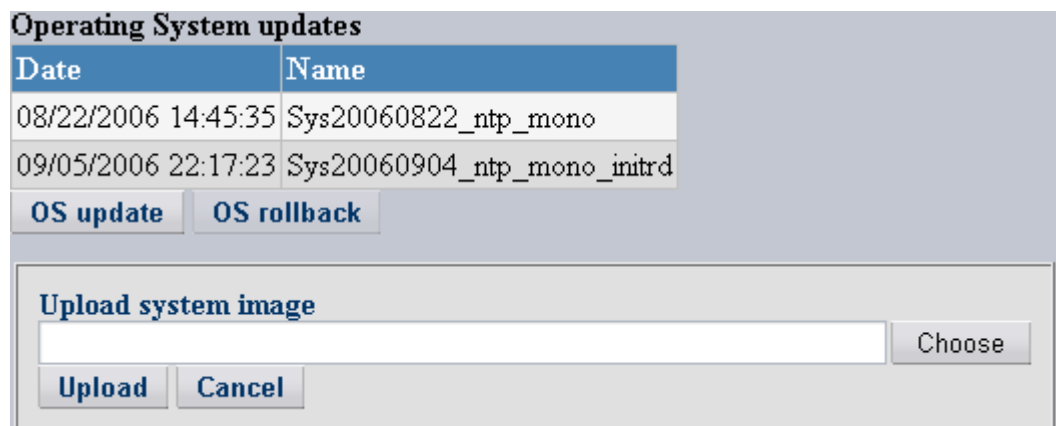


Fig. 42 OS image upload dialog

5. Click **Choose** to bring up the file dialog and select the OS image you intend to upload

6. The OS image selected, click **Upload** to upload the image to the DVX-7090 Router host.

The uploaded OS installs automatically and becomes current. The newly installed and current OS version is displayed on the bottom line of the table 'Operating system updates'

The button **OS rollback** allows you to roll back to the previous version of the OS. It is strongly recommended that you use this button only when it is absolutely necessary.



When you click the rollback button, the system reverts to the previous OS version and the table 'Operating system updates' displays one line less than the number of lines before the rollback.

5 CONFIGURATION HOW-TO'S


5.1 HOW TO CONFIGURE ROUTING PATH TO VOICE TO EMAIL

When started, the Voice-to-email service prompts the caller to leave a message after the tone, records the caller's message, converts it into a .wav sound file and sends the file to the user's email address.

To configure a routing path to the Voice-to-email service:

1. Click  to access the routing table page.
2. Click  to add a new record.
3. Replace the default name **Route #...** with a descriptive name of your choice (Voice Mail Route, for example)
4. Use the drop-down list of the combo box **Command** to select the option **Service**
5. Use the appearing combo box **Argument** to select the option **Voice to eMail**
6. In the edit box **Match** on the Destination line of entry boxes enter the destination number **009** for the service

	Match	Pattern	Result
Source	.*	^(.*)\$	\$1
Destination	^009\$	^(.*)\$	\$1

7. Suppose you need to make this service available on weekends only. Click  under the title **Activity Schedule** and select the checkbox **Time** to enter the start and end time for the Voice to eMail tool. Further, select the checkbox **Days** and select Saturday and Sunday on the drop-down list of weekdays.

Enabled

Route name:

Command:


Argument:

	Match	Pattern	Result
Source	.*	^(.*)\$	\$1
Destination	^009\$	^(.*)\$	\$1

Activity Schedule

Schedule	Action
<input checked="" type="checkbox"/> Time From <input type="text" value="00:00"/> To <input type="text" value="23:59"/> <input checked="" type="checkbox"/> Days	<input type="button" value="X"/>

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday

8. Click  to add the newly configured record to the table of configured routes. This done, you will return to the Routes page again. This step completes the Voice-to-eMail route configuration procedure.

Note: *Remember, to benefit from the voice-to-email service, the called user must have the destination e-mail address and call forward to voice-to-email number configured*

5.2 HOW TO CONFIGURE ROUTING PATH TO DIRECT INWARD SYSTEM ACCESS

To enable an authorized user to access all or some of the D-Link DVX-7090 Router services from a remote location, create the DISA service with the required range of accessible features.

Suppose your objective is to create two routes to two different DISA services – the main one with unlimited access to all of the DVX-7090 Router features and customized DISA with access to conference calls only. The main DISA service will be accessed by dialing **799** while the customized one by **798**.

To configure DISA:

1. Click **Services** to access the Services page.
2. Click **New service** to add a new record.
3. In the text box **Service name** of the add-new-route dialog replace the default name **New service** entering some descriptive name, for example **DISA 1**.

4. Select the option **DISA** in the drop-down list of the combo box **Command** and make sure the checkbox **Enabled** is selected or the routing rule will remain inactive.

5. You don't have to configure the prompt as the DISA prompt is assigned by default.
6. Click **Apply** to add the newly configured record, and you will be back to the Services page again.
7. Click **Groups** in the column **Groups** and in the pop-up menu select the checkbox **All**. Members of the access group **All** have access to all services.

<input type="checkbox"/> Only Transfer <input type="checkbox"/> Only Conference <input type="checkbox"/> Marketing and Sales <input checked="" type="checkbox"/> All <input type="checkbox"/> Group #5
<input type="button" value="Apply"/> <input type="button" value="Discard"/>

8. Click to confirm your choice
9. Click to add another record
10. Give the new DISA service some other name (say, **DISA limited**)
11. Repeat steps 4 through 6 of the configuration sequence.
12. Click in the column **Groups** and in the pop-up menu select the checkbox **Conferences only**.
13. Click to confirm your choice
14. Click to access the routing table page
15. Click to bring up the add-new-route dialog
16. Make sure the checkbox **Enabled** is selected or the routing rule will remain inactive
17. Replace the default name **Route #...** with a descriptive name of your choice (**DISA main**, for example)
18. Use the drop-down list of the combo box **Command** to select the option **Service**
19. Use the appearing combo box **Argument** to select the option **DISA 1**
20. In the edit box **Match** on the Destination line of entry boxes enter the destination number **799** for the main DISA service

	Match	Pattern	Result
Source	.*	^(.*)\$	\$1
Destination	^799\$	^(.*)\$	\$1

21. Click to add the newly configured record to the table of configured routes. This done, you will return to the Routes page again. This step completes the DISA route configuration procedure.

To add a routing record for the limited DISA service (destination number **798**)

1. Click to duplicate the newly created DISA record, and you will be displayed with the clone editing form

Enabled

Route name

Command

Argument

	Match	Pattern	Result
Source	<input type="text" value=".*"/>	<input type="text" value="^(.*)\$"/>	<input type="text" value="\$1"/>
Destination	<input type="text" value="^799\$"/>	<input type="text" value="^(.*)\$"/>	<input type="text" value="\$1"/>

2. Replace the default route name **DISA main clone** with the name you have chosen for the limited DISA (**DISA_conferences**, for example)
3. Select the option DISA limited in the combo box **Argument**
4. Replace the destination number **799** with the destination number **798** in the **Match** entry box on the line **Destination**

Enabled

Route name

Command

Argument

	Match	Pattern	Result
Source	<input type="text" value=".*"/>	<input type="text" value="^(.*)\$"/>	<input type="text" value="\$1"/>
Destination	<input type="text" value="^798\$"/>	<input type="text" value="^(.*)\$"/>	<input type="text" value="\$1"/>

5. Click **Apply** to add the newly configured record to the table of configured routes. This done, you will return to the Routes page again. This step completes the configuration procedure for alternate DISA routes.

5.3 HOW TO CONFIGURE ROUTING PATH TO EXTENSION NUMBERS

To configure call routing to DVX-7090 Router extensions:

1. Click **Routes** to access the routing table page.
2. Click **New route** to add a new call handling rule.
3. In the text box **Route name** of the add-new-route dialog replace the default name **Route #...** entering some descriptive name, for example **Route to local users**.
4. Make sure the checkbox **Enabled** is selected or the routing rule will remain inactive
5. Select the option **Dial User** in the combo box **Command**
6. Leave the fields for the source and destination numbers unchanged
7. Click **Apply** to confirm your choice.

The resulting call handling record is shown in Fig. 43

<input checked="" type="checkbox"/> Enabled			
Route name	Route to local users		
Command	Dial User		
Argument			
	Match	Pattern	Result
Source	.*	^(*)\$	\$1
Destination	.*	^(*)\$	\$1

Fig. 43 Call routing rule for extension numbers

5.4 HOW TO CONFIGURE ROUTING PATH FOR OUTBOUND CALLS

To create a rule for calls leaving the system do the following:

1. Click **Routes** to access the routing table page.
2. Click **New route** to add a call handling rule.
3. In the text box **Route name** of the add-new-route dialog replace the default name **Route #...** entering a descriptive name to your liking, for example **Outgoing calls**.
4. Select the option **Dial Gateway** in the combo box **Command**
5. Select the gateway that handles outward calls from the drop-down list of configured gateways of the combo box **Argument**.
6. If neither source nor destination number transformation is necessary, leave the **Source** and **Destination** number edit boxes as they are.

<input checked="" type="checkbox"/> Enabled			
Route name	Outgoing calls		
Command	Dial Gateway		
Argument	Gateway 225		
	Match	Pattern	Result
Source	.*	^(.*)\$	\$1
Destination	.*	^(.*)\$	\$1

Fig. 44 Routing rule for outbound calls

7. Make sure the checkbox **Enabled** is selected or the routing rule will remain inactive
8. Click **Apply** to submit the newly configured call handling rule, and you will return to the routing table page.

Refer to section 5.9 for tips on configuring a technical prefix for calls placed outside the system.

5.5 HOW TO CONFIGURE ROUTING PATH TO CALL PICKUP

The DVX-7090 Router provides for two types of call pickup:

1. group call pickup and
2. directed call pickup

Group call pickup allows you to answer any ringing phone that is in the same pickup group with you simply by dialing the pickup number.

In directed call pickup you must enter the call pickup key sequence and dial the extension number of the ringing phone to answer the call. You do not have to be in the same group with the user of the ringing phone to use directed call pickup.

Suppose the administrator assigns key sequence 888 for the call pickup rule.

To configure call pickup:

1. Click **Routes** to access the routing table page.
2. Click **New route** to add a call handling rule.
3. In the text box **Route name** of the add-new-route dialog replace the default name **Route #...** entering a descriptive name to your liking, for example Pick Up.
4. Select the option **Service** in the combo box **Command**
5. Select the name of the service that ensures pick up from the drop-down list of service names of the combo box **Argument**.
6. As the source number is of no importance here, leave the edit boxes on the line **Source** unchanged. Enter the Pick up service destination number **888** in the edit box **Match** and edit box **Pattern** followed by a regular expression for whatever number that may be dialed after **888**, to allow for directional pick up.

The screenshot shows a configuration window for a routing rule. At the top, there is a checked checkbox labeled 'Enabled'. Below it, the 'Route name' is set to 'Pick Up'. The 'Command' dropdown is set to 'Service', and the 'Argument' dropdown is set to 'Pick up neighbor's cal'. Below these fields is a table with four columns: 'Source', 'Match', 'Pattern', and 'Result'. The 'Source' row has a match of '.' and a result of '\$1'. The 'Destination' row has a match of '^888(.*)\$' and a result of '\$1'.

	Match	Pattern	Result
Source	.	^(.*)\$	\$1
Destination	^888(.*)\$	^888(.*)\$	\$1

Fig. 45 Routing rule for group and directional pick up

7. Make sure the checkbox **Enabled** is selected or the routing rule will remain inactive.
8. Click **Apply** to submit the newly configured call handling rule, and you will return to the routing table page
9. Click **Groups** in the column **Groups** and in the pop-up menu select a group (or groups), the members of which will be eligible to use the service.

Only Transfer
 Only Conference
 Marketing and Sales
 All
 Group #5

Note: *To make call pick up possible the owner of the ringing phone and the configured rule must belong to the same access group.*

10. Click to confirm your choice.

5.6 HOW TO CONFIGURE ROUTING PATH TO IMPERSONATE FUNCTION

The Impersonate function allows a caller who enters a specific PIN code to access the Router's services and features configured for the account of the user to which the entered PIN code belongs.

Suppose, the administrator assigns the Impersonate function key sequence 777. To use the office phone from a remote location, the user must:

- | | |
|-------------------------|--|
| When outside the system | <ul style="list-style-type: none"> • Dial into the Router • Dial the DISA number and get the dial tone • Enter the Impersonate key sequence 777 • Enter the user's telephone number • Enter the user's pin-code and get the dial tone • Now the user can make calls from the remote location as if being in the office |
|-------------------------|--|

To configure a routing rule for the Impersonate service invoked by dialing 777 followed by the user's office phone number or number of some other service:

1. Click **Routes** to access the routing table page.
2. Click **New route** to invoke the rule configuration form
3. In the text box **Route name** of the add-new-route dialog replace the default name **Route #...** entering a descriptive name to your liking, for example **Impersonate**.
4. Select the option **Service** in the combo box **Command**
5. Select the name of the service that ensures the Impersonate function from the drop-down list of service names of the combo box **Argument**.
6. The source number being of no importance here, leave the edit boxes on the line **Source** unchanged. Enter the Impersonate service destination number 777 in the edit box **Match** and edit box **Pattern** followed by a regular expression for whatever number that may be dialed after 777, i.e. (*).

<input checked="" type="checkbox"/> Enabled			
Route name	<input type="text" value="Impersonate"/>		
Command	<input type="text" value="Service"/>		
Argument	<input type="text" value="Impersonate"/>		
	Match	Pattern	Result
Source	<input type="text" value="(*)"/>	<input type="text" value="^(.*)\$"/>	<input type="text" value="\$1"/>
Destination	<input type="text" value="^777(*)\$"/>	<input type="text" value="^777(*)\$"/>	<input type="text" value="\$1"/>

7. If necessary, click **New** on the **Activity Schedule** form and enter time restrictions for the service accessibility.
8. Click **Apply** to add the rule to the routing table.
9. Click **Groups** in the column **Groups** and select in the pop-up menu a group or groups, the members of which will be eligible to use the Impersonate service:

Groups [Down Arrow] [Up Arrow] [Refresh] [Close]

- Only Transfer
- Only Conference
- Marketing and Sales
- All

Apply **Discard**

5.7 HOW TO CONFIGURE ROUTING PATH TO GROUP CALL SERVICE

A group call is a call intended for a particular group of DVX-7090 Router subscribers. When a group call comes, telephone sets of all the group members start ringing simultaneously. When one of the group members answers the call, all other telephones stop ringing.

Suppose the administrator has assigned the Group call service key sequence **444**. To make a group call, the caller is expected to:

- | | |
|-------------------------|---|
| When outside the system | <ul style="list-style-type: none"> • Dial into the DVX-7090 Router • Dial the DISA number and get the dial tone • Dial Group call service number 444 and get RBT • Wait till one of the group extensions answers |
|-------------------------|---|

To configure a Group call rule, do the following:

1. Click **Routes** to access the routing table page.
2. Click **New route** to invoke the rule configuration form
3. In the text box **Route name** of the add-new-route dialog replace the default name **Route #...** entering a descriptive name to your liking, for example **Call whoever answers**.
4. Select the option **Service** in the combo box **Command**
5. Select **Group call** from the drop-down list of service names of the combo box **Argument**.
6. The source number being of no importance here, leave the edit boxes on the line **Source** unchanged. Enter the Group call service destination number **444** in the edit box **Match** on the **Destination** row of edit boxes.

Configuration	Users	Gateways	Services																		
<div style="border: 1px solid #ccc; padding: 5px;"> <input checked="" type="checkbox"/> Enabled <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Route name</td> <td style="border: 1px solid #ccc; padding: 2px;">Call whoever answers</td> </tr> <tr> <td>Command</td> <td style="border: 1px solid #ccc; padding: 2px;">Service ▼</td> </tr> <tr> <td>Argument</td> <td style="border: 1px solid #ccc; padding: 2px;">Group call ▼</td> </tr> </table> <table style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 30%;">Match</th> <th style="width: 30%;">Pattern</th> <th style="width: 25%;">Result</th> </tr> </thead> <tbody> <tr> <td>Source</td> <td style="border: 1px solid #ccc; padding: 2px;">.*</td> <td style="border: 1px solid #ccc; padding: 2px;">^(.*)\$</td> <td style="border: 1px solid #ccc; padding: 2px;">\$1</td> </tr> <tr> <td>Destination</td> <td style="border: 1px solid #ccc; padding: 2px;">^444\$</td> <td style="border: 1px solid #ccc; padding: 2px;">^(.*)\$</td> <td style="border: 1px solid #ccc; padding: 2px;">\$1</td> </tr> </tbody> </table> </div>				Route name	Call whoever answers	Command	Service ▼	Argument	Group call ▼		Match	Pattern	Result	Source	.*	^(.*)\$	\$1	Destination	^444\$	^(.*)\$	\$1
Route name	Call whoever answers																				
Command	Service ▼																				
Argument	Group call ▼																				
	Match	Pattern	Result																		
Source	.*	^(.*)\$	\$1																		
Destination	^444\$	^(.*)\$	\$1																		

7. If necessary, click **New** on the **Activity Schedule** form and enter time restrictions for the service accessibility.
10. Click **Apply** to add the rule to the routing table.
11. Click **Groups** in the column **Groups** and select a target group for Group calls in the appearing pop-up menu.

Only Transfer
 Only Conference
 Marketing and Sales
 All

Note: *Remember that the configured rule and the dialing user must belong to the same access group.*

5.8 HOW TO CONFIGURE ROUTING PATH TO AUTO REDIAL

The Auto Redial function saves the user the trouble of repeated dialing when the called number is busy or unreachable for some reason.

Suppose, the administrator assigns the Auto Redial function key sequence **003**. To use Auto Redial, the user must:

- | | | |
|-------------------------|---|--|
| When outside the system | } | <ul style="list-style-type: none"> • Dial into the Router • Dial the DISA number and get the dial tone • Enter the Auto Redial key sequence 003 followed by 1 (for line busy) or 0 (for any other cause making the number unreachable) • Enter the target telephone number • Wait until the call is answered |
|-------------------------|---|--|

To configure a routing rule for the Auto Redial service invoked by dialing **003** followed by the target phone number:

1. Click **Routes** to access the routing table page.
2. Click **New route** to display the rule configuration form
3. In the text box **Route name** of the add-new-route dialog replace the default name **Route #...** entering a descriptive name to your liking, for example **Auto Redial**.
4. Select the option **Service** in the combo box **Command**
5. Select the option **Auto Dial** from the drop-down list of service names of the combo box **Argument**.
6. The source number being of no importance, leave the edit boxes on the line **Source** unchanged. Enter destination number **003** for the Auto Redial function in the edit box **Match** and edit box **Pattern** followed by a regular expression for whatever number that may be dialed after **003**, i.e. **(.*)**.

<input checked="" type="checkbox"/> Enabled			
Route name	<input type="text" value="Auto Dial Route"/>		
Command	<input type="text" value="Service"/>		
Argument	<input type="text" value="Auto Dial"/>		
	Match	Pattern	Result
Source	<input type="text" value=".*"/>	<input type="text" value="^(.*)\$"/>	<input type="text" value="\$1"/>
Destination	<input type="text" value="^003(.*)\$"/>	<input type="text" value="^003(.*)\$"/>	<input type="text" value="\$1"/>

7. Click **Apply** to add the rule to the routing table.
8. Click **Groups** in the column **Groups** and select in the pop-up menu a group or groups, the members of which will be eligible to use Auto Redial.

5.9 HOW TO USE MATCH AND PATTERN FIELDS IN THE ROUTING TABLE

Regular expressions are character strings used to build search patterns. Regular expressions also provide a powerful string handling tool. Regular expressions may include both alphanumeric characters, i.e. letters and digits normally used in writing and the so-called metacharacters. Metacharacters are symbols that have special meaning and use.

In this application you use regular expressions to define match (**Match**) and pattern (**Pattern**) strings.

The **Match** field is for regular expressions that define a match pattern for the source or destination number search.

The most instrumental and frequent metacharacters that you may need to use in match patterns include:

^ denotes the beginning of the match string. For example, ^56 matches a string starting with "56".

\$ stands for the end of a string. For example, 88\$ corresponds to any set of characters ending with "88".

- signifies any character

\d means any decimal digit.

When the number of symbols in the sought string is unknown, use special metacharacters called quantifiers. The most commonly used quantifiers are as follows:

- * denotes any number of something, for example, X* means any number of X's;

- ? stands for zero or 1 entry of a character, for example, X? means none or one X;

- + is used to express one or more entries of a character, for example you type X+ to signify 1 or more entries of X, and finally

- X{n} denotes exactly *n* number of Xs.

The field **Pattern** is designed for entering source and destination number translation rules. The need to transform the source or destination number often arises before passing the number to a particular service. If no changes are required, use the following regular expression **.***.

When number transformation is necessary without passing it to any particular service afterwards, select one of the following commands from the list:

- Continue – the modified number is passed to the next rule in the Routing table;
- Restart – the modified number is passed to the first rule of the Routing table.

Brackets are used to mark parts of the number extracted during call handling, for example **^(56.*)**. In the field **Result** the marked parts are referred to as \$n. In the expression \$n n represents a positive integer (greater than or equal to one) that identifies the number of the brackets occurrence (e.g. \$1 denotes the first set of brackets, \$2 means the second set of brackets etc).

For example, to give local users whose extension numbers start with **56** the capability to make outgoing calls through dialing technical prefix **0**, configure source and destination number transformation as shown in the table below:

	Match	Pattern	Result
Source	^56.*	^(56.*)	\$1
Destination	^0.*	^0(.*)	\$1

According to this rule prefix 0 will be cut off from the destination number because the internal prefix used in the system is of no relevance to the gateway sending calls outside the system.

The syntax of regular expressions appearing in the field **Pattern** is identical to that of regular expressions entered in the field **Match**.

The table below contains a list of regular expression constructs applicable in configuring the system.

Table 5 Summary of regular expression constructs

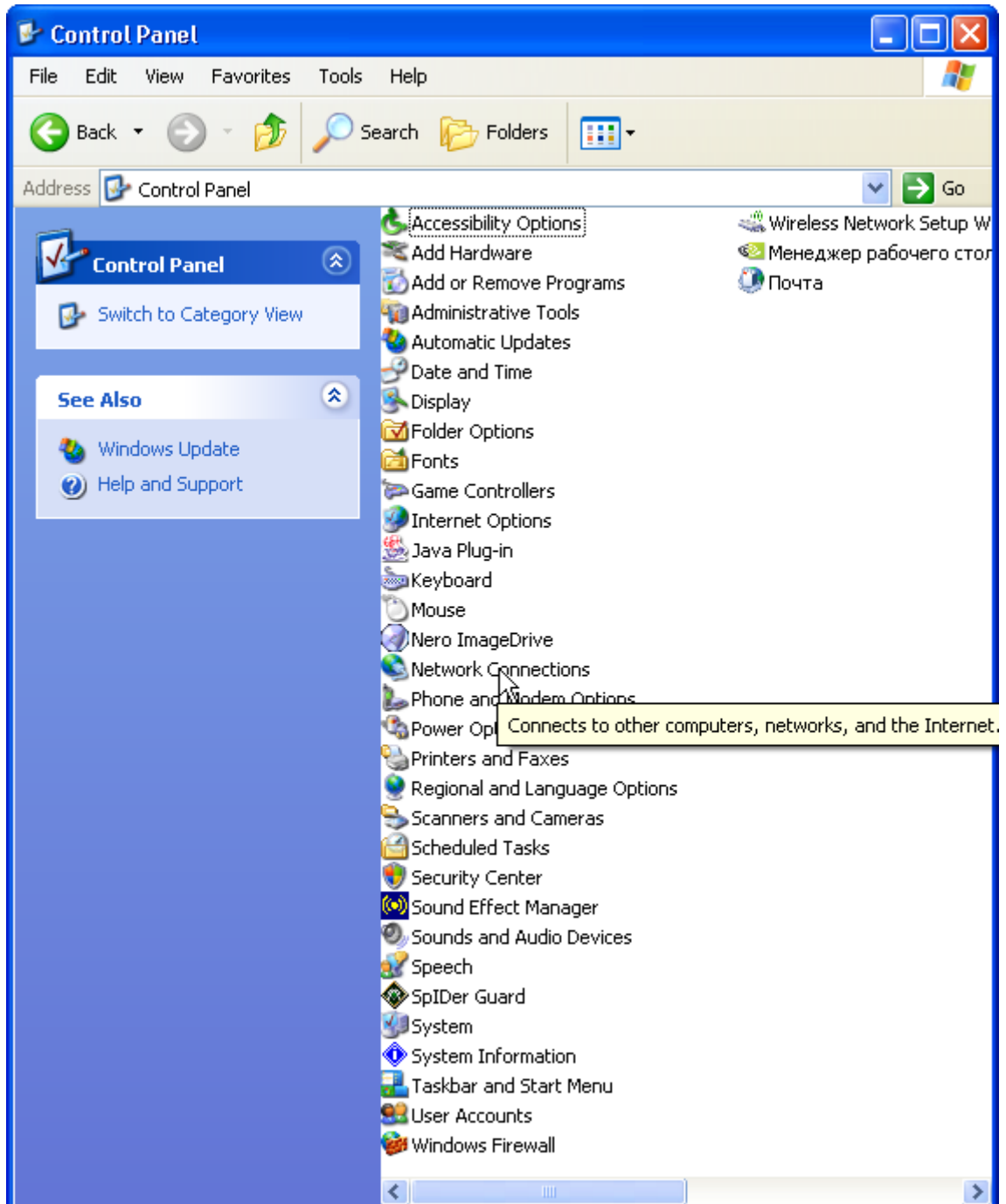
Construct	Matches
Characters	
<i>x</i>	The character <i>x</i>
<code>\0n</code>	The character with octal value <i>0n</i> ($0 \leq n \leq 7$)
<code>\0nn</code>	The character with octal value <i>0nn</i> ($0 \leq n \leq 7$)
<code>\0mnn</code>	The character with octal value <i>0mnn</i> ($0 \leq m \leq 3, 0 \leq n \leq 7$)
<code>\xhh</code>	The character with hexadecimal value <i>0xhh</i>
<code>\uhhhh</code>	The character with hexadecimal value <i>0xhhhh</i>
<code>\t</code>	The tab character (' <code>\u0009</code> ')
<code>\n</code>	The newline (line feed) character (' <code>\u000A</code> ')
Character classes	
<code>[abc]</code>	a, b, or c (simple class)
<code>[^abc]</code>	Any character except a, b, or c (negation)
<code>[a-zA-Z]</code>	a through z or A through Z, inclusive (range)
<code>[a-d[m-p]]</code>	a through d, or m through p: <code>[a-dm-p]</code> (union)
<code>[a-z&&[def]]</code>	d, e, or f (intersection)
<code>[a-z&&[^bc]]</code>	a through z, except for b and c: <code>[ad-z]</code> (subtraction)
<code>[a-z&&[^m-p]]</code>	a through z, and not m through p: <code>[a-lq-z]</code> (subtraction)
Predefined character classes	

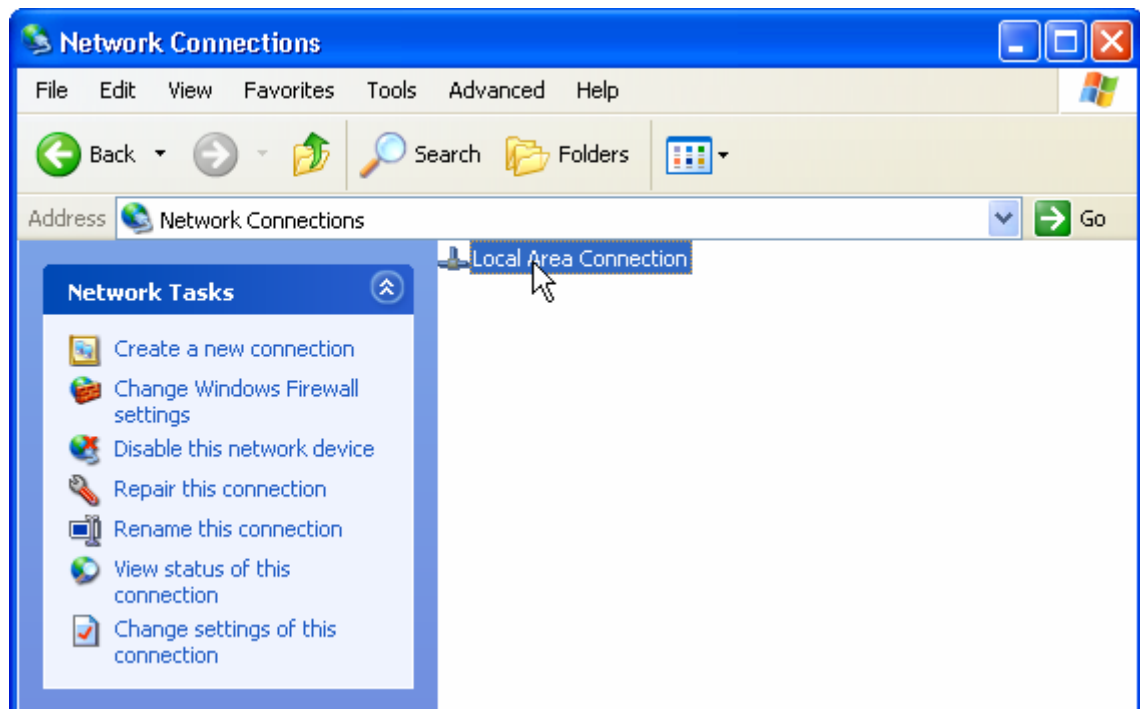
.	Any character (may or may not match line terminators)
\d	A digit: [0-9]
\D	A non-digit: [^0-9]
\s	A whitespace character: [\t\n\x0B\f\r]
\S	A non-whitespace character: [^\s]
\w	A word character: [a-zA-Z_0-9]
\W	A non-word character: [^\w]
Boundary matchers	
^	The beginning of a line
\$	The end of a line
\b	A word boundary
\B	A non-word boundary
\A	The beginning of the input
\G	The end of the previous match
\Z	The end of the input but for the final terminator, if any
\z	The end of the input
Greedy quantifiers	
X?	X, once or not at all
X*	X, zero or more times
X+	X, one or more times
X{n}	X, exactly n times
X{n, }	X, at least n times
X{n, m}	X, at least n but not more than m times
Reluctant quantifiers	
X??	X, once or not at all
X*?	X, zero or more times
X+?	X, one or more times
X{n}?	X, exactly n times
X{n, }?	X, at least n times
X{n, m}?	X, at least n but not more than m times
Possessive quantifiers	
X?+	X, once or not at all

X^{*+}	X , zero or more times
X^{++}	X , one or more times
$X\{n\}^+$	X , exactly n times
$X\{n, \}^+$	X , at least n times
$X\{n, m\}^+$	X , at least n but not more than m times
Logical operators	
XY	X followed by Y
$X Y$	Either X or Y

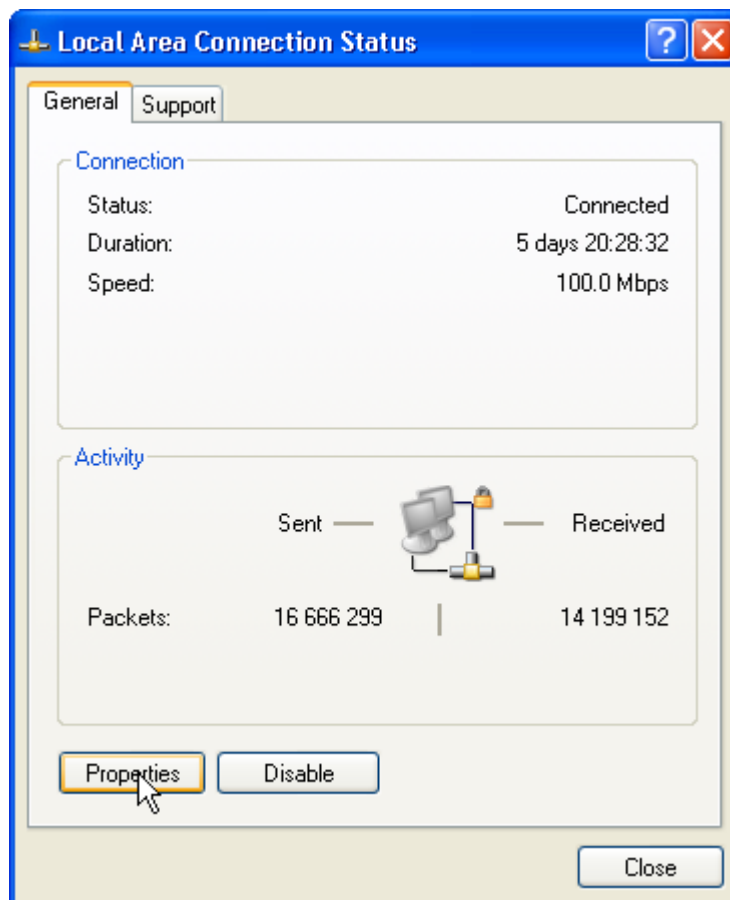
5.10 HOW TO CREATE A NETWORKING ALIAS FOR SUBNET 192.168.224.0

On a PC with the Windows OS click **Start** → **Control Panel** and double click the **Network Connections** option in the displayed **Control Panel** window.

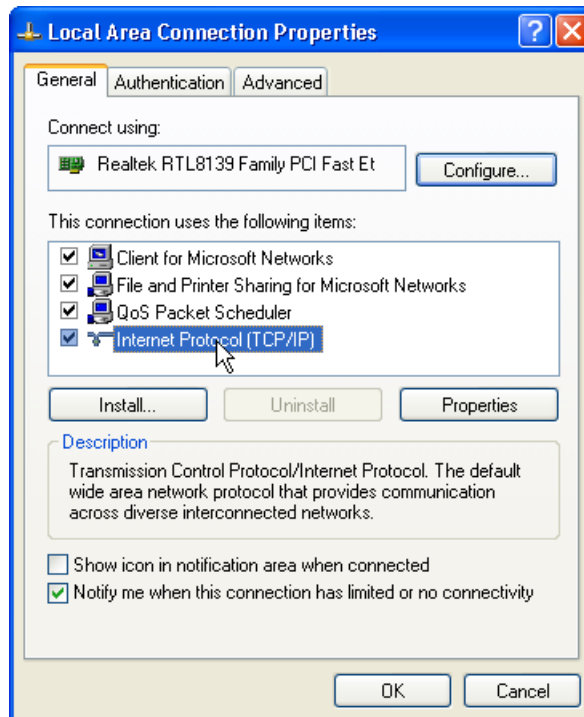




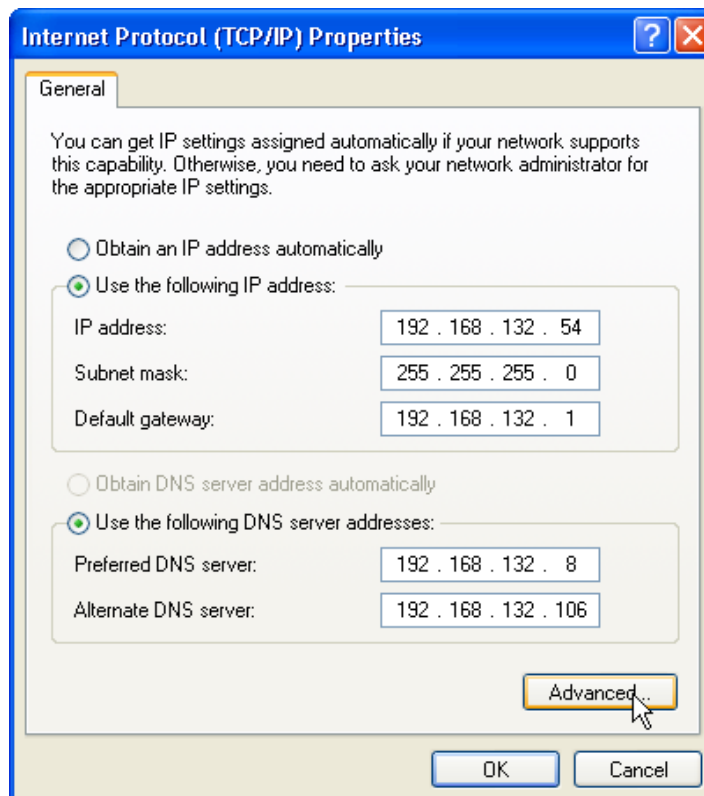
Double-click **Local Area Connection** and press the Properties button on the tab sheet **General**.



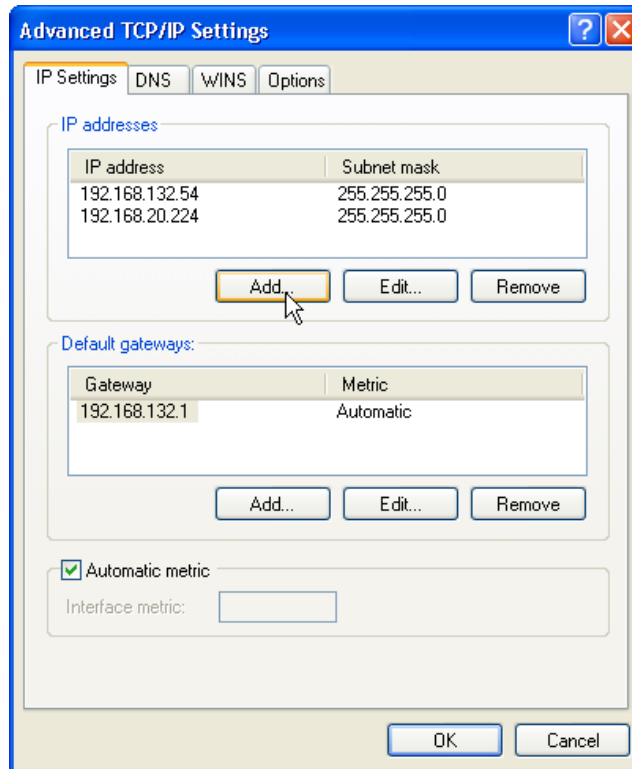
In the appearing **LocalArea Connection Properties** window select the item **Internet Protocol (TCP/IP)** and click the Properties button.



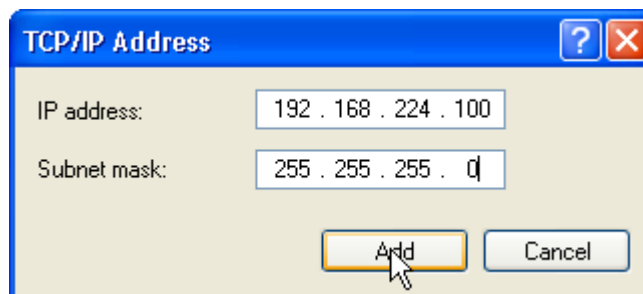
In the **Internet Protocol (TCP/IP) Properties** view, click the button Advanced...



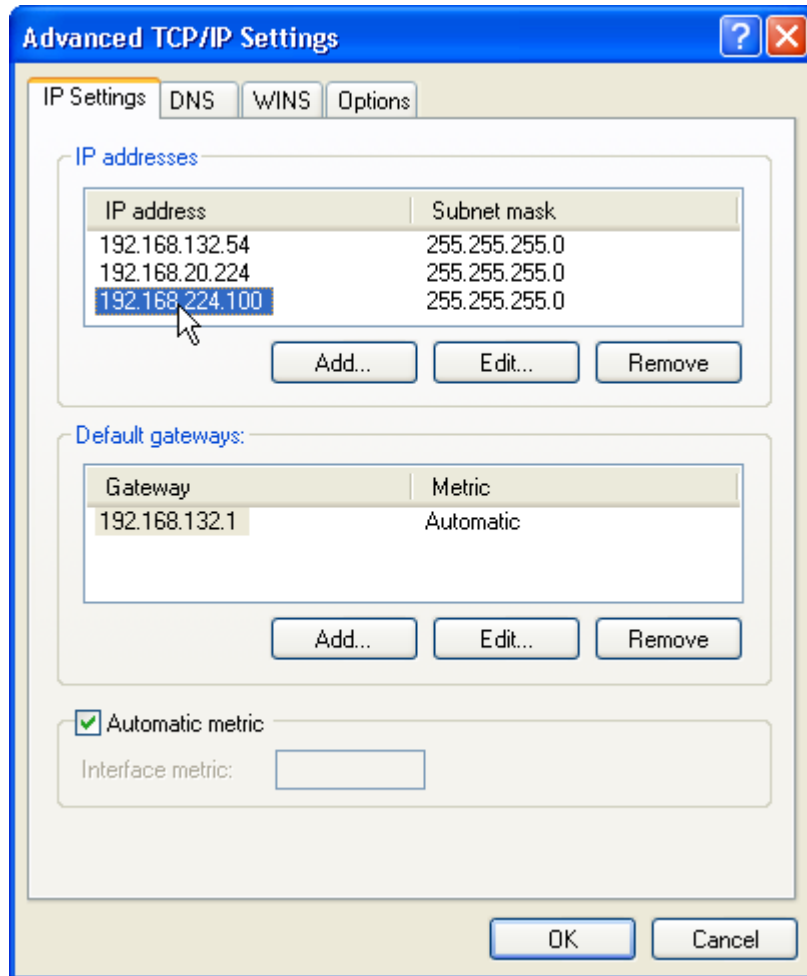
Click the Add button in the **Advanced TCP/IP Settings** window



Type **192.168.224.n** in the appearing **TCP/IP Address** dialog. **n** can be any number in the 0-255 range. Click the Add button to finalize the procedure.



The newly configured address should appear in the **Advanced TCP/IP Settings** window



6 USER INTERFACE

To access the logon page of the Web interface the user must start a Web browser and point it to http://ROUTER_IP, where ROUTER_IP is the IP specified by the system administrator in the IP address field of the WAN Settings box.

The login name and password that allow access to the user's personal interface are usually the user's telephone number configured in the DVX-7090 Router.

6.1 CONFIGURING USER'S DATA

A Router user can access the page with the user's personal settings only. Of all the personal settings presented on the page the user can edit E-mail, Web access password and call forwarding settings.

Fig. 46 User personal settings

To be able to receive email messages with sound files attached, type your email address in the **E-mail** edit field.

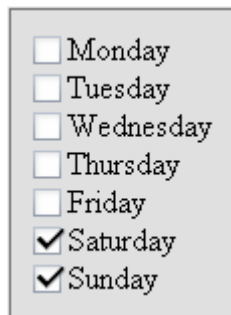
Specify a password for access to this page in the **Web access password** field.

To configure conditional and unconditional call forwarding:

1. Click **Add new** to add a line to the table **Forward options**

2. Select a condition (**Busy**, **No answer**, **Unreachable**, **Unconditional**) that will cause call forward using the combo box in the column **Fwd Condition**
3. If the forward rule being configured applies to a particular calling number only, type the necessary calling number in the edit box **Source**. Leave the field intact if the calling number does not matter.
4. When necessary, you can limit call forward to a particular time period and day or days of week.

To define a call forwarding period, select the checkbox **Time** (in the column **Activity Schedule**) and specify the period start and end time in the edit boxes **From** and **To** respectively. To specify on what days call forwarding will take place, select the checkbox **Days** and select call forward days on the drop-down menu invoked by a click on the appearing down-arrow button.



<input type="checkbox"/>	Monday
<input type="checkbox"/>	Tuesday
<input type="checkbox"/>	Wednesday
<input type="checkbox"/>	Thursday
<input type="checkbox"/>	Friday
<input checked="" type="checkbox"/>	Saturday
<input checked="" type="checkbox"/>	Sunday

5. Type in the forward number in the text box **Fwd Number** of the form and click **Apply** to validate the changes you have made to the record.

You may add as many lines with call forward settings as you deem appropriate.


6.2 VIEWING STATISTICS

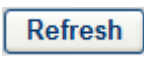
To access the Statistics page, click **Statistics**. The page presents call statistics for the user endpoint.

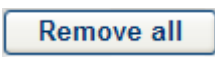
Time	Direction	Remote number	Remote party name	Reason	
04/20/2006 18:25:49	outgoing	88312788872	sipnet.ru	Normal call termination	X
04/20/2006 17:26:05	outgoing	88312788872	sipnet.ru	Normal call termination	X
04/20/2006 17:21:32	outgoing	88312788872	sipnet.ru	Normal call termination	X
04/20/2006 17:14:30	outgoing	88312788872	sipnet.ru	Normal call termination	X
04/20/2006 17:11:13	outgoing	88312788872	sipnet.ru	Normal call termination	X
04/20/2006 17:10:22	outgoing	88312788872	sipnet.ru	Normal call termination	X
04/20/2006 15:55:10	outgoing	88312788872	sipnet.ru	Interworking, unspecified	X
04/20/2006 15:53:28	outgoing	88312788872	sipnet.ru	Interworking, unspecified	X
04/20/2006 15:49:57	outgoing	88312788872	sipnet.ru	Interworking, unspecified	X
04/20/2006 15:46:26	outgoing	1975512	sipnet.ru	Normal call termination	X

1

Fig. 47 User's endpoint call statistics

The delete button  allows removal of the selected record.

Click  to repaint the statistics view.

Click  to remove all the records from the table.

6.3 MANAGING VOICE PROMPTS

To access the Prompts page, click the tab **Prompts**:

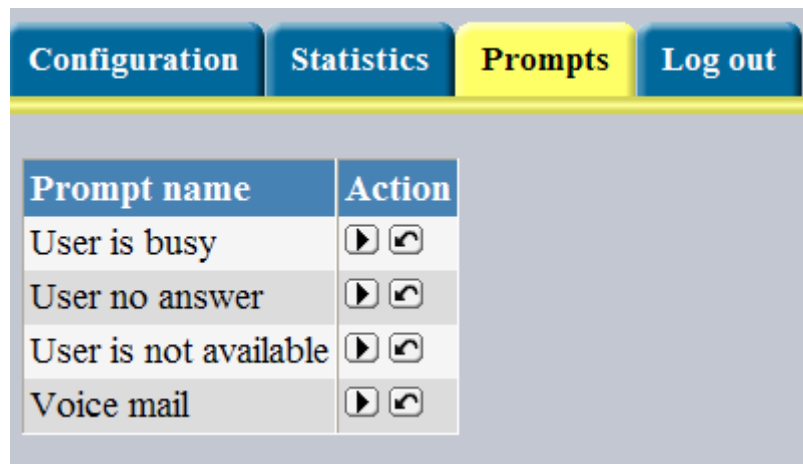


Fig. 48 The Prompts page of the user's interface

You can play or save the prompts on your computer using the button ▶.

You can upload new prompts from your computer with the help of the ↺ button. Click this button, to invoke the Upload Prompt dialog box that appears above the prompts table:

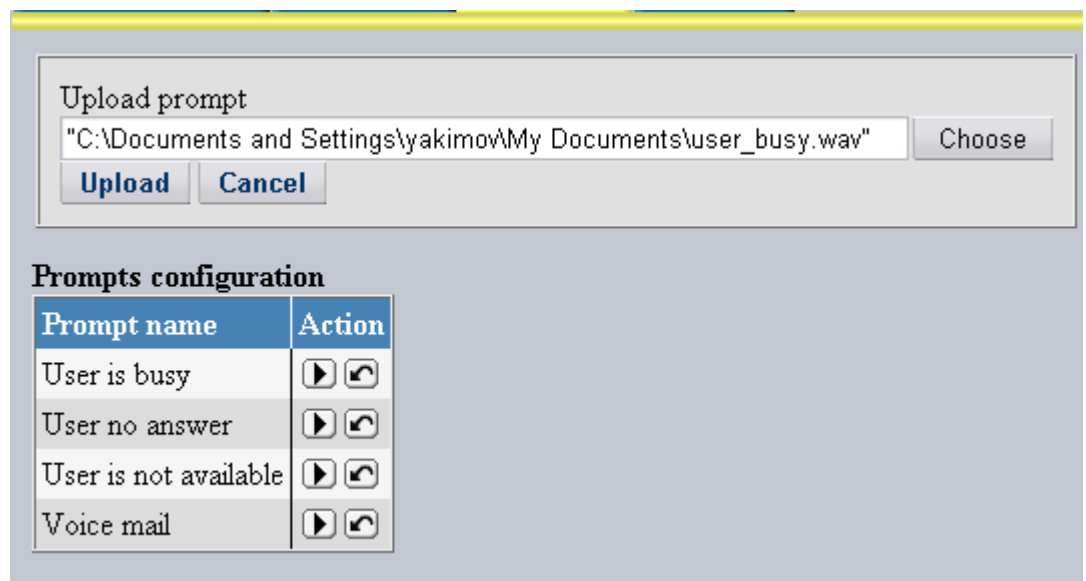
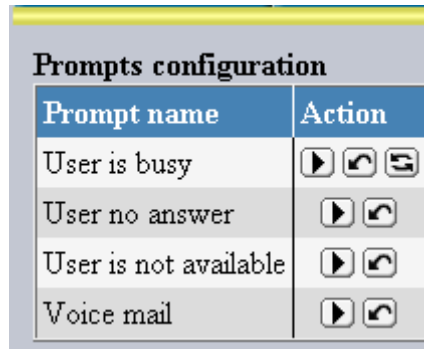


Fig. 49 "Upload prompt" dialog

Click Choose to invoke the file dialog, select the .wav file you need and click Upload.

Lines with customized prompts are easily identified by the 'roll-back' button ↺ (see Fig. 50)













Prompt name	Action
User is busy	  
User no answer	 
User is not available	 
Voice mail	 

Fig. 50 Table of prompts with customized line-busy prompt

Prompt files added by users do not overwrite the default sound files, and users can always revert to the default prompt using the “roll-back” button  in the **Action** column

7 USAGE HOW-TO'S

7.1 HOW TO USE CALL TRANSFER

The DVX-7090 Router provides for 2 types of transfer:

- Attended (consultative) transfer when the transferor first contacts the transfer target before leaving the call, and
- Blind (unsupervised) transfer when the transferor just transfers the call to the called extension and hangs up.

To use the transfer service the user should belong to a group authorized to use the Transfer service (See the [Configuring groups](#) section for details).

A common transfer scenario unfolds as follows:

1. User A calls user B
2. User B answers the call
3. User B wishes to transfer the call to user C (the sequence of events when user A does the transfer to user C is the same).
4. User B presses the Flash button to place user A on hold. (**Note:** If there is no Flash button hitting the Flash key can be emulated by sequentially pressing * and # within one second time.)
5. User B dials user C (**Note:** *The majority of phones require pressing # to complete dialing*).

Further steps vary with the type of transfer (attended or blind.)

In case of a blind transfer:

6. User B hangs up.
7. User A becomes the calling party for user C and hears the ringback tone.
8. When/if user C answers the call, a call session between A and C is established.

During an attended transfer:

6. User B establishes a connection with user C
7. User B is able to switch between user A and C by pressing the Flash button if any (if there is no Flash button hitting the Flash key can be emulated by sequentially pressing * and # within one second time.) User A and C do not hear each other.

Note: *If user B's group has Conference permissions users A and C will be able to hear each other.*

8. When user B hangs up, a call session between A and C becomes established.

7.2 HOW TO MAKE CONFERENCE CALLS

The DVX-7090 Router supports 3 party conference calls only.

As setting up a conference involves the call transfer service, the user who is the conference initiator must belong to a group with both Transfer and Conference permissions.

The 3-party conference scenario unfolds as follows:

1. User A calls user B
2. User B answers the call
3. User B wishes to transfer the call to user C (the procedure when user A does the transfer to user C is the same).
4. User B presses the Flash button to place user A on hold. (**Note:** If there is no Flash button hitting the Flash key can be emulated by sequentially pressing * and # within one second time.)
5. User B dials user C.
6. User C answers the call
7. User B presses the Flash key. From this moment on all call parties can hear and talk to each other. (**Note:** If there is no Flash button hitting the Flash key can be emulated by sequentially pressing * and # within one second time.)
8. Any user can leave the conference at any time. When one of the conference participants leaves the conference turns to a regular phone call.

APPENDIX A ACRONYMS

Table 6 List of acronyms used in this manual

Acronym	Expansion
CDR	Call Details Record
CHAP	Challenge Handshake Authentication Protocol
DB	Database
DHCP	Dynamic Host Configuration Protocol
DISA	Direct Inward System Access
DNS server	Domain Name Server
DTMF	Dual Tone Multi-Frequency
LAN	Local Area Network
MIME	Multipurpose Internet Mail Extension
NAT	Network Address Translation
PBX	Private Branch Exchange
RAS	Remote Access Service
RBT	Ring-Back Tone
RTP/RTCP	Real-Time Protocol/Real-Time Transmission Protocol
SIP	Session Initiation Protocol
SMTP	Simple Mail Transfer Protocol
SSL	Secure Socket Layer
SW	Software
TTL	Time-To-Live period
VoIP	Voice Over IP
WAN	Wide Area Network

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