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Getting Started

with

Billion Softswitch

Content

1. How to use this book

This tutorial is intended to help you start working with BSS as soon as possible. We give you answers on most frequent questions and show you how to configure the most important parameters and how to avoid the most frequent errors. Starting the work with BSS by this tutorial, you will be able to continue its deeper studying by going over to detailed description of all of its functions and parameters contained in User Manual.

2. VoIP equipment. What is BSS needed for?

In the context of VoIP, under "equipment" term we will mean PC or notebook equipped with the application-specific software such as BSS.

Thus, as it appears from abbreviation, VoIP technology is built upon IP network. However, as the telephony appeared much earlier, it is necessary to integrate existing telephony networks with VoIP networks in some way. For this reason, it is important for us to separate VoIP equipment in two groups: the first one which works only in IP environment and the second one which works on the border between IP and traditional telephony.

Different gateways (both personal and carrier-class) refer to the second group of equipment. There exist also less widespread gateways connecting IP and mobile networks. From the VoIP side they seemed identically. An important point is that this group of equipment is able to transfer the call from non-IP network to IP network – and vice versa.

Different IP-phones, soft phones which can be installed to PC, PDA or mobile phone with IP network support, proxy-servers refers to the first group of VoIP equipment – i.e. they work only in IP environment. BSS also refers to this group of equipment.

VoIP becomes more and more popular but it is still inferior to traditional telephony protocols by popularity. VoIP's benefits can be especially seen with long-distance calls. Just at that spot VoIP covers more and more area. However, it is quite widespread situation when the carriers perform switching of calls arrived by VoIP using traditional switching devices. In this case call is transferring from VoIP network, passing through traditional switch-board and returning back to VoIP network. It is unlikely that this scheme is optimal, especially taking into consideration the expensiveness of equipment for such kind of inversions.

It is more easily to switch such calls staying within IP network – and BSS will be of service to this purpose. Installed at low-priced PC, it allows replacing three devices – and the price for each of these devices is higher than the price of BSS together with PC where it is installed.

Moreover, BSS implementation area isn't completed with above mentioned. BSS can be also used as system core when constructing new generation SIP-based phone network. SIP-based networks become more and more popular and they are used not only on enterprise scale but also on global scale.

3. Billion Softswitch – vocabulary

In this chapter we will discuss terms used in Billion Softswitch. In many cases user interface needs to be short, so used terms can not always be evident and clear. In this chapter you will be able to find extended explanation of those terms which you will meet working with Billion Softswitch.

BSS should be considered as software which transforms your PC into telephone switchboard. After BSS installation you are able to control interconnections which are preformed by popular VoIP protocols – SIP and H323. It can be calls from PC to PC, from PC to phone and vice versa, and even calls from phone to phone.

To work with BSS, you will need any modern or not very modern PC equipped with NIC (Network Interface Card) and connected to LAN or Internet.

You can use BSS as core program of your telecommunication business or as add-on to your office PBX or as a switch for control of voice-over-IP communications within your corporate or home LAN. BSS is at once a transit and a subscriber switchboard. You will see that this product is unique in its characteristics.

To proceed with work, let's try to clear up the main terms that BSS works with.

3.1. From point A to point B

BSS is a commutation server. This means that it accepts call from one party and routes it to another party. The party from which BSS accepts call is **originator**. The party to which BSS routes the call is **terminator**. Gateways, soft phones, hardware IP-phones, other softswitches and the rest devices fitted for work with VoIP protocols can be in quality both of originators and terminators. Each of these parties must have an IP-address and port (in its turn, each port has its own value set by default for one or another protocol; for instance, default port for H323 is 1720 and default port for SIP is 5060).

As it was mentioned above, BSS can be used both as transit (class 4) and subscriber's (class 5) switch-board.

Having an idea of what originator is and what terminator is, let's take a look at working BSS as transit switch. BSS is installed in a local network at PC which has 192.168.0.1 IP-address. Originator (IP-telephony gateway) is located at 192.168.0.2 IP-address and terminator (another gateway) is located at 192.168.0.3 IP-address. In such a manner we get two so-called legs: from originator to BSS and from BSS to terminator.

There is also a **Subscriber** term in BSS. As in case of traditional telephony, subscriber can be both originator and terminator – i.e. perform and accept calls. Upon that, calls can be realized not only between two subscribers but also between originator-gateway and subscriber and between terminator gateway and subscriber.

We now consider above mentioned three types of parties of communication process in more detail.

3.2. About subscribers

Subscriber is identified by login and password. Its IP-address is reported to BSS during the registration process. After registration process is finished successfully subscriber becomes available for performing and accepting of calls. Soft phone or hardware IP-phone can acts as subscriber. Subscriber's name can be, in particular, a phone number or a literal form. Subscriber's IP-address can be changed occasionally – and BSS will receive notification of this change during regular registration process.

Let's give an example. Suppose that you travel widely with your laptop with soft phone installed. BSS is installed at your home or office PC and your name or some phone number is registered as subscriber at BSS. Each time you are connecting to Internet in different cities you get new IP-addresses. And each time you're getting these new IP-addresses you register at BSS at your home or office. As a result, BSS is always able to get connection with you. Your eventual caller may not know your location or current IP-address, so he (she) directs calls addressed to your account name or phone number to BSS – and BSS redirects them to your laptop as you have reported it of your new IP-address during the process of registration.

Usually, subscriber is the beginning and the end of communication chain. You can find more detailed information of subscriber's properties set up in User Manual.

3.3. About originators

Originator is the party which sends call to BSS. Usually, originator is an object of transit telephony. It can be a gateway belonging to another carrier which directs calls to BSS.

It is obvious that in most cases authorization of originator is needed, especially if BSS located not in private network but in Internet. Originator can be authorized both by IP-address and by login/password. Authorization by IP-address is the most secure method because in this case BSS will accept call only from those IP-addresses which were listed to it. Calls from all other devices will be refused. Authorization by login/password is an alternate method of authorization. This method is relevant for those cases when IP-address is changeable – but it is more appropriate to consider such kind of originator as a subscriber.

There can be a number of originators and they can direct calls simultaneously. Moreover, one originator is able to direct a few calls to BSS – for example, if it is IP-telephony gateway. BSS is able to accept as many concurrent calls as it limits by the license installed. Note that this limitation has nothing to do with the number of originators – i.e. even if you have license for 32 ports (simultaneous calls) the list of originators can contain more than 100 entries. You can find more detailed information on how to set up originators properties in User Manual.

3.4. About terminators and routes

Terminator is the device where BSS forwards calls to. As we said above, subscriber also can be a terminator. While establishing transit of telecommunication traffic BSS can receive the call which is not directed to its subscriber. In this case it refers to the list of terminators.

There can be a number of terminators and BSS determines to which of them redirect call in accordance with rules. Dialed number in a call received by BSS is a basis for decision making.

In order to decide where to send the call BSS goes to the list of **Routes**. Each route has a field "Prefix". Based on this field BSS makes a choice. This field can contain letters and numeric characters as well as special character "~". This character is a countertype of an asterisk (*) when operating with files – and it means "all the rest of it".

For instance, route with prefix "00~" will be selected for calls with following dialed numbers:

00123456789

00987654321

And it won't be selected for calls to:

0123123123 or

4567890123 numbers

Every route has one or more terminators bound to. The binding can be done in Advanced properties dialog of the route. In order to bind one or more terminators it should be selected in the list in this window.

There is also quite often the situation when large variety of entries with equal or similar prefix is presented in route's table. In this case BSS will be selecting routes from top to bottom of the table. If no terminator bound to the first route was able to serve the call then BSS try to pass this call to the next route with suitable prefix. This rule has the exception – if administrator doesn't want BSS to overpass to route B if terminators of route A have not served the call, it is necessary to turn on "Stop hunting on this route" option for route A. You can find more detailed information on how to set up terminators and routes properties in User Manual.

4. Billion Softswitch – user interface

One of the most important BSS features is its ability to run under different operating systems. To make this possible, BSS user interface was realized in a form of web-pages which are seemed to be the same without reference to applied OS. Moreover, it gives ability to manage BSS remotely which is very important if PC with BSS is located in a specialized hosting center.

BSS user interface page consists of three parts. Top part contains product info, version number and licensor name. On the bottom left you will find main menu and on the bottom right – operation area. The last one changes depending on selected menu item.

Each page is represented in standard web-form supported by the most of web-browsers. There are few kinds of pages: configuration forms, lists, status pages and also log-file browsing page.

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4.1. Configuration forms

Configuration forms are web-interface standard elements without any difficulties of work in with. After data input it is needed to press "Accept" button in the bottom of the form. By pressing "Reset" you retrieve previous values.

4.2. Working with lists

Each page with lists contains table and "Accept"/"Reset" control buttons. The far right table column is used for table line content management. Besides, end table line is used for adding of new line in a list. Now let's see how it works.

If the table already contains some lines they can be changed or deleted. If you want to delete some line you have to choose "Delete" value within drop-down menu of the far right table column. If some fields of table line were changed and you want to save these changes you have to choose "Keep" value within drop-down menu of the far right column. In such a manner you are able to change or mark for deleting several lines at one stroke. To make these changes effective, it is needed to press "Accept" button in the foot of the page.

To add new line you have to input necessary data to the bottom line and then choose from the drop-down menu of the far right table column "Add Top" or "Add Bottom". After pressing "Accept" button the new line will appear either on the top or at the end of the list – depending on made choice.

Besides, using drop-down menu in the far right table column you are also able to move some line up or down within the table. To perform it, you have to choose appropriate value within "Move Up/Move Down/To Top/To Bottom" of drop-down menu and then press "Accept" button. After it is done, table will be redisplayed with new lines' locations.

It is often that not all fields related to this table line are displayed at the page. For such cases "Advanced properties" column with "Edit" link is provided. After clicking this link, you will see the pop-up window with all additional data excluded from table. All data in this window are presented in a form of configuration forms with "Accept", "Reset" and "Close" buttons.

It is necessary to note that after all changes in a pop-up window are accepted, you need also accept changes at the main page. You will be informed about this by red color of "Edit" link.

4.3. Status pages

Status pages consist of two parts: refresh rate set up form and status table. Those pages are refreshed automatically. User can manage refresh rate by inputting of interested value in "Refresh interval, sec" field. New value will be applied either during the following update or after pressing "Refresh Now" button.

4.4. Log-file viewing page

This page displays the contents of BSS log-file wherein different events are registered. As log-file can have quite solid size BSS breaks it down into enumerated parts. Numeration begins with null. When user selects "Log-file" page, BSS prompts for number of part which has to be displayed. After that – and upon condition that inquired part exists on hard disc – its contents will be displayed on the screen.

5. Billing

Billion Softswitch is often used in business communication networks. In such cases the most important question is payments accounting for network users. Billing system helps to solve above mentioned problem. There are a lot of billing systems on the modern telecom market, so the user has different variations of integration BSS with billing system which is suited to his goals.

5.1. Internal built-in billing system

Billion Softswitch has its own internal built-in billing system that is meant for small networks limited by several tens of customers. This built-in billing provides user with the minimal menu functions such as: calls rating, customers' personal accounts accounting, prevention of debt receivable appearance (prepaid scheme), reporting. This system is included directly to BSS core and it is available to all users.

To enable billing system functions, you have to set "Internal" value for "Billing Type" parameter at the "Billing Settings" page.

After it is performed, two new items ("Customers" and "Tariff Plans") will appear in main menu. Besides, you are also able to bind some terminator to selected customer (see "Advanced properties" for "Terminators" menu item).

Customers are the main accounting unit for built-in billing. Customers list is conducted at "Customers" page and this one is available from the main menu. All of originators, terminators and subscribers can appear as customers. As we have already said above, terminators can be bound to customers by the usage of "Advanced properties" pop-up window. Subscribers and originators binding can be realized in a little bit more complicated way.

The identifier for customer is its name which can contents any entry. You can indicate which of subscribers or originators field will conform to customer's name at "Billing settings" page. For subscribers, it can be login, description, IP-address and account. For originators, it can be login, description, IP-address, caller ID (ANI), caller IP-address or PIN-code.

Thus, for instance, you can create some subscriber which name will contain originator's IP-address and set "IP-address" value to "Subscriber User Name" parameter ("Billing settings" page). As a result, Billion Softswitch will charge off this customer account for cost of calls incoming from this originator.

Two tariff plans – for sale and for buy – can be set for each customer. If the customer is an originator, so the tariff plan "For buy" should be set for it. If the customer is a terminator, so the tariff plan "For sale" should be set for this one. Customer can be both originator and terminator at once.

Tariff plans can be set at "Tariff plans" page available from main menu. The list of costs for different directions is conducted for each tariff plan. Call direction (and the price for this call) is defined by dialing code of some locality.

As we have already noticed above, built-in billing system is of limited use and it doesn't suit for those networks that have more than hundred of customers. It makes sense to use external billing system in such cases.

5.2. Integration with external billing system

Integration with external billing system is possible in two ways: CDR-files interchange and interaction by RADIUS-protocol. Both of these ways have their own pros and cons.

Only so-called post-paid system can be built on CDR-files interchange basis because Billion Softswitch is not able to verify availability of funds on the account; it only can enter event of call to CDR-file. Then these files are transferred to billing system and processed. On the ground of billing system reports user can make a decision of manual suspending of calls form one or another originator.

The main advantage of working with CDR-files is that Billion Softswitch doesn't depend on billing system operational capability and it is able to work independently, whereas in case of RADIUS-protocol usage Billion Softswitch is bound to connect billing system before each call setup, to request authority and maximum possible call duration as well as to specify customer's account balance at regular times during the call. With this scheme of work, the facility of Billion Softswitch to interpret calls directly depends on accessibility of billing system. However, the usage of RADIUS-protocol allows realizing strict control of customer's accounts and minimizing or preventing the occurrence of customer's negative balance.
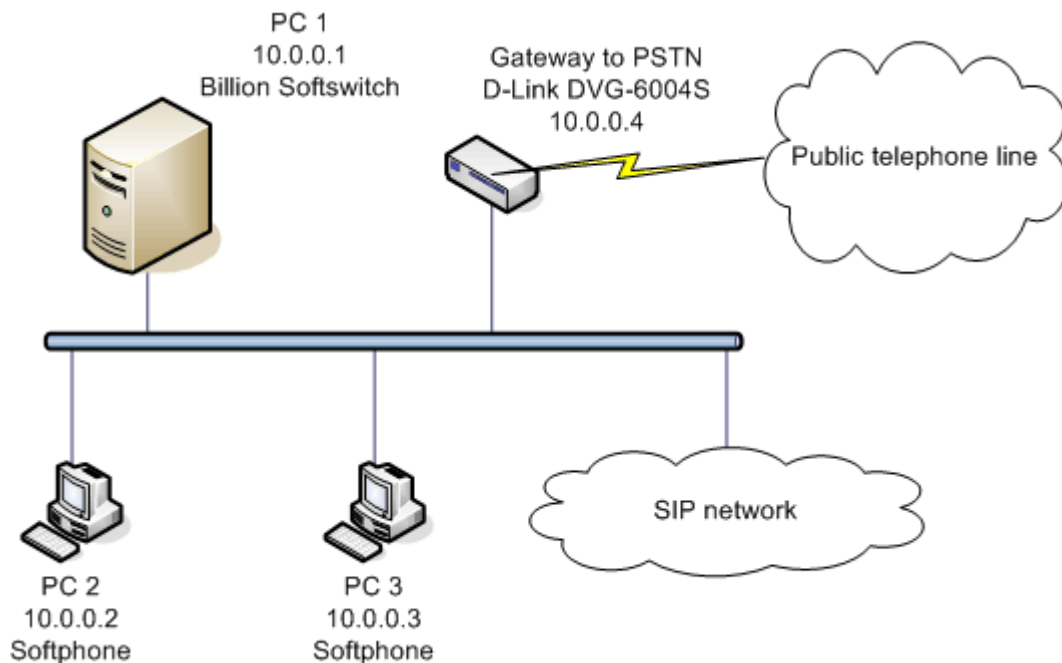
6. Popular usage scenario

This section is dedicated to step-by-step descriptions of actions which are needed to be done during BSS configuration to realize the most popular scenario of VoIP-networking. This scenario can be completed even with unregistered (demo) version of Billion Softswitch.

Step by step we will build the system consisting of following components (see pic. 6.1):

- VoIP proxy-server presented by the computer with established on it BSS – ip-address: 10.0.0.1,

- Two IP-phones, presented by computers with Billion Phone softphones installed – ip-addresses: 10.0.0.2 and 10.0.0.3,

- IP-telephony gateway (in our example, D-Link DVG 6004S) with four FXO-ports, providing integration with a public telephone line – ip-address: 10.0.0.4.

The system will have also connection with a SIP-network, for making long-distance and international calls. This scenario assumes that you have already successfully installed and started BSS on your computer (hereafter, PC1).

Pic. 6.1. VoIP communication network managed by Billion Softswitch

Step 1. Registration of IP-phones on BSS

IP-phones (in our example – softphones installed on personal computers) can be registered on BSS as subscribers. This is because Billion Softswitch could check their status (on- or off-line). To register ip-phones on BSS click "Subscribers" item in the main menu of configuration page and do the following:

- For PC 2:

    o Description: PC 2.

    o Account: 101.

    o «Additional parameters»: Login: 101, Password: 101 (or any another at will). Press button "Accept" in a popup window of additional parametres.

    o In the "Action" column choose in the drop-down menu "Add".

    o Press "Accept" button under the subscribers table.

- for PC 3:

    o Description: PC 3

    o Account: 102

    o «Additional parameters»: Login: 102, Password: 102 (or any another at will). Press button "Accept" in a popup window of additional parametres.

o   In the "Action" column to choose in the drop-down menu «Add bottom»

o   Press "Accept" button under the subscribers table.

Open Billion Phone Options dialog and enter the following:

•   Domain: 10.0.0.1

•   User name: 101 or 102

•   Password: 101 or 102 (or other password you enter for Subscriber)

•   Press Ok.

After setting up completion Billion Phone will try to register on BSS. The registration status of ip-phones can be checked on the page «Subscribers status» in configuration panel of Billion Softswitch. If in the table on this page we see two lines corresponding to our ip-phones, then, this step is successfully finished.

Step 2. The call from one ip-phone to another through Billion Softswitch

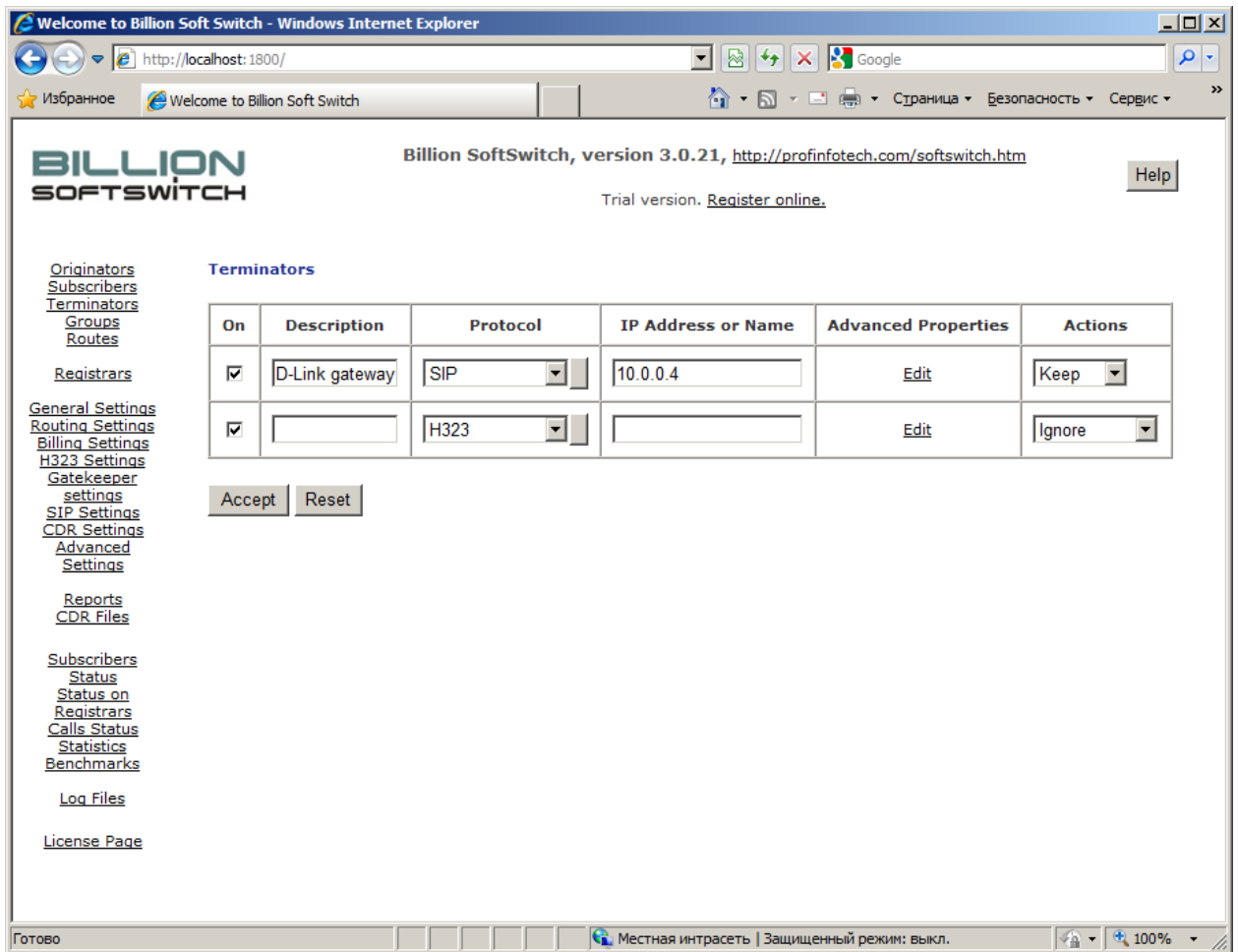Now a test call from one ip-phone to another can be made.

In a window of ip-phone PC 2 enter the number of ip-phone PC 3: 102 and press the call button. The call should be established. You can check the call status on the page «Calls status» in Billion Softswitch configuration panel.

Step 3. Call to a public phone line (PSTN)

Now, having connected two ip-phones, we have created the elementary internal VoIP-network.

To have possibility to make calls to public numbers, it is necessary to include into our system a gateway providing integration of a VoIP-network with PSTN. In our example it will be D-Link DVG-6004S. As shown on the scheme, the gateway's ip-address is 10.0.0.4. In Billion Softswitch configuration panel on Terminators page add the following record:
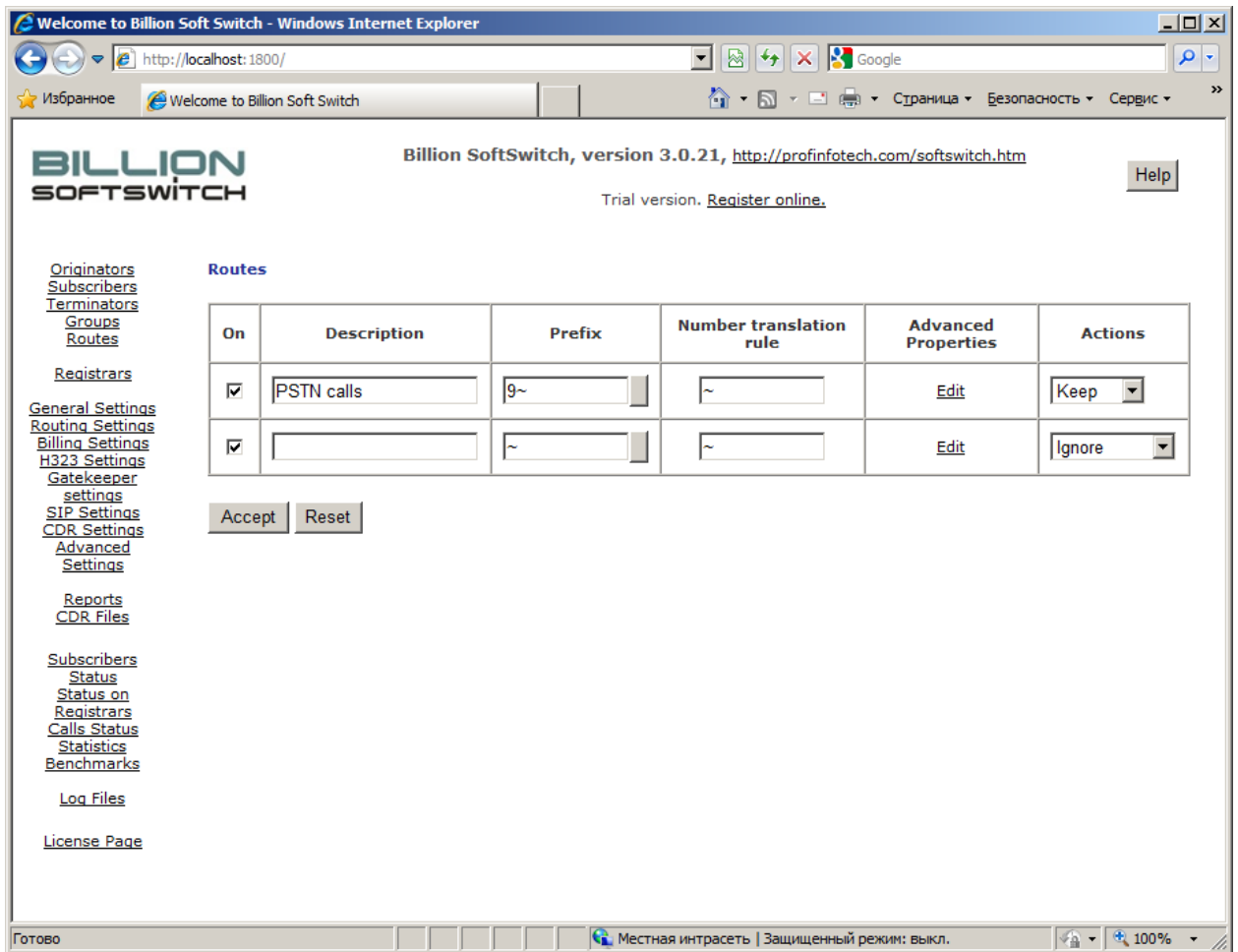
- Description: D-Link gateway

- Protocol: SIP

- IP-address or a name: 10.0.0.4

We have added the terminator to the system. Now we need to create a route for calls to this terminator. In order to get to public line let's agree to type 9 before the phone number.

Open page "Routes" in Billion Softswitch configuration panel. Let's add a new line:

- Description: PSTN calls

- Prefix: 9~

- Rule of change of number: ~

- In Additional parameters window choose the only terminator «D-Link gateway; sip:10.0.0.4».

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The prefix «9~» means «all calls, which dialed number begins with 9». As we have left Number translation rule by default equal to «~», then beginning 9 in dialed number will be removed from the call sent to terminator.
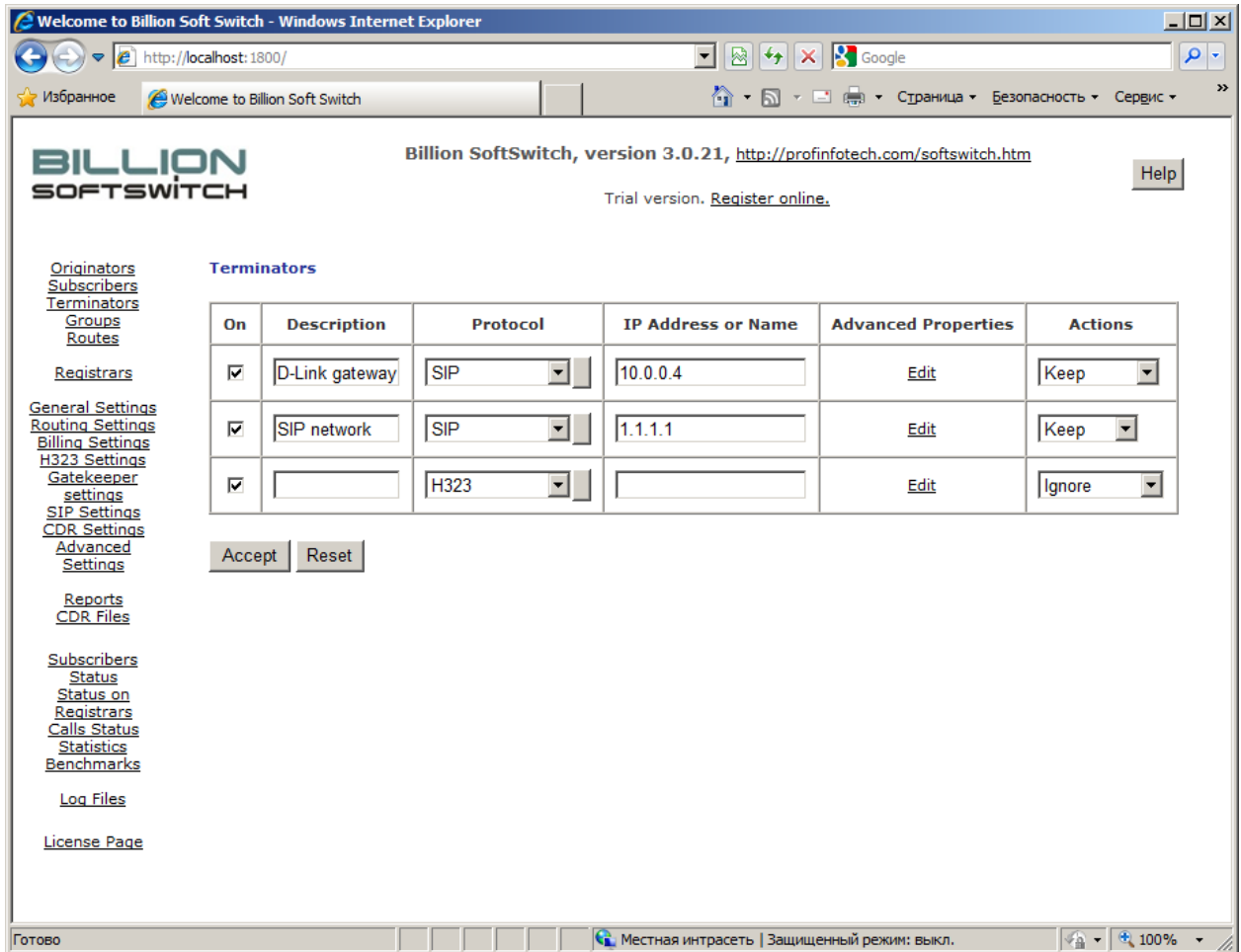
Now we can make a test call to public phone number. In the ip-phone window on PC 2 enter phone number started with prefix 9 and press the call button. The call should be established. You can check call status on the page «Calls status» in Billion Softswitch configuration panel.

Step 4. Connection to SIP-network

In order to be able to make long-distance calls under lower price, we can connect our system to an Internet telephony network (SIP-network). As well as in the Step 3, we need to create a terminator and a route. Let's open page "Terminators" and we add new record:

- Description: SIP network

- Protocol: SIP

- IP-address or domain name: <sip-network-domain>

- In additional parameters enter Login and Password received by you at registration in a SIP-network.

Let's agree that for long distance calls the subscriber will dial prefix 0 before phone number. Now we will open page "Routes" and add new record:

- Description: Long distance

- Prefix: 0~

- Rule of change of number: ~

- In a window of Additional parameters to choose терминатора «SIP network; sip:1.1.1.1»

Now we can make a test call to long-distance number. In the ip-phone window on PC 2 enter phone number with a prefix 0 in a format <country code><city code><phone number> and press the call button. The call should be established. You can check call status on the page «Calls status» in Billion Softswitch configuration panel.

Summary

So, we have built the elementary network of the VoIP-telephony, allowing to make internal vocal calls, and also to call on PSTN and long-distance numbers. You can expand functionality of your network, using the various Billion Softswitch functions. If you have any questions, wishes or ideas how to make Billion Softswitch even more useful tool, we will be glad to hear from you.

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