

**Porta  Billing 100<sup>®</sup>**

Maintenance Release 10



**User Guide, Part II**

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**PortaBilling100 User Guide Part II**  
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Please address your comments and suggestions to: Sales Department,  
PortaOne, Inc., Suite 400, 2963 Glen Drive, Coquitlam, BC, V3B 2P7,  
Canada

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## Preface

This document provides PortaBilling100 users with the most common examples and guidelines for setting up a VoIP network. The last section of the document answers the most frequent questions users ask after running PortaBilling100 for the first time.

### Where to get the latest version of this guide

The hard copy of this guide is updated at major releases only, and does not always contain the latest material on enhancements occurring between minor releases. The online copy of this guide is always up to date, and integrates the latest changes to the product. You can access the latest copy of this guide at [www.portaone.com/resources/documentation](http://www.portaone.com/resources/documentation)

### Conventions

This publication uses the following conventions:

- Commands and keywords are in **boldface**
- Terminal sessions, console screens and system file names are displayed in `fixed width font`



**Caution** means ‘reader beware’. You are capable of doing something that might result in a program malfunction or loss of data.

**NOTE:** Means ‘reader take note’. Notes contain helpful suggestions or references to materials not contained in this manual.

**Timesaver** means that you can save time by performing the action described in the paragraph.



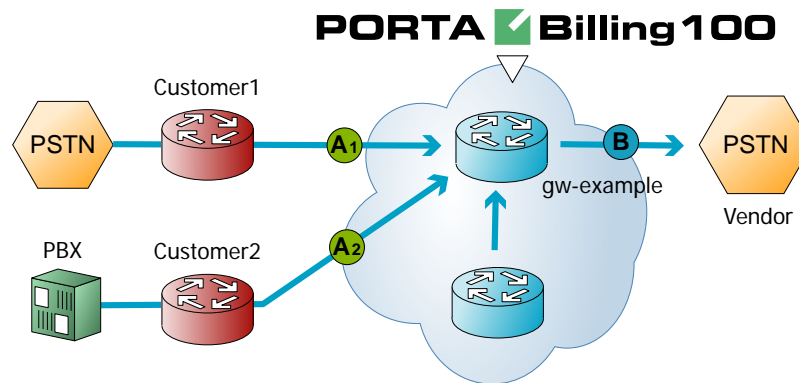
**Tips** are information that might help you to solve a problem.

# 4. Setting up a Wholesale IP Telephony Company

Wholesale voice is a growth market, with service providers building new capacities and launching new services. The primary wholesale service is long-distance transport and aggregation, with the key advantage being that country-specific features and domestic calling regulations are not required. The principal beneficiaries are developing countries, where, in many cases, the quality of VoIP is superior to that of traditional PSTN services.

## Typical business case

Central to the delivery of wholesale voice services are voice points-of-presence (POPs), which are interconnected to other service providers. The Minutes Aggregation and Resale service (including ASP Termination) allows wholesale network providers to collect traffic from multiple originating providers, then aggregate and deliver it to the termination providers they select.



The provider in this scenario is the owner of termination node (POP) gw-example1. This is a typical example of a VoIP network where customers pay the provider to terminate traffic at point (A<sub>n</sub>), while the provider himself pays the vendor for traffic at point (B). The provider makes his profit on the difference between:

- the tariff he charges his customer (A<sub>n</sub>), and
- the tariff he is being charged by the vendor (B).





































































































- ANI accounts should **always** be created with a non-empty VoIP password. Prepaid cards should be created with an empty VoIP password.
- Modify the TCL script, so that when the first authentication by ANI is done, the billing will receive User-Name=ANI and a special flag “skip password”. Thus, authentication will be successful if such an account exists, otherwise it will fail and the user will be prompted for a PIN.
- When a user enters a PIN, the PIN is provided in the User-Name, and the Password attribute is empty. The system checks for such an account, and since the password is empty for prepaid card VoIP, authentication is successful. If somebody tries to enter an ANI number as the PIN, authentication will fail because the password supplied does not match the one assigned to the account.
- If given the option “enter your registered phone number”, the user will then enter both his phone number and password (the latter is required to prevent unauthorized usage of his account), and both will be supplied to the billing. Authentication will be successful only if a correct account ID and password are provided.

## Make a custom report from PortaBilling

PortaBilling provides you with an open data model. An ER-diagram of the database structure is not included in this document, but may be obtained from Porta Software Ltd upon request. If you want to prepare custom reports on your workstation or a non-PortaBilling server, you will need to do the following:

- Make sure the remote computer has database drivers installed to access the PortaBilling database. Normally you would use native MySQL connectivity on Unix-based hosts and ODBC on Windows-based hosts.
- For any data-mining solutions (extracting data from the database), use **only** the slave database.
- Use a tool like Crystal Reports, Microsoft Access or some custom application to retrieve data from the database, process it and submit it to the user.

## Use ODBC to connect to PortaBilling

**ODBC** (Open Database Connectivity) provides a way for client programs to access a wide range of databases or data sources. If you need extended customized reporting not available in PortaBilling, you can do this using external tools such as MS Access or Crystal Reports.

## Create a MySQL user to be used for reports

1. Login into your Portabilling slave server using ssh.

2. Start the MySQL command tool.

```
andrew@demo:/home/porta-admin$mysql -u root mysql
Reading table information for completion of table and column
names
You can turn off this feature to get a quicker startup with
-A
```

```
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 42122 to server version: 4.0.17-
log
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the
buffer.
```

```
mysql>
```

3. Create a new user using the GRANT command.

```
mysql> grant ALL PRIVILEGES on `porta-billing`.* to
`reports`@'192.168.0.5' identified by `pod23uk`;
Query OK, 0 rows affected (0.02 sec)
```

```
mysql>
```

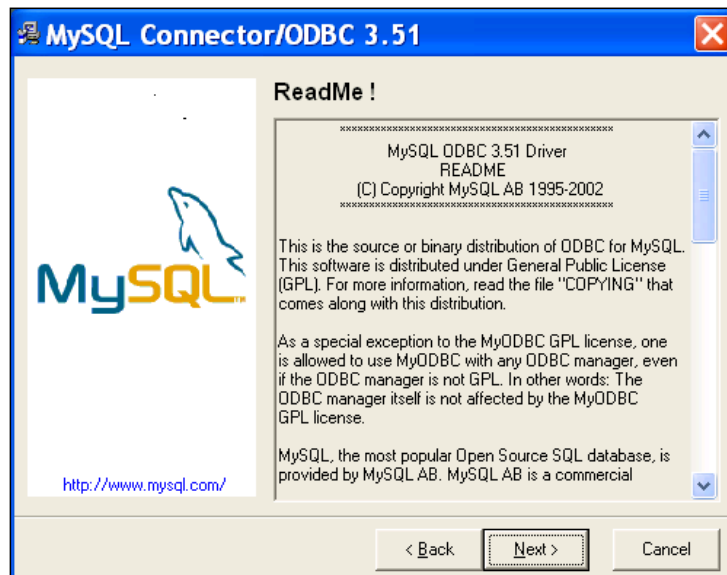
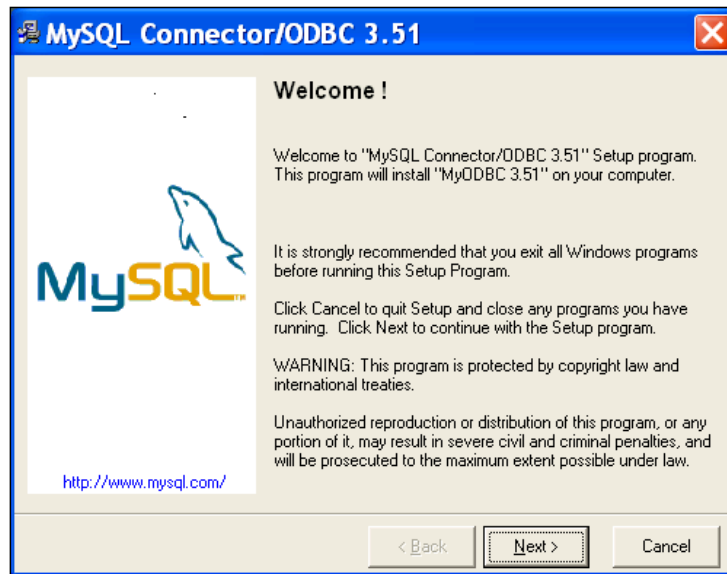
**NOTE:** The command above will permit access to all of the tables in the database. It is provided just as an example; modify it according to your actual needs.

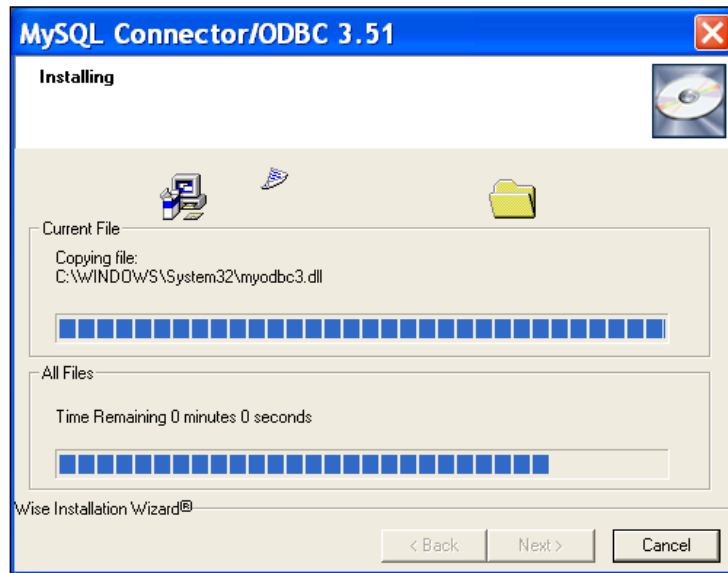
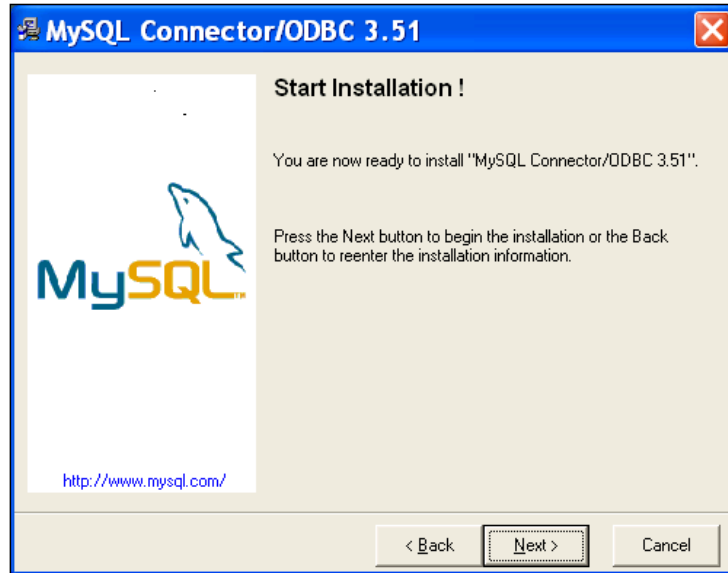
4. Flush the privileges.

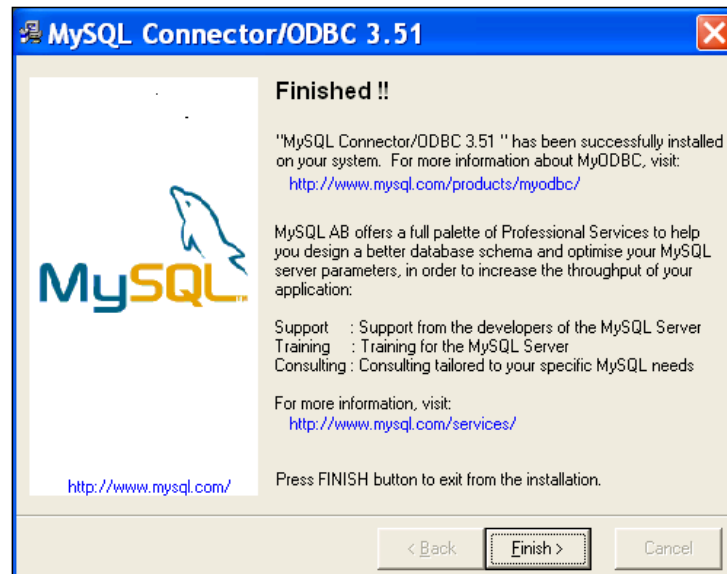
```
mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.07 sec)
```

## Installing the MySQL ODBC driver

1. Download and run the installation package from:  
<http://www.mysql.com>
2. Click **Next** on the information screens.







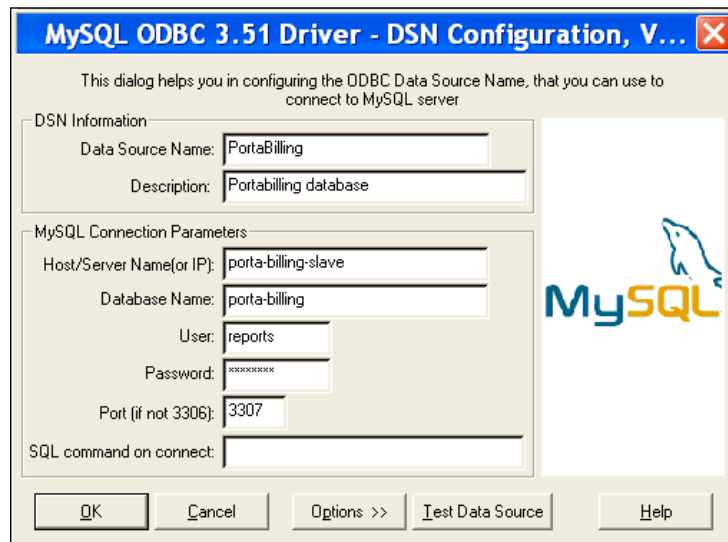
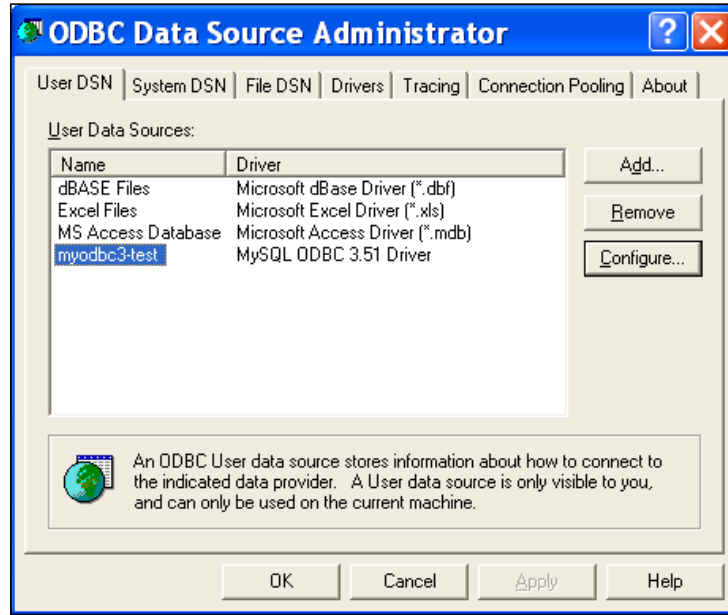
3. Click **Finish**.

### Configuring ODBC

Before configuring the data source, create an MySQL user on slave DB with read-only permissions. Please examine the following document on how to add new user accounts to MySQL:

[http://www.mysql.com/doc/en/Adding\\_users.html](http://www.mysql.com/doc/en/Adding_users.html)

1. Control panel -> Administrative tools -> Data sources (ODBC).
2. Select myodbc3-test and click **Configure...**. Fill in the configuration form.

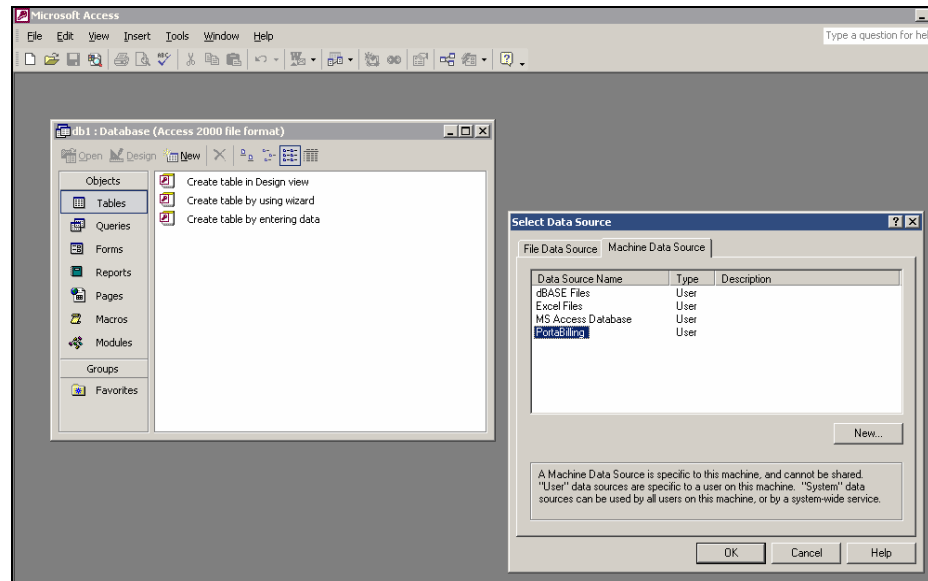


**Important parameters include:**

- **Host/Server Name (or IP)** – hostname (or IP address) of your slave server
- **Database Name** – porta-billing
- **User, Password** – username and password of the MySQL user you have created for reporting purposes
- **Port** – the port on which the database service is accessible; enter 3307 here

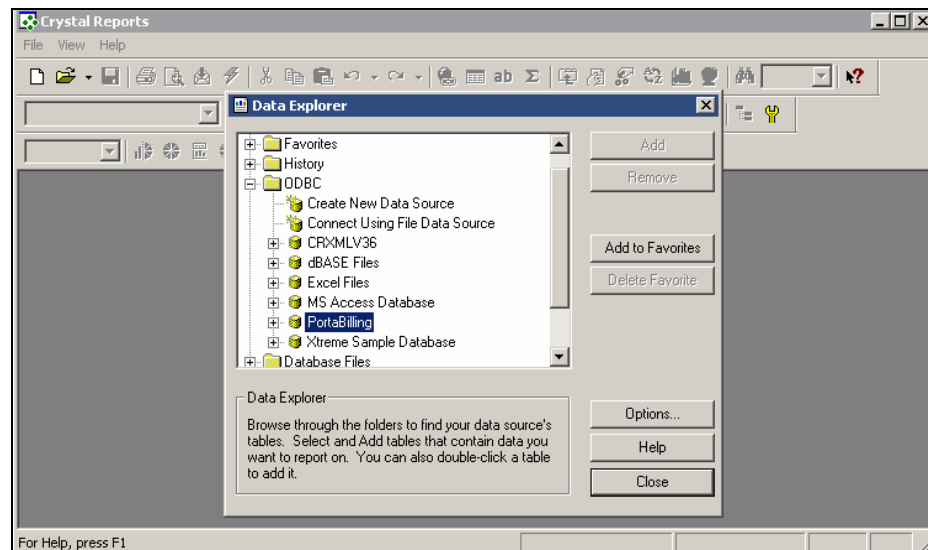
**Note:** This port number differs from the one used by default.

## Using ODBC



### In MS Access:

1. Create a blank database.
2. Right-click in the table design view, and choose **Link tables...**
3. Choose **ODBC databases** from “Files of type...” list.
4. Select **Machine data source**.
5. Select **PortaBilling** and click OK.
6. Select the desired tables.



### In Crystal Reports:

1. Create a *New Report*.
2. In *Data Explorer*, open **ODBC** branch.
3. Select **PortaBilling**.
4. Select the desired tables.

## Use redirect number feature

Each account in PortaBilling has a redirect number field. If this field is not empty, PortaBilling will include an h323-redirect-number in each authentication confirm message and use an h323-return-code of 52. How to proceed in this case is determined by the gateway. The account owner is allowed to modify the redirect number using the customer self-provisioning web.

There are no scripts for a redirect number functionality in the Cisco TCL package. You may wish to implement this functionality in-house, or Porta Software may be able to assist you.

### Customer support number

PortaBilling allows you to enter the redirect number during the process of account generation so that you may specify different redirect numbers for different account batches. Different batches may be distributed in different regions, and only a slight modification to the prepaid card script will make it more intelligent in terms of choosing a customer support center.

### IP telephony private line auto ringdown

In the case of a combination of ANI (CLI) authentication and immediate call forwarding, you may map phone lines from one world region to another. This is advantageous in that you will require only one local access number. Mapping is dependant on ANI (CLI).

## Configure outgoing connection to vendor if sending calls using a gatekeeper, so that the remote IP address is not known in advance

In this situation, you clearly cannot use a **VoIP to Vendor** connection, since the IP address of the remote gateway will be assigned dynamically. The solution is to set up an IPIPGW and use it to send traffic to this vendor.

If you only have one such vendor whose termination IP address is unknown beforehand, and are sure that everything sent to the unknown IP address is going to this vendor, you can use a special feature in PortaBilling to handle this situation: create a “VoIP to Vendor” connection and enter **ANY** as the remote IP address. Any outgoing VoIP

call which goes neither to one of your trusted nodes nor any IP addresses explicitly defined in other connections will match this connection. If you have more than one such vendor whose remote IP is not known in advance, this method is no longer applicable. If you are using tech-prefixes, so that the phone number changes based on which carrier is being used (e.g. a call to 42021234567 will go to vendor A as 12345#42021234567, and to vendor B as 9876542021234567), you can use connection match by prefix. In the example above, enter **PREFIX:12345#** in the Remote IP field for the connection to vendor A, and **PREFIX:98765** for the connection to vendor B. Such a prefix connection will be matched only if the call does not go via a connection with a specific IP address or to a trusted node.

## Force PortaBilling to disconnect after a customer calls over his credit limit

There is no need for PortaBilling to do this, as the gateway is able to by itself. When the gateway authorizes an account to make a call in PortaBilling, PortaBilling returns a maximum credit time (`h323-credit-time` RADIUS attribute) in the case of a successful authorization. When the gateway connects the call, it starts a timer; when the timer hits zero, it automatically disconnects the call.

## Create accounts to be used for SIP services

There are no special requirements as to how such accounts should be created. You use the same interface to create and manage accounts for all services supported by PortaBilling (H323, SIP). Thereafter accounts can use H323, SIP or SIP & H323 services, depending on their product's accessibility. So if you plan for accounts with a certain product to be able to login to the SIP server and make outgoing calls, be sure to include the PortaSIP node with the appropriate tariff in the **Accessibility** for this product.

## Integrate PB logins in your website

You can include the login form on your website using the following HTML code:

```
<form name=log method=post action=https://pb.mycompany.com/login.html>
  Login <input type="text" name="user" value="">
  Password <input type="password" name="password" value="">
```

```
<input type=button value="Login" onClick="submit()">
<input type=hidden name="redirectOnLoginError" value="www.myweb.com">
</form>
```

"redirectOnLoginError" - in case of unsuccessful login, PortaBilling will redirect the browser to the URL specified in the value attribute.

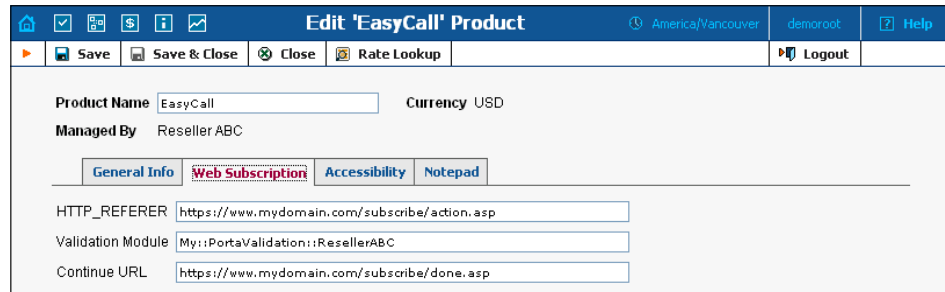
## Configure online web signup

### Typical steps for Web Subscription configuration:

- Decide where you are going to host your online web signup page. (This could be your corporate website, for instance.) Determine the URL of the page which will submit the request to create an account in PortaBilling. You will need to enter this in the "Subscription HTTP\_REFERER" field. For instance, if your web signup page is running on:  
<http://www.mydomain.com/subscribe.html>, then this is exactly what you should enter in the field. If your web signup portal consists of several pages or screens, you should enter the address of the last page, i.e. the one which contains the Submit button invoking the PortaBilling signup procedure. You will need an https server and a digital certificate in order to secure credit card transactions.
- Create a Web Subscription HTML form using the example provided with PortaBilling and put it on your web site. You can add or remove some fields in order to achieve the functionality you require, i.e. you may request that an account ID be entered if you are providing ANI-based service, or may not, if you are in the debit card business, and so on.
- In the configuration file of the web server:  
`/usr/local/etc/apache/porta.httpd.conf`, uncomment the section about the virtual host for online signup; by default it runs on port 8500.
- Create a validation module or use the one provided with PortaBilling. By customizing the validation module, you can implement the advanced restrictions you require (e.g. allow creation of accounts with a balance of 10, 20 or 50 dollars only, or ensure that lifetime is no more than 180 days). Place this module somewhere on the web server so that it will be accessible for `mod_perl`; for example, in: `/usr/local/lib/perl5/site_perl`. Thus, if you decided to name your module: `My::PortaValidation::ResellerABC`, the actual program code would reside in:  
`/usr/local/lib/perl5/site_perl/My/PortaValidation/ResellerABC.pm`

**NOTE:** Make sure that you restart the web server (apachectl restart) after making changes in the module.

- Create a reseller.
- Create a set of tariffs and products managed by this reseller.
- Fill in the form on the Product “Web Subscription” Tab.
- Login to the customer self-provisioning interface and enter the merchant account data (Company Info -> Merchant Account tab).



The screenshot displays the 'Edit EasyCall Product' interface. At the top, there is a navigation bar with icons for home, save, save & close, close, rate lookup, and logout. The main content area shows the product details: Product Name 'EasyCall', Currency 'USD', and Managed By 'Reseller ABC'. Below this, there are four tabs: 'General Info', 'Web Subscription', 'Accessibility', and 'Notepad'. The 'Web Subscription' tab is selected, showing three input fields: 'HTTP\_REFERER' with the value 'https://www.mydomain.com/subscribe/action.asp', 'Validation Module' with 'My::PortaValidation::ResellerABC', and 'Continue URL' with 'https://www.mydomain.com/subscribe/done.asp'.

#### How it works:

- To start using your services, a user must go to your website and proceed to the online web signup page.
- Once the signup form is completed, the data will be posted to the PortaBilling server.
- After receiving the signup request, PortaBilling checks the HTTP header (provided by the customer's browser) and searches for a product with a matching “Subscription HTTP\_REFERER”, allowing further processing only if the host is found in the database. If not found, the transaction is rejected.
- PortaBilling associates the Subscription Host with the product for the account that is being created.
- PortaBilling will use the appropriate validation module to check if the supplied data are correct.
- The validation module will check the data, fill in any non-mandatory fields and return the data, along with the acquired status, to PortaBilling.
- If the status indicates an error, then registration is rejected and the browser is redirected using “Continue URL”.
- If the status is OK, then PortaBilling proceeds with registration and executes the credit card transaction.
- If the status indicates an error, then registration is rejected and the browser is redirected using “Continue URL”.
- If the status is OK, then PortaBilling creates an account and redirects the browser using “Continue URL”.

- Each time the browser is redirected using “Continue URL”, PortaBilling provides a comprehensive set of parameters.

#### List of “Continue URL” parameters and possible values:

- status “OK”, “ERROR”
- message “CC rejected”
- session\_id – unique session ID supplied by the web subscription server
- account\_id – generated account ID

#### Sample files:

These can be found on your PortaBilling installation in the following directories:

```
~porta-admin/apache/subscription/subscription.html  
~porta-admin/apache/subscription/subscription_result.html  
~porta-admin/site_lib/Porta/Subscription.pm
```

An online web signup HTML form can be found at the following URL:

```
https://myPortaBilling.myCompany.com:8500/subscription.html
```

where myPortaBilling.myCompany.com is the URL of your PortaBilling Web Interface, and 8500 is the port on which the subscription virtual host is running.

# 7. Maintenance

## Configuration files

There are two separate configuration files, one for the billing engine (master server) and one for the web interface (slave server).

### Billing engine

The configuration file is called `porta-billing.conf` and is located in the `/home/porta-billing/etc` directory. It is automatically created by the installation program and populated with the initial configuration. You do not have to edit it unless you wish to alter the default behavior.

```
porta-billing.conf:
# Only full qualified email addresses, no local aliases please
#
[Global]
last_resort_email=admin@yourdomain.com
If a critical condition is detected (e.g. radius server is down) who should receive the
email alert.
email_header_from=porta-billing@yourdomain.com
What should appear in the From: field of email alerts.
Suspicious_Time_Threshold_sec=86400
Maximum acceptable difference in time sent by the gateway and current time on the
server. Default is 24 hours.
SQL_Trace=0
Whether all SQL queries and their results should be logged to the PortaBilling log file.
Use with caution, and only when a detailed debug is necessary, since this produces
huge log files.

[Master]
DSN=DBI:mysql:database=porta-billing
User=root
Password=xxxxxx
Connect parameters for the master database.
# Simultaneous login prevention for debit accounts
#
[Fraud_Detection]
Active=Yes
Turn the fraud protection on.
Test_Mode=No
Turn the fraud detection on. Debit accounts will be allowed to login more than once,
but an email alert will be sent.
Recovery_Time_sec=1800
After a debit account is successfully authenticated, how long should this information
should be kept in the memory? Default is 30 minutes. A longer recovery time will
increase the amount of memory required by the billing engine.
# Node IP Cache
#
[Node IP Cache]
Cache_Cleanup_Time_sec=600
How often information about nodes and connections should be updated from the
database. You can force nodes/connections to reload by sending a HUP signal to the
radius daemon.

# Email flood prevention.
#
[Email]
```

```
Max_Sequential_Emails=5
Look_Behind_sec=450
```

If the **Max\_Sequential\_Emails** in the **Look\_Behind\_sec** interval have already been sent, any extra email alert will be blocked. This is done to protect against email flooding.

```
Mail_Templates_Dir=Mail_Templates
```

```
# radcheck.pl
#
[Self Test]
Timeout_sec=5
Test_Frequency_sec=60
Errors_Before_Restart=3
Path_To_Lock_File=/var/run/radcheck.pid
NAS-IP-Address=127.0.0.1
Shared_Secret=SecretKey
User-Name=127.0.0.1
Password=cisco
```

This section defines parameters for the PortaBilling self-test suite. The script periodically sends an authentication request to the radius server, and expects a positive answer.

```
# radcheck.pl & porta-clients.pl
#
[Radius]
Host=127.0.0.1
Path_To_radius.sh=/home/porta-billing/radius_scripts/radius.sh
Path_To_Config=/var/db/raddb
Path_To_PID_File=/var/run/radiusd.pid
```

General parameters of the radius server required by the scripts as a self-check.

```
[Log]
# Where logs should go. Possible values are:
# Syslog, File and Console
Log_To=File
```

This writes a PortaBilling log to the file on disk. This is the default option, and normally is sufficient for both production and debugging. Use other ways of logging only for special debug purposes.

```
# For logging to file, give the filename.
# For logging to the syslog, give description in
# form of syslog:<facility>:<priority>
Log_Dest=/var/log/porta-billing.log
Path to log file. Default is: /var/log/porta-billing.log
#Log_Dest=syslog:daemon:warn
#NAS=13.232.103.106
#Username=0007777777
```

```
[Call_Cleanup]
```

Parameters in this section configure the lifetime of calls in the call cache.

```
Radius_Retransmits=5
Radius_Timeout=3
```

In order to know when we should no longer expect any packets, we need to know the maximum possible delay with which the request can be delivered to radius (the last possible retransmit).

```
Alive_Interval=60
```

If we bill by keep-alive requests, we need to know what is the interval between them.

```
Incoming_Session_Lifetime=10
```

Call lifetime after incoming call leg has been disconnected.

```
Default_Lifetime=120
```

Default lifetime of the call.

```
[Suggestions]
```

No\_Remote\_IP\_Auth=no

Whether PortaBilling should warn you when it seems that your gateways are not authenticating incoming VoIP sessions.

## Admin server and web interface

The configuration file is called `porta-admin.conf` and is located in the `/home/porta-admin/etc` directory. It is automatically created by the installation program and populated with the initial configuration. You might wish to edit it so that the system will better suit your needs.

### **porta-admin.conf:**

[Global]

System\_Name=MyBilling

Enter a distinctive name for your system here.

sendmail=/usr/sbin/sendmail

ZIP=/usr/local/bin/zip

UNZIP=/usr/local/bin/unzip

TempDir=/var/tmp/porta

maintainer=PortaBilling <porta-100@mybilling.com>

What should be in the **From:** field of outgoing emails.

Time\_Zone=America/New\_York

Default time zone (when creating new objects such as user, customer, etc.).

Debug=0

Check\_Age=2

Pager=30

How many entries per page should be shown in tables. This is a master parameter, and can be altered for individual forms.

[Porta\_Realm]

admin=443

accounts=8445

cc\_staff=8446

customer=8444

Ports that different parts of the web interface are using.

[Master]

DSN=DBI:mysql:database=porta-billing;host=porta-billing-master

User=root

Password=xxxx

PrintError=1

Connect parameters for the master database.

[Slave]

DSN=DBI:mysql:database=porta-billing;mysql\_socket=/tmp/mysql-

slave.sock

User=root

Password=xxxxx

PrintError=1

Connect parameters for the slave database.

[Backup]

Keep=1

[X-Rates]

# Max age (days)

Max\_age = 60

```
Pager = 25
Base_Currency = USD

[Web]
# Login expiration (seconds)
Login_expire=172800
# Login expire if not used (seconds)
Passive_expire=86400

[Currency]
Pager = 25

# Default values for Card generator
Default values for "Account generator".
# Billing_model={Debit| Credit | Voucher}
# Preferred_language=<2-chars language name from iso-639-1>
[Cardissue]
Amount=1000
Balance=10
Life_time=90
Length=12
Default PIN length.
Billing_model=Debit
Preferred_language=en

# Default values for 'Add card manually'
# Billing_model={Debit| Credit | Voucher}
# Preferred_language=<2-chars language name from iso-639-1>
[Addcard]
Balance=0
Life_time=90
Batch=
Billing_model=Credit
Preferred_language=en

# Default values for Rates
# Pager Lines per page
# Cleanup_Interval -- interval for cleanup in days
[Rates]
Pager=50
Cleanup_Interval=90
How long old (not current) rates should be kept.

[CustomerWeb]
Pager=50
Interval=1

[AccountWeb]
Interval=1
Pager=50

[TraceCall]
Pager=50
Interval=1

[Invoice]
Pager=50
Interval=1

[Stats]
GrossMargin_Interval=1
# GrossMargin_Measure = day | month
GrossMargin_Measure=day
```

```
# GrossMargin_MaxAge = max age in days
GrossMargin_MaxAge=1000
ASR_days = 90
ASR_weeks = 52
ASR_month = 10

[RRD]
It is not recommended to change these parameters without a good grasp of RRD
principles.
Load_delay_seconds = 3600
Zero_call_length = 10
Load_delay_interval = 900
# % when ASR graph appears
ASR_Threshold = 5

[StatCalc]
Interval=0
Mask=%

[OnlinePayment]
PassFile=/home/porta-admin/etc/passphrase.txt
Encryption key for merchant account passwords.
Pager=25

[CDR]
How long CDRs should be kept in the database.
Keep_month=2
Keep_month_failed=2
```

## Replication repair



For a better understanding of the following material it is highly recommended that you read the “Replication in MySQL” chapter at [www.mysql.com](http://www.mysql.com), or follow this link: <http://www.mysql.com/doc/R/e/Replication.html>.

In the most common situation, recovering the replication process after a fault resembles setting up replication from scratch.

You should follow the instructions in the “How to Set up Replication” chapter of MySQL documentation. However, in our case the master database should not be stopped.

Let’s go through the procedure step by step:

### 1. Make sure slave database has stopped slave thread

Logon to the MySQL slave database using the `mysql` command. At the slave server shell command prompt, enter the following command:

```
mysql -uroot -p<mysql root password> porta-billing
```

After that you will see the `mysql` command prompt. Query the slave server status by entering this command:

```
show slave status;
```

MySQL displays a table with the status of the slave replication.

**Important:** You should see ‘No’ as a value in the ‘Slave\_Running’ column. If You see ‘Yes’, stop the replication process by using this command:

```
slave stop;
```

## 2. Make a master database snapshot

The MySQL distribution provides a special tool for this: ‘`mysqlhotcopy`’. To use this tool, logon to the master server and enter the following at the command prompt:

```
mysqlhotcopy --flushlog -u root -p <root password> porta-billing
```

After the program finishes running, you can find the `porta-billing_copy` database in your `mysql` data directory. Normally, the data directory is located at `/usr/local/var` or `/var/db/mysql`, but this may vary by installation. Consult your `mysql.conf` or system administrator if you are unsure.

You now have a fresh snapshot of your database.

## 3. Make a snapshot archive and copy it to slave server

As the `root` user, go to the `mysql` data directory. Enter the following command:

```
tar czvf porta-billing.tgz porta-billing_copy/
```

This creates an archive of the snapshot. Now it can be copied to the slave server. The best way of doing this is by using the secure copy tool ‘`scp`’:

```
scp porta-billing.tgz porta-admin@<slave server name>:
```



You will be prompted for the ‘`porta-admin`’ user password, and then the archive will be copied into the `porta-admin` user home directory on the slave server. When username and password are provided, the archive can be stored in any user’s home directory. In a single-server configuration, the secure copy tool is not necessary. The regular copy command may be used instead.

#### 4. Remember master binary logs position

Login to the master MySQL server and enter the command:

```
show master logs;
```

Remember the last `log_name` - you will need it to start replication on the slave server later.

#### 5. Restoring database from archive on slave server

While logged in as 'root' on the slave server, unpack the archive file to the mysql data directory. To do this, simply `cd` to the mysql data dir and enter the command:

```
tar xvzf <path to>/porta-billing.tgz
```

If you used the `scp` copy command as described earlier, the `<path to>` may be replaced by the `~porta-admin`.

Delete the old database stored in `porta-billing` directory:

```
rm -rf porta-billing
```

and then rename the newly-created `porta-billing_copy` to `porta-billing`

```
mv porta-billing_copy porta-billing
```

Check the permissions on the unpacked files. Normally all files and the `porta-billing` directory must be owned by the 'mysql' user. In a single-server configuration, this will be the 'porta-admin' user.



**Note:** This procedure is not completely in agreement with MySQL documentation, which instructs the user to dump the whole database to sql statements and then restore it on the slave machine. Carrying out such an action on a production database with a large amount of traffic could result in significant latency.

#### Resume replication

Logon to the slave mysql server using the `mysql` command:

```
mysql -uroot -p<root password> porta-billing
```

Recall `log_name` from the previous step and use it in the following statement:

```
CHANGE MASTER TO MASTER_LOG_FILE='<log_name>',  
MASTER_LOG_POS=4;
```

At this point, the mysql server must be restarted for replication to continue. The following are the commands to stop and start mysql on a typical FreeBSD system:

```
/usr/local/etc/rc.d/mysql.server stop ;  
/usr/local/etc/rc.d/mysql.server start
```

On RedHat Linux systems the commands may be:

```
/usr/etc/init.d/mysql stop ; /usr/etc/init.d/mysql start
```

The location may vary depending on the operating system. If in doubt, ask your system administrator.

To ensure that replication has resumed, logon to the server and check the slave status:

```
show slave status;
```

In the second row of the 'Slave\_Running' column you will see 'Yes'.