

Dongle GSM Gateway

User Guide

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Version 1.0

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Dongle GSM Gateway is offering you...

TRIPLE * OPTIMIZATION**

- > **Bandwidth Optimization upto 80% Of Optima +**
- > **Make your own Gateway with Dongles +**
- > **Easy Manageability & Low cost of Portable Raspberry Pi.**

Greetings!!! The RnD team of Impro Labs Pte Ltd., integrated all these three features together to offer you the Solution, **Dongle GSM Gateway**, as a pioneer in the VOIP industry which will **reduce your business startup cost & risk incredibly** with low maintenance cost of your setup and maximize your business profit.

What is Dongle GSM Gateway

Dongle GSM Gateway is the concept designed by Impro Labs Pte. Ltd. to make your own gateway with Raspberry Pi and Usb Dongles, which will reduce setup cost and traditional gateway's purchasing risk as well as terminate calls with Optima Saver to reduce bandwidth consumption.

Why Dongle GSM Gateway

Dongle GSM Gateway will minimize the risk of purchasing traditional gateways, lower the power uses, lower heat generation, will provide affordable solution to All with low maintaining and start up cost. Details Below:

- ★ Run **Raspberry Pi** instead of PC without monitor and even with a portable power bank supplying 2.4A, 5V power which is very useful who got power issue, costing approximately **USD 40**. *Purchased & Managed by clients (price may differ market wise)
- ★ Set up **Gateway with dongles** of 32 ports at a cheapest rate approximately **USD 300-500** whereas other gateways costs USD 600-2000, like goip, skyline etc. *Purchased & Managed by clients (price may differ market wise).
- ★ Optimize bandwidth consumption upto 80% alongwith multipath tunneling to bypass critical levels of Blocking by Dongle GSM Gateway, **Charging USD 150/e1/Mo**.
*Provided by **Optima Saver**.

Requirements to make your own Gateway

1. Raspberry Pi 3, model B with 2.5A, 5V USB Power Supply Adapter & microUSB cable.
2. microSD Card , 8GB(minimum) or above , class 10 (Mandatory).
3. Clear Raspberry Pi 3 Casing.(optional)
4. 2 Heat Sinks. (optional)
5. For USB dongles, currently supported manufacturer is Huawei with model no: E153, E1550, E1552, E156, E160, E169, E1692, E175X, K3520 (per dongle=per port)
6. USB Hub with power adapter for connecting USB dongles (8 USB Hub port means, it has 8 usb ports in which 8 USB dongles can be attached)

Recommendations:

7. For voice call feature, it's highly recommended the use of USB version 2.0 minimum.
8. According to vendor specs , most usb modems have: 5V/500mA → 2.5 W. Almost every computer has USB ports where you can plug devices such as pen drives, bluetooth dongles, portable hard disks, etc. 3G modems can also be plugged, but power source may be a serious limitation. If your computer has several USB ports, you must check it can deliver all the power needed for your devices at the same time.
9. Normally, USB ports can deliver only 500 mA, so if you have more than one modem (or other hungry devices) plugged, it's possible you get stuck with strange problems.
10. Also, USB hubs can be a source of problems if you connect more than one 3G modem. 500 mA is not enough current for 2 or more dongles, so you must need a good USB hub with external power support.

Installation Requirement(First time)

1. PC with monitor
2. USB Card Reader(microSD) / Adapter.
3. Router with internet.

System (Raspberry Pi + Dongles) Configuration Gist

1. Insert microSD card into USB Card Reader, then insert the USB Card Reader into PC. Then format the microSD card with “SD Formatter”, link [HERE](#).
2. Download the Dongle GSM Gateway image zip file from [HERE](#) & unzip it, then burn the Dongle GSM Gateway image into microSD card with “Win32DiskImager”, link [HERE](#).
3. Insert the microSD into Raspberry Pi machine’s microSD card slot.
4. Connect the microUSB cable from power adapter to microUSB port of the Raspberry Pi machine.
5. Connect the PC, Raspberry Pi, Gateway(lan) under same router via lan.
6. Get the MAC address of Raspberry Pi and IP of Gateway for further configuration from DHCP client list of router management page.
7. Get an Optima Saver IP from our SALES team and config your Client Panel.
8. Insert USB dongles in USB hub, then connect USB hub in USB port of Pi.

Now we will explain these steps in details later One by One.

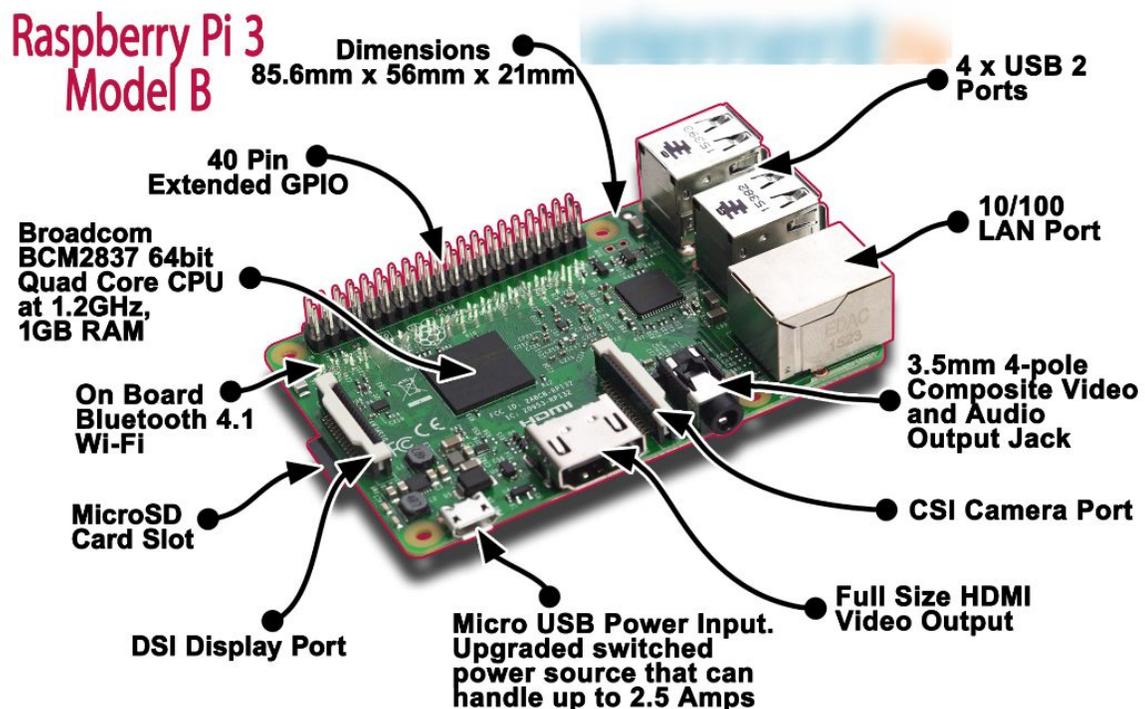


Figure: Raspberry P3i machine.

Raspberry Pi Setup Details

A guide to setting up your **Raspberry Pi**

ESSENTIAL (FOR GENERAL USE)

- Device
 - optimapi Pi, Version 3, Model B recommended.
- microSD Card
 - We recommend 8GB ,CLASS 10 **microSD Card** (version 3, model B)
 - The card class determines the sustained write speed for the card; a class 4 card will be able to write at 4MB/s, whereas a class 10 should be able to attain 10 MB/s.
 - The Raspberry Pi requires microSD cards, which can be used with a built-in SD card reader or USB SD card reader for image burning process from PC.
 - Make sure you are using a genuine microSD card. There are many cheap microSD cards available which card space are actually smaller than advertised or which will not last very long.
- Ethernet (network) cable
 - An Ethernet cable is used to connect your Raspberry Pi to a local network and the internet through a router/ switch.
 - Should use any router which must be configured as DHCP for distributing internet via ethernet. If you one wants to use switch, then our support team may configure the ip manually.
- Power supply
 - The Raspberry Pi is powered by a microUSB power supply which can supply at least 2.5A at 5V for the model/version 3.

OPTIONAL

- Keyboard and mouse
 - Any standard USB keyboard and mouse will work with your Raspberry Pi.

CONNECTIVITY

- You may connect through 3G Modem/ LAN / WLAN with Raspberry Pi machine for internet connectivity. For wifi/ wlan connectivity, you have to knock our support for manual configuration.

Here We will guide you the installation procedure of Dongle GSM Gateway OS into microSD card.

Formatting the microSD Card

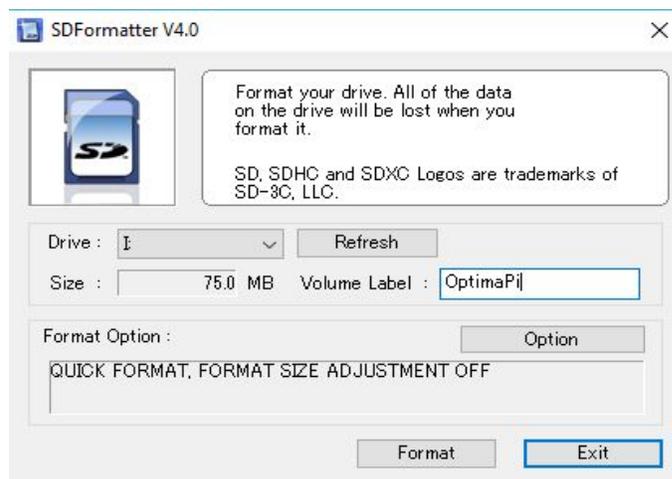
We recommend to Format the microSD Card. In some cases to re-use a microSD card you might find the usable capacity is less than you were expecting. This can be due to partitions previously configured and some “format” utilities can’t remove them.

Dongle GSM Gateway os previously used ,microSD cards will often only appear to have a capacity of 56MB in windows but that is because it can’t see the much larger Linux partition.

In order to ensure your microSD cards are completely blank and has no partitions that may be hidden from Windows, we always recommend to erase it with “SD Formatter” on your PC first. This is a tool created by the SD Association. Download the installer from [HERE](#) for Windows.

Step 1 – Run

Insert your microSD card and run the SDFormatter application :

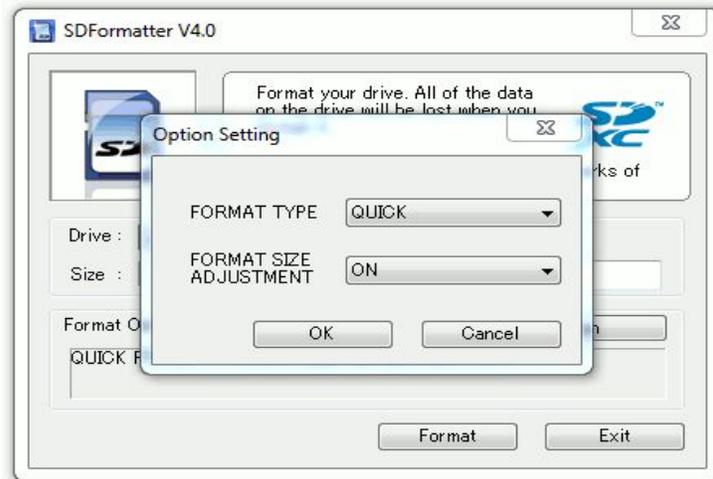


N.B : Here the card may only appears to have a capacity of 75MB despite being a 8GB card

Double check the drive letter. Then check it again. You do not want to format another device by accident!

Step 2 – Enable Size Adjustment

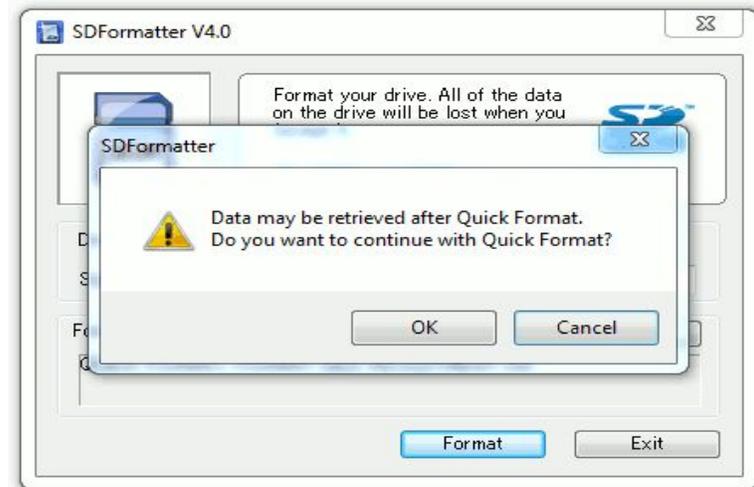
As we are specifically interested in restoring the true capacity of the card click “Option” and



turn “Format Size Adjustment” to “ON”, Click “OK”.

Step 3 – Format

Click “Format” to start the process.



Click “OK” to proceed.

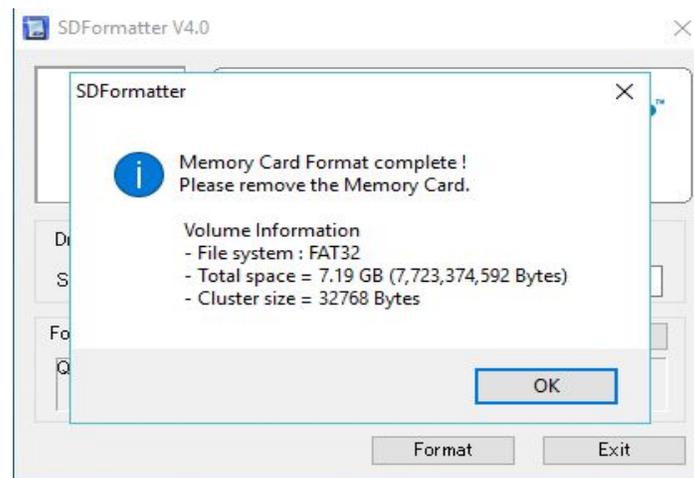


Click "OK" to proceed.

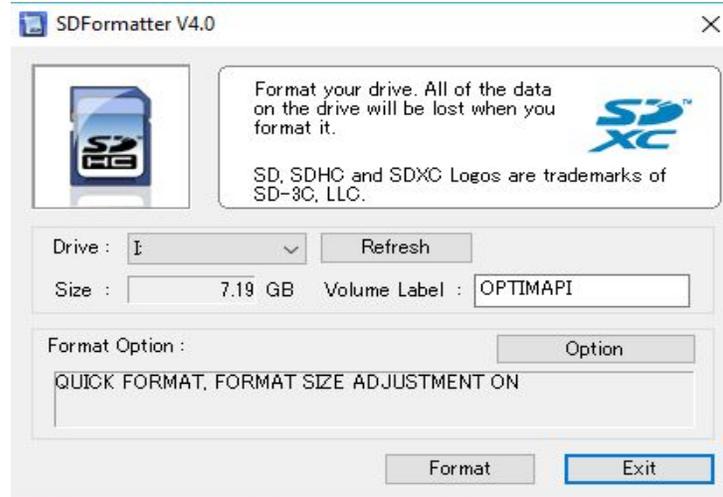
The process should start and it should only take a few seconds.

Step 4 – Finish

When the process finishes it will provide a summary of the cards capacity.



In our example the 8GB card has a capacity of 7.19GB which sounds right. Certainly an improvement on the 75MB that appeared before.



You can now click “Exit”. Eject your microSD card as normal.

Now you are ready to Install a new Dongle GSM Gateway image to it which is explained in the next segment.

Installing Dongle GSM Gateway Image into Raspberry Pi

This resource will explain how to install a Dongle GSM Gateway operating system image in a microSD card. You will need a pc with an SD card reader build-in or you may use USB SD card reader which is available in the market, to write the image.

Downloading the Image:

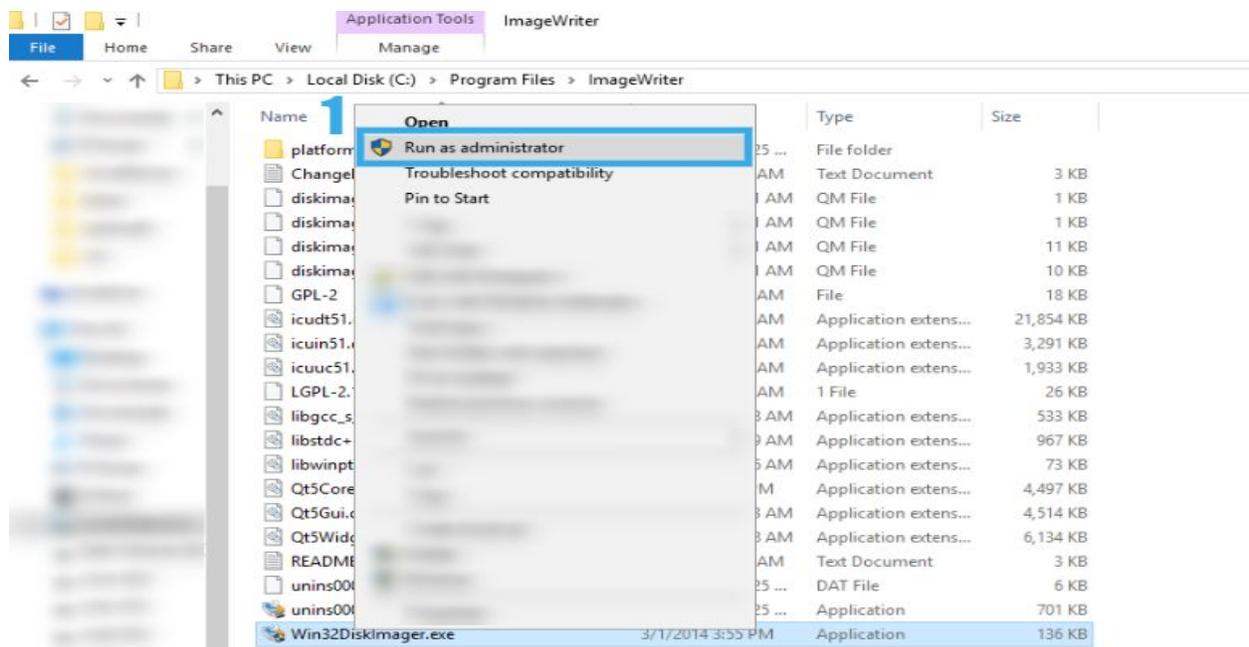
Official image of Dongle GSM Gateway is available to download from [HERE](#). Use [Bitcomet](#) for downloading the image which will check MD5 checksum to ensure the image has been downloaded with no data loss.

After downloading the .zip file, right click in the zip file and click extract all to unzip it to get the image file (.img) for writing to your microSD card. This unzipping procedure may take 1 min maximum. You may use any third party application to unzip, like: 7-zip ([32 Bit](#) or [64 Bit](#))

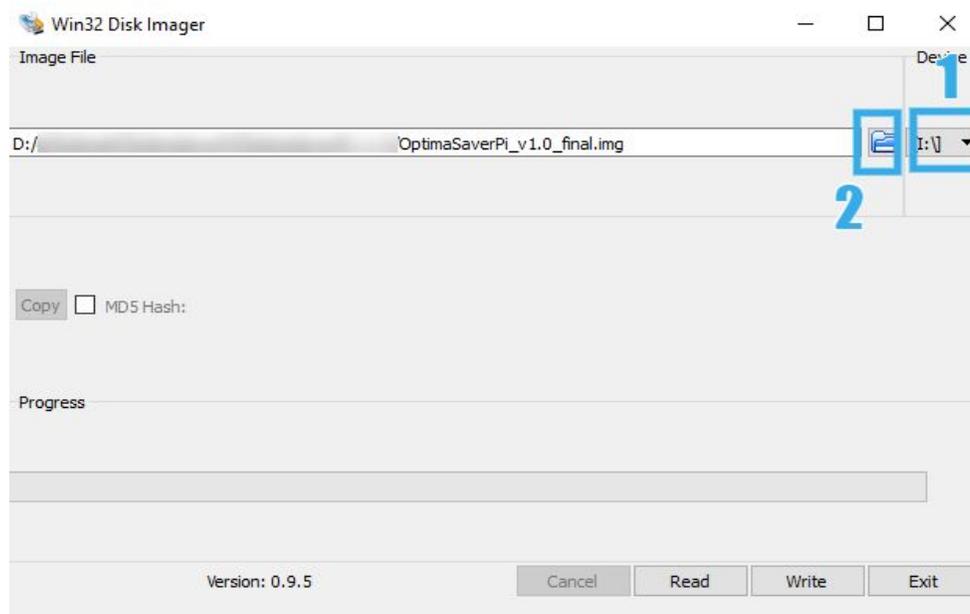
Writing an image to the microSD card:

With the image file of the distribution of your choice, you need to use an image writing tool to install it on your microSD card. See our guide for your system with windows below:

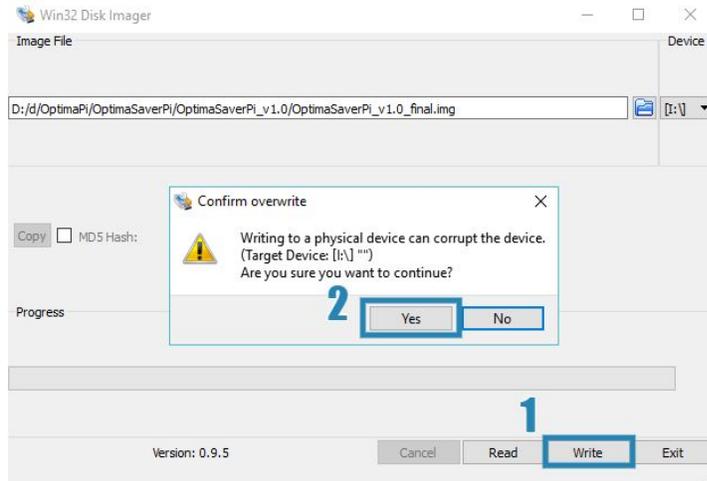
- Insert the microSD card into your SD card reader and check which drive letter was assigned from windows explorer carefully.
- Download the Win32DiskImager.exe utility from the [HERE](#) and install it.



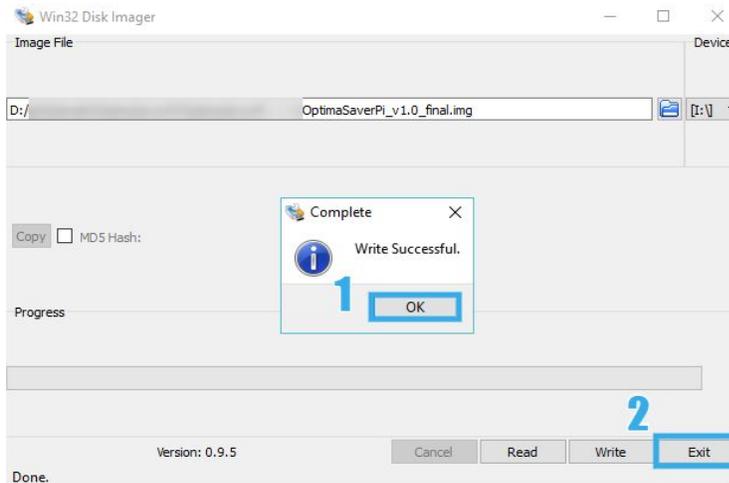
- Run the Win32DiskImager executable utility; you may need to run this as administrator. Right-click on the file, and select Run as administrator(1).



- Select the drive letter of the SD card in the device box(1). Be careful to select the correct drive; if you get the wrong one you can destroy the data on your computer's hard disk! If you are using an SD card slot in your computer and can't see the drive in the Win32DiskImager window, try using an external USB SD card adapter.
- Select the image file you extracted earlier(2).



- Click Write(1) then click yes (2) to start and wait for the write to complete.



- If Write is Successful(1), exit(2) the Win32 Disk Imager.



- Select the device(1) & eject(2) the microSD card safely always. This image writing procedure may take min 4 mins to maximum 12 mins, depending upon your microSD card quality and pc performance.

Getting Set Up Ready

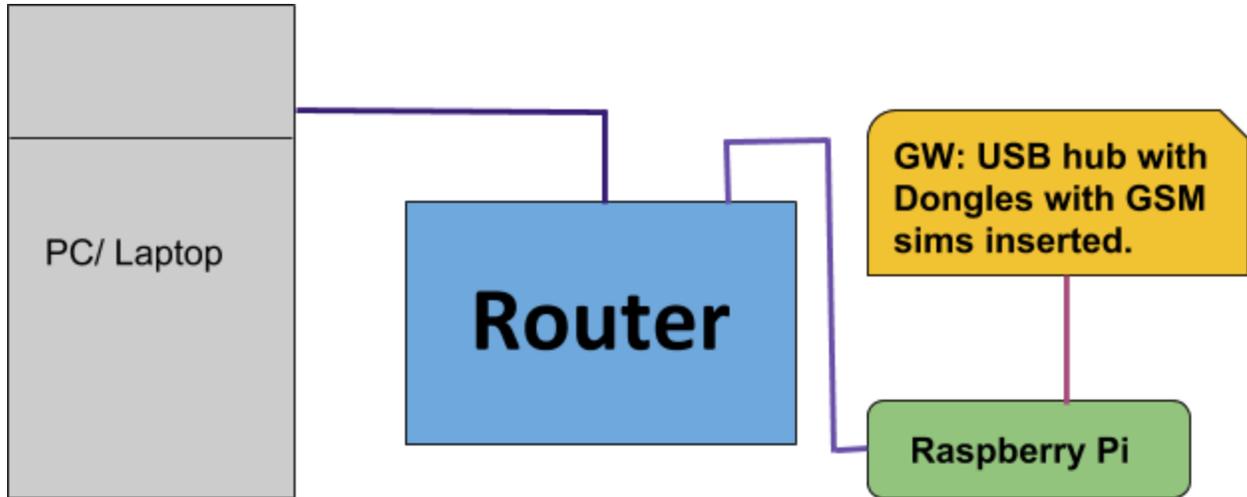
After you write the Dongle GSM Gateway image into the microSD card, insert the card into Raspberry Pi machine properly, shown in below pic.



Now we will guide you step by step for getting your setup ready.

1. Raspberry Pi, MAC Address discovery from router.
2. Gateway IP discovery for further configuration.

you will be needing a windows pc and a router, where Raspberry Pi and the GW:USB hub with dongles and sims inserted into dongles will be connected with the Raspberry Pi via USB port.



Lan design for configuration purpose only.

Then you have to login to router management page with default ip e.g 192.168.0.1 and goto DHCP client list page, e.g:

The screenshot shows the TP-LINK router management interface. The left sidebar contains a menu with options like Status, Quick Setup, WPS, Network, Wireless, DHCP, and System Tools. The main content area is titled 'DHCP Client List' and displays a table with the following data:

ID	Client Name	MAC Address	Assigned IP	Lease Time
1	optimapi	B8-27-EB-	192.168.0.100	01:41:44
2		-D1-CF	192.168.0.101	01:56:40

Below the table is a 'Refresh' button. Red annotations in the original image highlight the 'Client Name' and 'MAC Address' of the first row (ID 1) and the 'Assigned IP' of the second row (ID 2).

Figure 1 : Raspberry Pi Mac Address & Gateway ip discovery

Here you may see the Raspberry Pi device MAC Address e.g: B8-27-EB-XX-XX-XX , note it down for further configuration and also you may need to find your gateway dhcp ip, e.g. 192.168.0.101 here, which will need later to config the gateway (shown Figure 1).

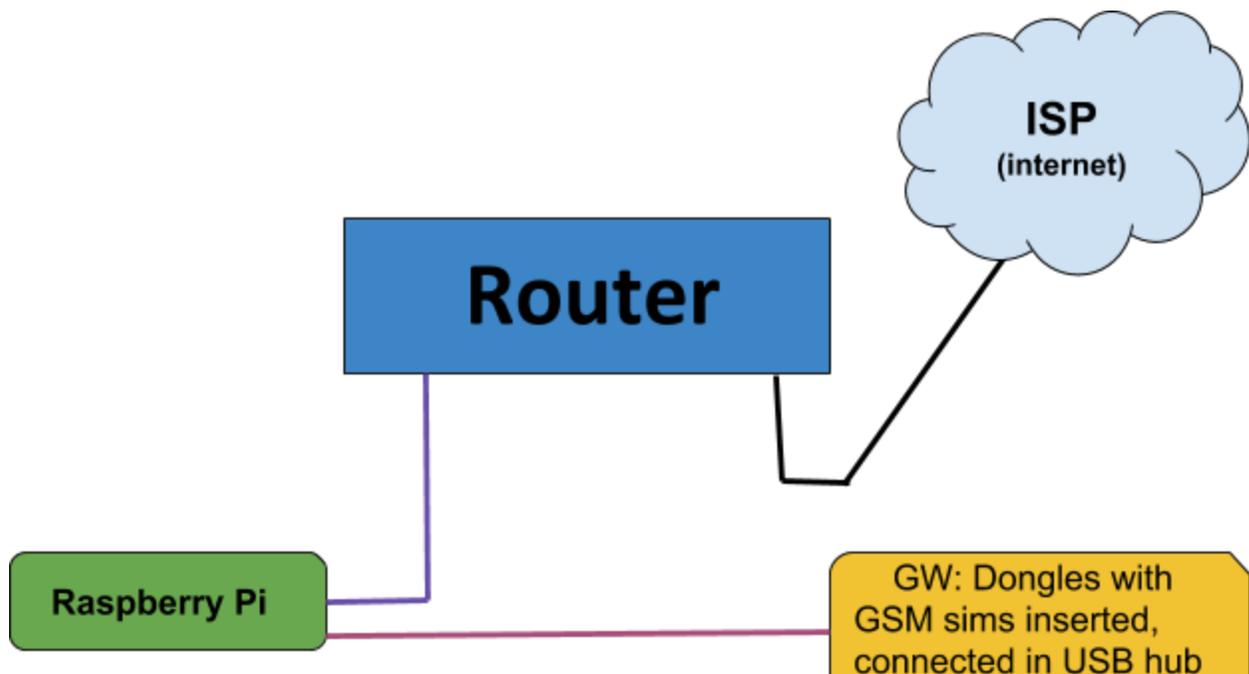
N.B: if your mobile device is connected under same router, then you may also access your router from your mobile's browser and get your desired info.

Lan Design Requirement to run setup

- Router
- Lan Cables
- Raspberry Pi
- USB hub with Chan Dongles Inserted
- ISP (Internet)

Lan Design:

ROUTER =====(lan)=====>> Raspberry Pi <<=====(USB port)==== USB hub with Dongles



Lan Design to run the setup

With a lan cable, >> connect Raspberry Pi and Router, then with the USB cable from USB hub << connect Router and USB hub with Dongles.

Now you are ready to run the Raspberry Pi.

Starting Raspberry Pi

After connecting power with Raspberry Pi properly, the machine will start instantly. If you can connect Raspberry Pi with the monitor via HDMI directly or via HDMI to VGA converter, then after starting Raspberry Pi successfully you will see a welcome screen (shown Figure 2)

```
*****
Trying for DHCP IP.....
IP Address : 192.168. .
MAC Address: b8:27:eb: : :
*****

Raspbian GNU/Linux 8 OptimaChanPi tty1

OptimaChanPi login: _
```

Figure 2: Raspberry Pi login welcome screen.

Login name: optima , pass: optima to manage the system with some limited command line, like:

- xmac.optima (to see the mac address of Raspberry Pi machine.)
- ifconfig (to see the interface wise ip list)
- reboot.
- poweroff.
- Ping.
- wvdial (for 3G Modem)

You may also type sudo (space) + Tab to see the available command list.

N.B. All shell commands must be executed with sudo, e.g: sudo poweroff.

Manual IP Config(STATIC)

You may also configure Raspberry Pi machine LAN IP manually as per your requirement, which is described below:

Type in the shell like below, here we have set 192.168.1.10 ip for an example, you may set ip as per your configuration.

```
sudo ifconfig eth0 192.168.1.10 netmask 255.255.255.0 up
```

but this is a temporary process. If you restart the machine the config will be removed. To make this permanent, please knock our support mentioning the ip(192.168.1.10) that you have assigned manually.

Dongle GSM Gateway Terminal Remote Access

Now It's time to take an OptimaSaver Server IP from our **SALES** (Skype: sales.improlabs) team with the Optima Saver Client Panel link where you need to config the panel with some required info. You may also access Dongle GSM Gateway terminal remotely from OptimaSaver Client Panel. I will explain you in short how you may access the terminal step by step:

A. From Optima Client Panel, go to Gateway tab, then:

1. Fill up the required info shown in figure 3, page no 17.
2. Click on update.
3. Click on the grey icon shown in figure 3, page no 17.
4. Click ok on the dialog box.
5. When the ip color turns blue from grey, click on the ip to access the terminal, shown in figure 3, page no 17.
6. Add the entries for your dongles like this as SL 1(dongle1), ip 0.0.0.1 & SL 2 (dongle2) ip 0.0.0.2, shown in figure 3a , page no 17.
7. Add the entry to access your dongle config page as SL no 4 named piWEb , ip 192.168.101.1, shown in figure 3a , page no 17.
8. Enter the call limit as per your dongle entries, like if you got 8 dongles, call limit for each dongle will be 8, shown in figure 3a , page no 17.

B. Now enter the login name: *optima*, password: *optima* , to access the terminal, where you should type sudo (space) (tab) to see the available commands for you, shown in figure 4, page no 16.

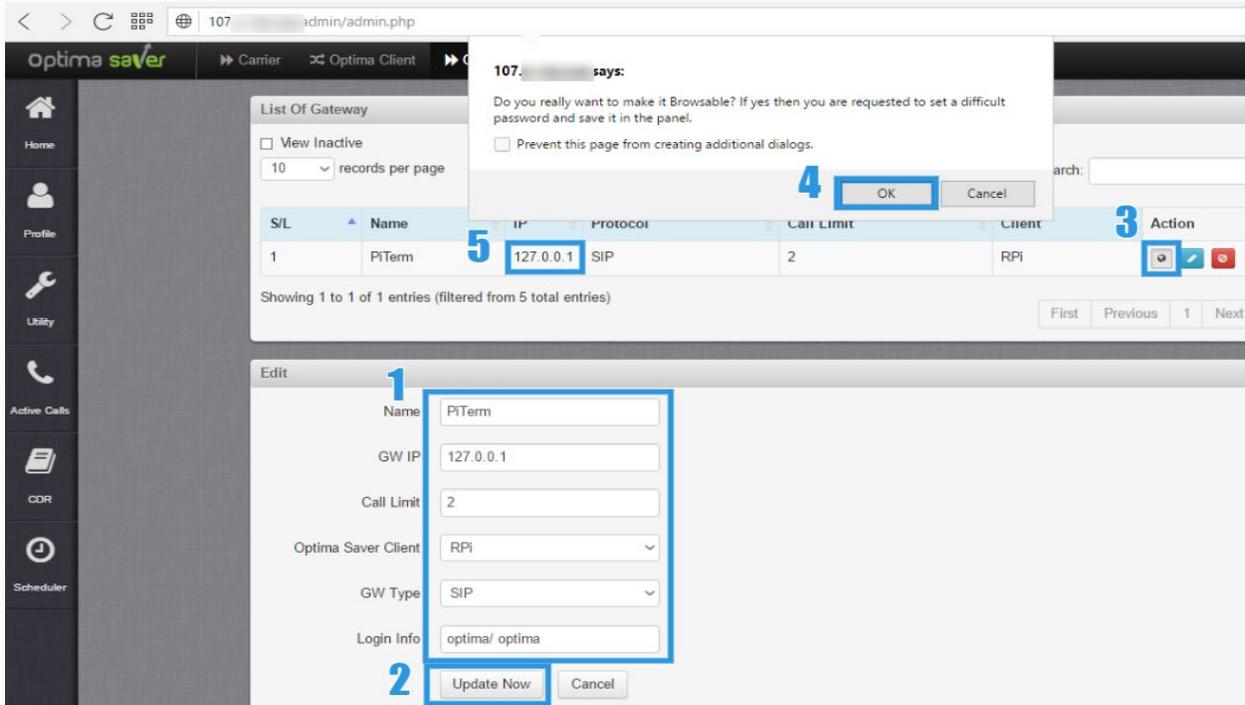


Figure 3 : Dongle GSM Gateway terminal remote access setup

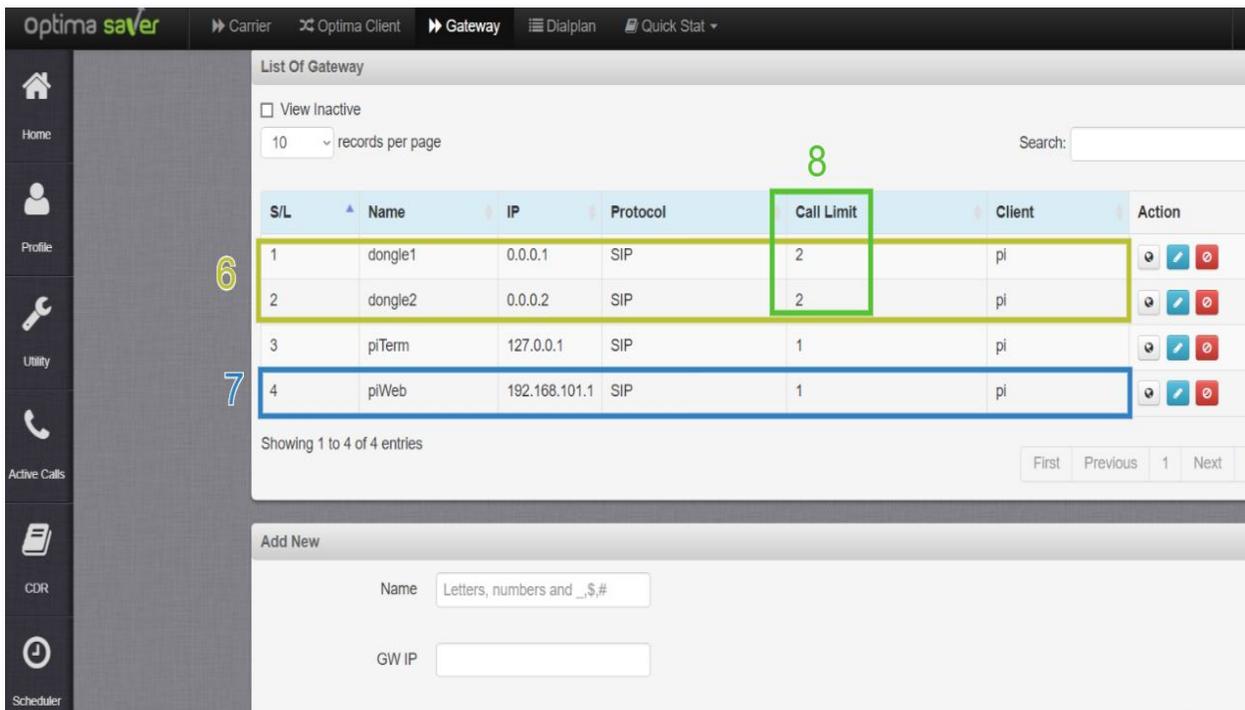


Figure 3a : Dongle GSM Gateway terminal remote access entries.

```
OptimaSaverPi login: optima
Password:
Last login: from 192.168.1.107 on pts/1
Linux OptimaSaverPi 4.1.18-v7+ #846 SMP armv7l

-----
Optima Saver Pi v1.0
-----

Welcome to OptimaSaverPi. This version has been built on
Optima V5.03. All rights reserved to Impro Labs Pte. Ltd.
Copying, forging and doing anything with the build that
goes against the Company will violate all the supports
and marked as illegal activity.

Thank you for using Optima Saver by Impro Labs Pte. Ltd.
-----

Type 'sudo' or '?' or 'help' to get the list of allowed commands
optima:~$ sudo
ifconfig ping poweroff reboot route wvdial xmac.optima
optima:~$ sudo
```

Figure 4: Dongle GSM Gateway terminal remote access.

Common Issues

- If your Raspberry Pi don't get any ip at the welcome screen then you need to check the dhcp settings in router also check that it's connected with lan ports of both. If all are ok, then Raspberry Pi will automatically get the ip and show you in the welcome screen. For further assistance you may knock our support team.
- If you can't see any welcome screen, make sure your SD or microSD is properly inserted into Raspberry Pi Machine.
- If you see any rainbow sign after starting Raspberry Pi in the screen, that means 2.5 A was not provided properly to the machine, you may need to change the power adapter.
- Make sure you are using a good quality power supply. You can check your power supply by measuring the voltage between TP1 and TP2 on the Raspberry Pi; if this drops below 4.75V when doing complex tasks then it is most likely unsuitable.
- Make sure you are using a good quality USB cable for the power supply. When using a high quality power supply, the TP1->TP2 voltage can drop below 4.75V. This is generally due to the resistance of the wires in the USB power cable; to save money, USB cables have as little copper in them as possible, and as much as 1V (or 1W) can be lost over the length of the cable.
- Make sure you are shutting your Raspberry Pi down properly before powering it off. Type sudo poweroff and wait for the Pi to signal it is ready to be powered off by flashing the activity LED.
- Don't use a cheap rate/ quality microSD reader, it may damage your microSD for good.