

Configuring Linux ‘pppd’ for a Skywire[®] 4G LTE CAT3 Verizon

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1. Introduction

1.1 Applies to the Following Part Numbers:

Orderable Device	Description	Carrier	Network Type
NL-SWDK	Skywire Development Kit	Any	Any
NL-AB-BBBC	Skywire BeagleBone Black Cape	Any	Any
NL-AB-BBCL	Skywire BeagleBone Black Cape Lite	Any	Any
NL-AB-RPI	Skywire Raspberry Pi Adapter	Any	Any
NL-AB-MPCIE	Mini-PCI Express Adapter Board	Any	Any
NL-SW-LTE-TSVG	LTE without Fallback, GPS, GLONASS	Verizon	LTE
NL-SW-LTE-TSVG-B	LTE without Fallback, GPS, GLONASS	Verizon	LTE
NL-SIM-COM	3FF Commercial Temp Range SIM Card	Verizon	LTE

1.2 Prerequisites



This document assumes you have completed the initial setup of your modem and development kit. If you have not completed those steps, refer to the Skywire® Development Kit User Manual and complete the modem setup before proceeding.

If you are using a device that is communicating via SSH, Telnet, or any other type of Ethernet interface, you must connect to it via USB or serial. Section 2.8 requires the Ethernet interface to be taken down.

2. PPP – 4G LTE Modems

2.1 Overview

This example has been tested on the following distributions of Linux:

- Debian Linux 8.1
- Ubuntu Linux 12.04 LTS
- Ubuntu Linux 14.04 LTS
- Ubuntu Linux 16.04 LTS
- Arch Linux 06-01-2015
- BeagleBone Black Debian 8.x
- Raspberry Pi Raspbian 8.x

using a Skywire® NL-LTE-TSVG Verizon 4G LTE modem.

This example is written using Debian and Ubuntu. Some additional steps are necessary to get PPP working on Ubuntu, and those steps will be covered in their respective sections.

2.2 Elevate to root

In order to make the changes necessary, it is necessary to login to the root account. To do so, type the following command into the Terminal:

For Debian:

```
$ su -
```

For Ubuntu:

```
$ sudo -i
```

followed by the Enter key. You will be prompted to enter your password: enter it, followed by the Enter key.

2.3 Check for Updates

Make sure that your Debian or Ubuntu system is up to date using the following commands:

```
# apt-get update  
# apt-get upgrade
```

2.4 Install the “ppp” Package

To install the ppp package, type the following command:

```
# apt-get install ppp
```

2.5 Verify The Modem is Connected

To verify that our system can see the Skywire modem, type the following command:

```
# lsusb
```

followed by the enter key, and you should have an entry similar to the one below:

```
Bus 001 Device 002: ID 1bc7:1201 Telit
```

If so, the modem is connected properly. If not, verify the modem is connected properly and run the command again.

2.6 Ubuntu Only: Load the “option” Driver

The Skywire modem does not properly enumerate automatically, if at all, under Ubuntu. To enumerate the device, we need to load the “option” driver.

To get our device’s ID, type the following command:

```
# lsusb
```

followed by the Enter key. There should be a device listed according to the following format that says “Telit”:

```
Bus 001 Device 002: ID 1bc7:1201 Telit
```

Make note of the eight-character hex code right before “Telit”. In the case of a SW-LTE-TSVG, it is “1bc7:1201”.

To load the option driver, type the following into the Terminal:

```
# modprobe option  
# echo 1bc7 1201 > /sys/bus/usb-  
    serial/drivers/option1/new_id
```

2.7 Write PPP Scripts

We need to write two scripts for PPP to reference when initializing the connection.

Note: We have a GitHub page with the necessary PPP files available for customers to use located here:

<https://github.com/NimbeLink/skywire-ppp-scripts>

We highly recommend downloading that repo and following the instructions in the files related to your modem. The other recommended option is to click on the file you want and copy and paste directly from GitHub.

First, clone the repo and navigate to the cloned repo. Next, as superuser (root) copy the file:

```
vzw-TSVG
```

to:

```
/etc/ppp/peers/
```

or copy-and-paste the contents of:

```
vzw-TSVG
```

from the GitHub repo to

```
/etc/ppp/peers/vzw-TSVG
```

The contents of `vzw-TSVG` are shown below:

```
/dev/ttyUSB3
115200
connect "/usr/sbin/chat -v -f /etc/ppp/peers/vzw-TSVG-chat"
noauth
defaultroute
usepeerdns
local
debug
updetach
```

Next, copy:

```
vzw-TSVG-chat
```

to:

```
/etc/ppp/peers/
```

or copy-and-paste the contents of

```
vzw-TSVG-chat
```

from the GitHub repo to

```
/etc/ppp/peers/vzw-TSVG-chat
```

Make sure to replace `[apn]` with your APN. The contents of `vzw-TSVG-chat` are shown below:

```
TIMEOUT 35
ECHO ON
'' \rATZ
OK 'ATQ0 V1 E1 S0=0 &C1 &D2 +FCLASS=0'
OK AT+CGDCONT=3,"IP","[apn]","0.0.0.0",0,0
OK ATD*99***3#
CONNECT ''
```

2.8 Take Down the Ethernet Interface

A PPP connection requires that any existing Ethernet connection be taken down. To bring down the Ethernet connection, type the following command:

```
# ifconfig eth0 down
```

(Optional) To verify that the Ethernet connection is down, type:

```
# ifconfig
```

followed by the Enter key. `eth0` should not be listed.

2.9 Bring Up the PPP Interface

To enable the PPP interface, type the following commands:

For Debian:

```
# pon vzw-TSVG
```

For Ubuntu:

```
# pppd call vzw-TSVG
```

followed by the enter key. You will see the second script you wrote appear on the screen, followed by the network communication the Skywire modem is going through to get connected.

Once the process is complete, test the connection:

```
#ping -c 2 www.google.com
```

and you should receive a response similar to this:

```
PING www.google.com (216.58.216.196) 56(84) bytes of data.  
64 bytes from ord31s21-in-f4.1e100.net (216.58.216.196): icmp_seq=1 ttl=50 time=47.8 ms  
64 bytes from ord31s21-in-f4.1e100.net (216.58.216.196): icmp_seq=2 ttl=50 time=90.6 ms  
  
--- www.google.com ping statistics ---  
2 packets transmitted, 2 received, 0% packet loss, time 1001ms  
rtt min/avg/max/mdev = 47.818/69.237/90.656/21.419 ms
```

This indicates that your PPP connection is up and connected to the network.

2.10 Troubleshooting

- If your PPP fails with the error 0x1 in Section 2.9, chances are your `vzw-TSVG` file cannot see your `vzw-TSVG-chat` file. Ensure that the last part of line 3 of the `vzw-TSVG` file:

```
.../vzw-TSVG-chat
```

has the same name as your `vzw-TSVG-chat` file. The tool `xxd` may be beneficial to ensure that there are no extra characters in the file and that the files are named the same:

```
$ xxd vzw-TSVG
```

If you are still having issues, rename the last part of line 3 in the verizon file to:

```
.../vzw
```

and rename `vzw-TSVG-chat` to `vzw` and try again.

- If your PPP fails with the error 0x3 in Section 2.9, you may have poor signal strength. Move the unit closer to a window for a better signal strength.
- If your PPP still fails with error 0x3 in Section 2.9, your APN may be incorrect. Verify that your APN is correct in your `vzw-TSVG-chat` file.