

# Configuring Linux 'pppd' for a Skywire<sup>®</sup> 4G LTE CAT1 Verizon Over UART

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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-MPCIE	Mini-PCI Express Adapter Board	Any	Any
NL-SW-LTE-GELS3	LTE CAT1, Verizon	Verizon	4G LTE
NL-SW-LTE-GELS3-B	LTE CAT1, Verizon	Verizon	4G LTE
NL-SW-LTE-GELS3-C	LTE CAT1, Verizon	Verizon	4G 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 2.7 requires the Ethernet interface to be taken down.**

## 1.3 Notes On Usage

The CAT1 Skywire® modem can take 30-60 seconds to boot. Ensure that you wait at least this long before attempting to run the PPP scripts.

In addition, this process works when you bring up the PPP connection. However, if you try to bring down the PPP connection, and then try to bring up the connection again without power cycling the modem, it will not work. Thus, it is recommended that you power cycle the modem before you try to bring up your connection again.

## 2. PPP – 4G LTE CAT 1 Modem

### 2.1 Overview

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

- Ubuntu Linux 14.04 LTS
- Ubuntu Linux 16.04 LTS
- BeagleBone Black Debian 8.x

This example is written using Ubuntu 14.04 LTS.

### 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:

```
$ sudo su
```

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 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 003 Device 005: ID 0403:6001 Future Technology Devices  
International, Ltd FT232 Serial (UART)
```

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

## 2.6 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-GELS3
```

to:

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

or copy-and-paste the contents of:

```
vzw-GELS3
```

from the GitHub repo to

```
/etc/ppp/peers/vzw-GELS3
```

The contents of `vzw-GELS3` are shown below:

```
/dev/ttyUSB0
115200

# pppd options
debug
hide-password
noauth
defaultroute
noipdefault
usepeerdns
local
updetach
ipcp-max-configure 20
ipcp-max-failure 20

# pppd options
lcp-echo-interval 5
lcp-echo-failure 10

# Logfile configuration log will be stored into ppp-logfile
logfile /etc/ppp/ppp-logfile
record /etc/ppp/ppp-dumplog

# provider specific chat script for connection establishment
connect "/usr/sbin/chat -v -f /etc/ppp/peers/vzw-GELS3-chat"
```

Next, copy:

```
vzw-GELS3-chat
```

to:

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

or copy-and-paste the contents of

```
vzw-GELS3-chat
```

from the GitHub repo to

```
/etc/ppp/peers/vzw-GELS3-chat
```

Make sure to replace [apn] with your APN. If the device was activated on go.nimbelink.com, the APN is:

```
NIMBLINK.GW12.VZWENTP
```

The contents of `vzw-GELS3-chat` are shown below:

```
' ' ATZ
SAY 'Setting APN\n'
OK 'AT+CGDCONT=3,"IPV4V6","[apn]" '
SAY 'Dialing...'
OK 'ATD*99***3#'
CONNECT ' '
```

## 2.7 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.

## 2.8 Bring Up the PPP Interface

To enable the PPP interface, type the following commands:

```
# pon vzw-GELS3
```

followed by the enter key. After a few seconds, 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.

## 2.9 Troubleshooting

- If your PPP fails with the error 0x1 in Section 2.8, chances are your `vzw-GELS3` file cannot see your `vzw-GELS3-chat` file. Ensure that the last part of line 3 of the `vzw-GELS3` file:

```
.../vzw-GELS3-chat
```

has the same name as your `vzw-GELS3-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-GELS3
```

If you are still having issues, rename the last part of the last line in the `vzw-GELS3` file to:

```
.../vzw
```

and rename `vzw-GELS3-chat` to `vzw` and try again.

- If your PPP fails with the error 0x3 in Section 2.8, 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 2.8, your APN may be incorrect. Verify that your APN is correct in your `vzw-GELS3-chat` file.
- You can see debug output of the PPP process in `/etc/ppp/ppp-logfile` and `/etc/ppp/ppp-dumplog`.
- If PPP still fails after the above troubleshooting steps, power cycle the modem and ensure you are waiting long enough before running the script.