Using LAPB with FarSync Adapters on RedHat Enterprise Linux 8

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For use with FarSync Device Software versions 2.3.6 (and 4.0.0)

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1 Introduction

This document describes how to setup, configure and run LAPB over FarSync cards/devices using Linux. RedHat Enterprise Linux 8 was used to produce this document, but the same process applies to other distributions.

Either a FarSync PCI(e) card or two FarSync Flex devices are required in order to exercise the LAPB support using the FarSync sample application, testLapb.

This guide is meant only to allow the user to setup, configure and exercise the LAPB support - more advanced, detailed information, such as for the LAPB API itself, is contained within the FarSync SDK.

It is assumed that the FarSync Device Software and FarSync SDK tar.gz files have been expanded to the user's home directory.

1.1 Prerequisites

Before continuing, please make sure the following are in place:

- **The Kernel source has been installed.**
- **A symbolic link has been added in /usr/src/ pointing to the kernel source**

```
[strawberry@STRAWBERRY ~]$ ls -la /usr/src/ | grep linux
lrwxrwxrwx.  1 root root  45 Mar  9  2022 linux -> /usr/src/kernels/4.18.0-240.22.1.el8_3.x86_64
[strawberry@STRAWBERRY ~]$
```

- **Kernel development system should be installed including: C compiler, Make system and Patch utility.**
- **farsync_SDK_2.3.6 should have been copied to the system and expanded.**
- **farsync_2.3.6 should have been copied to the system, expanded and the product archive (in the linux directory) expanded.**

2 Preparing and Installing the WAN driver

2.1 Assemble the required files into the kernel-hdlc directory

2.1.1 Change to the kernel-hdlc directory

cd ~/farsync-2.3.6-b307/kernel-hdlc

2.1.2 Copy the kernel's HDLC/LAPB source files

cp Makefile-with-hdlc-3.17.0 Makefile
cp /usr/src/linux/drivers/net/wan/hdlc* .
cp /usr/src/linux/include/linux/hdlc.h .
cp /usr/src/linux/net/lapb/lapb_* .

2.1.3 Copy lapb-api.patch4 from farsync sdk

For kernels **< 5.6**

cp ~/farsync_sdk-2.3.6/examples/lapbApi/hdlc/lapb-api.patch4 .

2.2 Edit Makefile

Below is an extract from the Makefile, all the parameters in **bold** require to be added or uncommented.

```
#
# Makefile for the Linux farsync & fsflex
#
# $Id$
#
COMPNY_DIR = /etc/farsite
MODULE_DIR = $(COMPNY_DIR)/modules
KMOD_DIR = /lib/modules/`uname -r`/kernel/drivers/net/wan
EXTRA_CFLAGS := -I/etc/farsite/include -DUSE_INTERRUPTS
EXTRA_CFLAGS += -DCONFIG_HDLC_RAW -DCONFIG_HDLC_RAW_ETH -DCONFIG_HDLC_PPP -
DCONFIG_HDLC_CISCO -DCONFIG_HDLC_FR -DCONFIG_HDLC_X25
lapb-objs := lapb_in.o lapb_out.o lapb_subr.o lapb_timer.o lapb_iface.o

ifneq ($(KERNELRELEASE),)
obj-m += lapb.o farsync.o fsflex.o hdlc.o hdlc_raw.o hdlc_raw_eth.o hdlc_cisco.o hdlc_fr.o hdlc_ppp.o hdlc_x25.o
else
KDIR := /lib/modules/$(shell uname -r)/build
PWD := $(shell pwd)
```

2.3 Applying patch to enable LAPB API

Note: this step is only required for kernels **< 5.6**:

patch < lapb-api.patch4 -p0

```
[strawberry@STRAWBERRY kernel-hdlc]$ patch < lapb-api.patch4 -p0
patching file hdlc_x25.c
Hunk #1 succeeded at 26 with fuzz 2 (offset 1 line).
Hunk #2 succeeded at 53 (offset 1 line).
Hunk #3 succeeded at 86 with fuzz 1 (offset 1 line).
Hunk #4 succeeded at 156 with fuzz 2 (offset 6 lines).
Hunk #5 succeeded at 164 (offset -1 lines).
[strawberry@STRAWBERRY kernel-hdlc]$
```

2.4 Install WAN driver

The install script is located in the farsync-2.3.6-b307 directory.

cd ../
sudo ./install wan

The following error may well be reported:

hdlc_fr.c:1282:2: error: implicit declaration of function ‘mark_driver_unmaintained’; did you mean ‘mark_driver_unsupported’? [-Werror=implicit-function-declaration]
  mark_driver_unmaintained(THIS_MODULE->name);
  ^~~~~~~~~~~~~~~~~~~~~~~~
  mark_driver_unsupportfs

In which case edit the hdlc_fr.c file and change line 1282. In the extract below, line 1282 has been commented out and a new line added with the required change:

1282 /* mark_driver_unmaintained(THIS_MODULE->name); */
1283 mark_driver_unsupported(THIS_MODULE->name);

After making the change:

sudo ./install wan

3 Post WAN driver install

3.1 Edit /etc/init.d/farsync

Check the commands in **bold** are present and configured correctly (Note: Depending on the version being used **/sbin/modprobe farsync** might not be present):

```
 #
 # Make sure the kernel modules are loaded
 #
 if [ -f $KMOD_DIR/farsync.o -o -f $KMOD_DIR/farsync.ko ]
 then
#        /sbin/modprobe farsync
#        /sbin/modprobe hdlc_ppp
         /sbin/insmod $MODULE_DIR/hdlc.ko
         /sbin/insmod $MODULE_DIR/farsync.ko
         /sbin/insmod $MODULE_DIR/hdlc_ppp.ko
         check_farsync_loaded


# If you have used this script to load the syncppp
# and hdlc modules with the farsync module then
# uncomment the next 2 lines to unload syncppp & hdlc with farsync
 /sbin/rmmod $MODULE_DIR/hdlc_ppp.ko
 /sbin/rmmod $MODULE_DIR/hdlc.ko
#/sbin/rmmod $MODULE_DIR/syncppp.ko
```

3.2 Start driver

sudo /etc/init.d/farsync start

3.3 Load the LAPB and HDLC x25 modules

The modules are currently located in the kernel-hdlc directory

sudo insmod kernel-hdlc/lapb.ko
sudo insmod kernel-hdlc/hdlc_x25.ko hdlc_dce_count=1 hdlc_dce_list=1

```
[strawberry@STRAWBERRY farsync-2.3.6-b307]$ sudo insmod kernel-hdlc/lapb.ko
[strawberry@STRAWBERRY farsync-2.3.6-b307]$ sudo insmod kernel-hdlc/hdlc_x25.ko hdlc_dce_count=1 hdlc_dce_list=1
[strawberry@STRAWBERRY farsync-2.3.6-b307]$
```

hdlc_dce_count the number of dce interfaces required
hdlc_dce_list a list of the interface indexes of the DCE's

The use of **ifcfg** network configuration files has been deprecated for some time now and more recent Linux distributions have removed support for them entirely. For systems without support for **ifcfg** network files, please refer next to Section 3.6.

3.4 Edit port configuration files

Two ports are required to be configured for the test. Edit both /etc/farsite/farsync/ifcfg-hdlc0 and /etc/farsite/farsync/ifcfg-hdlc1 and configure accordingly. IPADDR, IPV6ADDR, POINTOPOINT, NETMASK, NETWORK and MTU, can be commented out, as they are not required.

3.4.1 ifcfg-hdlc0 (configured as a DTE)

```
# Other media options are shdsl, E1, T1, x21d, v24, v35, rs530 and rs449
MEDIA=x21
# Network protocols are PPP or CISCO
PROTO=x25
# We are a DTE and use the external clock from the line/DCE
CLOCK=ext
# Make sure hdlc linemode is selected
LINEMODE=hdlc
```

3.4.2 ifcfg-hdlc1 (configured as a DCE)

```
# Other media options are shdsl E1, T1, x21d, v24, v35, rs530 and rs449
MEDIA=x21
# Network protocols are PPP or CISCO
PROTO=x25
# We are a DCE and provide clock at the specified rate
CLOCK=64000
# Make sure hdlc linemode is selected
LINEMODE=hdlc
```

3.5 Open both ports

```
sudo ifup hdlc0
sudo ifup hdlc1
```

3.6 Managing interfaces without the use of ifcfg configuration files

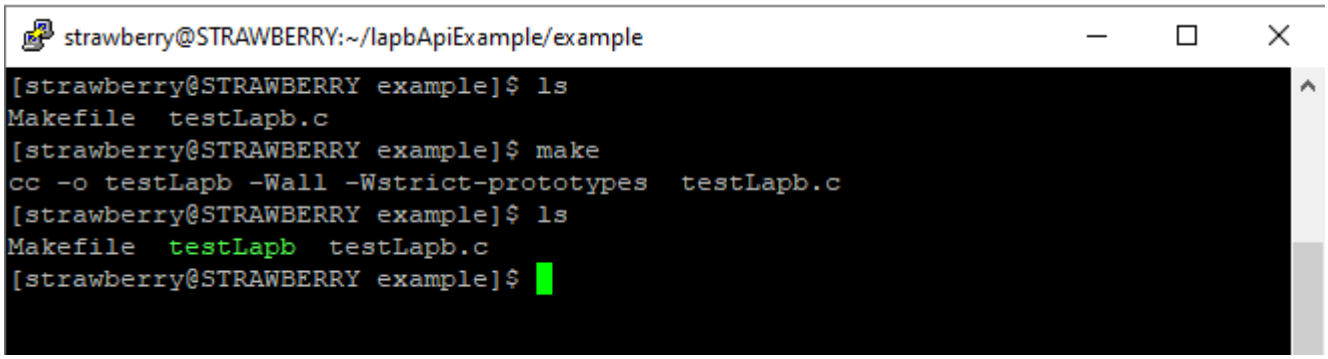
If the system does not support **ifcfg** configuration files and/or **ifup** then the use of a user-managed script, such as the following example, is an alternative:

```
farutil hdlc0 set media x21
farutil hdlc0 set clock ext
farutil hdlc0 set proto x25
farutil hdlc1 set media x21
farutil hdlc1 set clock 64000
farutil hdlc1 set proto x25
ifconfig hdlc0 up
ifconfig hdlc1 up
```

4 Exercising the LAPB Interfaces

4.1 Build the LAPB sample application

$cd ~/farsync_sdk-2.3.6/examples/lapbApi/example/
$ make
cc -o testLapb -Wall -Wstrict-prototypes testLapb.c
$

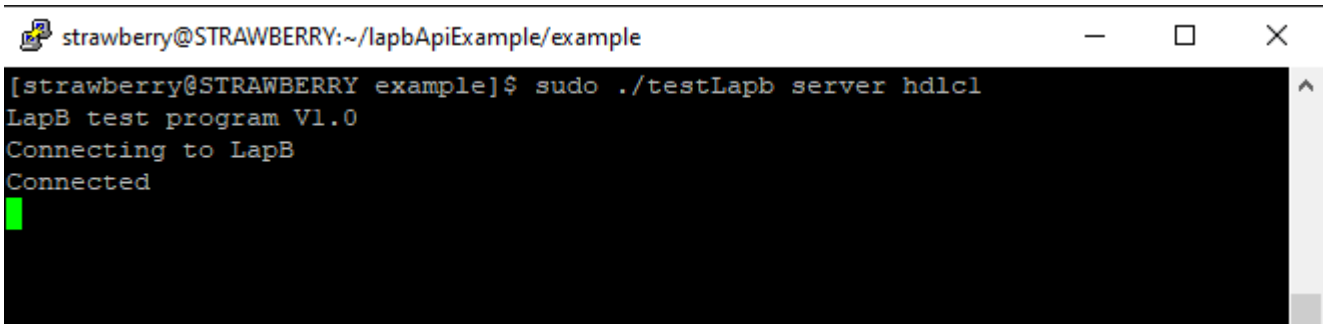


4.2 Connect two ports together

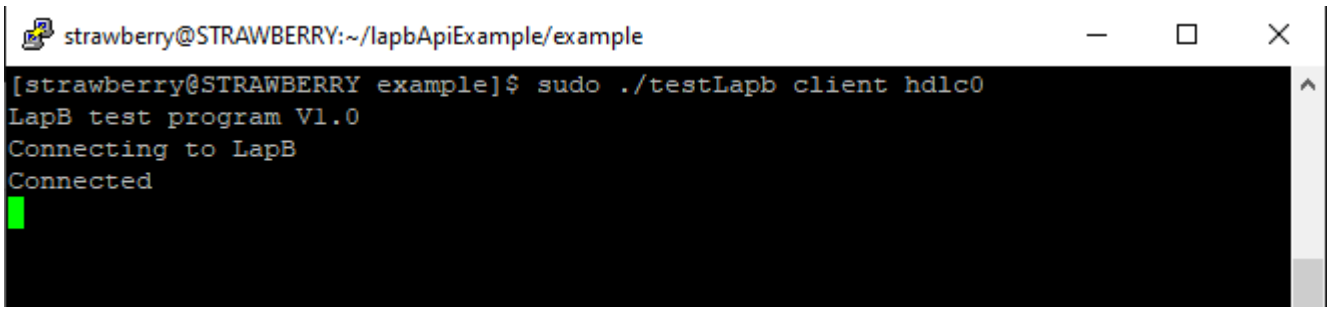
In this case the card being used is a T4Ue with an MTU4 cable. Connected to both A & B ports are UCX1 cables which are then connected together using a NULL-MX cable.

4.3 Run the sample application in two terminals

4.3.1 Start Server

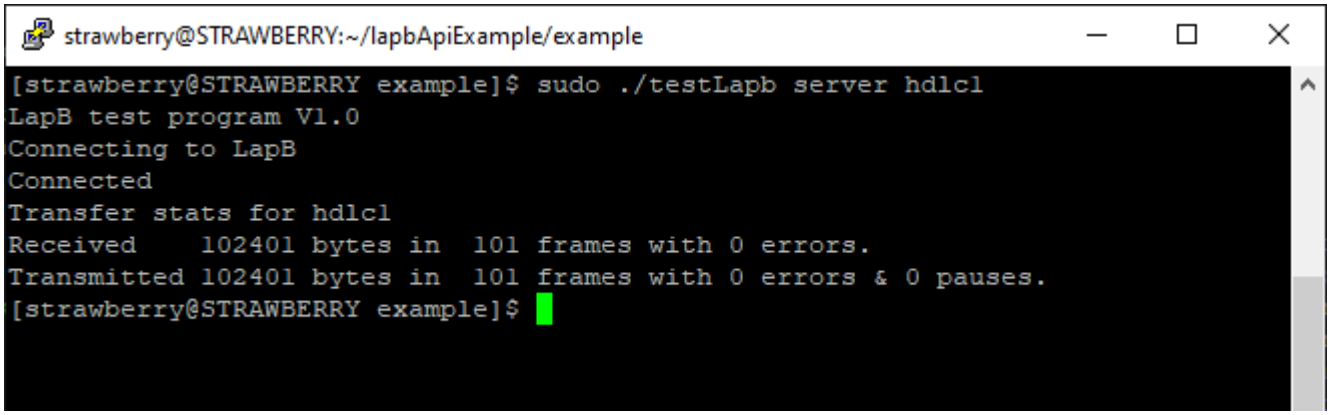


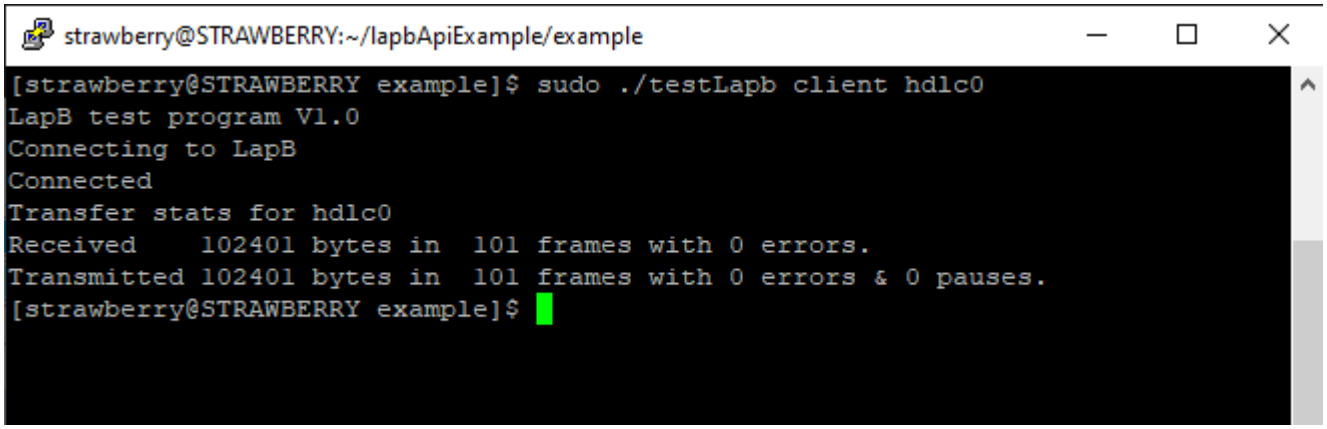
4.3.2 Start Client



4.4 Test Results

After around 20 – 30 seconds the test should finish and the results displayed





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