
Installing Linux Device Drivers for CCL

Communication Controller for Linux
on zSeries – LAN Connectivity

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Installing LCS Devices

Red Hat Enterprise Server 4 - Ethernet LCS - Static Commands

1. Verify the devices are attached to the system.
2. Add the LCS "alias" in the /etc/modprobe.conf

```
alias eth2 lcs
```

3. Create the /etc/sysconfig/network-scripts/ifcfg-eth2 script. This script will activate the device each time the system is booted.

```
# IBM LCS  
  
DEVICE=eth2  
  
BOOTPROTO=static  
  
ONBOOT=yes  
  
NETTYPE=lcs  
  
SUBCHANNELS=0.0.aaaa,0.0.bbbb  
  
PORTNAME=0  
  
TYPE=Ethernet
```

Where:

aaaa = LCS read device address
bbbb = LCS write device and address

4. Reboot the system.
5. After the system reboots, issue the ifconfig command and verify the device is active.

Red Hat Enterprise Server 4 – Ethernet LCS – Dynamic Commands

1. Verify the devices are attached to the system.
2. Load the LCS device driver

```
modprobe lcs
```

3. Create a new LCS device by grouping the CCW devices

```
echo 0.0.aaaa,0.0.bbbb > /sys/bus/ccwgroup/drivers/lcs/group
```

where:

```
aaaa == LCS Read Device  
bbbb == LCS Write Device
```

4. Set the devices port number

```
echo 0 > /sys/bus/ccwgroup/drivers/lcs/0.0.aaaa/portno
```

5. Bring the device online

```
echo 1 /sys/bus/ccwgroup/drivers/lcs/0.0.aaaa/online
```

6. Add the LCS "alias" in the /etc/modprobe.conf

```
alias eth2 lcs
```

7. Create the `/etc/sysconfig/network-scripts/ifcfg-eth2` script. This script will activate the device each time the system is booted.

```
# IBM LCS  
DEVICE=eth2  
BOOTPROTO=static  
ONBOOT=yes  
NETTYPE=lcs  
SUBCHANNELS=0.0.aaaa,0.0.bbbb  
PORTNAME=0  
TYPE=Ethernet
```

Where:

```
aaaa = LCS read device address  
bbbb = LCS write device and address
```

8. Activate the Device

```
ifup eth2
```

Red Hat Enterprise Server 4 – Token Ring LCS – Static Commands

1. Verify the devices are attached to the system.
2. Add the LCS "alias" in the /etc/modprobe.conf

```
alias tr4 lcs
```

3. Create the /etc/sysconfig/network-scripts/ifcfg-tr4 script. This script will activate the device each time the system is booted.

```
# IBM LCS

DEVICE=tr4

BOOTPROTO=static

ONBOOT=yes

NETTYPE=lcs

SUBCHANNELS=0.0.aaaa,0.0.bbbb

PORTNUM=0

TYPE=TokenRing
```

Where:

aaaa = LCS read device address
bbbb = LCS write device and address

4. Reboot the system.
5. After the system reboots, issue the ifconfig command and verify the device is active.

Red Hat Enterprise Server 4 – Token Ring LCS – Dynamic Commands

1. Verify the devices are attached to the system.
2. Load the LCS device driver

```
modprobe lcs
```

3. Create a new LCS device by grouping the CCW devices

```
echo 0.0.aaaa,0.0.bbbb > /sys/bus/ccwgroup/drivers/lcs/group
```

where:

```
aaaa == LCS Read Device  
bbbb == LCS Write Device
```

4. Set the devices port number

```
echo 0 > /sys/bus/ccwgroup/drivers/lcs/0.0.aaaa/portno
```

5. Bring the device online

```
echo 1 /sys/bus/ccwgroup/drivers/lcs/0.0.aaaa/online
```

9. Add the LCS "alias" in the /etc/modprobe.conf

```
alias tr4 lcs
```

10. Create the `/etc/sysconfig/network-scripts/ifcfg-eth2` script. This script will activate the device each time the system is booted.

```
# IBM LCS  
DEVICE=tr4  
BOOTPROTO=static  
ONBOOT=yes  
NETTYPE=lcs  
SUBCHANNELS=0.0.aaaa,0.0.bbbb  
PORTNUM=0  
TYPE=TokenRing
```

Where:

aaaa = LCS read device address
bbbb = LCS write device and address

11. Activate the Device

```
ifup tr4
```

SuSE Linux Enterprise Server 8 - Ethernet LCS - Static Commands

1. Verify the devices are attached to the system.
2. Define the device "alias" in the /etc/modules.conf

```
alias eth6 lcs
```

3. Add the device to the /etc/chandev.conf

```
lcs6,0xaaaa,0xbbbb,0,0
```

Where:

```
aaaa == LCS read device address  
bbbb == LCS write device and address  
0 == Filler - reserved for future use  
0 == LCS device port number
```

4. Create the /etc/sysconfig/network/ifcfg-eth6. This script will activate the device each time the system is booted.

```
BOOTPROTO='static'  
  
STARTMODE='onboot'
```

5. Reboot the system.
6. After the system reboots, issue the ifconfig command and verify the device is active.

SuSE Linux Enterprise Server 8 – Ethernet LCS – Dynamic Commands

1. Verify the devices are attached to the system.
2. Add the device to the `/etc/chandev.conf`

```
lcs6,0xaaaa,0xbbbb,0,0
```

Where:

```
aaaa == LCS read device address  
bbbb == LCS write device and address  
0 == Filler - reserved for future use  
0 == LCS device port number
```

3. Issue the following commands to activate the device

```
echo read_conf > /proc/chandev  
echo reprobe > /proc/chandev
```

4. Configure the interface

```
ifconfig eth6 up
```

SuSE Linux Enterprise Server 8 – Token Ring LCS – Static Commands

1. Verify the devices are attached to the system.
2. Define the device "alias" in the `/etc/modules.conf`

```
alias tr8 lcs
```

3. Add the device to the `/etc/chandev.conf`

```
lcs8,0xaaaa,0xbbbb,0,0
```

Where:

```
aaaa == LCS read device address  
bbbb == LCS write device and address  
0 == Filler - reserved for future use  
0 == LCS device port number
```

4. Create the `/etc/sysconfig/network/ifcfg-eth6`. This script will activate the device each time the system is booted.

```
BOOTPROTO='static'  
  
STARTMODE='onboot'
```

5. Reboot the system.
6. After the system reboots, issue the `ifconfig` command and verify the device is active.

SuSE Linux Enterprise Server 8 – Token Ring LCS – Dynamic Commands

1. Verify the devices are attached to the system.
2. Add the device to the `/etc/chandev.conf`

```
lcs8,0xaaaa,0xbbbb,0,0
```

Where:

```
aaaa == LCS read device address  
bbbb == LCS write device and address  
0 == Filler - reserved for future use  
0 == LCS device port number
```

3. Issue the following commands to activate the device

```
echo read_conf > /proc/chandev  
echo reprobe > /proc/chandev
```

4. Configure the interface

```
ifconfig tr8 up
```

SuSE Linux Enterprise Server 9 – Ethernet LCS – Static Commands

1. Verify the devices are attached to the system.
2. Define the LCS device by creating the `etc/sysconfig/hardware/hwcfg-lcs-bus-ccw-0.0.aaaa`. The `aaaa` is the read device for the LCS.

```
CCW_CHAN_IDS='0.0.aaaa,0.0.bbbb'  
  
CCW_CHAN_MODE=''  
  
CCW_CHAN_NUM='2'  
  
MODULE='lcs'  
  
MODULE_OPTIONS=''  
  
SCRIPTDOWN='hwdown-ccw'  
  
SCRIPTUP='hwup-ccw'  
  
SCRIPTUP_ccw='hwup-ccw'  
  
SCRIPTUP_ccwgroup='hwup-lcs'  
  
STARTMODE='auto'
```

where:

```
aaaa == LCS Read Device  
bbbb == LCS Write Device
```

3. Define the network interface by creating the `/etc/sysconfig/network/ifcfg-lcs-bus-ccw-0.0.aaaa`.

```
BOOTPROTO='static'  
  
STARTMODE='onboot'
```

4. Reboot the system.
5. After the system reboots, issue the `ifconfig` command and verify the device is active.

SuSE Linux Enterprise Server 9 – Ethernet LCS – Dynamic Commands

1. Verify the devices are attached to the system.
2. Load the LCS device driver

```
modprobe lcs
```

3. Create a new LCS device by grouping the CCW devices

```
echo 0.0.aaaa,0.0.bbbb > /sys/bus/ccwgroup/drivers/lcs/group
```

where:

```
aaaa == LCS Read Device  
bbbb == LCS Write Device
```

4. Set the devices port number

```
echo 0 > /sys/bus/ccwgroup/drivers/lcs/0.0.aaaa/portno
```

5. Bring the device online

```
echo 1 > /sys/devices/cu3088/0.0.aaaa/online
```

6. Find the device interface number

```
ls -Al /sys/class/net/*/device
```

7. Configure the interface

```
ifconfig ethx up
```

SuSE Linux Enterprise Server 9 – Token Ring LCS – Static Commands

1. Verify the devices are attached to the system.
2. Define the LCS device by creating the `/etc/sysconfig/hardware/hwcfg-lcs-bus-ccw-0.0.aaaa`. The `aaaa` is the read device for the LCS.

```
CCW_CHAN_IDS='0.0.aaaa,0.0.bbbb'  
  
CCW_CHAN_MODE=''  
  
CCW_CHAN_NUM='2'  
  
MODULE='lcs'  
  
MODULE_OPTIONS=''  
  
SCRIPTDOWN='hwdown-ccw'  
  
SCRIPTUP='hwup-ccw'  
  
SCRIPTUP_ccw='hwup-ccw'  
  
SCRIPTUP_ccwgroup='hwup-lcs'  
  
STARTMODE='auto'
```

where:

```
aaaa == LCS Read Device  
bbbb == LCS Write Device
```

3. Define the network interface by creating the `/etc/sysconfig/network/ifcfg-lcs-bus-ccw-0.0.aaaa`.

```
BOOTPROTO='static'  
  
STARTMODE='onboot'
```

4. Reboot the system.
5. After the system reboots, issue the `ifconfig` command and verify the device is active.

SuSE Linux Enterprise Server 9 – Token Ring LCS – Dynamic Commands

1. Verify the devices are attached to the system.
2. Load the LCS device driver

```
modprobe lcs
```

3. Create a new LCS device by grouping the CCW devices

```
echo 0.0.aaaa,0.0.bbbb > /sys/bus/ccwgroup/drivers/lcs/group
```

where:

```
aaaa == LCS Read Device  
bbbb == LCS Write Device
```

4. Set the devices port number

```
echo 0 > /sys/bus/ccwgroup/drivers/lcs/0.0.aaaa/portno
```

5. Bring the device online

```
echo 1 > /sys/devices/cu3088/0.0.aaaa/online
```

6. Find the device interface number.

```
ls -Al /sys/class/net/*/device
```

7. Configure the device

```
ifconfig trx up
```

Installing QDIO Ethernet with Layer 2

Red Hat Enterprise Server 4 - QDIO Layer 2 - Static Commands

1. Verify the devices are attached to the system.
2. Add the QETH "alias" in the /etc/modprobe.conf. ETH8 would be the next interface number you could use (N+1).

```
alias eth8 qeth
```

3. Create the /etc/sysconfig/network-scripts/ifcfg-eth8 script. This script will activate the device each time the system is booted.

```
# IBM QETH  
DEVICE=eth8  
BOOTPROTO=static  
NETTYPE=qeth  
ONBOOT=yes  
SUBCHANNELS=0.0.aaaa,0.0.bbbb,0.0.cccc  
LAYER2=yes  
MACADDR=xx:xx:xx:xx:xx:xx  
TYPE=Ethernet
```

Where:

aaaa = QETH read device address
bbbb = QETH write device and address
cccc = QETH Data device

The MACADDR is the canonical address of the LOCADDR defined in the NCP gen.

4. Make a backup copy of the script `/etc/sysconfig/network-scripts/network-functions`
5. Add the following statements to the `/etc/sysconfig/network-scripts/network-functions` in the `configure_ccwgroup_device` () function

```
if [ -n "$LAYER2" ]; then
    if [ "$LAYER2" = "yes" ]; then
        [ -e $SYSDIR/layer2 ] && echo 1 > $SYSDIR/layer2
    fi
fi
```

6. Reboot the system.
7. After the system reboots, issue the `ifconfig` command and verify the device is active.

NOTE: At the time of writing this document, we had to manually update the `etc/sysconfig/network-scripts/network-functions`. This was tested using Red Hat Enterprise Server - Update 3. This step may not be necessary using later levels of the operating system.

Red Hat Enterprise Server 4 – QDIO Layer 2 –Dynamic Commands

1. Verify the devices are attached to the system.
2. Change to the following directory

```
cd /sys/bus/ccwgroup/drivers/qeth/
```

3. ECHO the devices into the group

```
echo 0.0.aaaa,0.0.bbbb,0.0.cccc > group
```

Where:

aaaa = QETH read device address
bbbb = QETH write device and address
cccc = QETH Data device

4. Turn on the Layer2 option

```
echo 1 > 0.0.2f00/layer2
```

5. Activate the device

```
echo 1 > 0.0.2f00/online
```

6. Issue the following command to show you the device interface number

```
cat /proc/qeth
```

7. Activate the QETH device and assign the MAC address

```
ifconfig ethx hw ether xx:xx:xx:xx:xx:xx up
```

ethx would be the next interface number you could use (N+1).

SuSE Linux Enterprise Server 8 – QDIO Layer 2 – Static Commands

At the present time, Layer 2 support, as required by Communications Controller for Linux on z9 and zSeries, is not supported on SuSE Linux Enterprise Server 8. There is no plan for support on this version of Linux.

If you are using SuSE Linux Enterprise Server 8 and require Layer 2 support, please consider migrating to SuSE Linux Enterprise Server 9.

SuSE Linux Enterprise Server 8 – QDIO Layer 2 – Dynamic Commands

At the present time, Layer 2 support, as required by Communications Controller for Linux on z9 and zSeries, is not supported on SuSE Linux Enterprise Server 8. There is no plan for support on this version of Linux.

If you are using SuSE Linux Enterprise Server 8 and require Layer 2 support, please consider migrating to SuSE Linux Enterprise Server 9.

SuSE Linux Enterprise Server 9 - QDIO Layer 2 - Static Commands

1. Verify the devices are attached to the system.
2. Define the QETH device by creating the script `/etc/sysconfig/hardware/hwcfg-qeth-bus-ccw-0.0.aaaa`. The `aaaa` is the read device for the QETH device.

```
# Hardware configuration for a qeth device at 0.0.aaaa

STARTMODE="auto"

MODULE="qeth_mod"

MODULE_OPTIONS=""

MODULE_UNLOAD="yes"

# Scripts to be called for the various events.

SCRIPTUP="hwup-ccw"

SCRIPTUP_ccw="hwup-ccw"

SCRIPTUP_ccwgroup="hwup-qeth"

SCRIPTDOWN="hwdown-ccw"

# CCW_CHAN_IDS sets the channel IDs for this device

# The first ID will be used as the group ID

CCW_CHAN_IDS="0.0.aaaa 0.0.bbbb 0.0.cccc"

# CCW_CHAN_NUM set the number of channels for this device

# Always 3 for an qeth device

CCW_CHAN_NUM=3

# CCW_CHAN_MODE sets the port name for an OSA-Express device

CCW_CHAN_MODE="GIGEaaaa"

# QETH_LAYER2_SUPPORT enables Layer2 support for this device.

QETH_LAYER2_SUPPORT=1
```

where:

```
aaaa == QETH Read Device
bbbb == QETH Write Device
cccc == QETH Data Device
```

3. Define the network interface by creating the script
/etc/sysconfig/network/ifcfg-qeth-bus-ccw-0.0.aaaa.

```
LLADDR='xx:xx:xx:xx:xx:xx'  
  
BOOTPROTO="static"  
  
UNIQUE=""  
  
STARTMODE="onboot"
```

LLADDR keyword allows you to define the MAC address for the QDIO device. This keyword should be the first in the list. This will allow the MAC address to be set before the device comes active.

4. Reboot the system.
5. After the system reboots, issue the ifconfig command and verify the device is active.

SuSE Linux Enterprise Server 9 – QDIO Layer 2 – Dynamic Commands

1. Verify the devices are attached to the system.
2. Load the QETH device driver

```
modprobe qeth
```

3. Create a new QETH device by grouping the CCW devices

```
echo 0.0.aaaa,0.0.bbbb,0.0.cccc > /sys/bus/ccwgroup/drivers/  
qeth/group
```

where:

```
aaaa == QETH Read Device  
bbbb == QETH Write Device  
cccc == QETH Data Device
```

4. Set the Layer 2 option

```
echo 1 > /sys/devices/qeth/0.0.aaaa/layer2
```

5. Bring the QETH device online

```
echo 1 > /sys/devices/qeth/0.0.aaaa/online
```

6. Find the interface number for the QETH device

```
ls -Al /sys/class/net/*/device
```

7. Configure the QETH device

```
ifconfig ethx hw ether xx:xx:xx:xx:xx:xx up
```