

# **MCA Driver Programming Interface**

**Alan Cox**

**`alan@lxorguk.ukuu.org.uk`**

**David Weinehall**

**Chris Beauregard**

## **MCA Driver Programming Interface**

by Alan Cox, David Weinehall, and Chris Beauregard

Copyright © 2000 Alan CoxDavid WeinehallChris Beauregard

This documentation is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

For more details see the file COPYING in the source distribution of Linux.

# Table of Contents

<b>1. Introduction.....</b>	<b>1</b>
<b>2. Known Bugs And Assumptions .....</b>	<b>2</b>
<b>3. Public Functions Provided .....</b>	<b>3</b>
mca_find_adapter .....	3
mca_find_unused_adapter.....	3
mca_read_stored_pos.....	4
mca_read_pos.....	5
mca_write_pos .....	6
mca_set_adapter_name .....	7
mca_mark_as_used .....	8
mca_mark_as_unused .....	8
<b>4. DMA Functions Provided .....</b>	<b>10</b>
mca_enable_dma.....	10
mca_disable_dma.....	10
mca_set_dma_addr.....	11
mca_get_dma_addr .....	12
mca_set_dma_count.....	12
mca_get_dma_residue.....	13
mca_set_dma_io.....	14
mca_set_dma_mode.....	15

# Chapter 1. Introduction

The MCA bus functions provide a generalised interface to find MCA bus cards, to claim them for a driver, and to read and manipulate POS registers without being aware of the motherboard internals or certain deep magic specific to onboard devices.

The basic interface to the MCA bus devices is the slot. Each slot is numbered and virtual slot numbers are assigned to the internal devices. Using a `pci_dev` as other busses do does not really make sense in the MCA context as the MCA bus resources require card specific interpretation.

Finally the MCA bus functions provide a parallel set of DMA functions mimicing the ISA bus DMA functions as closely as possible, although also supporting the additional DMA functionality on the MCA bus controllers.

## Chapter 2. Known Bugs And Assumptions

None.

# Chapter 3. Public Functions Provided

## mca\_find\_adapter

### LINUX

Kernel Hackers Manual July 2015

#### Name

`mca_find_adapter` — scan for adapters

#### Synopsis

```
int mca_find_adapter (int id, int start);
```

#### Arguments

*id*

MCA identification to search for

*start*

starting slot

#### Description

Search the MCA configuration for adapters matching the 16bit ID given. The first time it should be called with start as zero and then further calls made passing the return value of the previous call until MCA\_NOTFOUND is returned.

Disabled adapters are not reported.

## mca\_find\_unused\_adapter

### LINUX

## Name

`mca_find_unused_adapter` — scan for unused adapters

## Synopsis

```
int mca_find_unused_adapter (int id, int start);
```

## Arguments

*id*

MCA identification to search for

*start*

starting slot

## Description

Search the MCA configuration for adapters matching the 16bit ID given. The first time it should be called with start as zero and then further calls made passing the return value of the previous call until `MCA_NOTFOUND` is returned.

Adapters that have been claimed by drivers and those that are disabled are not reported. This function thus allows a driver to scan for further cards when some may already be driven.

## `mca_read_stored_pos`

### LINUX

## Name

`mca_read_stored_pos` — read POS register from boot data

## Synopsis

```
unsigned char mca_read_stored_pos (int slot, int reg);
```

## Arguments

*slot*

slot number to read from

*reg*

register to read from

## Description

Fetch a POS value that was stored at boot time by the kernel when it scanned the MCA space. The register value is returned. Missing or invalid registers report 0.

## mca\_read\_pos

### LINUX

Kernel Hackers Manual July 2015

## Name

`mca_read_pos` — read POS register from card

## Synopsis

```
unsigned char mca_read_pos (int slot, int reg);
```

## Arguments

*slot*

slot number to read from



*reg*

register to read from

## Description

Fetch a POS value directly from the hardware to obtain the current value. This is much slower than `mca_read_stored_pos` and may not be invoked from interrupt context. It handles the deep magic required for onboard devices transparently.

## mca\_write\_pos

### LINUX

Kernel Hackers Manual July 2015

### Name

`mca_write_pos` — read POS register from card

### Synopsis

```
void mca_write_pos (int slot, int reg, unsigned char byte);
```

### Arguments

*slot*

slot number to read from

*reg*

register to read from

*byte*

byte to write to the POS registers

## Description

Store a POS value directly from the hardware. You should not normally need to use this function and should have a very good knowledge of MCA bus before you do so. Doing this wrongly can damage the hardware.

This function may not be used from interrupt context.

Note that this is technically a Bad Thing, as IBM tech stuff says you should only set POS values through their utilities. However, some devices such as the 3c523 recommend that you write back some data to make sure the configuration is consistent. I'd say that IBM is right, but I like my drivers to work.

This function can't do checks to see if multiple devices end up with the same resources, so you might see magic smoke if someone screws up.

## mca\_set\_adapter\_name

### LINUX

Kernel Hackers Manual July 2015

### Name

`mca_set_adapter_name` — Set the description of the card

### Synopsis

```
void mca_set_adapter_name (int slot, char * name);
```

### Arguments

*slot*

slot to name

*name*

text string for the name

## Description

This function sets the name reported via /proc for this adapter slot. This is for user information only. Setting a name deletes any previous name.

## mca\_mark\_as\_used

### LINUX

Kernel Hackers Manual July 2015

### Name

`mca_mark_as_used` — claim an MCA device

### Synopsis

```
int mca_mark_as_used (int slot);
```

### Arguments

*slot*

slot to claim

### FIXME

should we make this threadsafe

Claim an MCA slot for a device driver. If the slot is already taken the function returns 1, if it is not taken it is claimed and 0 is returned.

# mca\_mark\_as\_unused

## LINUX

Kernel Hackers Manual July 2015

### Name

`mca_mark_as_unused` — release an MCA device

### Synopsis

```
void mca_mark_as_unused (int slot);
```

### Arguments

*slot*

slot to claim

### Description

Release the slot for other drives to use.

# Chapter 4. DMA Functions Provided

## mca\_enable\_dma

### LINUX

Kernel Hackers Manual July 2015

#### Name

`mca_enable_dma` — channel to enable DMA on

#### Synopsis

```
void mca_enable_dma (unsigned int dmanr);
```

#### Arguments

*dmanr*

DMA channel

#### Description

Enable the MCA bus DMA on a channel. This can be called from IRQ context.

## mca\_disable\_dma

### LINUX

Kernel Hackers Manual July 2015

#### Name

`mca_disable_dma` — channel to disable DMA on

## Synopsis

```
void mca_disable_dma (unsigned int dmanr);
```

## Arguments

*dmanr*

DMA channel

## Description

Enable the MCA bus DMA on a channel. This can be called from IRQ context.

## mca\_set\_dma\_addr

### LINUX

Kernel Hackers Manual July 2015

## Name

`mca_set_dma_addr` — load a 24bit DMA address

## Synopsis

```
void mca_set_dma_addr (unsigned int dmanr, unsigned int a);
```

## Arguments

*dmanr*

DMA channel

*a*

24bit bus address

## Description

Load the address register in the DMA controller. This has a 24bit limitation (16Mb).

## mca\_get\_dma\_addr

### LINUX

Kernel Hackers Manual July 2015

## Name

`mca_get_dma_addr` — load a 24bit DMA address

## Synopsis

```
unsigned int mca_get_dma_addr (unsigned int dmanr);
```

## Arguments

*dmanr*

DMA channel

## Description

Read the address register in the DMA controller. This has a 24bit limitation (16Mb). The return is a bus address.

## mca\_set\_dma\_count

### LINUX

Kernel Hackers Manual July 2015

#### Name

`mca_set_dma_count` — load a 16bit transfer count

#### Synopsis

```
void mca_set_dma_count (unsigned int dmanr, unsigned int count);
```

#### Arguments

*dmanr*

DMA channel

*count*

count

#### Description

Set the DMA count for this channel. This can be up to 64Kbytes. Setting a count of zero will not do what you expect.

## mca\_get\_dma\_residue

### LINUX

Kernel Hackers Manual July 2015

#### Name

`mca_get_dma_residue` — get the remaining bytes to transfer



## Synopsis

```
unsigned int mca_get_dma_residue (unsigned int dmanr);
```

## Arguments

*dmanr*

DMA channel

## Description

This function returns the number of bytes left to transfer on this DMA channel.

## mca\_set\_dma\_io

### LINUX

Kernel Hackers Manual July 2015

## Name

`mca_set_dma_io` — set the port for an I/O transfer

## Synopsis

```
void mca_set_dma_io (unsigned int dmanr, unsigned int io_addr);
```

## Arguments

*dmanr*

DMA channel

*io\_addr*

an I/O port number

## Description

Unlike the ISA bus DMA controllers the DMA on MCA bus can transfer with an I/O port target.

## mca\_set\_dma\_mode

### LINUX

Kernel Hackers Manual July 2015

## Name

`mca_set_dma_mode` — set the DMA mode

## Synopsis

```
void mca_set_dma_mode (unsigned int dmanr, unsigned int mode);
```

## Arguments

*dmanr*

DMA channel

*mode*

mode to set

## Description

The DMA controller supports several modes. The mode values you can set are-

`MCA_DMA_MODE_READ` when reading from the DMA device.

`MCA_DMA_MODE_WRITE` to writing to the DMA device.

`MCA_DMA_MODE_IO` to do DMA to or from an I/O port.

`MCA_DMA_MODE_16` to do 16bit transfers.