

Communication Solutions



Never stop thinking

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CONFIDENTIAL Introduction

### 1 Introduction

The INCA-IP2 communication processor family for LAN phone applications comes with an extensive set of software, which was combined to the INCA-IP2 Board Support Package (BSP). It incorporates a wide range of applications and protocol stacks, which help to reduce development effort, since software engineers can focus on the implementation and integration of additional software while relying on INCA-IP2 BSP's standard set of protocol and application software.

INCA-IP2 contains two MIPS 24KEc CPUs. One is the main CPU (CPU0), which is supported by a coprocessors (CPU1). The coprocessor handles all real time tasks while the main CPU runs the INCA-IP2 BSP software suite on top of a Linux® Operating System. The BSP adds drivers for all peripherals integrated in the chip. The modular INCA-IP2 BSP structure allows to tailor the software according to any specific scenario and hence optimizing the flash memory sizes for a given application. It also allows easy integration of new software components by adding them to the source tree of the package and then build them automatically.

### 1.1 Scope of the Document

The scope of this document is to give an overview of all INCA-IP2 BSP components All elements described in this document are incorporated in the INCA-IP2 BSP V0.9.

### 1.2 Organization of the Document

This document is organized as follows:

Chapter 1, Introduction

Gives a general overview on the contents of the INCA-IP2 Board Support Package and describes the basic handling.

Chapter 2, Root File System Content

Gives a general overview on the File System of the Infineon Linux® distribution LXDB-1.0.

Chapter 3, Synchronous Serial Channel (SSC)

Provides a detailed description of the INCA-IP2 Serial Peripheral Interface device driver. This device driver is implemented as Linux<sup>®</sup> kernel module.

Chapter 4, Asynchronous Serial Interface (ASC)

Provides a detailed description of the INCA-IP2 Asynchronous Serial Interface device driver.

Chapter 5, Multi Processor System (MPS)

Provides a detailed description of the INCA-IP2 Multi Processor System device driver. This device driver is implemented as Linux<sup>®</sup> kernel module.

Chapter 6, Terminal Specific Functions (TSF)

Provides a detailed description of the INCA-IP2 Terminal Specific Functions device driver. This device driver is implemented as Linux<sup>®</sup> kernel module.

· Chapter 7, Ethernet Driver

Provides a detailed description of the INCA-IP2 Ethernet device driver.

Chapter 8, Switch Access Interface

Provides a detailed description of the INCA-IP2 Switch Access Interface device driver.

Chapter 9, Pseudo LAN Driver

Provides a detailed description of the INCA-IP2 Pseudo LAN device driver.

Chapter 10, Crypto Engine Driver

Provides a detailed description of the INCA-IP2 Crypto Engine device driver. This device driver is implemented as Linux<sup>®</sup> kernel module

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Chapter 11 USB Support

Gives a general overview about the supported USB features.

Chapter 12, Bluetooth Support

Gives a general overview about the supported Bluetooth features.

Chapter 13, Multiplexer Support

Gives a general overview about the supported Bluetooth features.

Chapter 14, Parallel Port Support

Gives a general overview about the supported Bluetooth features.

Chapter 15, TAPI V3.x

Gives a general overview about the low level TAPIv3 driver.

#### 1.3 INCA-IP2 BSP Overview

**Figure 1** gives an architectural overview of all INCA-IP2 BSP components. On the hardware level, the coprocessor assist the main CPU in handling the voice based interface. All real time tasks are executed by the coprocessor. This concept allows using a non-real time adapted Linux<sup>®</sup> operating system on the main CPU. Hence, using INCA-IP2 BSP, there is no need to allocate software resources for adapting existing protocol stacks or applications in order to integrate real time function calls.

The Linux<sup>®</sup> OS does not facilitate an internal boot loader. In INCA-IP2 BSP, a boot loader is available that can handle kernel images from several sources, like different flash memory types (NOR, NAND).

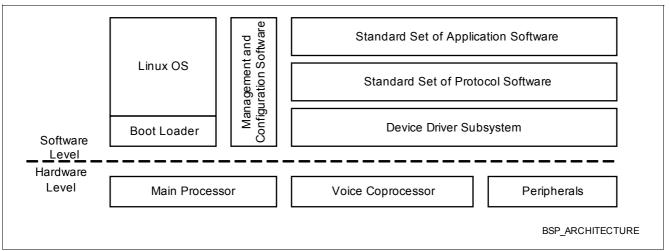


Figure 1 INCA-IP2 BSP Architecture

Once the system has undergone some basic initialization, the boot loader decompresses the Linux<sup>®</sup> from the flash memory, copies it into the SDRAM and jumps to the kernel entry address. From here on, the Linux<sup>®</sup> OS starts its boot procedure.

Once the Linux® has started, any INCA-IP2 specific device driver might be invoked. The Ethernet driver connects to the Linux® socket API and will be automatically addressed when a socket is opened on an Ethernet interface. The Multi Processor System (MPS) device driver communicates with the voice coprocessor through a software based mailbox. The task of the mailbox is to organize the message based traffic between the voice coprocessors and the device driver. The device driver translates Linux® OS function calls to messages for the voice coprocessor and vice versa. On the network layer, the INCA-IP2 offers support for a variety of protocol scenarios.

On top of the protocol related stacks, a set of standard higher layer applications is also included in the INCA-IP2 BSP. It incorporates an ftp client, a dhcp client, a telnet server and client, the network time protocol and a web server.

**Root File System Content** 

### 2 Root File System Content

The target file system for the INCA-IP2 is optimized for minimal size based on uclibc as standard C library. Busybox is used as shell and includes some networking functionalities (for example HTTP server and DHCP support).

The next chapters list some directories and describe the most important content.

### 2.1 /bin

This directory contains the busybox binary and a lot of links to busybox which represent standard shell commands.

### 2.2 /etc

Under /etc several configuration files can be found.

"inittab" will be read by busybox during startup and contains a list of commands, which are run automatically. For example the shell is started through inittab.

"profile" contains definitions for the shell and code which is started everytime the shell is started.

"rc.conf" is the global config file which should be edited by using the web management or the phone application.

#### 2.3 /etc/init.d

Several startup scripts are located in this directory.

### 2.4 /firmware

This directory contains the currently used image of the firmware for the coprocessor.

### 2.5 /lib

Libraries like uclibc are located here. Also kernel modules can be found in the modules directory under the specific kernel version.

#### 2.6 /share/web

The ASP and HTML files for the web management are located here.

### 2.7 /usr/lib

This directory contains libraries which are used by iptables, PPP and SNMP.

### 2.8 /usr/local/lib

The library for the web management is located in this directory.

### 2.9 /usr/local/pa

This directory contains the IFX SIP phone application.

Synchronous Serial Channel (SSC)

# 3 Synchronous Serial Channel (SSC)

The "ifx\_ssc" module controls the Serial Peripherial Interface SSC0 and SSC1 of the INCA-IP2 Standard INCA-IP2.

The availability of the SSC0 and/or SSC1 interfaces are requested from the central "mux" module.

Note: The availability of SSC0/SSC1 interfaces must be defined before compiling the kernel (use "make menuconfig").

### Interface to Kernel Module or User Application

The two interfaces are mutually exclusive; the instance that applies first "wins":

- · A kernel module opens an SSC device or
- An user application opens an SSC device.

### 3.1 Proc File /proc/driver/ifx\_ssc

The INCA-IP2 SSC driver registers a proc file, which can be used to query information regarding the state of the SSC device.

Table 1 SSC Driver proc file

Proc file	Description
ifx_ssc	Prints status information about SSC device

#### 3.2 Function Reference

This chapter contains the Function reference.

Table 2 Function Overview

Name	Description
ifx_ssc_open	SSC Port Open.
ifx_ssc_close	SSC Port Close.
ifx_ssc_register_frm_callb ack	Register SSC Frame callback.
ifx_ssc_unregister_frm_ca llback	Unegister SSC Frame callback.
ifx_ssc_kread	SSC kernel read.
ifx_ssc_kwrite	SSC kernel write.
ifx_ssc_read	SSC Read.
ifx_ssc_write	SSC Write.
ifx_ssc_sethwopts	SSC set hardware options.
ifx_ssc_ioctl	SSC IOCTL.
ifx_ssc_cs_low	Chip select enable.
ifx_ssc_cs_high	Chip select disable.

### 3.2.1 ifx ssc open

### **Description**

SSC Port Open.

Synchronous Serial Channel (SSC)

This routine is called whenever a port is opened. It enforces exclusive opening of a port and enables interrupts, etc.

### **Prototype**

```
int ifx_ssc_open (
         struct inode * inode,
         struct file * filp );
```

### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device or 0/1 for calls from kernel mode
struct file *	filp	File pointer of device

#### **Return Values**

Data Type	Description
int	0 OK
	-ENXIO Invalid port number
	-EBUSY Port already open

### 3.2.2 ifx\_ssc\_close

### **Description**

SSC Port Close.

This routine is called when a particular device is closed.

### **Prototype**

```
int ifx_ssc_close (
          struct inode * inode,
          struct file * filp );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device or 0 or 1 for calls from kernel
		mode
struct file *	filp	File pointer of device

### **Return Values**

Data Type	Description	
int	0 OK	
	-ENXIO Invalid port number	

Synchronous Serial Channel (SSC)

### 3.2.3 ifx\_ssc\_register\_frm\_callback

### **Description**

Register SSC Frame callback.

This function registers the kernel callback function for the SSC frame end interrupt.

### **Prototype**

```
int ifx_ssc_register_frm_callback (
          int port,
          void(*)(int port) func );
```

#### **Parameters**

Data Type	Name	Description
int	port	SSC Port number (0 = SSC0, 1 = SSC1)
void(*)(int port)	func	Pointer to callback function

### **Return Values**

Data Type	Description
int	0 OK
	-ENXIO Invalid port number
	-EBUSY A callback function is already registered
	-EINVAL Function Pointer is NULL

### 3.2.4 ifx\_ssc\_unregister\_frm\_callback

### **Description**

Unegister SSC Frame callback.

This function unregisters the kernel callback function for the SSC frame end interrupt.

### **Prototype**

```
int ifx_ssc_unregister_frm_callback (
          int port );
```

### **Parameters**

Data Type	Name	Description
int	port	SSC Port number (0 = SSC0, 1 = SSC1)

### **Return Values**

Data Type	Description	
int	0 OK	
	-ENXIO Invalid port number	

Synchronous Serial Channel (SSC)

### 3.2.5 ifx\_ssc\_kread

### **Description**

SSC kernel read.

SSC read function to be called from kernel mode. If called from an interrupt the polling read function will be used. If a large number of data shall be received, it is not advised to use this function from interrupts.

#### **Prototype**

```
ssize_t ifx_ssc_kread (
    int port,
    char * kbuf,
    size_t len );
```

#### **Parameters**

Data Type	Name	Description
int	port	SSC Port number (0 = SSC0, 1 = SSC1)
char *	kbuf	Pointer to receive buffer
size_t	len	Length of receive buffer

#### **Return Values**

Data Type	Description
ssize_t	>0 Number of bytes received
	-ENXIO Invalid port number
	-EBUSY Reception currently ongoing
	-EINVAL Invalid receive buffer

### 3.2.6 ifx\_ssc\_kwrite

### **Description**

SSC kernel write.

Interface write function to be called from kernel mode. Please note that the buffer will be freed by the transmit handler and thus cannot be a local variable but must be allocated with kmalloc.

### **Prototype**

```
ssize_t ifx_ssc_kwrite (
    int port,
    const char * kbuf,
    size_t len );
```

Data Type	Name	Description
int	port	SSC Port number (0 = SSC0, 1 = SSC1)



### Synchronous Serial Channel (SSC)

Data Type	Name	Description
const char *	kbuf	Pointer to receive buffer
size_t	len	Length of receive buffer

#### **Return Values**

Data Type	Description
ssize_t	>0 Number of bytes received
	-ENXIO Invalid port number
	-EBUSY Transmission currently ongoing
	-EINVAL Invalid receive buffer

### 3.2.7 ifx\_ssc\_read

### **Description**

SSC Read.

This function is called from user space for reading from the SSC.

### **Prototype**

```
ssize_t ifx_ssc_read (
    struct file * filp,
    char * ubuf,
    size_t len,
    loff_t * off );
```

#### **Parameters**

Data Type	Name	Description
struct file *	filp	File structure of device node
char *	ubuf	Buffer to read to
size_t	len	Number of bytes to be read
loff_t *	off	Current position in file

### **Return Values**

Data Type	Description
ssize_t	>=0 Number of bytes read from FIFO
	-EBUSY SSC receiver busy
	-ENOMEM Could not allocate Rx buffer
	-EFAULT Transmission failed

### 3.2.8 ifx\_ssc\_write

### Description

SSC Write.

This function copies the data from user space into a trasmit buffer and then starts transmission.



Synchronous Serial Channel (SSC)

### **Prototype**

```
ssize_t ifx_ssc_write (
    struct file * filp,
    const char * ubuf,
    size_t len,
    loff_t * off );
```

### **Parameters**

Data Type	Name	Description
struct file *	filp	File structure of device node
const char *	ubuf	Buffer to read from
size_t	len	Number of bytes to be written
loff_t *	off	Current position in file

### **Return Values**

Data Type	Description
ssize_t	>=0 Number of bytes written to FIFO
	-EBUSY SSC transmitter busy
	-ENOMEM Could not allocate Tx buffer
	-EFAULT Transmission failed

### 3.2.9 ifx\_ssc\_sethwopts

### **Description**

SSC set hardware options.

This routine intializes the SSC appropriately depending on slave/master and full-/half-duplex mode. It assumes that the SSC is disabled and the fifo's and buffers are flushed later on.

### **Prototype**

```
int ifx_ssc_sethwopts (
          struct ifx_ssc_port * info );
```

#### **Parameters**

Data Type	Name	Description
struct ifx_ssc_port *	info	Pointer to structure ifx_ssc_port

### **Return Values**

Data Type	Description
int	0 OK
	-EINVAL Invalid hardware options supplied

Synchronous Serial Channel (SSC)

### 3.2.10 ifx\_ssc\_ioctl

### **Description**

SSC IOCTL.

The following IOCTIs are supported for the SSC device:

- IFX SSC STATS READ
- IFX\_SSC\_STATS\_RESET
- IFX\_SSC\_BAUD\_SET
- IFX\_SSC\_BAUD\_GET
- IFX\_SSC\_HWOPTS\_SET
- IFX SSC HWOPTS GET
- IFX\_SSC\_RXTX\_MODE\_SET
- IFX\_SSC\_RXTX\_MODE\_GET
- IFX\_SSC\_ABORT
- · IFX SSC FIFO FLUSH
- IFX\_SSC\_GPO\_OUT\_SET
- IFX\_SSC\_GPO\_OUT\_CLR
- IFX\_SSC\_GPO\_OUT\_GET
- IFX\_SSC\_FRM\_STATUS\_GET
- IFX\_SSC\_FRM\_CONTROL\_GET
- IFX\_SSC\_FRM\_CONTROL\_SET
- IFX\_SSC\_DMA\_ENABLE
- IFX\_SSC\_DMA\_DISABLE
- IFX\_SSC\_BUFFER\_FREE\_ENABLE
- IFX\_SSC\_BUFFER\_FREE\_DISABLE

### **Prototype**

```
int ifx_ssc_ioctl (
    struct inode * inode,
    struct file * filp,
    unsigned int cmd,
    unsigned long data );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filp	File structure of device
unsigned int	cmd	IOCTL command
unsigned long	data	Argument for some IOCTL commands

### **Return Values**

Data Type	Description
int	-ENOIOCTLCMD invalid IOCTL command

Synchronous Serial Channel (SSC)

### 3.2.11 ifx\_ssc\_cs\_low

### **Description**

Chip select enable.

This function sets the given chip select for SSC0 to low.

### **Prototype**

```
ifx_void_t ifx_ssc_cs_low (
          u32 pin );
```

#### **Parameters**

Data Type	Name	Description
u32	pin	Selected CS pin

### 3.2.12 ifx\_ssc\_cs\_high

### **Description**

Chip select disable.

This function sets the given chip select for SSC0 to high.

### **Prototype**

```
ifx_void_t ifx_ssc_cs_high (
          u32 pin );
```

#### **Parameters**

Data Type	Name	Description
u32	pin	Selected CS pin

### 3.3 IOCTL Reference

This chapter contains the IOCTL reference.

### Table 3 DefineOverview

Name	Description
IFX_SSC_STATS_READ	Read out the statistics.
IFX_SSC_STATS_RESET	Clear the statistics.
IFX_SSC_BAUD_SET	Set the baudrate.
IFX_SSC_BAUD_GET	Get the current baudrate.
IFX_SSC_HWOPTS_SET	Set hardware options.
IFX_SSC_HWOPTS_GET	Get the current hardware options.
IFX_SSC_RXTX_MODE_SE	Set transmission mode.
T	
IFX_SSC_RXTX_MODE_G ET	Get the current transmission mode.

Synchronous Serial Channel (SSC)

### Table 3 DefineOverview (cont'd)

Name	Description
IFX_SSC_ABORT	Abort transmission.
IFX_SSC_FIFO_FLUSH	Set general purpose outputs.
IFX_SSC_GPO_OUT_SET	Set general purpose outputs.
IFX_SSC_GPO_OUT_CLR	Clear general purpose outputs.
IFX_SSC_GPO_OUT_GET	Get general purpose outputs.
IFX_SSC_FRM_STATUS_G ET	Get status of serial framing.
IFX_SSC_FRM_CONTROL _GET	Get counter reload values and control bits.
IFX_SSC_FRM_CONTROL _SET	Set counter reload values and control bits.
IFX_SSC_DMA_ENABLE	Enable DMA for SSC.
IFX_SSC_DMA_DISABLE	Disable DMA for SSC.
IFX_SSC_RESURRECT	Free txbuf and rxbuf.
IFX_SSC_BUFFER_FREE_ ENABLE	Enable freeing of buffers for all SSCs.
IFX_SSC_BUFFER_FREE_ DISABLE	Disable freeing of buffers for all SSCs.

# 3.3.1 IFX\_SSC\_STATS\_READ

### **Prototype**

#define IFX\_SSC\_STATS\_READ \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 1, struct ifx\_ssc\_statistics)

### **Parameters**

Data Type	Name	Description
IFX_SSC_STATS_READ	_IOR(IFX_SSC_IOCTL_MAGI	Read out the statistics.
<u> </u>	C, 1, struct ifx_ssc_statistics)	

# 3.3.2 IFX\_SSC\_STATS\_RESET

### **Prototype**

#define IFX\_SSC\_STATS\_RESET \_IO(IFX\_SSC\_IOCTL\_MAGIC, 2)

Data Type	Name	Description
IFX_SSC_STATS_RESET	_IO(IFX_SSC_IOCTL_MAGIC	Clear the statistics.
<u> </u>	, 2)	

Synchronous Serial Channel (SSC)

### 3.3.3 IFX\_SSC\_BAUD\_SET

### **Prototype**

#define IFX\_SSC\_BAUD\_SET \_IOW(IFX\_SSC\_IOCTL\_MAGIC, 3, unsigned int)

### **Parameters**

Data Type	Name	Description
IFX_SSC_BAUD_SET	_IOW(IFX_SSC_IOCTL_MAG	Set the baudrate.
	IC, 3, unsigned int)	

### 3.3.4 IFX\_SSC\_BAUD\_GET

### **Prototype**

#define IFX\_SSC\_BAUD\_GET \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 4, unsigned int)

#### **Parameters**

Data Type	Name	Description
IFX_SSC_BAUD_GET	_IOR(IFX_SSC_IOCTL_MAGI	Get the current baudrate.
	C, 4, unsigned int)	

### 3.3.5 IFX\_SSC\_HWOPTS\_SET

### **Prototype**

#define IFX\_SSC\_HWOPTS\_SET \_IOW(IFX\_SSC\_IOCTL\_MAGIC, 5, struct ifx\_ssc\_hwopts)

### **Parameters**

Data Type	Name	Description
IFX_SSC_HWOPTS_SET	_IOW(IFX_SSC_IOCTL_MAG	Set hardware options.
	IC, 5, struct ifx_ssc_hwopts)	

# 3.3.6 IFX\_SSC\_HWOPTS\_GET

### **Prototype**

#define IFX\_SSC\_HWOPTS\_GET \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 6, struct ifx\_ssc\_hwopts)

Data Type	Name	Description
IFX_SSC_HWOPTS_GET	_IOR(IFX_SSC_IOCTL_MAGI	Get the current hardware options.
	C, 6, struct ifx_ssc_hwopts)	

Synchronous Serial Channel (SSC)

### 3.3.7 IFX\_SSC\_RXTX\_MODE\_SET

### **Prototype**

#define IFX\_SSC\_RXTX\_MODE\_SET \_IOW(IFX\_SSC\_IOCTL\_MAGIC, 7, unsigned int)

### **Parameters**

Data Type	Name	Description
IFX_SSC_RXTX_MODE_SET	_IOW(IFX_SSC_IOCTL_MAG	Set transmission mode.
	IC, 7, unsigned int)	

### 3.3.8 IFX\_SSC\_RXTX\_MODE\_GET

### **Prototype**

#define IFX\_SSC\_RXTX\_MODE\_GET \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 8, unsigned int)

#### **Parameters**

Data Type	Name	Description
IFX_SSC_RXTX_MODE_GET	_IOR(IFX_SSC_IOCTL_MAGI	Get the current transmission mode.
	C, 8, unsigned int)	

### 3.3.9 IFX\_SSC\_ABORT

### **Prototype**

#define IFX\_SSC\_ABORT \_IO(IFX\_SSC\_IOCTL\_MAGIC, 9)

### **Parameters**

Data Type	Name	Description
IFX_SSC_ABORT	_IO(IFX_SSC_IOCTL_MAGIC	Abort transmission.
	, 9)	

### 3.3.10 IFX\_SSC\_FIFO\_FLUSH

### **Prototype**

#define IFX\_SSC\_FIFO\_FLUSH \_IO(IFX\_SSC\_IOCTL\_MAGIC, 10)

Data Type	Name	Description
IFX_SSC_FIFO_FLUSH	_IO(IFX_SSC_IOCTL_MAGIC	Set general purpose outputs.
	, 10)	

Synchronous Serial Channel (SSC)

### 3.3.11 IFX\_SSC\_GPO\_OUT\_SET

### **Prototype**

#define IFX\_SSC\_GPO\_OUT\_SET \_IOW(IFX\_SSC\_IOCTL\_MAGIC, 11, unsigned int)

### **Parameters**

Data Type	Name	Description
IFX_SSC_GPO_OUT_SET	_IOW(IFX_SSC_IOCTL_MAG	Set general purpose outputs.
	IC, 11, unsigned int)	

### 3.3.12 IFX\_SSC\_GPO\_OUT\_CLR

### **Prototype**

#define IFX\_SSC\_GPO\_OUT\_CLR \_IOW(IFX\_SSC\_IOCTL\_MAGIC, 12, unsigned int)

#### **Parameters**

Data Type	Name	Description
IFX_SSC_GPO_OUT_CLR	_IOW(IFX_SSC_IOCTL_MAG	Clear general purpose outputs.
	IC, 12, unsigned int)	

### 3.3.13 IFX\_SSC\_GPO\_OUT\_GET

### **Prototype**

#define IFX\_SSC\_GPO\_OUT\_GET \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 13, unsigned int)

### **Parameters**

Data Type	Name	Description
IFX_SSC_GPO_OUT_GET	_IOR(IFX_SSC_IOCTL_MAGI	Get general purpose outputs.
	C, 13, unsigned int)	

### 3.3.14 IFX\_SSC\_FRM\_STATUS\_GET

### **Prototype**

#define IFX\_SSC\_FRM\_STATUS\_GET \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 14, struct
ifx\_ssc\_frm\_status)

Data Type	Name	Description
IFX_SSC_FRM_STATUS_GE	_IOR(IFX_SSC_IOCTL_MAGI	Get status of serial framing.
Т	C, 14, struct	
	ifx_ssc_frm_status)	

Synchronous Serial Channel (SSC)

### 3.3.15 IFX\_SSC\_FRM\_CONTROL\_GET

### **Prototype**

#define IFX\_SSC\_FRM\_CONTROL\_GET \_IOR(IFX\_SSC\_IOCTL\_MAGIC, 15, struct
ifx\_ssc\_frm\_opts)

#### **Parameters**

Data Type	Name	Description
IFX_SSC_FRM_CONTROL_G	_IOR(IFX_SSC_IOCTL_MAGI	Get counter reload values and control bits.
ET	C, 15, struct ifx_ssc_frm_opts)	

### 3.3.16 IFX\_SSC\_FRM\_CONTROL\_SET

### **Prototype**

#define IFX\_SSC\_FRM\_CONTROL\_SET \_IOW(IFX\_SSC\_IOCTL\_MAGIC, 16, struct
ifx\_ssc\_frm\_opts)

#### **Parameters**

Data Type	Name	Description
IFX_SSC_FRM_CONTROL_S	_IOW(IFX_SSC_IOCTL_MAG	Set counter reload values and control bits.
ET	IC, 16, struct ifx_ssc_frm_opts)	

### 3.3.17 IFX\_SSC\_DMA\_ENABLE

#### **Prototype**

#define IFX\_SSC\_DMA\_ENABLE \_IO(IFX\_SSC\_IOCTL\_MAGIC, 17)

#### **Parameters**

Data Type	Name	Description
IFX_SSC_DMA_ENABLE	_IO(IFX_SSC_IOCTL_MAGIC	Enable DMA for SSC.
<u> </u>	, 17)	

### 3.3.18 IFX\_SSC\_DMA\_DISABLE

### **Prototype**

#define IFX\_SSC\_DMA\_DISABLE \_IO(IFX\_SSC\_IOCTL\_MAGIC, 18)

Data Type	Name	Description
IFX_SSC_DMA_DISABLE	_IO(IFX_SSC_IOCTL_MAGIC	Disable DMA for SSC.
	, 18)	

Synchronous Serial Channel (SSC)

### 3.3.19 IFX\_SSC\_RESURRECT

### **Prototype**

#define IFX\_SSC\_RESURRECT \_IO(IFX\_SSC\_IOCTL\_MAGIC, 19)

### **Parameters**

Data Type	Name	Description
IFX_SSC_RESURRECT	_IO(IFX_SSC_IOCTL_MAGIC	Free txbuf and rxbuf.
	, 19)	

### 3.3.20 IFX\_SSC\_BUFFER\_FREE\_ENABLE

### **Prototype**

#define IFX\_SSC\_BUFFER\_FREE\_ENABLE \_IO(IFX\_SSC\_IOCTL\_MAGIC, 20)

### **Parameters**

Data Type	Name	Description
IFX_SSC_BUFFER_FREE_E	_IO(IFX_SSC_IOCTL_MAGIC	Enable freeing of buffers for all SSCs.
NABLE	, 20)	

### 3.3.21 IFX\_SSC\_BUFFER\_FREE\_DISABLE

### **Prototype**

#define IFX\_SSC\_BUFFER\_FREE\_DISABLE \_IO(IFX\_SSC\_IOCTL\_MAGIC, 21)

Data Type	Name	Description
IFX_SSC_BUFFER_FREE_DI	_IO(IFX_SSC_IOCTL_MAGIC	Disable freeing of buffers for all SSCs.
SABLE	, 21)	

**Asynchronous Serial Interface (ASC)** 

## 4 Asynchronous Serial Interface (ASC)

The INCA-IP2 features two asynchronous serial interfaces (ASC0 and ASC1). Both can be accessed under Linux via terminal devices /dev/ttyS0 and /dev/ttyS1. The driver is compiled directly into the kernel and ASC0 is activated as console during boot. All messages will be printed to this device until another logging mechanism is started (for example syslogd).

The standard setting for the console is:

```
115200 Baud, 8 Databits, No parity, 1 Stopbit
```

The baudrate is set by a kernel parameter from the boot loader. With the stty program it is possible to change terminal settings during runtime. It can also be used to query th ecurrent setting of the interface.

```
# stty speed
```

will print the current baudrate. To change the baudrate to 9600 the following command would be used:

```
# stty speed 9600
```

Note: After changing the terminal settings, the used terminal program must also be adjusted to the same settings. Otherwise it will not react on any input.

By default stty uses /dev/ttyS0 as device. This behavior can be changed with the -F option.

```
# stty -F /dev/ttyS1 38400
```

will change the baudrate of ASC1 to 38400.

Multi Processor System (MPS)

# 5 Multi Processor System (MPS)

This chapter describes the software interface and implementation of the device driver for the voice processor.

The interface between the INCA-IP2 main processor and the voice coprocessor is implemented through a software mailbox mechanism. The communication between voice coprocessor and main processor is based on transmitting specific command messages / voice packets through this mailbox.

The voice coprocessor driver encapsulates support for the following main packet types:

- Voice packets (Read/Write) for real-time voice streaming,
- Command packets (Read/Write) for realizing various DSP functionalities,
- · Firmware download.

#### 5.1 Internal Structure

The flow of messages to the mailboxes are handled by internal FIFOs. The size of the internal FIFOs is configured during compilation of the source code and cannot be changed during runtime.

The following communication paths are handled by the FIFOs:

- · Voice channel 0 downstream / upstream,
- · Voice channel 1 downstream / upstream,
- Voice channel 2 downstream / upstream,
- Voice channel 3 downstream / upstream,
- · Command connection upstream / downstream.

Multi Processor System (MPS)

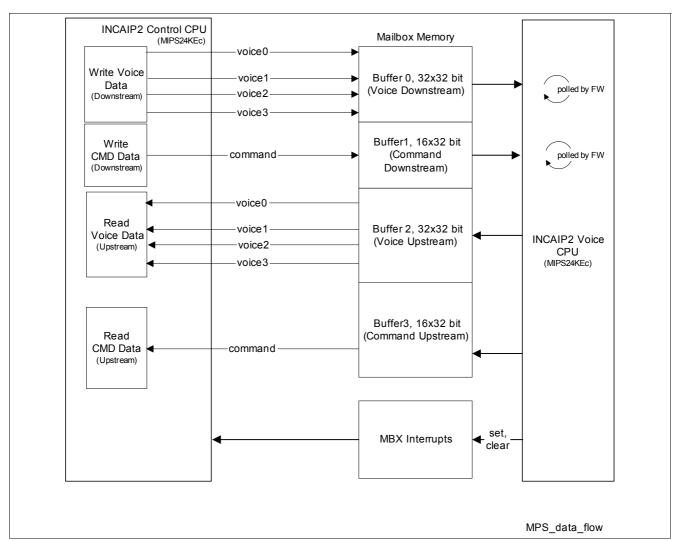


Figure 2 Internal Communication Structure in the MPS Device Driver

### 5.2 Driver Module

The driver module is called mps.o and can be inserted using insmod.

### 5.3 Proc Files in /proc/driver/ifx-mps

The INCA-IP2 MPS driver provides access to status information using proc files located in /proc/driver/ifx-mps/. The following entries are provided:

Table 4 MPS Driver proc files

Proc file	Description	
version	Display MPS driver version information	
status	Display MPS specific status information	

### 5.4 Function Reference

This chapter contains the Function reference.



Multi Processor System (MPS)

### Table 5 Function Overview

Name	Description
ifx_mps_open	Open MPS device.
ifx_mps_close	Close MPS device.
ifx_mps_poll	Poll handler.
ifx_mps_ioctl	MPS IOCTL handler.
ifx_mps_register_data_call	Register data callback.
back	
ifx_mps_unregister_data_	Unregister data callback.
callback	
ifx_mps_register_event_ca llback	Register event callback.
ifx_mps_unregister_event _callback	Unregister event callback.
ifx_mps_event_activation	Change event interrupt activation.
ifx_mps_read_mailbox	Read from mailbox upstream FIFO.
ifx_mps_write_mailbox	Write to downstream mailbox buffer.

### 5.4.1 ifx\_mps\_open

### **Description**

Open MPS device.

Open the device from user mode (e.g. application) or kernel mode. An inode value of 1..5 indicates a kernel mode access. In such a case the inode value is used as minor ID.

### **Prototype**

```
s32 ifx_mps_open (
          struct inode * inode,
          struct file * file_p );
```

### **Parameters**

Data Type	Name	Description
struct inode *	inode	Pointer to device inode
struct file *	file_p	Pointer to file descriptor

### **Return Values**

Data Type	Description
s32	0 OK, device opened
	EMFILE Device already open
	EINVAL Invalid minor ID

Multi Processor System (MPS)

### 5.4.2 ifx\_mps\_close

### **Description**

Close MPS device.

Close the device from user mode (e.g. application) or kernel mode. An inode value of 1..5 indicates a kernel mode access. In such a case the inode value is used as minor ID.

### **Prototype**

```
s32 ifx_mps_close (
          struct inode * inode,
          struct file * filp );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Pointer to device inode
struct file *	filp	Pointer to file descriptor

#### **Return Values**

Data Type	Description
s32	0 OK, device closed
	ENODEV Device invalid
	EINVAL Invalid minor ID

### 5.4.3 ifx\_mps\_poll

### **Description**

Poll handler.

The select function of the driver. A user space program may sleep until the driver wakes it up.

### **Prototype**

```
unsigned int ifx_mps_poll (
    struct file * file_p,
    poll_table * wait );
```

Data Type	Name	Description
struct file *	file_p	File structure of device
poll_table *	wait	Internal table of poll wait queues

Multi Processor System (MPS)

### **Return Values**

Data Type	Description
unsigned int	mask If new data is available the POLLPRI bit is set, triggering an exception indication.
	If the device pointer is null POLLERR is set.

### 5.4.4 ifx\_mps\_ioctl

### Description

MPS IOCTL handler.

An inode value of 1..5 indicates a kernel mode access. In such a case the inode value is used as minor ID. The following IOCTLs are supported for the MPS device.

- FIO\_MPS\_EVENT\_REG
- FIO\_MPS\_EVENT\_UNREG
- FIO MPS MB READ
- FIO\_MPS\_MB\_WRITE
- FIO\_MPS\_DOWNLOAD
- FIO\_MPS\_GETVERSION
- FIO\_MPS\_MB\_RST\_QUEUE
- FIO\_MPS\_RESET
- · FIO MPS RESTART
- FIO\_MPS\_GET\_STATUS

If MPS\_FIFO\_BLOCKING\_WRITE is defined the following commands are also available.

- FIO MPS TXFIFO SET
- FIO\_MPS\_TXFIFO\_GET

### **Prototype**

```
s32 ifx_mps_ioctl (
          struct inode * inode,
          struct file * file_p,
          u32 nCmd,
          unsigned long arg );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	file_p	File structure of device
u32	nCmd	IOCTL command
unsigned long	arg	Argument for some IOCTL commands

#### **Return Values**

Data Type	Description	
s32	0 Setting the LED bits was successfull	
	-EINVAL Invalid minor ID	
	-ENOIOCTLCMD Invalid command	

Multi Processor System (MPS)

# 5.4.5 ifx\_mps\_register\_data\_callback

### **Description**

Register data callback.

Allows the upper layer to register a callback function either for downstream (tranmsit mailbox space available) or for upstream (read data available)

# **Prototype**

```
s32 ifx_mps_register_data_callback (
          type,
          u32 dir,
          void(*)( type) callback );
```

#### **Parameters**

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3
		- voice1, 4 - voice2, 5 - voice3)
u32	dir	Direction (1 - upstream, 2 - downstream)
void(*)( type)	callback	Callback function to register

#### **Return Values**

Data Type	Description
s32	0 OK, callback registered successfully
	ENXIO Wrong DSP device entity (only 1-5 supported)
	EBUSY Callback already registered
	EINVAL Callback parameter null

# 5.4.6 ifx\_mps\_unregister\_data\_callback

# Description

Unregister data callback.

Allows the upper layer to unregister the callback function previously registered.

### **Prototype**

```
s32 ifx_mps_unregister_data_callback (
          type,
          u32 dir );
```

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3 - voice1, 4 - voice2, 5 - voice3)
u32	dir	Direction (1 - upstream, 2 - downstream)

Multi Processor System (MPS)

#### **Return Values**

Data Type	Description	
s32	0 OK, callback registered successfully	
	ENXIO Wrong DSP device entity (only 1-5 supported)	
	EINVAL Nothing to unregister	
	EINVAL Callback value null	

# 5.4.7 ifx\_mps\_register\_event\_callback

#### **Description**

Register event callback.

Allows the upper layer to register a callback function either for events specified by the mask parameter.

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3
		- voice1, 4 - voice2, 5 - voice3)
MbxEventRegs_s *	mask	Mask according to MBC_ISR content
void(*)(MbxEventRegs_s *events)	callback	Callback function to register

#### **Return Values**

Data Type	Description	
s32	0 OK, callback registered successfully	
	ENXIO Wrong DSP device entity (only 1-5 supported)	
	EBUSY Callback already registered	

# 5.4.8 ifx\_mps\_unregister\_event\_callback

# **Description**

Unregister event callback.

Allows the upper layer to unregister the callback function previously registered.

### **Prototype**



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#### **Parameters**

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3
		- voice1, 4 - voice2, 5 - voice3)

#### **Return Values**

Data Type	Description	
s32	0 OK, callback registered successfully	
	ENXIO Wrong DSP device entity (only 1-5 supported)	

# 5.4.9 ifx\_mps\_event\_activation

# **Description**

Change event interrupt activation.

Allows the upper layer enable or disable interrupt generation of event previously registered. Note that

# **Prototype**

#### **Parameters**

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3
		- voice1, 4 - voice2, 5 - voice3)
MbxEventRegs_s *	act	Register values according to MbxEvent_Regs,
		whereas bit=1 means active, bit=0 means
		inactive

#### **Return Values**

Data Type	Description
s32	0 OK, interrupt masked changed accordingly
	ENXIO Wrong DSP device entity (only 1-5 supported)
	EINVAL Callback value null

# 5.4.10 ifx\_mps\_read\_mailbox

#### **Description**

Read from mailbox upstream FIFO.

This function reads from the mailbox upstream FIFO selected by type.



Multi Processor System (MPS)

# **Prototype**

#### **Parameters**

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3 - voice1, 4 - voice2, 5 - voice3)
mps_message *	rw	Pointer to message structure for received data

#### **Return Values**

Data Type	Description	
s32	0 OK, successful read operation	
	ENXIO Wrong DSP device entity (only 1-5 supported)	
	-1 ERROR, in case of read error.	

# 5.4.11 ifx\_mps\_write\_mailbox

#### **Description**

Write to downstream mailbox buffer.

This function writes data to either the command or to the voice FIFO

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
	type	DSP device entity (1 - command, 2 - voice0, 3
		- voice1, 4 - voice2, 5 - voice3)
mps_message *	rw	Pointer to message structure

#### **Return Values**

Data Type	Description
s32	0 OK, successful write operation
	-ENXIO Wrong DSP device entity (only 1-5 supported)
	-EAGAIN ERROR, in case of FIFO overflow.

# 5.5 IOCTL Reference

This chapter contains the IOCTL reference.

Multi Processor System (MPS)

# Table 6 DefineOverview

Name	Description
FIO_MPS_EVENT_REG	Set event notification mask.
FIO_MPS_EVENT_UNREG	Mask Event Notification.
FIO_MPS_MB_READ	Read Message from Mailbox.
FIO_MPS_MB_WRITE	Write Message to Mailbox.
FIO_MPS_RESET	Reset Voice CPU.
FIO_MPS_RESET	Restart Voice CPU.
FIO_MPS_GETVERSION	Read Version String.
FIO_MPS_MB_RST_QUEU	Reset Mailbox Queue.
E	
FIO_MPS_DOWNLOAD	Download Firmware.
FIO_MPS_TXFIFO_SET	Set FIFO Blocking State.
FIO_MPS_TXFIFO_GET	Read FIFO Blocking State.
FIO_MPS_GET_STATUS	Read channel Status Register.
FIO_MPS_GET_CMD_HIST ORY	Read command history buffer.

# 5.5.1 FIO\_MPS\_EVENT\_REG

### **Prototype**

#define FIO\_MPS\_EVENT\_REG \_IOW(IFX\_MPS\_MAGIC, 1, unsigned int)

#### **Parameters**

Data Type	Name	Description
FIO_MPS_EVENT_REG	_IOW(IFX_MPS_MAGIC, 1,	Set event notification mask.
	unsigned int)	

# 5.5.2 FIO\_MPS\_EVENT\_UNREG

# **Prototype**

#define FIO\_MPS\_EVENT\_UNREG \_IO(IFX\_MPS\_MAGIC, 2)

### **Parameters**

Data Type	Name	Description
FIO_MPS_EVENT_UNREG	_IO(IFX_MPS_MAGIC, 2)	Mask Event Notification.

# 5.5.3 FIO\_MPS\_MB\_READ

#### **Prototype**

#define FIO\_MPS\_MB\_READ \_IOR(IFX\_MPS\_MAGIC, 3, mps\_message)



Multi Processor System (MPS)

### **Parameters**

Data Type	Name	Description
FIO_MPS_MB_READ	_IOR(IFX_MPS_MAGIC, 3,	Read Message from Mailbox.
	mps_message)	

# 5.5.4 FIO\_MPS\_MB\_WRITE

# **Prototype**

#define FIO\_MPS\_MB\_WRITE \_IOW(IFX\_MPS\_MAGIC, 4, mps\_message)

#### **Parameters**

Data Type	Name	Description
FIO_MPS_MB_WRITE	_IOW(IFX_MPS_MAGIC, 4,	Write Message to Mailbox.
	mps_message)	

# 5.5.5 FIO\_MPS\_RESET

### **Prototype**

#define FIO\_MPS\_RESET \_IO(IFX\_MPS\_MAGIC, 6)

#### **Parameters**

Data Type	Name	Description
FIO_MPS_RESET	_IO(IFX_MPS_MAGIC, 6)	Reset Voice CPU.

# 5.5.6 FIO\_MPS\_RESTART

# **Prototype**

#define FIO\_MPS\_RESTART \_IO(IFX\_MPS\_MAGIC, 7)

#### **Parameters**

Data Type	Name	Description
FIO_MPS_RESTART	_IO(IFX_MPS_MAGIC, 7)	Restart Voice CPU.

# 5.5.7 FIO\_MPS\_GETVERSION

# **Prototype**

#define FIO\_MPS\_GETVERSION \_IOR(IFX\_MPS\_MAGIC, 8, char\*)

Multi Processor System (MPS)

### **Parameters**

Data Type	Name	Description
FIO_MPS_GETVERSION	_IOR(IFX_MPS_MAGIC, 8,	Read Version String.
	char*)	

# 5.5.8 FIO\_MPS\_MB\_RST\_QUEUE

# **Prototype**

#define FIO\_MPS\_MB\_RST\_QUEUE \_IO(IFX\_MPS\_MAGIC, 9)

#### **Parameters**

Data Type	Name	Description
FIO_MPS_MB_RST_QUEUE	_IO(IFX_MPS_MAGIC, 9)	Reset Mailbox Queue.

# 5.5.9 FIO\_MPS\_DOWNLOAD

# **Prototype**

#define FIO\_MPS\_DOWNLOAD \_IO(IFX\_MPS\_MAGIC, 17)

#### **Parameters**

Data Type	Name	Description
FIO_MPS_DOWNLOAD	_IO(IFX_MPS_MAGIC, 17)	Download Firmware.

# 5.5.10 FIO\_MPS\_TXFIFO\_SET

# **Prototype**

#define FIO\_MPS\_TXFIFO\_SET \_IOW(IFX\_MPS\_MAGIC, 18, bool\_t)

# **Parameters**

Data Type	Name	Description	
FIO_MPS_TXFIFO_SET	_IOW(IFX_MPS_MAGIC, 18,	Set FIFO Blocking State.	
	bool_t)		

# 5.5.11 FIO\_MPS\_TXFIFO\_GET

# **Prototype**

#define FIO\_MPS\_TXFIFO\_GET \_IOR(IFX\_MPS\_MAGIC, 19, bool\_t)



Multi Processor System (MPS)

#### **Parameters**

Data Type	Name	Description	
FIO_MPS_TXFIFO_GET	_IOR(IFX_MPS_MAGIC, 19,	Read FIFO Blocking State.	
	bool_t)		

# 5.5.12 FIO\_MPS\_GET\_STATUS

# **Prototype**

#define FIO\_MPS\_GET\_STATUS \_IOR(IFX\_MPS\_MAGIC, 20, u32)

#### **Parameters**

Data Type	Name	Description		
FIO_MPS_GET_STATUS	_IOR(IFX_MPS_MAGIC, 20,	, Read channel Status Register.		
	u32)			

# 5.5.13 FIO\_MPS\_GET\_CMD\_HISTORY

#### **Prototype**

#define FIO\_MPS\_GET\_CMD\_HISTORY \_IOR(IFX\_MPS\_MAGIC, 21, u32)

Data Type	Name	Description
FIO_MPS_GET_CMD_HISTO	_IOR(IFX_MPS_MAGIC, 21,	Read command history buffer.
RY	u32)	



**Terminal Specific Functions (TSF)** 

#### **Terminal Specific Functions (TSF)** 6

The Terminal Specific Functions (TSF) comprises the keypad scanner, the LED multiplex unit and the pulse width modulation units. All three functionalities are grouped in a single kernel module (tsf)

#### 6.1 **Keypad Scanner**

The "tsf" kernel module serves interrupts origined from the keypad scanner over pins KEY0..14

The **KEY0-6** pins are always available, allowing to control up to **21** keys.

Pins KEY7-14 are multiplexed with GPIO, SPI or ASC pins. The "tsf" module gueries the number of available KEY pins from the mux module.

With pins KEY0-7, up to 28 keys can be realized.

With pins KEY0-8, up to 36 keys can be realized.

With pins KEY0-9, up to 45 keys can be realized.

With pins KEY0-10, up to 55 keys can be realized.

With pins KEY0-11, up to 66 keys can be realized.

With pins KEY0-12, up to 78 keys can be realized.

With pins KEY0-13, up to **91** keys can be realized.

With pins KEY0-14, up to 105 keys can be realized.

Note: The pins that shall be assigned to the keypad scanner must be defined before compiling the kernel (use "make menuconfig").

A "keypad" device is registered to give user space applications access to the keypad scanner.

#### **Key Event Reporting**

The keypad module contains a ring buffer storing KEY\_PRESSED / KEY\_RELEASED events. For optionally determining the duration of pressing a key down, the timestamp "jiffies" is added to each key event.

### **Key Code**

The key code is determined according to the scanline -> keycode mapping examples given in Table 7 and Table 8.

Table 7 Example: Keycodes for KEY(v.x) = RESvx with 14 Scanlines

I abic		ampic.	Reycou	C3 101 1	·- · (y,^)	- 1120	/ A WILLI	I T OCAII	111103				
У	RES1	RES1	RES1	RES9	RES8	RES7	RES6	RES5	RES4	RES3	RES2	RES1	RES0
X	2x	1x	0x	x	x	x	x	x	x	x	x	x	x
13	5A	59	57	54	50	4B	45	3E	36	2D	23	18	С
12		58	56	53	4F	4A	44	3D	35	2C	22	17	В
11	_		55	52	4E	49	43	3C	34	2B	21	16	Α
10	Case 3	3		51	4D	48	42	3B	33	2A	20	15	9
9			_		4C	47	41	3A	32	29	1F	14	8
8	_				1	46	40	39	31	28	1E	13	7
7	3F 3						38	30	27	1D	12	6	
6	Case 2 37 2F 26 1C 11						11	5					
5							=		2E	25	1B	10	4
4	24 1A F							F	3				
3	_										19	Е	2
2	_											D	1
1	Case 1	l (refer t	o User's	Manual	)								0

**Terminal Specific Functions (TSF)** 

Table 8 Example: Keycodes for KEY(y,x) = RESyx with 8 Scanlines

у	RES6	RES5	RES4	RES3	RES2	RES1	RES0
X	x	X	X	x	X	x	x
7	1B	1A	18	15	11	С	6
6		19	17	14	10	В	5
5			16	13	F	Α	4
4				12	E	9	3
3					D	8	2
2						7	1
1							0

#### **Concurrent Pressing of Keys**

The keypad module is able to detect concurrent pressing of multiple keys. Here the rules regarding unequal key row/column numbers are checked (refer to INCA-IP2 User's Manual for details).

#### Reporting to Kernel Module or User Application

The reporting of key events can be done either to another kernel module (via placing a callback function) or to a user application (via ioctl's). The two reporting paths are mutually exclusive; the instance that applies first "wins":

- · A kernel module registers a callback function
- A user application opens the keypad device.

#### 6.1.1 Proc File /proc/driver/keypad

The INCA-IP2 keypad driver registers a proc file, which holds the current state of the key fifo with keycode, state and time stamp.

# 6.2 LED Multiplexer

The LED signals LED0-9 are supported by the "tsf" module.

The **LED0-5** pins are always available.

Pins **LED6-9** may be multiplexed with GPIO, EBU or external interrupt pins. The "tsf" module queries the number of available LED pins from the mux module.

During initialization a device "ledmatrix" will be created, which can be used to change LED settings from user space..

# 6.2.1 Proc File /proc/driver/ledmatrix

The INCA-IP2 LED driver registers a proc file, which can be used to query information regarding the state of the LEDs. Also by writing to it the state of the LEDs can be changed.

Table 9 LED Driver proc file commands

Command	Description	
led_set 0x0000ff00	Set LEDs to on, if corresponding bit is set to 1	
led_clr 0x0000ff00	Set LEDs to off, if corresponding bit is set to 1	
led_eth 0x001f001f	Set Ethernet LED config to specified value	

**Terminal Specific Functions (TSF)** 

# 6.2.2 Module Parameters

The following module parameters are supported for LED features.

Table 10 insmod Parameters

Parameter	Description
led_eth_lan, led_eth_pc	Defines which special function LEDs shall be controlled by ethernet hardware (lower 4 bits) and how (5th bit). The value is the logical OR of the following bits:  LED_ETH_SPD (= 1)  LED_ETH_ACT (= 2)  LED_ETH_DPX (= 4)  LED_ETH_STA (= 8)  LED_ETH_TL (= 16)
ncol	Defines if a 2-column or 4-column LED matrix shall be controlled: 2B , 2-column matrix 4B , 4-column matrix
inv	Defines polarity of the column drivers:  0B , LEDs sourced via external NPN transistors  1B , LEDs directly sourced

#### Example:

> insmod tsf ncol=2

### 6.3 Pulse Width Modulator

The "tsf" module has control over the Pulse Width Modulator pins PWM1 and PWM2. Both are multiplexed with GPIO or EBU pins. The availability of these pins is enquired from the "mux" module.

Each PWM - although very simple - is treated as a separate device with the names "pwm1" and "pwm2".

# 6.3.1 Proc Files /proc/driver/pwm1 and /proc/driver/pwm2

The INCA-IP2 LED driver registers a proc file, which can be used to query information regarding the state of the LEDs. Also by writing to it the state of the LEDs can be changed.

Table 11 PWM Driver proc files

Proc File	Description
pwm1	Status of PWM1 device
pwm2	Status of PWM2 device

#### 6.3.2 Module Parameters

For PWM support the following parameters are supported by the "tsf" module.

Table 12 insmod Parameters

Parameter	Description
pwm1_value,	Optionally a PWM value can be applied as an insmod parameter. If not applied, the init value
pwm2_value	is zero.

#### Example:

> insmod tsf pwm1\_value=127

**Terminal Specific Functions (TSF)** 

# 6.4 Function Reference

This chapter contains the Function reference.

#### Table 13 FunctionOverview

Name	Description
ifx_pwm_set	Set PWM value.
ifx_pwm_get	Get PWM value.
ifx_pwm_read	Read PWM from device.
ifx_pwm_write	Write PWM to device.
ifx_led_off	Clear LED bits.
ifx_led_on	Set LED bits.
ifx_led_ioctl	LED matrix IOCTL handler.
ifx_keypad_open	Open keypad device.
ifx_keypad_release	Release keypad device.
ifx_keypad_ioctl	Keypad IOCTL handler.
ifx_keypad_poll	Poll handler.
ifx_key_register_callback	Register kaypad callback.
ifx_key_unregister_callbac	Unregsiter callback function.
k	
ifx_tsf_init	Initialize TSF unit.
ifx_tsf_exit	Remove TSF module.

# 6.4.1 ifx\_pwm\_set

# **Description**

Set PWM value.

This function sets the Pulse Width value of a PWM device.

# **Prototype**

```
int ifx_pwm_set (
          int id,
          u8 value );
```

#### **Parameters**

Data Type	Name	Description
int	id	ID of the addressed PWM device
u8	value	PWM value in the range 0255

# **Return Values**

Data Type	Description	
int	0 OK	
	-EINVAL Device not available or invalid value	

**Terminal Specific Functions (TSF)** 

# 6.4.2 ifx\_pwm\_get

### **Description**

Get PWM value.

This function gets the Pulse Width value of a PWM device.

# **Prototype**

```
int ifx_pwm_get (
    int id );
```

#### **Parameters**

Data Type	Name	Description
int	id	ID of the addressed PWM device

#### **Return Values**

Data Type	Description	
int	>=0 current PWM value	
	-EINVAL Device not available or invalid ID	

# 6.4.3 ifx\_pwm\_read

# **Description**

Read PWM from device.

This function is called when a user space program read from the PWM device. It will copy the current PWM value into the provided buffer.

### **Prototype**

```
ssize_t ifx_pwm_read (
    struct file * filp,
    char * buf,
    size_t count,
    loff_t * f_pos );
```

Data Type	Name	Description
struct file *	filp	File structure of device node
char *	buf	Destination buffer to copy data to
size_t	count	Number of bytes to be read
loff_t *	f_pos	Current position in file



**Terminal Specific Functions (TSF)** 

#### **Return Values**

Data Type	Description	
ssize_t	count Number of bytes read	
	-EINVAL Invalid minor ID provided	
	-EFAULT Error on copying data to user space	

# 6.4.4 ifx\_pwm\_write

### **Description**

Write PWM to device.

This function is called when a user space program writes to the PWM device. It will read the new PWM value from the buffer and then set it. If more than one byte shall be written and error will occur.

#### **Prototype**

```
ssize_t ifx_pwm_write (
    struct file * filp,
    const char * buf,
    size_t count,
    loff_t * f_pos );
```

#### **Parameters**

Data Type	Name	Description
struct file *	filp	File structure of device node
const char *	buf	Source buffer to read value from
size_t	count	Number of bytes to be written (must be 1)
loff_t *	f_pos	Current position in file

#### **Return Values**

Data Type	Description	
ssize_t	count Number of bytes written	
	-EINVAL Invalid minor ID provided or to manny bytes written.	
	-EFAULT Error on copying data from user space	

# 6.4.5 ifx\_led\_off

#### **Description**

Clear LED bits.

Switch off the of the Matrix. All set bits in the 'indexLED' are switched off. Other bits are ignored

#### **Prototype**



**Terminal Specific Functions (TSF)** 

### **Parameters**

Data Type	Name	Description
u32	indexLED	bit vector as in register LED_REG

#### **Return Values**

Data Type	Description
u32	0 If clearing the LED bits was successfull
	indexLED If the chip or the implementation doesn't support to clear one or more LEDs,
	the function is returning the indexLED bits that lead to the error.

# 6.4.6 ifx\_led\_on

# **Description**

Set LED bits.

Switch on the of the Matrix. All set bits in the 'indexLED' are switched on. Other bits are ignored

# **Prototype**

#### **Parameters**

Data Type	Name	Description
u32	indexLED	bit vector as in register LED_REG

#### **Return Values**

Data Type	Description	
u32	0 If setting the LED bits was successfull	
	indexLED If the chip or the implementation doesn't support to set one or more LEDs,	
	the function is returning the indexLED bits that lead to the error.	

# 6.4.7 ifx\_led\_ioctl

### **Description**

LED matrix IOCTL handler.

The following IOCTLs are supported for the LED device.

- · LED\_ON
- · LED OFF
- LED\_ETH\_PC
- LED\_ETH\_LAN

# **Prototype**

```
int ifx_led_ioctl (
```



**Terminal Specific Functions (TSF)** 

```
struct inode * inode,
struct file * filp,
unsigned int cmd,
unsigned long arg );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filp	File structure of device
unsigned int	cmd	IOCTL command
unsigned long	arg	Argument for some IOCTL commands

#### **Return Values**

Data Type	Description	
int	0 Setting the LED bits was successfull	
	-ENOIOCTLCMD An invalid command was specified	

# 6.4.8 ifx\_keypad\_open

# **Description**

Open keypad device.

This function is called when the keypad device is opend. If the device is not opened from kernel already private data for the interrupt handler is initialized and then the interrupt is registerd.

### **Prototype**

```
int ifx_keypad_open (
          struct inode * inode,
          struct file * filp );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filp	File structure of device

#### **Return Values**

Data Type	Description	
int	0 OK, device opened	
	-EINVAL There was a problem with request_irq	
	-ENOMEM No more memory available	
	-EBUSY Device is already opened from kernel	

**Terminal Specific Functions (TSF)** 

# 6.4.9 ifx\_keypad\_release

### **Description**

Release keypad device.

This function is called when the keypad device is closed. The interrupt will be released and the memory freed.

# **Prototype**

```
int ifx_keypad_release (
          struct inode * inode,
          struct file * filp );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filp	File structure of device

#### **Return Values**

Data Type	Description
int	0 OK, device opened

# 6.4.10 ifx\_keypad\_ioctl

# **Description**

Keypad IOCTL handler.

The following IOCTL is supported for the keypad device.

KEYPAD\_GET

# **Prototype**

```
int ifx_keypad_ioctl (
    struct inode * inode,
    struct file * filp,
    unsigned int cmd,
    unsigned long arg );
```

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filp	File structure of device
unsigned int	cmd	IOCTL command
unsigned long	arg	Argument for some IOCTL commands



**Terminal Specific Functions (TSF)** 

#### **Return Values**

Data Type	Description	
int	0 OK	
	-ENOIOCTLCMD An invalid command was specified	
	-EAGAIN No key event stored	
	-EFAULT Error on copying data to user space	

# 6.4.11 ifx\_keypad\_poll

#### **Description**

Poll handler.

For select calls from user space this function is called. It will sleep on the device wait queue until a key event is available.

#### **Prototype**

```
unsigned int ifx_keypad_poll (
    struct file * filp,
    poll_table * wait );
```

#### **Parameters**

Data Type	Name	Description
struct file *	filp	File structure of device
poll_table *	wait	Internal table of poll wait queues

### **Return Values**

Data Type	Description	
unsigned int	mask If new data is available the POLLPRI bit is set, triggering an exception indication	

# 6.4.12 ifx\_key\_register\_callback

#### **Description**

Register kaypad callback.

This function is called by another kernel module to register a callback function for key events.

#### **Prototype**

Data Type	Name	Description
keypad_callback_t	fp	Pointer to callback function

**Terminal Specific Functions (TSF)** 

#### **Return Values**

Data Type	Description	
int	-EBUSY Keypad device is already opended from user space.	
	0 OK	

# 6.4.13 ifx\_key\_unregister\_callback

# Description

Unregsiter callback function.

This function is called by another kernel module to unregister its callback function.

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
int	0 OK

# 6.4.14 ifx\_tsf\_init

#### **Description**

Initialize TSF unit.

This function configures the TSF modules for keypad, ledmatrix and pwm and creates several proc file entries.

# **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

# 6.4.15 ifx\_tsf\_exit

#### **Description**

Remove TSF module.

Upon removal of the TSF module this function will free all allocated resources and unregister devices.

**Terminal Specific Functions (TSF)** 

# **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

# 6.5 IOCTL Reference

This chapter contains the IOCTL reference.

#### Table 14 DefineOverview

Name	Description
LED_ON	Switch LED on.
LED_OFF	Switch LED off.
LED_ETH_PC	Set PC Port LEDs.
LED_ETH_LAN	Set LAN Port LEDs.

# 6.5.1 LED\_ON

# **Prototype**

#define LED\_ON \_IOW('T', 1, unsigned int)

#### **Parameters**

Data Type	Name	Description
LED_ON	_IOW('T', 1, unsigned int)	Switch LED on.
		Sets the LED bits specified in arg.

# 6.5.2 **LED\_OFF**

# **Prototype**

#define LED\_OFF \_IOW('T', 2, unsigned int)

# **Parameters**

Data Type	Name	Description
LED_OFF	_IOW('T', 2, unsigned int)	Switch LED off.
		Clears the LED bits specified in arg.

# 6.5.3 LED\_ETH\_PC

# **Prototype**

#define LED\_ETH\_PC \_IOW('T', 3, unsigned char)



**Terminal Specific Functions (TSF)** 

# **Parameters**

Data Type	Name	Description
LED_ETH_PC	_IOW('T', 3, unsigned char)	Set PC Port LEDs. Sets the Ethernet LED bits specified in arg for PC port.

# 6.5.4 LED\_ETH\_LAN

# **Prototype**

#define LED\_ETH\_LAN \_IOW('T', 4, unsigned char)

Data Type	Name	Description
LED_ETH_LAN	_IOW('T', 4, unsigned char)	Set LAN Port LEDs.
		Sets the Ethernet LED bits specified in arg for
		LAN port.

**Ethernet Driver** 

# 7 Ethernet Driver

The ethernet driver registers an ethernet device at the kernel. Based on the ethernet driver the kernel provides the standard Linux/POSIX socket interface to user mode applications. The driver can be compiled into the kernel as well as a module.

The kernel ethernet API is based on the net\_device structure with function pointers for different control operations. The ethernet driver source can be found under source/kernel/ifx/bsp/drivers/net/incaip2\_sw.c

#### 7.1 Function Reference

This chapter contains the Function reference.

#### Table 15 FunctionOverview

Name	Description
ifx_switch_open	Open network device.
ifx_switch_release	Close network device.
ifx_switch_rx	Switch receive.
ifx_switch_tx	Write data to Ethernet switch.
ifx_switch_tx_timeout	Transmission timeout callback.
ifx_switch_stats	Get device statistics.
ifx_switch_set_mac_addre	Set MAC address.
SS	
ifx_switch_init	Initialize switch driver.

# 7.1.1 ifx\_switch\_open

# **Description**

Open network device.

This functions opens the network device and starts the interface queue.

# **Prototype**

```
int ifx_switch_open (
         struct net_device * dev );
```

#### **Parameters**

Data Type	Name	Description
struct net_device *	dev	Device structure for Ethernet device

#### **Return Values**

Data Type	Description
int	0 OK, device opened
	-1 Error, registering DMA device



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# 7.1.2 ifx\_switch\_release

### **Description**

Close network device.

This functions closes the network device, which will also stop the interface queue.

# **Prototype**

```
int ifx_switch_release (
          struct net_device * dev );
```

#### **Parameters**

Data Type	Name	Description
struct net_device *	dev	Device structure for Ethernet device

#### **Return Values**

Data Type	Description
int	0 OK, device closed (cannot fail)

# 7.1.3 ifx\_switch\_rx

# Description

Switch receive.

This function reads data from Ethernet switch and passes it to upper network layer. It is called by ifx\_switch\_hw\_receive after an DMA receive interrupt has occured.

# **Prototype**

```
ifx_void_t ifx_switch_rx (
    struct net_device * dev,
    int len,
    struct sk_buff * skb );
```

#### **Parameters**

Data Type	Name	Description
struct net_device *	dev	pointer to network device structure that holds DMA device information
int	len	number of data bytes received from DMA
struct sk_buff *	skb	pointer to socket buffer structure that contains the receiveddata to be sent

# 7.1.4 ifx\_switch\_tx

### **Description**

Write data to Ethernet switch.

CONFIDENTIAL Ethernet Driver

This function writes the data comprised in skb structure via DMA to the Ethernet Switch. It is installed as the switch driver's hard\_start\_xmit method.

#### **Prototype**

```
int ifx_switch_tx (
         struct sk_buff * skb,
         struct net_device * dev );
```

#### **Parameters**

Data Type	Name	Description
struct sk_buff *	skb	Pointer to socket buffer structure that contains the data to be sent
struct net_device *	dev	Pointer to network device structure which is used for data transmission

#### **Return Values**

Data Type	Description
int	1 Transmission error
	0 OK, successful data transmission

# 7.1.5 ifx\_switch\_tx\_timeout

#### **Description**

Transmission timeout callback.

This functions is called when a trasmission timeout occurs. It will wake up the interface queue again.

#### **Prototype**

```
ifx_void_t ifx_switch_tx_timeout (
          struct net_device * dev );
```

# **Parameters**

Data Type	Name	Description
struct net_device *	dev	Device structure for Ethernet device

# 7.1.6 ifx\_switch\_stats

### **Description**

Get device statistics.

This functions returns the device statistics, stored in the device structure.

### **Prototype**



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#### **Parameters**

Data Type	Name	Description
struct net_device *	dev	Device structure for Ethernet device

#### **Return Values**

Data Type	Description
net_device_stats *	stats Pointer to statistics structure

# 7.1.7 ifx\_switch\_set\_mac\_address

#### **Description**

Set MAC address.

This functions sets the MAC address of the specified Ethernet device.

#### **Prototype**

```
int ifx_switch_set_mac_address (
          struct net_device * dev,
          void * p );
```

#### **Parameters**

Data Type	Name	Description
struct net_device *	dev	Device structure for Ethernet device
void *	р	Pointer to MAC address (array of 6 octets)

#### **Return Values**

Data Type	Description
int	0 OK, MAC address set

# 7.1.8 ifx\_switch\_init

# **Description**

Initialize switch driver.

This functions initializes the switch driver structures and registers the Ethernet device.

# **Prototype**

```
int ifx_switch_init (
         struct net_device * dev );
```

Data Type	Name	Description
struct net_device *	dev	Device structure for Ethernet device



# INCA-IP2 IP-Phone Solution, Linux® BSP Release 2.0

CONFIDENTIAL Ethernet Driver

# **Return Values**

Data Type	Description
int	0 OK
	ENOMEM No memory for structures available
	-1 Error during DMA init or Ethernet address configuration.

**Switch Access Interface** 

### 8 Switch Access Interface

This chapter describes the API provided by the switch access module.

The sources are under "<kernel-dir>/arch/mips/infineon/incaip2/switchapi".

# 8.1 Switch and PHY System Overview

The INCA-IP2 switch is a 3 port switch which allows to share one ethernet connection between the INCA-IP2 phone itself and a PC. Therefore all incoming packets form the LAN have to be forwarded by the switch to the INCA-IP2 controller, to the PC or to both. Because the LAN and the PC ports of the switch are both ethernet interfaces these ports have also the same functionality. Via MAC modules these ports are connected to ethernet PHY's. The PHYs provide standard functionality like auto-negotiation.

The connection to the internal controller (CPU port) is done via a so called pseudo MAC (PMAC) because this is not an ethernet interface.

While on the LAN and PC port the appropriate PHY transfers the data to the ethernet, the CPU port forwards the data via an internal DMA controller to the CPU.

To work properly the mentioned modules of the switch have to be configured first.

The ethernet switch device driver provides therefore interfaces to configure the PHYs, the switch MACs and also switch features like VLAN.

#### 8.2 Function Reference

This chapter contains the Function reference.

Table 16 FunctionOverview

Name	Description
addrresl_ioctl	Address resolution IOCTL handler.
mac_ioctl	Mac IOCTL handler.
port_ioctl	Port IOCTL handler.
qos_ioctl	QoS IOCTL handler.
switch_ioctl	Switch IOCTL handler.
ifx_mdio_read	Read MDIO register.
ifx_mdio_write	Write to MDIO register.
s_api_open	Open switch API device.
s_api_release	Close switch API device.
s_api_read	Read switch API device.
s_api_write	Write to switch API device.
s_api_ioctl	Switch API IOCTL handler.

# 8.2.1 addrresl\_ioctl

# **Description**

Address resolution IOCTL handler.

IOCTL handler for address resolution configuration. The following IOCTLS are supported:

- IFX\_MAP\_INGRESS\_PRIORITY\_COS
- IFX\_GET\_INGRESS\_PRIORITY\_COS
- IFX\_MAP\_COS\_EGRESS\_PRIORITY
- IFX\_GET\_COS\_EGRESS\_PRIORITY



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- IFX\_MAP\_COS\_REDUCTION
- IFX\_GET\_COS\_REDUCTION
- IFX\_VLAN\_CHECK
- IFX\_SET\_VLAN\_AWARE
- IFX GET VLAN AWARE
- IFX\_GET\_VLAN\_IDX
- IFX\_GET\_VLAN\_MIB

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
struct file *	file	- File structure of device
unsigned int	cmd	- IOCTL command
unsigned long	arg	- Argument for some IOCTL commands

#### **Return Values**

Data Type	Description
int	0 - OK
	ENOTTY - Invalid command

# 8.2.2 mac\_ioctl

# **Description**

Mac IOCTL handler.

IOCTL handler for Mac address table modification. The following IOCTLs are supported:

- IFX\_GET\_MAC\_TABLE\_IDX
- IFX\_ADD\_MAC\_TABLE\_ENTRY
- IFX\_ADD\_MAC\_TABLE\_ENTRY\_IDX
- IFX\_GET\_MAC\_TABLE\_ENTRY\_IDX
- IFX\_GET\_MAC\_TABLE\_STAT

# **Prototype**

Data Type	Name	Description
struct file *	file	- File structure of device
unsigned int	cmd	- IOCTL command
unsigned long	arg	- Argument for some IOCTL commands

CONFIDENTIAL Switch Access Interface

#### **Return Values**

Data Type	Description
int	0 - OK
	ENOTTY - Invalid command

# 8.2.3 port\_ioctl

# **Description**

Port IOCTL handler.

IOCTL handler for port configuration modification. The following IOCTLs are supported:

- IFX GET PORT MIB COUNTERS
- IFX\_SET\_INGRESS\_MONITOR\_FLAG
- IFX\_GET\_INGRESS\_MONITOR\_FLAG
- IFX\_SET\_EGRESS\_MONITOR\_FLAG
- IFX\_GET\_EGRESS\_MONITOR\_FLAG
- IFX\_PHY\_READ
- IFX PHY WRITE
- IFX\_SET\_PORT\_LOCK
- IFX\_GET\_PORT\_LOCK
- IFX SET PORT VLANID
- IFX\_GET\_PORT\_VLANID
- IFX\_SET\_PORT\_INGRESS\_VLAN\_TAG
- IFX\_GET\_PORT\_INGRESS\_VLAN\_TAG
- IFX\_SET\_PORT\_INGRESS\_VLAN\_FILTER
- IFX\_GET\_PORT\_INGRESS\_VLAN\_FILTER
- IFX\_SET\_PORT\_COS
- IFX\_GET\_PORT\_COS
- IFX\_SET\_PORT\_JUMBO\_ENABLE
- IFX\_GET\_PORT\_JUMBO\_ENABLE

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
struct file *	file	- File structure of device
unsigned int	cmd	- IOCTL command
unsigned long	arg	- Argument for some IOCTL commands

#### **Return Values**

Data Type	Description
int	0 - OK
	ENOTTY - Invalid command

**Switch Access Interface** 

#### 8.2.4 qos\_ioctl

### **Description**

QoS IOCTL handler.

IOCTL handler for QoS configuration. The following IOCTLs are supported:

- IFX GET RULE MEM
- IFX\_SET\_PORT\_KEY
- IFX\_GET\_PORT\_KEY
- IFX\_SET\_FLOW\_PATTERN
- IFX GET\_FLOW\_PATTERN
- IFX DELETE FLOW PATTERN
- IFX SET FLOW ACTION PARAM
- IFX\_GET\_FLOW\_ACTION\_PARAM
- IFX\_SET\_PORT\_RULE:
- IFX GET PORT RULE:
- IFX SET PORT MASK:
- IFX\_GET\_PORT\_MASK:
- IFX\_SET\_PORT\_OFFSET:
- IFX\_GET\_PORT\_OFFSET:
- IFX\_SET\_RX\_CONFIG:
- IFX\_GET\_RX\_CONFIG:
- IFX SET QOS BUCKET:
- IFX\_GET\_QOS\_BUCKET:
- IFX\_SET\_QOS\_BUCKET\_FLOW\_CONTROL:
- IFX\_GET\_QOS\_BUCKET\_FLOW\_CONTROL:
- IFX\_SET\_QOS\_WF\_QUEUE:
- IFX GET QOS WF QUEUE:
- IFX\_SET\_QOS\_SHAPING\_QUEUE:
- IFX\_GET\_QOS\_SHAPING\_QUEUE:
- IFX SET QOS REPLENISH RATE:
- IFX\_GET\_QOS\_REPLENISH\_RATE:
- IFX\_SET\_QOS\_BURST\_SIZE:
- IFX GET QOS BURST SIZE:
- IFX\_SET\_QOS\_EXTEND\_BURST\_SIZE:
- IFX\_GET\_QOS\_EXTEND\_BURST\_SIZE:

#### **Prototype**

Data Type	Name	Description
struct file *	file	- File structure of device
unsigned int	cmd	- IOCTL command
unsigned long	arg	- Argument for some IOCTL commands

**Switch Access Interface** 

#### **Return Values**

Data Type	Description
int	0 - OK
	ENOTTY - Invalid command

# 8.2.5 switch\_ioctl

# Description

Switch IOCTL handler.

IOCTL handler for switch configuration. The following IOCTLs are supported:

- · IFX SET INGRESS WATERMARK
- IFX\_GET\_INGRESS\_WATERMARK
- IFX\_SET\_EGRESS\_WATERMARK
- IFX\_GET\_EGRESS\_WATERMARK
- IFX\_SET\_TX\_CONFIG
- IFX\_GET\_TX\_CONFIG
- IFX\_SET\_PORT\_RATE\_SHAPE
- IFX\_GET\_PORT\_RATE\_SHAPE

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
struct file *	file	- File structure of device
unsigned int	cmd	- IOCTL command
unsigned long	arg	- Argument for some IOCTL commands

#### **Return Values**

Data Type	Description
int	0 - OK
	ENOTTY - Invalid command

# 8.2.6 ifx\_mdio\_read

# Description

Read MDIO register.

Read from Phy register.

# **Prototype**



**Switch Access Interface** 

### **Parameters**

Data Type	Name	Description
u8	chipld	Chip Id
u8	phy_addr	MDIO address of the PHY device
u8	RegOffset	PHY register address
u16 *	pwData	Pointer to Data read from phy register

#### **Return Values**

Data Type	Description	
s32	PR_ERR_NONE - Success	
	PR_ERR_PHY_RD - If phy read fails	
	PR_ERR_NULL_PTR - pwData or base address is null pointer	
	PR_ERR_CHIP_ID - If the chip Id invalid	

# 8.2.7 ifx\_mdio\_write

# **Description**

Write to MDIO register.

Write 16 bit value wData to Phy register defined by passed phy\_addr and RegOffset.

# **Prototype**

### **Parameters**

Data Type	Name	Description
u8	chipId	Chip Id
u8	phy_addr	MDIO address of the PHY device
u8	RegOffset	PHY register address
u16	wData	Data to be written into phy register

### **Return Values**

Data Type	Description
s32	PR_ERR_NONE - Success
	PR_ERR_PHY_WR - If Phy write fails
	PR_ERR_NULL_PTR - Base address is null pointer
	PR_ERR_CHIP_ID - If the chip Id invalid

# 8.2.8 s\_api\_open

# **Description**

Open switch API device.

This function increases the usage count of the switch API device.

CONFIDENTIAL Switch Access Interface

# **Prototype**

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	- Inode of device
struct file *	file	- File structure of device

#### **Return Values**

Data Type	Description
int	0 - OK, device opened

# 8.2.9 s\_api\_release

#### **Description**

Close switch API device.

This function decreases the usage count of the switch API device.

# **Prototype**

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	- Inode of device
struct file *	file	- File structure of device

# **Return Values**

Data Type	Description
int	0 - OK, device closed

# 8.2.10 s\_api\_read

#### **Description**

Read switch API device.

The switch API device does not support direct reading, thus this function does not return any data.

# **Prototype**



CONFIDENTIAL Switch Access Interface

#### **Parameters**

Data Type	Name	Description
struct file *	file	- File structure of device node
char *	buf	- Destination buffer to copy data to
size_t	count	- Number of bytes to be read
loff_t *	offset	- Current position in file

#### **Return Values**

Data Type	Description
ssize_t	0 - Always zero

# 8.2.11 **s\_api\_write**

#### **Description**

Write to switch API device.

The switch API device does not support writing, thus this function does use any provided data.

#### **Prototype**

# **Parameters**

Data Type	Name	Description
struct file *	file	- File structure of device node
const char *	buf	- Destination buffer to copy data to
size_t	count	- Number of bytes to be read
loff_t *	offset	- Current position in file

#### **Return Values**

Data Type	Description
ssize_t	0 - Always zero

# 8.2.12 s\_api\_ioctl

#### **Description**

Switch API IOCTL handler.

The IOCTL handler checks the given command and will call the appropriate subhandler. If an error occurs in the subhandler, its error code will also be returned from this function. The following subhandlers are available:

- Address resolution configuration (addrresl\_ioctl)
- MAC configuration (mac\_ioctl)
- General port configuration (port\_ioctl)
- QOS configuration (qos\_ioctl)

**Switch Access Interface** 

• General switch configuration (switch\_ioctl)

# **Prototype**

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	- Inode of device
struct file *	file	- File structure of device
unsigned int	cmd	- IOCTL command
unsigned long	arg	- Argument for some IOCTL commands

# **Return Values**

Data Type	Description
int	0 - OK
	ENOTTY - Wrong IOC magic number or IOC number too large or invalid command
	EFAULT - Error accessing data from user space

# 8.3 IOCTL Reference

This chapter contains the IOCTL reference.

Table 17 DefineOverview

Name	Description
IFX_MAP_INGRESS_PRIORITY_COS	Map ingress priority class of service IOCTL.
IFX_GET_INGRESS_PRIORITY_COS	Get ingress priority class of service IOCTL.
IFX_MAP_COS_EGRESS_ PRIORITY	Map egress priority class of service IOCTL.
IFX_GET_COS_EGRESS_P RIORITY	Get egress priority class of service IOCTL.
IFX_MAP_COS_REDUCTION	Map class of service reduction IOCTL.
IFX_GET_COS_REDUCTION	Get class of service reduction IOCTL.
IFX_SET_UNKNOWN_UCA ST_ID	Set the Id for unknown unicast destination address.
IFX_GET_UNKNOWN_UCA ST_ID	Get the Id for unknown unicast destination address.
IFX_SET_UNKNOWN_MCA ST_ID	Set the Id for unknown multicast destination address.
IFX_GET_UNKNOWN_MC AST_ID	Get the Id for unknown multicast destination address.
IFX_SET_BCAST_ID	Set the ld for broadcast destination address.

**Switch Access Interface** 



Table 17 DefineOverview (cont'd)

Table II DelilleOverview	(conta)
Name	Description
IFX_GET_BCAST_ID	Get the Id for broadcast destination address.
IFX_SET_PMAC_TAG_INS ERTION	Set VLAN Tag insertion at PMAC IOCTL.
IFX_SET_VLAN_AWARE	Set VLAN awarenes IOCTL.
IFX_GET_VLAN_AWARE	Get VLAN awarenes IOCTL.
IFX_GET_VLAN_IDX	Get VLAN index IOCTL.
IFX_GET_VLAN_MIB	Get MIB counters for VLAN/Flow IOCTL.
IFX_VLAN_CHECK	Check VLAN existance IOCTL.
IFX_ADD_VLAN_TABLE_E NTRY	Add VLAN table entry IOCTL.
IFX_DEL_VLAN_TABLE_E NTRY	Delete VLAN table entry IOCTL.
IFX_GET_VLAN_TABLE_E NTRY	Get VLAN table entry IOCTL.
IFX_GET_MAC_TABLE_ID X	Get MAC table index IOCTL.
IFX_ADD_MAC_TABLE_E NTRY_IDX	Add MAC table entry with index IOCTL.
IFX_GET_MAC_TABLE_EN TRY_IDX	Get MAC table entry index IOCTL.
IFX_GET_MAC_TABLE_ST AT	Get MAC table statistics IOCTL.
IFX_ADD_MAC_TABLE_E NTRY	Add MAC table entry IOCTL.
IFX_CONTROL_MAC_TAB LE_AGING	Control MAC table aging IOCTL.
IFX_SET_PORT_FE_MODE	Set Port Fast Ethernet Mode IOCTL.
IFX_GET_PORT_FE_MOD E	Get Port Fast Ethernet Mode IOCTL.
IFX_SET_PORT_GE_MOD E	Set Port Gigabit Ethernet Mode IOCTL.
IFX_GET_PORT_GE_MOD E	Get Port Gigabit Ethernet Mode IOCTL.
IFX_SET_INGRESS_MONI TOR_FLAG	Set ingress monitor flag IOCTL.
IFX_GET_INGRESS_MONI TOR_FLAG	Get ingress monitor flag IOCTL.
IFX_SET_EGRESS_MONIT OR_FLAG	Set egress monitor flag IOCTL.
IFX_GET_EGRESS_MONIT OR_FLAG	Get egress monitor flag IOCTL.
IFX_PHY_READ	Read PHY register IOCTL.
IFX_PHY_WRITE	Write PHY register IOCTL.
IFX_SET_PORT_LOCK	Set port locking bit IOCTL.



**Switch Access Interface** 

Table 17 DefineOverview (cont'd)

Name	Description
IFX_GET_PORT_LOCK	Get port locking bit IOCTL.
IFX_SET_PORT_VLANID	Set port VLAN ID IOCTL.
IFX_GET_PORT_VLANID	Get port VLAN ID IOCTL.
IFX_SET_PORT_INGRESS	Set VLAN Ingress Tag IOCTL.
_VLAN_TAG	Oct VE WY INGRESS TAG TO STE.
IFX_GET_PORT_INGRESS	Get VLAN Ingress Tag IOCTL.
_VLAN_TAG	
IFX_SET_PORT_INGRESS	Set VLAN Ingress Filter IOCTL.
_VLAN_FILTER	
IFX_GET_PORT_INGRESS	Get VLAN Ingress Filter IOCTL.
_VLAN_FILTER	
IFX_SET_PORT_COS	Set default CoS IOCTL.
IFX_GET_PORT_COS	Get default CoS IOCTL.
IFX_SET_PORT_JUMBO_E	Set Jumbo Enable flag IOCTL.
NABLE	
IFX_GET_PORT_JUMBO_	Get Jumbo Enable flag IOCTL.
ENABLE	0.15.10.5.11.10071
IFX_GET_PORT_CONFIGU RATION	Get Port Configuration IOCTL.
	Cat MDIO and autopagatistics made IOCTI
IFX_GET_MDIO_MODE	Get MDIO and autonogotiation mode IOCTL.
IFX_SET_MDIO_MODE	Set MDIO and autonegotiation mode IOCTL.
IFX_GET_MAC_MIB_COU NTERS	Get MIB counters for MAC IOCTL.
IFX_GET_PORT_MIB_COU NTERS	Get MIB counters for port IOCTL.
IFX_SET_PORT_ETH_CON F	Set Port Ethernet Configuration IOCTL.
IFX_GET_PORT_ETH_CON F	Get Port Ethernet Configuration IOCTL.
IFX_SET_PORT_KEY	Set port keys IOCTL.
IFX_GET_PORT_KEY	Get port keys IOCTL.
IFX_SET_FLOW_PATTERN	Set rule for flow ID IOCTL.
IFX_GET_FLOW_PATTER	Get rule for flow ID IOCTL.
N	
IFX_DELETE_FLOW_PATT	Delete rule for flow ID IOCTL.
ERN	
IFX_SET_FLOW_ACTION_ PARAM	Set action parameters for flow ID IOCTL.
IFX_GET_FLOW_ACTION_	Get action for flow ID IOCTL.
PARAM	
IFX_SET_PORT_RULE	Set rule for port ID IOCTL.
IFX_GET_PORT_RULE	Get rule for port ID IOCTL.
IFX_SET_PORT_MASK	Set rule mask for port ID IOCTL.
·	



CONFIDENTIAL Switch Access Interface

Table 17 DefineOverview (cont'd)

Table II DelilleOverview	(conta)
Name	Description
IFX_GET_PORT_MASK	Get rule mask for port ID IOCTL.
IFX_SET_PORT_OFFSET	Set offset for port ID IOCTL.
IFX_GET_PORT_OFFSET	Get offset for port ID IOCTL.
IFX_SET_RX_CONFIG	Set the RX configuration IOCTL.
IFX_GET_RX_CONFIG	Get the RX configuration IOCTL.
IFX_SET_QOS_BUCKET	Set values for token bucket ID IOCTL.
IFX_GET_QOS_BUCKET	Get values for token bucket ID IOCTL.
IFX_SET_QOS_BUCKET_F LOW_CONTROL	Set flow control for token bucket ID IOCTL.
IFX_GET_QOS_BUCKET_F LOW_CONTROL	Get flow control for token bucket ID IOCTL.
IFX_SET_QOS_WF_QUEU	Set parameters for WFQ IOCTL.
IFX_GET_QOS_WF_QUEU	Get parameters for WFQ IOCTL.
IFX_SET_QOS_SHAPING_ QUEUE	Set parameters for rate shaping IOCTL.
IFX_GET_QOS_SHAPING_ QUEUE	Get parameters for rate shaping IOCTL.
IFX_SET_QOS_REPLENIS H_RATE	Set token bucket replenish rate IOCTL.
IFX_GET_QOS_REPLENIS H_RATE	Get token bucket replenish rate IOCTL.
IFX_SET_QOS_BURST_SI ZE	Set token bucket burst size IOCTL.
IFX_GET_QOS_BURST_SI ZE	Get token bucket burst size IOCTL.
IFX_SET_QOS_EXTEND_B URST_SIZE	Set token bucket extended burst size IOCTL.
IFX_GET_QOS_EXTEND_B URST_SIZE	Get token bucket extended burst size IOCTL.
IFX_GET_RULE_MEM	Get rule memory IOCTL.
IFX_SET_INGRESS_WATE RMARK	Set Ingress watermark IOCTL.
IFX_GET_INGRESS_WATE RMARK	Get Ingress watermark IOCTL.
IFX_SET_EGRESS_WATE RMARK	Set Egress watermark IOCTL.
IFX_GET_EGRESS_WATE RMARK	Get Egress watermark IOCTL.
IFX_SET_TX_CONFIG	Set Tx config IOCTL.
IFX_GET_TX_CONFIG	Get Tx config IOCTL.
IFX_SET_PORT_RATE_SH APE	Enable port rate shaping IOCTL.

**Switch Access Interface** 

## Table 17 DefineOverview (cont'd)

Name	Description
IFX_GET_PORT_RATE_SH	Get port rate shaping flag IOCTL.
APE	
IFX_SET_PAUSE_FRAME_	Enable/Disable Pause Frame generation IOCTL.
GEN	
IFX_GET_PAUSE_FRAME_	Get port rate shaping flag IOCTL.
GEN	

## 8.3.1 IFX\_MAP\_INGRESS\_PRIORITY\_COS

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_MAP_INGRESS_PRIORI	_IOW(IFX_IOC_MAGIC,3,cos	Map ingress priority class of service IOCTL.
TY_COS	_pr_api)	Calls
		ifx_map_ingress_priority_CoS(arg.chipId,
		arg.Priority, arg.CoS);

## 8.3.2 IFX\_GET\_INGRESS\_PRIORITY\_COS

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_INGRESS_PRIORIT	_IOR(IFX_IOC_MAGIC,4,cos	Get ingress priority class of service IOCTL.
Y_COS	_pr_api)	Calls
		ifx_get_ingress_priority_CoS(arg.chipId,
		arg.Priority, &arg.CoS);

## 8.3.3 IFX\_MAP\_COS\_EGRESS\_PRIORITY

### **Prototype**

Data Type	Name	Description
IFX_MAP_COS_EGRESS_PR	_IOW(IFX_IOC_MAGIC,5,cos	Map egress priority class of service IOCTL.
IORITY	_pr_api)	Calls
		ifx_map_CoS_egress_priority(arg.chipId,
		arg.CoS, arg.Priority);

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## 8.3.4 IFX\_GET\_COS\_EGRESS\_PRIORITY

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_COS_EGRESS_PRI	_IOR(IFX_IOC_MAGIC,6,cos	Get egress priority class of service IOCTL.
ORITY	_pr_api)	Calls
		ifx_get_CoS_egress_priority(arg.chipId,
		arg.CoS, &arg.Priority);

## 8.3.5 IFX\_MAP\_COS\_REDUCTION

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_MAP_COS_REDUCTION	_IOW(IFX_IOC_MAGIC,7,cos	Map class of service reduction IOCTL.
	_rd_api)	Calls ifx_map_CoS_reduction(arg.chipId,
		arg.CoS, arg.reduction);

## 8.3.6 IFX\_GET\_COS\_REDUCTION

## **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_COS_REDUCTION	_IOR(IFX_IOC_MAGIC,8,cos	Get class of service reduction IOCTL.
	_rd_api)	Calls ifx_get_CoS_reduction(arg.chipId,
		arg.CoS, &arg.reduction);

## 8.3.7 IFX\_SET\_UNKNOWN\_UCAST\_ID

**Switch Access Interface** 

## **Parameters**

Data Type	Name	Description
IFX_SET_UNKNOWN_UCAST	_IOW(IFX_IOC_MAGIC,9,IFX	Set the Id for unknown unicast destination
_ID	_ZERO_SIZE)	address.
		Calls ifx_set_unknown_ucast_ID(arg.chipId,
		arg.floodld);

## 8.3.8 IFX\_GET\_UNKNOWN\_UCAST\_ID

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_UNKNOWN_UCAS	_IOR(IFX_IOC_MAGIC,10,IF	Get the Id for unknown unicast destination
T_ID	X_ZERO_SIZE)	address.
		Calls ifx_get_unknown_ucast_ID(arg.chipld,
		&arg.floodId);

# 8.3.9 IFX\_SET\_UNKNOWN\_MCAST\_ID

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_UNKNOWN_MCAS	_IOW(IFX_IOC_MAGIC,11,IF	Set the Id for unknown multicast destination
T_ID	X_ZERO_SIZE)	address.
		Calls ifx_set_unknown_mcast_ID(arg.chipId,
		arg.floodId);

## 8.3.10 IFX\_GET\_UNKNOWN\_MCAST\_ID

### **Prototype**

Data Type	Name	Description
IFX_GET_UNKNOWN_MCAS	_IOR(IFX_IOC_MAGIC,12,IF	Get the ld for unknown multicast destination
T_ID	X_ZERO_SIZE)	address.
		Calls ifx_get_unknown_mcast_ID(arg.chipId,
		&arg.floodId);

# 8.3.11 IFX\_SET\_BCAST\_ID

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_SET_BCAST_ID	_IOW(IFX_IOC_MAGIC,13,IF	Set the Id for broadcast destination address.
	X_ZERO_SIZE)	Calls ifx_set_bcast_ID(arg.chipId,
		arg.floodId);

## 8.3.12 IFX\_GET\_BCAST\_ID

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_GET_BCAST_ID	_IOR(IFX_IOC_MAGIC,14,IF X_ZERO_SIZE)	Get the ld for broadcast destination address. Calls ifx_get_bcast_ID(arg.chipId, &arg.floodId);

# 8.3.13 IFX\_SET\_PMAC\_TAG\_INSERTION

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_SET_PMAC_TAG_INSER TION	_IOW(IFX_IOC_MAGIC,16,p mac_vlan_api)	Set VLAN Tag insertion at PMAC IOCTL. Calls ifx_pmac_vlan_tag_insertion(arg.chipld, arg.en_dis,arg.VlanId, arg.prio,0);

## 8.3.14 IFX\_SET\_VLAN\_AWARE

### **Parameters**

Data Type	Name	Description
IFX_SET_VLAN_AWARE	_IOW(IFX_IOC_MAGIC,17,vla	Set VLAN awarenes IOCTL.
	n_aware_api)	Calls ifx_set_VLAN_aware(arg.chipId,
		arg.VlanAwareFlag);

## 8.3.15 IFX\_GET\_VLAN\_AWARE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_VLAN_AWARE	_IOR(IFX_IOC_MAGIC,18,vla	Get VLAN awarenes IOCTL.
	n_aware_api)	Calls ifx_get_VLAN_aware(arg.chipId, &arg.VlanAwareFlag);

## 8.3.16 IFX\_GET\_VLAN\_IDX

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_VLAN_IDX	_IOR(IFX_IOC_MAGIC,21,vla	Get VLAN index IOCTL.
	n_idx_api)	Calls ifx_get_VLAN_idx(arg.chipId, arg.vlanId, &arg.VlanIndex);

## 8.3.17 IFX\_GET\_VLAN\_MIB

### **Prototype**

## **Parameters**

Data Type	Name	Description
IFX_GET_VLAN_MIB	_IOR(IFX_IOC_MAGIC,22,mi	Get MIB counters for VLAN/Flow IOCTL.
	b_idx_api)	Calls <b>ifx_get_VLAN_mib</b> (arg.chipId, arg.mibIdx, arg.counterId, &arg.count);

## 8.3.18 IFX\_VLAN\_CHECK

**Switch Access Interface** 

### **Parameters**

Data Type	Name	Description
IFX_VLAN_CHECK	_IOR(IFX_IOC_MAGIC,35,vla	Check VLAN existance IOCTL.
	n_status_api)	Calls (arg.chipld, arg.vlanld, &arg.flag);

## 8.3.19 IFX\_ADD\_VLAN\_TABLE\_ENTRY

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_ADD_VLAN_TABLE_ENT	_IOW(IFX_IOC_MAGIC,38,vla	Add VLAN table entry IOCTL.
RY	n_tableentry_api)	Calls ifx_add_vlan_entry(arg.chipId,
		arg.vlanId, &arg.portmemberList,
		&arg.portegressList, arg.valid);

## 8.3.20 IFX\_DEL\_VLAN\_TABLE\_ENTRY

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_DEL_VLAN_TABLE_ENT	_IOW(IFX_IOC_MAGIC,39,vla	Delete VLAN table entry IOCTL.
RY	n_tableentry_api)	Calls ifx_delete_vlan_entry(arg.chipld,
		arg.vlanId );

## 8.3.21 IFX\_GET\_VLAN\_TABLE\_ENTRY

### **Prototype**

Data Type	Name	Description
IFX_GET_VLAN_TABLE_ENT	_IOR(IFX_IOC_MAGIC,40,vla	Get VLAN table entry IOCTL.
RY	n_tableentry_api)	Calls
		ifx_get_vlan_table_entry(vte_api.chipId,
		vte_api.vlanId,
		(u32*)&vte_api.portmemberList,
		(u32*)&vte_api.portegressList, &vte_api.valid);

## 8.3.22 IFX\_GET\_MAC\_TABLE\_IDX

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_GET_MAC_TABLE_IDX	_IOR(IFX_IOC_MAGIC,66,ma	Get MAC table index IOCTL.
	cTidx_api)	Calls ifx_get_MAC_table_idx(arg.macAddr,
		arg.tableIndex);

## 8.3.23 IFX\_ADD\_MAC\_TABLE\_ENTRY\_IDX

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_ADD_MAC_TABLE_ENT	_IOW(IFX_IOC_MAGIC,67,m	Add MAC table entry with index IOCTL.
RY_IDX	acTenIdex_api)	Calls
		ifx_add_MAC_table_entry_idx(arg.chipld,
		arg.macTableIndex, arg.macAddr,
		arg.lan_port, arg.pc_port, arg.cpu_port,
		arg.criticalFlag, arg.maState);

## 8.3.24 IFX\_GET\_MAC\_TABLE\_ENTRY\_IDX

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_MAC_TABLE_ENT	_IOR(IFX_IOC_MAGIC,68,ma	Get MAC table entry index IOCTL.
RY_IDX	cTenIdex_api)	Calls
		<pre>ifx_get_MAC_table_entry_idx(arg.chipId,</pre>
		arg.macTableIndex, arg.macAddr,
		arg.lan_port, arg.pc_port, arg.cpu_port,
		arg.criticalFlag, arg.maState);

## 8.3.25 IFX\_GET\_MAC\_TABLE\_STAT

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## **Parameters**

Data Type	Name	Description
IFX_GET_MAC_TABLE_STAT	_IOR(IFX_IOC_MAGIC,70,ma	Get MAC table statistics IOCTL.
	cTstat_api)	Calls ifx_get_MAC_table_stat(arg.chipId,
		arg.staticCount, arg.valid);

## 8.3.26 IFX\_ADD\_MAC\_TABLE\_ENTRY

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_ADD_MAC_TABLE_ENT	_IOW(IFX_IOC_MAGIC,71,m	Add MAC table entry IOCTL.
RY	acTenIdex_api)	Calls (arg.macAddr, arg.lan_port, arg.pc_port,
		arg.cpu_port, arg.criticalFlag, arg.maState);

## 8.3.27 IFX\_CONTROL\_MAC\_TABLE\_AGING

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_CONTROL_MAC_TABLE	_IOW(IFX_IOC_MAGIC,72,m	Control MAC table aging IOCTL.
_AGING	acAging_api)	Calls (arg.macAddr, arg.lan_port, arg.pc_port,
		arg.cpu_port, arg.criticalFlag, arg.maState);

## 8.3.28 IFX\_SET\_PORT\_FE\_MODE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_FE_MODE	_IOW(IFX_IOC_MAGIC,76,po	Set Port Fast Ethernet Mode IOCTL.
	rtMode_api)	Calls ifx_set_port_FE_mode( arg.chipld,
		arg.portld, arg.feature, arg.mode );

## 8.3.29 IFX\_GET\_PORT\_FE\_MODE

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_FE_MODE		Get Port Fast Ethernet Mode IOCTL.
	tMode_api)	Calls ifx_get_port_FE_mode arg.chipId,
		arg.portId, arg.feature, &arg.mode)

## 8.3.30 IFX\_SET\_PORT\_GE\_MODE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_GE_MODE	_IOW(IFX_IOC_MAGIC,78,po	Set Port Gigabit Ethernet Mode IOCTL.
	rtMode_api)	Calls ifx_set_port_GE_mode( arg.chipId,
		arg.portId, arg.feature, arg.mode );

## 8.3.31 IFX\_GET\_PORT\_GE\_MODE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_GE_MODE	_IOR(IFX_IOC_MAGIC,79,por	Get Port Gigabit Ethernet Mode IOCTL.
	tMode_api)	Calls ifx_get_port_GE_mode arg.chipId,
		arg.portId, arg.feature, &arg.mode)

## 8.3.32 IFX\_SET\_INGRESS\_MONITOR\_FLAG

### **Prototype**

Data Type	Name	Description
IFX_SET_INGRESS_MONITO	_IOW(IFX_IOC_MAGIC,81,FI	Set ingress monitor flag IOCTL.
R_FLAG	ag_api)	Calls
		ifx_set_ingress_monitor_flag(arg.chipld,
		arg.portld, arg.flag);

## 8.3.33 IFX\_GET\_INGRESS\_MONITOR\_FLAG

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_INGRESS_MONITO	_IOR(IFX_IOC_MAGIC,82,Fla	Get ingress monitor flag IOCTL.
R_FLAG	g_api)	Calls
		ifx_get_ingress_monitor_flag(arg.chipId,
		arg.portld, &arg.flag);

## 8.3.34 IFX\_SET\_EGRESS\_MONITOR\_FLAG

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_SET_EGRESS_MONITO	_IOW(IFX_IOC_MAGIC,83,FI	Set egress monitor flag IOCTL.
R_FLAG	ag_api)	Calls
		ifx_set_egress_monitor_flag(arg.chipId,
		arg.portld, arg.flag);

## 8.3.35 IFX\_GET\_EGRESS\_MONITOR\_FLAG

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_EGRESS_MONITO	_IOR(IFX_IOC_MAGIC,84,Fla	Get egress monitor flag IOCTL.
R_FLAG	g_api)	Calls
		ifx_get_egress_monitor_flag(arg.chipld,
		arg.portld, &arg.flag);

## 8.3.36 IFX\_PHY\_READ

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### **Parameters**

Data Type	Name	Description
IFX_PHY_READ	_IOR(IFX_IOC_MAGIC,85,ph	Read PHY register IOCTL.
	yAction_api)	Calls ifx_phy_read(arg.chipId, arg.mdio_id,
		arg.phy_addr, arg.RegOffset, &arg.Data);

#### 8.3.37 IFX\_PHY\_WRITE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_PHY_WRITE	_IOW(IFX_IOC_MAGIC,86,ph	Write PHY register IOCTL.
	yAction_api)	Calls ifx_phy_write(arg.chipId, arg.mdio_id,
		arg.phy_addr, arg.RegOffset, arg.Data);

#### IFX\_SET\_PORT\_LOCK 8.3.38

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_LOCK	_IOW(IFX_IOC_MAGIC,87,FI	Set port locking bit IOCTL.
	ag_api)	Calls <b>ifx_set_port_lock</b> (arg.chipId, arg.portId, arg.flag);

#### IFX\_GET\_PORT\_LOCK 8.3.39

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_LOCK	_IOR(IFX_IOC_MAGIC,88,Fla	Get port locking bit IOCTL.
	g_api)	Calls <b>ifx_get_port_lock</b> (arg.chipId, arg.portId, &arg.flag);

#### IFX\_SET\_PORT\_VLANID 8.3.40

**Switch Access Interface** 

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_VLANID	_IOW(IFX_IOC_MAGIC,89,po	Set port VLAN ID IOCTL.
	rtVlan_api)	Calls ifx_set_port_VLANId(arg.chipId,
		arg.portld, arg.vlanid);

## 8.3.41 IFX\_GET\_PORT\_VLANID

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_VLANID	_IOR(IFX_IOC_MAGIC,90,por	Get port VLAN ID IOCTL.
		Calls <b>ifx_get_port_VLANId</b> (arg.chipId, arg.portId, &arg.vlanid);

## 8.3.42 IFX\_SET\_PORT\_INGRESS\_VLAN\_TAG

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_INGRESS_V	_IOW(IFX_IOC_MAGIC,91,FI	Set VLAN Ingress Tag IOCTL.
LAN_TAG	ag_api)	Calls
		ifx_set_port_ingress_VLAN_tag(arg.chipld,
		arg.portld, arg.flag);

## 8.3.43 IFX\_GET\_PORT\_INGRESS\_VLAN\_TAG

### **Prototype**

Data Type	Name	Description
IFX_GET_PORT_INGRESS_V	_IOR(IFX_IOC_MAGIC,92,Fla	Get VLAN Ingress Tag IOCTL.
LAN_TAG	g_api)	Calls
		<pre>ifx_get_port_ingress_VLAN_tag(arg.chipId,</pre>
		arg.portld, &arg.flag);

## 8.3.44 IFX\_SET\_PORT\_INGRESS\_VLAN\_FILTER

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_INGRESS_V	_IOW(IFX_IOC_MAGIC,93,FI	Set VLAN Ingress Filter IOCTL.
LAN_FILTER	ag_api)	Calls
		ifx_set_port_ingress_VLAN_filter(arg.chipId
		, arg.portld, arg.flag);

## 8.3.45 IFX\_GET\_PORT\_INGRESS\_VLAN\_FILTER

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_INGRESS_V	_IOR(IFX_IOC_MAGIC,94,Fla	Get VLAN Ingress Filter IOCTL.
LAN_FILTER	g_api)	Calls
		ifx_get_port_ingress_VLAN_filter(arg.chipId
		, arg.portId, &arg.flag);

## 8.3.46 IFX\_SET\_PORT\_COS

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_COS	_IOW(IFX_IOC_MAGIC,95,po	Set default CoS IOCTL.
	rtCoS_api)	Calls ifx_set_port_CoS(arg.chipId, arg.portId,
		arg.CoS);

## 8.3.47 IFX\_GET\_PORT\_COS

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_COS	_IOR(IFX_IOC_MAGIC,96,por	Get default CoS IOCTL.
	tCoS_api)	Calls ifx_get_port_CoS(arg.chipId, arg.portId,
		&arg.CoS);

## 8.3.48 IFX\_SET\_PORT\_JUMBO\_ENABLE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_JUMBO_EN	_IOW(IFX_IOC_MAGIC,97,FI	Set Jumbo Enable flag IOCTL.
ABLE	ag_api)	Calls ifx_set_port_jumbo_enable(arg.chipId,
		arg.portId, arg.flag);

## 8.3.49 IFX\_GET\_PORT\_JUMBO\_ENABLE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_JUMBO_EN	_IOR(IFX_IOC_MAGIC,98,Fla	Get Jumbo Enable flag IOCTL.
ABLE	g_api)	Calls ifx_get_port_jumbo_enable(arg.chipId,
		arg.portld, &arg.flag);

## 8.3.50 IFX\_GET\_PORT\_CONFIGURATION

### **Prototype**

Data Type	Name	Description
IFX_GET_PORT_CONFIGUR	_IOR(IFX_IOC_MAGIC,99,por	Get Port Configuration IOCTL.
ATION	tCoS_api)	Calls
		ifx_get_port_default_configuration(arg.chipl
		d, arg.portld, &arg.CoS));

# 8.3.51 IFX\_GET\_MDIO\_MODE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_MDIO_MODE	_IOR(IFX_IOC_MAGIC,100,m	Get MDIO and autonegotiation mode IOCTL.
	diomode_api)	Calls ifx_get_MDIO_mode(arg.chipId,
		arg.port_group, &arg.mdioMode,
		&arg.autoNegMode);

## 8.3.52 IFX\_SET\_MDIO\_MODE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_MDIO_MODE	_IOW(IFX_IOC_MAGIC,101,	Set MDIO and autonegotiation mode IOCTL.
	mdiomode_api)	Calls ifx_set_MDIO_mode(arg.chipId,
		arg.port_group, arg.mdioMode,
		arg.autoNegMode);

## 8.3.53 IFX\_GET\_MAC\_MIB\_COUNTERS

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_MAC_MIB_COUNT	_IOR(IFX_IOC_MAGIC,102,m	Get MIB counters for MAC IOCTL.
ERS	ibCounters_api)	Calls ifx_get_mac_MIB_counters(arg.chipId,
		arg.portld, arg.counterld, &arg.count);

## 8.3.54 IFX\_GET\_PORT\_MIB\_COUNTERS

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### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_MIB_COUN	_IOR(IFX_IOC_MAGIC,103,m	Get MIB counters for port IOCTL.
TERS	ibCounters_api)	Calls ifx_get_port_MIB_counters(arg.chipId,
		arg.portId, arg.counterId, &arg.count);

## 8.3.55 IFX\_SET\_PORT\_ETH\_CONF

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_ETH_CONF	_IOW(IFX_IOC_MAGIC,104,p	Set Port Ethernet Configuration IOCTL.
	ort_eth_conf_api)	Calls ifx_set_port_eth_conf( arg.chipId,
		arg.portld, arg.speed, arg.duplex, arg.autoneg,
		arg.int_ext_phy);

# 8.3.56 IFX\_GET\_PORT\_ETH\_CONF

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_ETH_CONF	_IOR(IFX_IOC_MAGIC,105,p	Get Port Ethernet Configuration IOCTL.
	ort_eth_conf_api)	Calls ifx_get_port_eth_conf( arg.chipld,
		arg.portld, &arg.speed, &arg.duplex,
		&arg.autoneg, &arg.int_ext_phy,
		&arg.link_status);

# 8.3.57 IFX\_SET\_PORT\_KEY

### **Prototype**

Data Type	Name	Description
IFX_SET_PORT_KEY	_IOW(IFX_IOC_MAGIC,111,p	Set port keys IOCTL.
	ortKey_api)	Calls <pre>ifx_set_port_key(arg.chipId, arg.portId, arg.lKey);</pre>

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## 8.3.58 IFX\_GET\_PORT\_KEY

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_KEY	_IOR(IFX_IOC_MAGIC,112,p	Get port keys IOCTL.
	ortKey_api)	Calls ifx_get_port_key(arg.chipId, arg.portId,
		&arg.IKey);

## 8.3.59 IFX\_SET\_FLOW\_PATTERN

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_FLOW_PATTERN	_IOW(IFX_IOC_MAGIC,113,fl	Set rule for flow ID IOCTL.
	owPattern_api)	Calls ifx_set_flow_pattern(arg.chipId,
		arg.flowld, arg.lKeyData, arg.lKeyMask);

# 8.3.60 IFX\_GET\_FLOW\_PATTERN

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_FLOW_PATTERN	_IOR(IFX_IOC_MAGIC,114,fl	Get rule for flow ID IOCTL.
	owPattern_api)	Calls ifx_get_flow_pattern(arg.chipId,
		arg.flowId, arg.IKeyData, arg.IKeyMask);

## 8.3.61 IFX\_DELETE\_FLOW\_PATTERN

## **Prototype**

Data Type	Name	Description
IFX_DELETE_FLOW_PATTE	_IOW(IFX_IOC_MAGIC,115,fl	Delete rule for flow ID IOCTL.
RN	owld_api)	Calls ifx_delete_flow_pattern(arg.chipId,
		arg.flowld);

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## 8.3.62 IFX\_SET\_FLOW\_ACTION\_PARAM

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_FLOW_ACTION_PA	_IOW(IFX_IOC_MAGIC,116,fl	Set action parameters for flow ID IOCTL.
RAM	owParam_api)	Calls ifx_set_flow_action_param(arg.chipId,
		arg.flowId, arg.feature, arg.flowAction);

## 8.3.63 IFX\_GET\_FLOW\_ACTION\_PARAM

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_FLOW_ACTION_PA	_IOR(IFX_IOC_MAGIC,117,fl	Get action for flow ID IOCTL.
RAM	owParam_api)	Calls ifx_get_flow_action_param(arg.chipId,
		arg.flowId, arg.feature, &arg.flowAction);

## 8.3.64 IFX\_SET\_PORT\_RULE

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_RULE		Set rule for port ID IOCTL.  Calls ifx_set_port_rule(arg.chipId, arg.portId, arg.portRule);

## 8.3.65 IFX\_GET\_PORT\_RULE

### **Prototype**

Data Type	Name	Description
IFX_GET_PORT_RULE	_IOR(IFX_IOC_MAGIC,121,p	Get rule for port ID IOCTL.
	ortRule_api)	Calls <b>ifx_get_port_rule</b> (arg.chipId, arg.portId, arg.portRule);

# 8.3.66 IFX\_SET\_PORT\_MASK

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_MASK	_IOW(IFX_IOC_MAGIC,122,p	Set rule mask for port ID IOCTL.
	ortRule_api)	Calls ifx_set_port_mask(arg.chipId,
		arg.portId, arg.portRule);

## 8.3.67 IFX\_GET\_PORT\_MASK

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_MASK	_IOR(IFX_IOC_MAGIC,123,p	Get rule mask for port ID IOCTL.
	ortRule_api)	Calls ifx_get_port_mask(arg.chipId,
		arg.portId, arg.portRule);

## 8.3.68 IFX\_SET\_PORT\_OFFSET

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_OFFSET	_IOW(IFX_IOC_MAGIC,124,p	
	ortOffset_api)	Calls ifx_set_port_offset(arg.chipId,
		arg.portId, arg.portOffset);

## 8.3.69 IFX\_GET\_PORT\_OFFSET

## **Prototype**

Data Type	Name	Description
IFX_GET_PORT_OFFSET	_IOR(IFX_IOC_MAGIC,125,p	Get offset for port ID IOCTL.
	ortOffset_api)	Calls ifx_get_port_offset(arg.chipId,
		arg.portId, arg.portOffset);

# 8.3.70 IFX\_SET\_RX\_CONFIG

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_SET_RX_CONFIG	_IOW(IFX_IOC_MAGIC,126,R	Set the RX configuration IOCTL.
	xConfig_api)	Calls ifx_set_Rx_config(arg.chipId,
		arg.portld, arg.L3Program, arg.L3StartVld,
		arg.L3Start);

## 8.3.71 IFX\_GET\_RX\_CONFIG

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_RX_CONFIG	_IOR(IFX_IOC_MAGIC,127,R	Get the RX configuration IOCTL.
	xConfig_api)	Calls ifx_get_Rx_config(arg.chipId,
		arg.portld, &arg.L3Program, &arg.L3StartVld,
		&arg.L3Start);

## 8.3.72 IFX\_SET\_QOS\_BUCKET

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_QOS_BUCKET	_IOW(IFX_IOC_MAGIC,128,	Set values for token bucket ID IOCTL.
	QoSbucket_api)	Calls ifx_set_QoS_bucket(arg.chipId,
		arg.tBucketId, arg.tBucketCnt,
		arg.tReplenishRateIdx, arg.tBurstSizeIdx);

## 8.3.73 IFX\_GET\_QOS\_BUCKET

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### **Parameters**

Data Type	Name	Description
IFX_GET_QOS_BUCKET	_IOR(IFX_IOC_MAGIC,129,Q	Get values for token bucket ID IOCTL.
	oSbucket_api)	Calls ifx_get_QoS_bucket(arg.chipId,
		arg.tBucketId, &arg.tBucketCnt,
		&arg.tReplenishRateIdx, &arg.tBurstSizeIdx);

## 8.3.74 IFX\_SET\_QOS\_BUCKET\_FLOW\_CONTROL

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_SET_QOS_BUCKET_FL	_IOW(IFX_IOC_MAGIC,130,	Set flow control for token bucket ID IOCTL.
OW_CONTROL	QoSBflowCntr_api)	ifx_set_QoS_bucket_flow_control(arg.chipl
		d, arg.portRuleBaseIdx, arg.actionLC,
		arg.actionNC);

## 8.3.75 IFX\_GET\_QOS\_BUCKET\_FLOW\_CONTROL

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_QOS_BUCKET_FL	_IOR(IFX_IOC_MAGIC,131,Q	Get flow control for token bucket ID IOCTL.
OW_CONTROL	oSBflowCntr_api)	Calls
		ifx_get_QoS_bucket_flow_control(arg.chipl
		d, &arg.portRuleBaseIdx, &arg.actionLC,
		&arg.actionNC);

## 8.3.76 IFX\_SET\_QOS\_WF\_QUEUE

**Switch Access Interface** 

## **Parameters**

Data Type	Name	Description
IFX_SET_QOS_WF_QUEUE	QoSWFqueue_api)	Set parameters for WFQ IOCTL. Calls ifx_set_QoS_WF_queue(arg.chipId, arg.portId, arg.queueId, arg.weightFactor, arg.deficitCount);

## 8.3.77 IFX\_GET\_QOS\_WF\_QUEUE

## **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_QOS_WF_QUEUE	_IOR(IFX_IOC_MAGIC,133,Q	Get parameters for WFQ IOCTL.
	oSWFqueue_api)	Calls ifx_get_QoS_WF_queue(arg.chipId,
		arg.portld, arg.queueld, &arg.weightFactor,
		&arg.deficitCount);

# 8.3.78 IFX\_SET\_QOS\_SHAPING\_QUEUE

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_QOS_SHAPING_Q	_IOW(IFX_IOC_MAGIC,134,	Set parameters for rate shaping IOCTL.
UEUE	QoSshapingQ_api)	Calls
		<pre>ifx_set_QoS_shaping_queue(arg.chipId, arg.portId, arg.queueId, arg.bucketCnt,</pre>
		arg.replenishRate, arg.tokenValue,
		arg.tReplenishTimer);

## 8.3.79 IFX\_GET\_QOS\_SHAPING\_QUEUE

**Switch Access Interface** 

## **Parameters**

Data Type	Name	Description
IFX_GET_QOS_SHAPING_Q UEUE	_IOR(IFX_IOC_MAGIC,135,Q oSshapingQ api)	Get parameters for rate shaping IOCTL. Calls
0202	oconapinga_api)	<pre>ifx_get_QoS_shaping_queue(arg.chipId, arg.portId, arg.queueId, &amp;arg.bucketCnt, &amp;arg.replenishRate, &amp;arg.tokenValue, &amp;arg.tReplenishTimer);</pre>

## 8.3.80 IFX\_SET\_QOS\_REPLENISH\_RATE

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_QOS_REPLENISH_	_IOW(IFX_IOC_MAGIC,136,i	Set token bucket replenish rate IOCTL.
RATE	dx_api)	Calls ifx_set_QoS_replenish_rate(arg.chipId,
		arg.ldx, arg.info);

## 8.3.81 IFX\_GET\_QOS\_REPLENISH\_RATE

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_QOS_REPLENISH_	_IOR(IFX_IOC_MAGIC,137,id	Get token bucket replenish rate IOCTL.
RATE	x_api)	Calls ifx_get_QoS_replenish_rate(arg.chipId, arg.ldx, &arg.info);

# 8.3.82 IFX\_SET\_QOS\_BURST\_SIZE

### **Prototype**

Data Type	Name	Description
IFX_SET_QOS_BURST_SIZE	_IOW(IFX_IOC_MAGIC,138,i	Set token bucket burst size IOCTL.
	dx_api)	Calls <b>ifx_set_QoS_burst_size</b> (arg.chipId, arg.ldx, arg.info);

**Switch Access Interface** 

## 8.3.83 IFX\_GET\_QOS\_BURST\_SIZE

**Prototype** 

### **Parameters**

Data Type	Name	Description
IFX_GET_QOS_BURST_SIZE	_IOR(IFX_IOC_MAGIC,139,id	Get token bucket burst size IOCTL.
	x_api)	Calls ifx_get_QoS_burst_size(arg.chipId,
		arg.ldx, &arg.info);

# 8.3.84 IFX\_SET\_QOS\_EXTEND\_BURST\_SIZE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_QOS_EXTEND_BU	_IOW(IFX_IOC_MAGIC,140,i	Set token bucket extended burst size IOCTL.
RST_SIZE	dx_api)	Calls
		ifx_set_QoS_extend_burst_size(arg.chipld,
		arg.ldx, arg.info);

## 8.3.85 IFX\_GET\_QOS\_EXTEND\_BURST\_SIZE

## **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_QOS_EXTEND_BU	_IOR(IFX_IOC_MAGIC,141,id	Get token bucket extended burst size IOCTL.
RST_SIZE	x_api)	Calls
		ifx_get_QoS_extend_burst_size(arg.chipId,
		arg.ldx, &arg.info);

## 8.3.86 IFX\_GET\_RULE\_MEM

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### **Parameters**

Data Type	Name	Description
IFX_GET_RULE_MEM	_IOR(IFX_IOC_MAGIC,144,ru	Get rule memory IOCTL.
	le_mem_api)	Calls ifx_get_rule_mem(arg.chipId, arg.bank,
		arg.address, arg.section, &arg.rule32_val);

#### 8.3.87 IFX\_SET\_INGRESS\_WATERMARK

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_INGRESS_WATER	_IOW(IFX_IOC_MAGIC,184,w	Set Ingress watermark IOCTL.
MARK	atermark_api)	Calls ifx_set_ingress_watermark(arg.chipld,
		arg.waterMarkType, arg.portId,
		arg.waterMark);

#### IFX\_GET\_INGRESS\_WATERMARK 8.3.88

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_INGRESS_WATER	_IOR(IFX_IOC_MAGIC,185,w	Get Ingress watermark IOCTL.
MARK	atermark_api)	Calls ifx_get_ingress_watermark(arg.chipId,
		arg.waterMarkType, arg.portId,
		&arg.waterMark);

#### IFX\_SET\_EGRESS\_WATERMARK 8.3.89

## **Prototype**

Data Type	Name	Description
IFX_SET_EGRESS_WATERM	_IOW(IFX_IOC_MAGIC,186,E	Set Egress watermark IOCTL.
ARK	watermark_api)	Calls ifx_set_egress_watermark(arg.chipId,
		arg.portld, arg.queueld, arg.waterMark);

## 8.3.90 IFX\_GET\_EGRESS\_WATERMARK

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_EGRESS_WATER	_IOR(IFX_IOC_MAGIC,187,E	Get Egress watermark IOCTL.
MARK	watermark_api)	Calls ifx_get_egress_watermark(arg.chipId,
		arg.portId, arg.queueId, &arg.waterMark);

## 8.3.91 IFX\_SET\_TX\_CONFIG

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_TX_CONFIG	_IOW(IFX_IOC_MAGIC,188,T	Set Tx config IOCTL.
	xConfig_api)	Calls ifx_set_Tx_config(arg.chipId, arg.portId,
		arg.xmitDropCount, arg.lateCollisionCount);

## 8.3.92 IFX\_GET\_TX\_CONFIG

## **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_TX_CONFIG	_IOR(IFX_IOC_MAGIC,189,T	Get Tx config IOCTL.
	xConfig_api)	Calls ifx_get_Tx_config(arg.chipld,
		arg.portId, &arg.xmitDropCount,
		&arg.lateCollisionCount);

## 8.3.93 IFX\_SET\_PORT\_RATE\_SHAPE

### **Parameters**

Data Type	Name	Description
IFX_SET_PORT_RATE_SHA	_IOW(IFX_IOC_MAGIC,190,r	Enable port rate shaping IOCTL.
PE	ateShape_api)	Calls ifx_set_PORT_rate_shape(arg.chipId,
		arg.en_dis, arg.PRE);

## 8.3.94 IFX\_GET\_PORT\_RATE\_SHAPE

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_GET_PORT_RATE_SHA	_IOR(IFX_IOC_MAGIC,191,ra	Get port rate shaping flag IOCTL.
PE	teShape_api)	Calls ifx_get_PORT_rate_shape(arg.chipId,
		&arg.PRE);

## 8.3.95 IFX\_SET\_PAUSE\_FRAME\_GEN

### **Prototype**

### **Parameters**

Data Type	Name	Description
IFX_SET_PAUSE_FRAME_G	_IOW(IFX_IOC_MAGIC,192,P	Enable/Disable Pause Frame generation
EN	auseFrame_api)	IOCTL.
		Calls ifx_set_pause_frame_gen(arg.chipId,
		arg.portId, arg.en_dis);

## 8.3.96 IFX\_GET\_PAUSE\_FRAME\_GEN

### **Prototype**

#### **Parameters**

Data Type	Name	Description
IFX_GET_PAUSE_FRAME_G	_IOR(IFX_IOC_MAGIC,193,P	Get port rate shaping flag IOCTL.
EN	auseFrame_api)	Calls ifx_get_pause_frame_gen(arg.chipId,
		arg.portld, &arg.en_dis);

### 8.4 Structure Reference

This chapter contains the structure reference.

### Table 18 StructOverview

Table 18 StructOverview		
Name	Description	
cos_pr	cos_pr IOCTL parameter struct.	
cos_rd	cos_rd IOCTL parameter struct.	
cos_sel_reg_t		
cpu_acs_ctrl_reg_t		
dst_lookup_reg_t		
Ewatermark	Ewatermark IOCTL parameter struct.	
feature_mode	set/get switch mode IOCTL parameter struct.	
Flagstat	Flagstat IOCTL parameter struct.	
flowId	flowld IOCTL parameter struct.	
flowParam	flowParam IOCTL parameter struct.	
flowPattern	flowPattern IOCTL parameter struct.	
gmac_reg_t		
idx	idx IOCTL parameter struct.	
ma_learn_reg_t		
macAging	macAging IOCTL parameter struct.	
macTenIdx	macTenIdx IOCTL parameter struct.	
macTidx	macTidx IOCTL parameter struct.	
macTstat	macTstat IOCTL parameter struct.	
mdiomode		
mib_idx	mib_idx IOCTL parameter struct.	
mibCounters	mibCounters IOCTL parameter struct.	
PauseFrame	Pause Frame Generation IOCTL parameter struct.	
PHY_REG0_T		
PHY_REG4_T		
PHY_REG9_T		
phyAction	phyAction IOCTL parameter struct.	
pmac_hd_ctl_reg_t		
pmac_vlan	vlan_idx IOCTL parameter struct.	
pmac_vlan_reg_t		
port_eth_conf	Port Ethernet Configuration IOCTL parameter struct.	
port_pause_ctl_reg_t		
port_rx_wm_regs_t		
port_status_per_vlan		
port_tx_wm_reg0_t		
port_tx_wm_reg1_t		
portCoS	portCoS IOCTL parameter struct.	
portKey	portKey IOCTL parameter struct.	
portMode	portMode IOCTL parameter struct.	
portOffset	portOffset IOCTL parameter struct.	
portRule	portRule IOCTL parameter struct.	

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## Table 18 StructOverview (cont'd)

Name	Description
portVlan	portVlan IOCTL parameter struct.
pr_ctrl_reg_t	
pri2_cos_reg_t	
QoSBflowCntr	QoSBflowCntr IOCTL parameter struct.
QoSbucket	QoSbucket IOCTL parameter struct.
QoSshapingQ	QoSshapingQ IOCTL parameter struct.
QoSWFqueue	QoSWFqueue IOCTL parameter struct.
rateShape	rateShape IOCTL parameter struct.
rtx_isr_reg_t	
rule_mem	rule_mem IOCTL parameter struct.
rx_config_reg_t	
RxConfig	RxConfig IOCTL parameter struct.
sd_cmd_reg_t	
sd_data_reg0_t	
sd_data_reg1_t	
sd_data_reg2_t	
switch_api_command	
tb_ctrl_reg_t	
tx_config_reg_t	
TxConfig	TxConfig IOCTL parameter struct.
ucast_fid	xcast_fid IOCTL parameter struct.
vlan_aware	vlan_aware IOCTL parameter struct.
vlan_idx	vlan_idx IOCTL parameter struct.
vlan_mibs_cmd_reg_t	
vlan_status	vlan_status IOCTL parameter struct.
vlan_tableentry	vlan_tableentry IOCTL parameter struct.
vlan_tbl_cmd_reg_t	
vlan_tbl_data_t	
watermark	watermark IOCTL parameter struct.
·	

## 8.4.1 cos\_pr

### **Description**

cos\_pr IOCTL parameter struct.

Used by:

- IFX\_MAP\_INGRESS\_PRIORITY\_COS
- IFX\_GET\_INGRESS\_PRIORITY\_COS
- IFX\_MAP\_COS\_EGRESS\_PRIORITY
- IFX\_GET\_COS\_EGRESS\_PRIORITY

**Switch Access Interface** 

## **Parameters**

Data Type	Name	Description	
u8	chipId	ChipID (always 0).	
u32	Priority	IngressPriority (0-7).	
u32	CoS	Class of service (0-3).	

## 8.4.2 cos\_rd

### **Description**

cos\_rd IOCTL parameter struct.

Used by:

- IFX\_MAP\_COS\_REDUCTION
- IFX\_GET\_COS\_REDUCTION

## **Prototype**

### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	reduction	Reduced class of service (0-3).
u32	CoS	Class of service (0-3).

## 8.4.3 cos\_sel\_reg\_t

### **Description**

## **Prototype**

Data Type	Name	Description
u32	Rsv	
u32	Cr3	
u32	Cr2	
u32	Cr1	
u32	Cr0	
u32	Cp0	
u32	Cp1	
u32 u32	Cp2	
u32	Ср3	



**Switch Access Interface** 

## 8.4.4 cpu\_acs\_ctrl\_reg\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	Table_sel		
u32	Index		
u32	Table_specific		
u32	Read_write		
u32	Req_ack		

## 8.4.5 dst\_lookup\_reg\_t

**Description** 

**Prototype** 

### **Parameters**

Data Type	Name	Description	
u32	Rsv1		
u32	En_ma_read		
u32	En_ma_learn		
u32	En_da_lookup		
u32	Rsv2		
u32	Da_state		
u32	Rsv3		
u32	Dst		
u32	Da_crit		
u32	Rsv4		

### 8.4.6 Ewatermark

### **Description**

Ewatermark IOCTL parameter struct.

Used by:

**Switch Access Interface** 

- IFX\_SET\_EGRESS\_WATERMARK
- IFX\_GET\_EGRESS\_WATERMARK

### **Prototype**

### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	queueld	Queue ID (0-3).
u32	waterMark	Watermark value.

## 8.4.7 feature\_mode

### **Description**

set/get switch mode IOCTL parameter struct.

Used by:

- IFX\_SET\_SWITCH\_MODE
- IFX\_GET\_SWITCH\_MODE

### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	feature	2 - GE_MCASTQ_THRESHOLD 6 - AGING_SOURCE 7 - AGING_TIME_SELECT 8 - MA_FREEZE_ALL 9 - MA_FREEZE_NEW 10 - CRCERROR_PACKET_MONITOR 11 - MACHANGE_PACKET_MONIOR 12 - PAUSE_PACKET_TO_CPU 13 - FORWARD_CFI_PACKET 14 - MA_REPLACE_THRESHOLD 33 - UNKNOWN_PROTOCOL_TO_CPU 34 - MONITORING_PORT
u32	mode	

## 8.4.8 Flagstat

### **Description**

Flagstat IOCTL parameter struct.

Used by:



**Switch Access Interface** 

- IFX\_SET\_INGRESS\_MONITOR\_FLAG
- IFX\_GET\_INGRESS\_MONITOR\_FLAG
- IFX\_SET\_EGRESS\_MONITOR\_FLAG
- IFX\_GET\_EGRESS\_MONITOR\_FLAG
- IFX SET PORT LOCK
- IFX GET PORT LOCK
- IFX\_SET\_PORT\_INGRESS\_VLAN\_TAG
- IFX\_GET\_PORT\_INGRESS\_VLAN\_TAG
- IFX\_SET\_PORT\_INGRESS\_VLAN\_FILTER
- IFX\_GET\_PORT\_INGRESS\_VLAN\_FILTER
- IFX\_SET\_PORT\_JUMBO\_ENABLE
- IFX\_GET\_PORT\_JUMBO\_ENABLE

### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
BOOL	flag	TRUE or FALSE.

### 8.4.9 flowld

### **Description**

flowld IOCTL parameter struct.

Used by:

IFX\_DELETE\_FLOW\_PATTERN

### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	flowId	Flow ID (0-23).

## 8.4.10 flowParam

### **Description**

flowParam IOCTL parameter struct.

Used by:

- IFX\_SET\_FLOW\_ACTION\_PARAM
- IFX\_GET\_FLOW\_ACTION\_PARAM
- IFX\_DELETE\_FLOW\_ACTION\_PARAM

## **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	flowId	Flow ID (0-23).
u32	feature	Possible Features.  REDIRECT_MCAST: bit 2 = LAN Portbit 1 = PC Portbit 0 = CPU port  MIRROR: 1 = Mirror Enable0 = Mirror Disable  COS_ASSIGNMENT: 0-3 CoS Value to be assigned to this rule.  VLAN_ASSIGNMENT: 0-4094 VLAN value to be associated for this rule.  TKN_BKT_ID: 0-62 Token bucket ID for this rule.63 Token bucket ID is flow ID  DELETE_ACTION_ENTRY: (valid only for IFX_DELETE_FLOW_ACTION_PARAM) removes the entry assigned by flowld from the action table.
u32	flowAction	Action value for the selected feature.

## 8.4.11 flowPattern

## Description

flowPattern IOCTL parameter struct.

Used by:

- IFX\_SET\_FLOW\_PATTERN
- IFX\_GET\_FLOW\_PATTERN

## **Prototype**

Data Type	Name	Description	
u8	chipId	ChipID (always 0).	
u32	flowId	Flow ID (0-23).	
u32	IKeyData[4]	Rule vector (0-127).	
u32	IKeyMask[4]	Mask vector (0-127).	

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# 8.4.12 gmac\_reg\_t

**Description** 

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u32	Rsv1	
u32	t_ipg	
u32	Rsv2	
u32	tpe	
u32	rpe	
u32	Ig	
u32	dg	
u32 u32	sg	
u32	g_sel	

#### 8.4.13 idx

#### **Description**

idx IOCTL parameter struct.

Used by:

- IFX\_SET\_QOS\_REPLENISH\_RATE
- IFX\_GET\_QOS\_REPLENISH\_RATE
- IFX\_SET\_QOS\_BURST\_SIZE
- IFX\_GET\_QOS\_BURST\_SIZE
- IFX\_SET\_QOS\_EXTEND\_BURST\_SIZE
- IFX\_GET\_QOS\_EXTEND\_BURST\_SIZE

## **Prototype**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	ldx	Index to replenish rate register.
u32	info	Replenish rate value.

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# 8.4.14 ma\_learn\_reg\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Rsv1		
u32	Ma_state		
u32	Rsv2		
u32	Ma_dest		
u32	MA_crit		
u32	Rsv3		

# 8.4.15 macAging

#### **Description**

macAging IOCTL parameter struct.

Used by:

IFX\_CONTROL\_MAC\_TABLE\_AGING

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	aging_period	MAC table aging period.

## 8.4.16 macTenIdx

#### **Description**

macTenIdx IOCTL parameter struct.

Used by:

- IFX\_ADD\_MAC\_TABLE\_ENTRY
- IFX\_GET\_MAC\_TABLE\_ENTRY\_IDX

**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	macTableIndex	MAC table index (0-63).
u8	macAddr[6]	MAC address macAddrPtr[0] -> MAC address byte 5 macAddrPtr[1] -> MAC address byte 4 macAddrPtr[2] -> MAC address byte 3 macAddrPtr[3] -> MAC address byte 2 macAddrPtr[4] -> MAC address byte 1 macAddrPtr[5] -> MAC address byte 0.
BOOL	lan_port	LAN port assignment -> FALSE: not assigned, TRUE: assigned.
BOOL	pc_port	PC port assignment -> FALSE: not assigned, TRUE: assigned.
BOOL	cpu_port	CPU port assignment -> FALSE: not assigned, TRUE: assigned.
BOOL	criticalFlag	Priority Status of the packet 0: normal, 1:critical.
u32	maState	aging status: 0(static),114(dynamic),15(aged out)

## 8.4.17 macTidx

#### **Description**

macTidx IOCTL parameter struct.

Used by:

• IFX\_GET\_MAC\_TABLE\_IDX

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	macAddr[6]	MAC address macAddrPtr[0] -> MAC address byte 5 macAddrPtr[1] -> MAC address byte 4 macAddrPtr[2] -> MAC address byte 3 macAddrPtr[3] -> MAC address byte 2 macAddrPtr[4] -> MAC address byte 1 macAddrPtr[5] -> MAC address byte 0.
u32	tableIndex	MAC table index (0-63).

## 8.4.18 macTstat

## **Description**

macTstat IOCTL parameter struct.

**Switch Access Interface** 

Used by:

IFX\_GET\_MAC\_TABLE\_STAT

## **Prototype**

#### **Parameters**

Data Type	Name	Description	
u8	chipld	ChipID (always 0).	
u32	staticCount	Number of static entries.	
u32	valid	Number of valid entries.	

#### **8.4.19** mdiomode

#### **Description**

## **Prototype**

#### **Parameters**

Data Type	Name	Description	
u8	chipld	ChipID (always 0).	
u32	port_group		
BOOL	mdioMode		
BOOL	autoNegMode		

# 8.4.20 mib\_idx

#### **Description**

mib\_idx IOCTL parameter struct.

Used by:

IFX\_GET\_VLAN\_MIB

#### **Prototype**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	mibldx	VLAN Index (0-63).



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Data Type	Name	Description
u32	counterId	Counter ID 0=Byte counter, 1=Packet counter, 2=Dropped packet counter, 3=Non unicast packet counter.
u32	count	Counter value.

## 8.4.21 mibCounters

## Description

mibCounters IOCTL parameter struct.

Used by:

- IFX\_GET\_PORT\_MIB\_COUNTERS
- IFX\_GET\_MAC\_MIB\_COUNTERS

## **Prototype**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	counterld	Port MIB counter ID  (IFX_GET_PORT_MIB_COUNTERS) 0 - rx  Bytes; 1 - rx Unicast Packets 2 - rx Broadcast  Packets 3 - rx Multicast Packets 4 - rx CRC  Errored Packets 5 - rx Undersized Good  Packets 6 - rx UnderSized Errored Packets 7 -  rx Packets with length <= 64 Byte 8 - rx Packets  with 64 byte < length <= 127 byte 9 - rx Packets  with 127 byte < length <= 255 byte 10 - rx  Packets with 255 byte < length <= 511 byte 11  - rx Packets with 511 byte < length <= 1023  byte 12 - rx Packets with 1023 byte < length <=  MAX_PKT_LEN byte 13 - rx Oversized Good  Packets (Packet length > MAX_PKT_LEN  bytes) 14 - rx Oversized Bad Packets (Packet  length > MAX_PKT_LEN bytes) 15 - rx Good  Pause Packets 16 - rx Dropped Packets 17 - tx  Bytes 18 - tx Unicast Pkts 19 - tx Broadcast  Pkts 20 - tx Multicast Pkts.  MAC MIB counter ID  (IFX_GET_MAC_MIB_COUNTERS) 0 - tx  Pause Frames 1 - tx single Collisions 2 - tx  multiple Collisions 3 - tx Excessive Collisions 4  - tx Later Collisions 5 - tx deferred
u32	count	Value of MIB counter.

**Switch Access Interface** 

#### 8.4.22 PauseFrame

#### **Description**

Pause Frame Generation IOCTL parameter struct.

Used by:

- IFX\_SET\_PAUSE\_FRAME\_GEN
- IFX\_GET\_PAUSE\_FRAME\_GEN

# **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC.
BOOL	en_dis	Enable/disable pause frame generation (0-disable, 1-enable).

# 8.4.23 PHY\_REG0\_T

#### **Description**

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u16	reset		
u16	loop_back		
u16	speed_sel		
u16	auto_nego_enable		
u16	power_down		
u16	isolate		
u16	restart_auto_nego		
u16	duplex_mode		
u16	reserv		

# 8.4.24 PHY\_REG4\_T

#### **Description**



**Switch Access Interface** 

# **Prototype**

#### **Parameters**

Data Type	Name	Description	
u16	next_page		
u16	reserved2		
u16	remote_fault		
u16	reserved1		
u16	pause		
u16	T4_100		
u16	full_100		
u16	half_100		
u16	full_10		
u16	half_10		
u16	selector_field		

# 8.4.25 PHY\_REG9\_T

## **Description**

### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u16	test_mode		
u16	master_slave_enable		
u16	master_slave_conf		
u16	port_type		
u16	full_1000		
u16	half_1000		
u16	reserv		

# 8.4.26 phyAction

#### **Description**

phyAction IOCTL parameter struct.

Used by:

- IFX\_PHY\_READ
- IFX\_PHY\_WRITE



**Switch Access Interface** 

# **Prototype**

#### **Parameters**

Data Type	Name	Description
uint	chipld	ChipID (always 0).
u8	mdio_id	MDIO ID.
u8	phy_addr	MDIO address of the PHY device.
u8	RegOffset	PHY register address.
u16	Data	Register data.

# 8.4.27 pmac\_hd\_ctl\_reg\_t

## **Description**

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	rem_L2_hd		
u32	rem_crc		
u32	add_stat_hd		
u32	add_crc		
u32	type_len		
u32	add_tag		
u32	add_eth_hd		

# 8.4.28 pmac\_vlan

#### **Description**

vlan\_idx IOCTL parameter struct.

Used by:

IFX\_GET\_VLAN\_IDX



**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
BOOL	en_dis	0- disable, 1-enable tag insertion
u32	VlanId	VLANID (1-4094).
u8	prio	Priority (0-7).
u8	cfi	canonical format indicator, 0-little endian, 1-big endian

# 8.4.29 pmac\_vlan\_reg\_t

#### **Description**

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u32	Rsv	
u32	pri	
u32	cfi	
u32	vlan_id	

# 8.4.30 port\_eth\_conf

#### **Description**

Port Ethernet Configuration IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_ETH\_CONF
- IFX\_GET\_PORT\_ETH\_CONF

#### **Prototype**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC.
u32	speed	0-10Mbit/s, 1-100Mbit/s, 2-1000Mbit/s
u32	duplex	half(0) or full duplex mode(1)
BOOL	autoneg	disable(0) or enable(1) autonegotiation

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Data Type	Name	Description
u32	int_ext_phy	use internal(0) or external(1) PHY
u32	link_status	link down(0) or link up(1) only for IFX_GET_PORT_ETH_CONF

# 8.4.31 port\_pause\_ctl\_reg\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	pfg_pc		
u32	pfg_lan		

# 8.4.32 port\_rx\_wm\_regs\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	rx_wm2		
u32	rx_wm1		

# 8.4.33 port\_status\_per\_vlan

**Description** 



**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description	
u8	vlanmember		
u8	port_state		
u8	Rsv		

# 8.4.34 port\_tx\_wm\_reg0\_t

**Description** 

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	Queue1_tx_wm		
u32	Queue0_tx_wm		

# 8.4.35 port\_tx\_wm\_reg1\_t

#### **Description**

## **Prototype**

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	Queue3_tx_wm		
u32	Queue2_tx_wm		

# 8.4.36 portCoS

#### Description

portCoS IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_COS
- IFX\_GET\_PORT\_COS



CONFIDENTIAL Switch Access Interface

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	CoS	Class of service (0-3).

# 8.4.37 portKey

#### **Description**

portKey IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_KEY
- IFX\_GET\_PORT\_KEY

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	lKey	IKEY value.

# 8.4.38 portMode

#### **Description**

portMode IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_FE\_MODE
- IFX\_GET\_PORT\_FE\_MODE
- IFX\_SET\_PORT\_GE\_MODE
- IFX\_GET\_PORT\_GE\_MODE



**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC.
u32	feature	Port feature to be configured/read (see mode descr. )
u32	mode	Feature related modes: Fast Ethernet(FE): 0 - FE/GE_PORT_AUTONEGOTIATION 0 - disable autonegotiation 1 - enable autonegotiation 1 - FE/GE_PORT_LINK_OK (only IFX_GET_PORT_FE_MODE) 0 - link down 1 - link up 2 - FE/GE_PORT_DUPLEX_MODE 0 - half duplex 1 - full duplex 3 - FE/GE_PORT_SPEED 0 - 10 MBit/s 1 - 100 MBit/s 2 - 1 GBit/s (only in GE mode) 4 - FE/GE_PORT_PAUSE_FLOW_CTRL 0 - disable flow control 1 - enable flow control 5 - FE/GE_PORT_PRIORITY 0. 3 - lowesthighest prio cos 6 - FE/GE_PORT_MONITOR_INGRESS 0 - disable ingress monitoring for port 1 - enable ingress monitoring for port 7 - FE/GE_PORT_MONITOR_EGRESS 0 - disable egrress monitoring for port 1 - enable egress monitoring for port 8 - FE/GE_PORT_AUTHENTICATION 0 - not authorized to receive or transmit 1 - authorized to receive but not to transmit 3 - authorized to transmit but not to receive 2 - authorized to transmit and receive

# 8.4.39 portOffset

#### **Description**

portOffset IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_OFFSET
- IFX\_GET\_PORT\_OFFSET

**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	portOffset[2]	Port Offset 0.
		7

# 8.4.40 portRule

#### **Description**

portRule IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_RULE
- · IFX GET PORT RULE
- IFX\_SET\_PORT\_MASK
- IFX\_GET\_PORT\_MASK

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portld	PortID 0=LAN 1=PC 2=CPU.
u32	portRule[4]	128 bit port rule

## 8.4.41 portVlan

#### Description

portVlan IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_VLANID
- IFX\_GET\_PORT\_VLANID

#### **Prototype**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	vlanid	VLANID (1-4094).

**Switch Access Interface** 

# 8.4.42 pr\_ctrl\_reg\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description
u32	Rsv1	
u32	MA_Replace_Threshold	
u32	Fwd_unknown2_cpu	
u32	Fwd_cfi_pkts	
u32	Fwd_pause2cpu	
u32	Monitor_MA_change_pkt	
u32	Monitor_crc	
u32	MA_Freez_New	
u32	MA_Freeze	
u32	Age_Timer	
u32	Age_tick_Sw	
u32	Send_Res2_cpu	
u32	Rsv2	
u32	ge_bcastq_threshold	
u32	Rsv3	

# 8.4.43 pri2\_cos\_reg\_t

**Description** 

**Prototype** 

Data Type	Name	Description	
u32	Rsv		
u32	Pc7		
u32	Pc6		
u32 u32	Pc5		
	Pc4		
u32	Pc3		



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Data Type	Name	Description
u32	Pc2	
u32	Pc1	
u32	Pc0	

## 8.4.44 QoSBflowCntr

#### **Description**

QoSBflowCntr IOCTL parameter struct.

Used by:

- IFX\_SET\_QOS\_BUCKET\_FLOW\_CONTROL
- IFX\_GET\_QOS\_BUCKET\_FLOW\_CONTROL

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	portRuleBaseIdx	Port Rule base Id (0-511).
u32	actionLC	Flow Control Action for loosley confirming packets.
u32	actionNC	Flow Control Action for non confirming packets.

## 8.4.45 QoSbucket

#### **Description**

QoSbucket IOCTL parameter struct.

Used by:

- IFX\_SET\_QOS\_BUCKET
- IFX\_GET\_QOS\_BUCKET

#### **Prototype**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	tBucketId	Token Bucket ID (0-63).
u32	tBucketCnt	32bit Bucket count
u32	tReplenishRateIdx	Replinish Rate.
u32	tBurstSizeIdx	Index of Replinish Rate register.

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# 8.4.46 QoSshapingQ

#### **Description**

QoSshapingQ IOCTL parameter struct.

Used by:

- IFX\_SET\_QOS\_SHAPING\_QUEUE
- IFX\_GET\_QOS\_SHAPING\_QUEUE

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	queueld	Queue ID (0-3).
u32	bucketCnt	21 bit Bucket count for rate shaping
u32	replenishRate	20 bit Replinish rate for rate shaping
u32	tokenValue	20 bit Token value for rate shaping
u32	tReplenishTimer	Replinish rate timer for rate shaping.

# 8.4.47 QoSWFqueue

#### **Description**

QoSWFqueue IOCTL parameter struct.

Used by:

- IFX\_SET\_QOS\_WF\_QUEUE
- IFX\_GET\_QOS\_WF\_QUEUE

#### **Prototype**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	queueld	Queue ID (0-3).
u32	weightFactor	16 bit Weight Factor associated with each queue for WFQ scheduling
u32	deficitCount	21 bit DeficitCount for WFQ scheduling

**Switch Access Interface** 

# 8.4.48 rateShape

#### **Description**

rateShape IOCTL parameter struct.

Used by:

- IFX\_SET\_PORT\_RATE\_SHAPE
- IFX\_GET\_PORT\_RATE\_SHAPE

# **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
BOOL	en_dis	rate shaping enable(1)/disable(0) flag
BOOL	PRE	Port rate shaping enable flag.

# 8.4.49 rtx\_isr\_reg\_t

#### **Description**

#### **Prototype**

Data Type	Name	Description
u32	Rsv	
u32	txma	Tx Maximum Attempts Interrupt.
u32	txlc	Tx Late Collision Interrupt.
u32	txec	Tx Early Collision Interrupt.
u32	txuf	Transmit Underflow Interrupt.
u32	rr	Rkey received Interrupt.
u32	noeof	No EOF detected Interrupt.
u32	nosof	No SOF detected Interrupt.
u32	rxfo	Receive FIFO overflow Interrupt.
u32	rxce	Receive CRC Error Interrupt.
u32	rxnrc	No RxD Cell in Receive Interrupt.
u32	rxnpd	No Packet Descriptor available Interrupt.
u32	rxnpn	No PBNUM available Interrupt.

**Switch Access Interface** 

# 8.4.50 rule\_mem

#### **Description**

rule\_mem IOCTL parameter struct.

Used by:

• IFX\_GET\_RULE\_MEM

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u8	chipId	ChipID (always 0).	
u32	bank		
u32	address		
u32	section		
u32	rule32_val		

# 8.4.51 rx\_config\_reg\_t

#### **Description**

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u32	L3Program		
u32	L3StartVld		
u32	L3Start		
u32	Res		

# 8.4.52 RxConfig

## **Description**

RxConfig IOCTL parameter struct.

Used by:

- IFX\_SET\_RX\_CONFIG
- IFX\_GET\_RX\_CONFIG

**Switch Access Interface** 



## **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
BOOL	L3Program	
BOOL	L3StartVld	Layer3 start valid flag.
u32	L3Start	Layer3 start value in bytes.

# 8.4.53 sd\_cmd\_reg\_t

**Description** 

## **Prototype**

#### **Parameters**

Data Type	Name	Description	
u32	Req_ack		
u32	Read_write		
u32	Res1		
u32	field_sel		
u32	Queue_id		
u32	Res2		
u32	Port_id		

# 8.4.54 sd\_data\_reg0\_t

Description

#### **Prototype**

Data Type	Name	Description
u32	Replinish_rate	
u32	Token_val	



**Switch Access Interface** 

8.4.55 sd\_data\_reg1\_t

Description

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Weight		
u32	Bucket_cnt		
u32	Replinish_rate		

# 8.4.56 sd\_data\_reg2\_t

Description

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Replinish_timer		
u32	Deficit_cnt		
u32	Weight		

# 8.4.57 switch\_api\_command

**Description** 

**Prototype** 

Data Type	Name	Description
const char *	name	
const void *	function	
const char *	param	



**Switch Access Interface** 

8.4.58 tb\_ctrl\_reg\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description
u32	Rsv	
u32	rule_base_idx	
u32	actionNC	
u32	actionLC	

## 8.4.59 tx\_config\_reg\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Rsv		
u32	Attempt_limit		
u32	late_coll_thresh		

# 8.4.60 TxConfig

#### **Description**

TxConfig IOCTL parameter struct.

Used by:

- IFX\_SET\_TX\_CONFIG
- IFX\_GET\_TX\_CONFIG



**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	xmitDropCount	Number of retransmission attempts before the packet is discarded.
u32	lateCollisionCount	Threshold of decision between Early and Late collision.

## 8.4.61 ucast\_fid

#### **Description**

xcast\_fid IOCTL parameter struct.

Used by:

- IFX\_SET\_UNKNOWN\_UCAST\_ID
- · IFX GET UNKNOWN UCAST ID
- IFX\_SET\_UNKNOWN\_MCAST\_ID
- IFX\_GET\_UNKNOWN\_MCAST\_ID
- IFX\_SET\_BCAST\_ID
- IFX\_GET\_BCAST\_ID

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
u32	floodId	

# 8.4.62 vlan\_aware

#### **Description**

vlan\_aware IOCTL parameter struct.

Used by:

- IFX\_SET\_VLAN\_AWARE
- IFX\_GET\_VLAN\_AWARE



**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description
u8	chipId	ChipID (always 0).
BOOL	VlanAwareFlag	TRUE=enable VLAN awareness, FALSE=disable.

## 8.4.63 vlan\_idx

## **Description**

vlan\_idx IOCTL parameter struct.

Used by:

• IFX\_GET\_VLAN\_IDX

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u8	chipId	ChipID (always 0).	
u32	VlanId	VLANID (1-4094).	
u32	VlanIndex	VLAN Index (0-63).	

## 8.4.64 vlan\_mibs\_cmd\_reg\_t

#### **Description**

#### **Prototype**

#### **Parameters**

Data Type	Name	Description	
u32	Req_ack		
u32	Read_write		
u32	MIBId		
u32	Reservd		
u32	Address		

# 8.4.65 vlan\_status

#### **Description**

vlan\_status IOCTL parameter struct.



**Switch Access Interface** 

Used by:

IFX\_VLAN\_CHECK

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	vlanld	VLANID (1-4094).
BOOL	flag	TRUE=created, FALSE=not created.

## 8.4.66 vlan\_tableentry

## Description

vlan\_tableentry IOCTL parameter struct.

Used by:

- IFX\_ADD\_VLAN\_TABLE\_ENTRY
- IFX\_GET\_VLAN\_TABLE\_ENTRY
- IFX\_DEL\_VLAN\_TABLE\_ENTRY

## **Prototype**

#### **Parameters**

Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	vlanld	VLANID (1-4094).
u32	portmemberList[2]	Port Membership -> 0:Not a member,1:Member (Bit 0=LAN port, bit 1=PC port, bit 2=CPU port).
u32	portegressList[2]	Port Egress Tagging -> 0:do not tag packet,1:tag packet.
BOOL	valid	Entry-valid-flag -> 0:table entry invalid,1:table entry valid.

# 8.4.67 vlan\_tbl\_cmd\_reg\_t

#### **Description**



**Switch Access Interface** 

#### **Parameters**

Data Type	Name	Description	
u32	Req_ack		
u32	Read_write		
u32	Reservd		
u32	Vlan_ld		

# 8.4.68 vlan\_tbl\_data\_t

**Description** 

**Prototype** 

#### **Parameters**

Data Type	Name	Description	
u32	Reservd		
u32	valid		
u32	egr_cpu		
u32	egr_pc		
u32	egr_lan		
u32	member_cpu		
u32	member_pc		
u32	member_lan		
u32	Vlan_ld		

#### 8.4.69 watermark

#### **Description**

watermark IOCTL parameter struct.

Used by:

- IFX\_SET\_INGRESS\_WATERMARK
- IFX\_GET\_INGRESS\_WATERMARK

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Data Type	Name	Description
u8	chipld	ChipID (always 0).
u32	waterMarkType	Type of watermark 1=GLOBAL_DROP_WATERMARK,2=PORTG ROUP_FC_WATERMARK,3=PORTGROUP_ DROP_WATERMARK.
u32	portId	PortID 0=LAN 1=PC 2=CPU.
u32	waterMark	Watermark value.

**Pseudo LAN Driver** 

#### 9 Pseudo LAN Driver

The pseudo lan driver allows easy access to PC- and LAN-port PHYs of the INCA-IP2. It allows to query the current configuration, to set the advertisement configuration or to force a specific configuration with help of the miitool which can be downloaded from http://wiki.metux.de/public/mii-tool.

Two network devices are created, which support only the ioctls needed by mii-tool. No data transfer is possible via these interface. The network interfaces are named "incaip2\_pc" for the PC PHY and "incaip2\_lan" for the LAN PHY.

Usage of the mii-tool is:

- mii-tool incaip2\_pc
   This shows the current link status of the PC PHY
- mii-tool -A 100BaseTx incaip2\_lan
   This programs the advertising register of the LAN PHY to allow only 100MBit/s connections during autonegotiation.

For further information have a look at the man-page of the mii-tool.

The pseudo lan driver source can be found under source/kernel/ifx/bsp/arch/mips/infineon/incaip2/pseudo lan

**Crypto Engine Driver** 

# 10 Crypto Engine Driver

The INCA-IP2 device provides hardware support for chiper (AES,DES/3DES) and digest (SHA1,MD5) algorithms and allows to prioritize voice against other data. Furthermore the cryptographic processing can be done with DMA support. Figure 3 shows a functional representation of the HW modules involved in the encryption process.

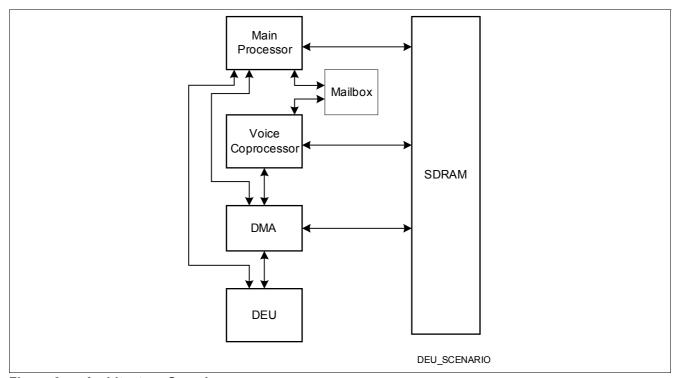


Figure 3 Architecture Overview

As shown in Figure 3 only the main processor has access to the Data Encryption Unit (DEU).

The Crypto Engine Driver supports the complete hardware feature set and provide convenient kernel functions that can be used by the application software in order to realize the required security application.

The crypto API of the Linux kernel 2.4.31 offers cryptographic support, which is also used by the Crypto Engine Driver, in order to keep the effort on application development side at a minimum. This makes it possible to reuse security applications running ontop of the crypto API.

In addition to the crypto API functionality, the Crypto Engine Driver supports all chaining modes (ECB,CBC,OFB,CFB).

#### 10.1 API Reference

This chapter describe the kernel interface functions used for the cryptographic processing.

## 10.1.1 crypto\_alloc\_tfm

#### **Description**

This function will first attempt to locate an already loaded algorithm. If that fails and the kernel supports dynamically loadable modules, it will then attempt to load a module of the same name or alias. This function has the same function interface as the **crypto\_alloc\_tfm** function defined in the api.c of the Linux kernel 2.6.11 (http://lxr.linux.no/source/crypto/api.c?a=mips).

**Crypto Engine Driver** 

#### 10.1.2 crypto\_digest\_init

#### **Description**

This function has the same functionality and the same function interface as the crypto\_digest\_init function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.3 crypto\_digest\_update

#### Description

This function has the same functionality and the same function interface as the crypto\_digest\_update function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.4 crypto digest final

#### Description

This function has the same functionality and the same function interface as the crypto\_digest\_final function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.5 crypto\_cipher\_setkey

#### **Description**

This function has the same functionality and the same function interface as the crypto\_cipher\_setkey function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.6 crypto\_cipher\_set\_iv

## **Description**

This function has the same functionality and the same function interface as the crypto\_cipher\_set\_iv function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.7 crypto\_tfm\_alg\_ivsize

#### **Description**

This function has the same functionality and the same function interface as the crypto\_tfm\_alg\_ivsize function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.8 crypto\_chiper\_encrypt

#### Description

This function has the same functionality and the same function interface as the crypto chiper encrypt function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

#### 10.1.9 crypto\_chiper\_decrypt

#### **Description**

This function has the same functionality and the same function interface as the crypto\_chiper\_decrypt function defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips).

CONFIDENTIAL Crypto Engine Driver

# 10.1.10 crypto\_alg

#### **Description**

Structure used by the function **crypto\_alloc\_tfm**. This structure replaces the **crypto\_alg** structure defined in the crypto.h of the Linux kernel 2.6.11 (http://lxr.linux.no/source/include/linux/crypto.h?a=mips). The enhanced IFX structure adds support for different transfer modes and priorities. This chapter describes only the new parameters.

#### **Prototype**

```
typedef struct
       struct list_head cra_list;
       u32 cra_flags;
       unsigned char ifx_transfer_mode;
       unsigned char ifx_priority;
       unsigned int cra_blocksize;
       unsigned int cra_ctxsize;
       const char cra_name[CRYPTO_MAX_ALG_NAME];
       unsigned int cra_preference;
       union {
              struct cipher_alg cipher;
              struct digest_alg digest;
              struct compress_alg compress;
       } cra_u;
       struct module *cra_module;
}crypto_alg;
```

Data Type	Name	Description
unsigned char	ifx_transfer_mode	<ul> <li>0<sub>D</sub> <b>DMA</b>, involve DMA for data transfer</li> <li>1<sub>D</sub> <b>FPI</b>, FPI bus is used for data transfer</li> </ul>
unsigned char	ifx_priority	<ul> <li>0<sub>D</sub> STANDARD, priority used for ordinary data encryption</li> <li>1<sub>D</sub> HIGH, priority used for voice data encryption</li> </ul>

CONFIDENTIAL USB Support

# 11 USB Support

With the release of the 2.4 Linux kernel USB support was integrated. The Linux USB subsystem supports Universal Host Controller Interface (UHCI) and Open Host Controller Interface (OHCI). The INCA-IP2 device includes a USB implementation based on the Open Host Controller Interface (OHCI) and therefore allows the use of the generic OHCI driver provided in the kernel.

The USB stack provides support for USB Human Interface Device class, which includes keyboards, mice, touchpads, joysticks and graphics tablets. In addition the USB stack provides also support for Printer class, Audio class and Mass Storage class.

For example to enable USB support for Audio class the following commands can be used:

root@host> insmod usbcore
root@host> insmod incaip2\_usb
root@host> insmod soundcore
root@host> insmod audio

More information about using the USB stack can be find on the official Linux USB Project web page http://www.linux-usb.org.

CONFIDENTIAL Bluetooth Support

# 12 Bluetooth Support

The Bluetooth wireless technology is a specification for a small-form factor, low-cost radio solution that provides links between mobile computers, mobile phones and other portable handheld devices. The specification is developed, published and promoted by the Bluetooth Special Interest Group (SIG; http://www.bluetooth.com).

BlueZ (http://www.bluez.org) is an implementation of the Bluetooth™ wireless standards specifications for Linux. It provides support for the core Bluetooth layers and protocols. The supported protocols and profiles are listed below:

#### **Protocols**

- Host Controller Interface (HCI)
- Logical Link Control and Adaptation Layer Protocol (L2CAP)
- RFCOMM Protocol
- Bluetooth Network Encapsulation Protocol (BNEP)

#### **Profiles**

- · Human Interface Device
- Hardcopy Cable Replacement
- · Advanced Audio Distribution

The BlueZ code is licensed under the GNU General Public License (GPL) and is incorporated in the INCA-IP2 Linux BSP. Information about using BlueZ can be find on the official BlueZ web page http://www.bluez.org/documentation.html.

CONFIDENTIAL Multiplexer Support

# 13 Multiplexer Support

To be able to include some features the INCA-IP2 needs to use a multiplexer for several pins. These pins include LEDs, keypad, ASC etc. Since each board is different it is necessary to adapt the multiplexer settings for each specific board. This is done during kernel configuration in the machine setup section, where a function can be selected for each pin. This selection determines which hardware blocks are available, which will influence the behaviour of some drivers like the LED part of the TSF driver. If an application needs to know the current settings of the multiplexer it can use several functions which are provided by the multiplex driver to query this information.

#### 13.1 Function Reference

This chapter contains the Function reference.

Table 19 FunctionOverview

Name	Description
ifx_mux_pwm1_pins	Availability of PWM1.
ifx_mux_pwm2_pins	Availability of PWM2.
ifx_mux_ssc_pins	Availability of SSC Ports.
ifx_mux_asc1_pins	Availability of ASC1.
ifx_mux_asc0_pins	Availability of ASC0.
ifx_mux_usb_pins	Availability of USB.
ifx_mux_clock_out_pins	Availability of Clock Output.
ifx_mux_rtc_clock_pins	Availability of RTC clock input.
ifx_mux_led_pins	Number of LEDs.
ifx_mux_key_pins	Number of Keypad pins.
ifx_mux_exin_pins	Number of EXIN pins.
ifx_mux_ebucs_pins	Number of EBU chip select pins.
ifx_mux_ebuaddr_pins	Number of EBU address pins.
ifx_mux_gp_pins	Number of GP pins.

# 13.1.1 ifx\_mux\_pwm1\_pins

# **Description**

Availability of PWM1.

This functions reports whether support for PWM1 is enabled in the multiplexer settings.

#### **Prototype**

Data Type	Name	Description
void		



**Multiplexer Support** 

#### **Return Values**

Data Type	Description
u32	1 PWM1 is available
	0 PWM1 is not available.

# 13.1.2 ifx\_mux\_pwm2\_pins

#### **Description**

Availability of PWM2.

This functions reports whether support for PWM2 is enabled in the multiplexer settings.

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
u32	1 PWM2 is available
	0 PWM2 is not available.

# 13.1.3 ifx\_mux\_ssc\_pins

#### **Description**

Availability of SSC Ports.

This functions reports which SSC ports are available.

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
u32	mux_ssc bitfield of available SSC ports

**Multiplexer Support** 

# 13.1.4 ifx\_mux\_asc1\_pins

#### **Description**

Availability of ASC1.

This functions reports whether support for ASC1 is enabled in the multiplexer settings.

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
u32	1 ASC1 is available
	0 ASC1 is not available.

# 13.1.5 ifx\_mux\_asc0\_pins

#### **Description**

Availability of ASC0.

This functions reports whether support for ASC0 is enabled in the multiplexer settings.

#### **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
u32	1 ASC0 is available
	0 ASC0 is not available.

# 13.1.6 ifx\_mux\_usb\_pins

#### **Description**

Availability of USB.



**Multiplexer Support** 

This functions reports whether support for USB is enabled in the multiplexer settings.

### **Prototype**

### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
u32	1 USB is available
	0 USB is not available.

# 13.1.7 ifx\_mux\_clock\_out\_pins

## **Description**

Availability of Clock Output.

This functions reports which alternate clock pins are available.

## **Prototype**

### **Parameters**

Data Type	Name	Description
void		

#### **Return Values**

Data Type	Description
u32	mux_altclock bitfield of available alternate clock pins

# 13.1.8 ifx\_mux\_rtc\_clock\_pins

## **Description**

Availability of RTC clock input.

This functions reports whether support for the 32kHz RTC input clock (CLK32) is enabled in the multiplexer settings.

```
u32 ifx_mux_rtc_clock_pins (
```



**Multiplexer Support** 

```
void );
```

#### **Parameters**

Data Type	Name	Description
void		

### **Return Values**

Data Type	Description
u32	1 CLK32 is available
	0 CLK32 is not available.

# 13.1.9 ifx\_mux\_led\_pins

## **Description**

Number of LEDs.

This functions reports the number of available LEDs

## **Prototype**

### **Parameters**

Data Type	Name	Description
void		

### **Return Values**

Data Type	Description
u32	num Number of available LEDs

# 13.1.10 ifx\_mux\_key\_pins

## **Description**

Number of Keypad pins.

This functions reports the number of available keypad pins



**Multiplexer Support** 

### **Parameters**

Data Type	Name	Description
void		

### **Return Values**

Data Type	Description
u32	num Number of available keypad pins

## 13.1.11 ifx\_mux\_exin\_pins

### **Description**

Number of EXIN pins.

This functions returns the bitfield of available external interrupt pins

#### **Prototype**

### **Parameters**

Data Type	Name	Description
void		

## **Return Values**

Data Type	Description
u32	mux_exin bitfield of available external interrupts pins

# 13.1.12 ifx\_mux\_ebucs\_pins

## Description

Number of EBU chip select pins.

This functions returns the bitfield of available EBU chip select pins

## **Prototype**

Data Type	Name	Description
void		



**Multiplexer Support** 

## **Return Values**

Data Type	Description
u32	mux_ebucs bitfield of available EBU chip select pins

# 13.1.13 ifx\_mux\_ebuaddr\_pins

## **Description**

Number of EBU address pins.

This functions returns the bitfield of available EBU address pins

### **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

### **Return Values**

Data Type	Description
u32	mux_ebuaddr bitfield of available EBU address pins

# 13.1.14 ifx\_mux\_gp\_pins

## **Description**

Number of GP pins.

This functions returns the bitfield of available general purpose pins

## **Prototype**

#### **Parameters**

Data Type	Name	Description
void		

### **Return Values**

Data Type	Description
u32	mux_gp bitfield of available general purpose pins

**Parallel Port Support** 

# 14 Parallel Port Support

The INCA-IP2 supports up to 28 general purpose pins depending on the multiplexer settings. For each pin the input/output settings can be changed individually.

# 14.1 Usage

Before it is possible to change the settings for a pin it needs to be reserved with the ifx\_port\_reserve function. To give some protection from unintended changes by other functions each function that wants to change a pin needs to get a unique module ID, which will identify the owner of a currently reserved pin.

If the user interface is used the IOCTL call will automatically reserve and release the specific pin.

## 14.2 Function Reference

This chapter contains the Function reference.

Table 20 FunctionOverview

Name	Description
ifx_port_ssc_cs_set	Set direction bit for chip select.
ifx_port_ssc_master_set	Set direction bit for SSC pins.
ifx_port_reserve_pin	Reserve port pin for usage.
ifx_port_free_pin	Free port pin.
ifx_port_set_open_drain	Enable Open Drain for given pin.
ifx_port_clear_open_drain	Disable Open Drain for given pin.
ifx_port_set_puden	Set PUDEN bit for given pin.
ifx_port_clear_puden	Disable PUDEN bit for given pin.
ifx_port_set_stoff	Enable Schmitt Trigger for given pin.
ifx_port_clear_stoff	Disable Schmitt Trigger for given pin.
ifx_port_set_dir_out	Set direction to output for given pin.
ifx_port_set_dir_in	Set direction to input for given pin.
ifx_port_set_output	Set output bit for given pin.
ifx_port_clear_output	Clear output bit for given pin.
ifx_port_get_input	Get input bit for given pin.
ifx_port_open	Open port device.
ifx_port_release	Release port device.
ifx_port_ioctl	Port driver IOCTL handler.

## 14.2.1 ifx\_port\_ssc\_cs\_set

## **Description**

Set direction bit for chip select.

This function sets the direction bit for the SSC chip select depending on the master/slave setting.

```
int ifx_port_ssc_cs_set (
          int ssc_port,
          int cs,
```



**Parallel Port Support** 

```
int master );
```

#### **Parameters**

Data Type	Name	Description
int	ssc_port	SSC Port number (0 or 1)
int	cs	Chip select (0 or 1)
int	master	Master/Slave select (1=master, 0=slave)

#### **Return Values**

Data Type	Description	
int	-EINVAL Invalid ssc_port, cs or master value provided.	
	0 OK	

# 14.2.2 ifx\_port\_ssc\_master\_set

#### **Description**

Set direction bit for SSC pins.

This function sets the direction bits for the SSC clock and data pins depending on the master/slave setting.

### **Prototype**

```
int ifx_port_ssc_master_set (
          int ssc_port,
          int master );
```

## **Parameters**

Data Type	Name	Description
int	ssc_port	SSC Port number (0 or 1)
int	master	Master/Slave select (1=master, 0=slave)

### **Return Values**

Data Type	Description	
int	-EINVAL Invalid ssc_port or master value provided.	
	0 OK	

# 14.2.3 ifx\_port\_reserve\_pin

## **Description**

Reserve port pin for usage.

This function reserves a given pin for usage by the given module.

```
int ifx_port_reserve_pin (
```



**Parallel Port Support** 

```
int port,
int pin,
int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be reserved
int	module_id	Module ID to identify the owner of a pin

#### **Return Values**

Data Type	Description
int	-EBUSY Pin allready used.
	-EINVAL Invalid port or pin provided.
	0 OK, pin reserved

# 14.2.4 ifx\_port\_free\_pin

## **Description**

Free port pin.

This functions frees a port pin and thus clears the entry in the usage map.

## **Prototype**

```
int ifx_port_free_pin (
          int port,
          int pin,
          int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be released
int	module_id	Module ID to identify the owner of a pin

#### **Return Values**

Data Type	Description
int	-EBUSY Pin used by another module than the given ID.
	-EINVAL Invalid port or pin provided.
	0 OK, pin freed

CONFIDENTIAL Parallel Port Support

# 14.2.5 ifx\_port\_set\_open\_drain

## **Description**

Enable Open Drain for given pin.

This function sets Open Drain mode for the given pin.

## **Prototype**

```
int ifx_port_set_open_drain (
        int port,
        int pin,
        int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

### **Return Values**

Description	
-EBUSY Pin used by another module than the given ID.	
-EINVAL Invalid port or pin provided.	
-ERESTARTSYS Another instance is using the driver.	
0 OK, pin freed	

# 14.2.6 ifx\_port\_clear\_open\_drain

#### **Description**

Disable Open Drain for given pin.

This function clears Open Drain mode for the given pin.

### **Prototype**

```
int ifx_port_clear_open_drain (
    int port,
    int pin,
    int module_id );
```

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin



**Parallel Port Support** 

## **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	-ERESTARTSYS Another instance is using the driver.	
	0 OK, pin freed	

## 14.2.7 ifx\_port\_set\_puden

#### **Description**

Set PUDEN bit for given pin.

This function sets the PUDEN bit for the given pin.

## **Prototype**

```
int ifx_port_set_puden (
          int port,
          int pin,
          int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

### **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	-ERESTARTSYS Another instance is using the driver.	
	0 OK, pin freed	

# 14.2.8 ifx\_port\_clear\_puden

## **Description**

Disable PUDEN bit for given pin.

This function clears the PUDEN bit for the given pin.

```
int ifx_port_clear_puden (
          int port,
          int pin,
          int module_id );
```



CONFIDENTIAL Parallel Port Support

### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

### **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	-ERESTARTSYS Another instance is using the driver.	
	0 OK, pin freed	

# 14.2.9 ifx\_port\_set\_stoff

### **Description**

Enable Schmitt Trigger for given pin.

This function enables the Schmitt Trigger for the given pin.

# **Prototype**

```
int ifx_port_set_stoff (
          int port,
          int pin,
          int module_id );
```

## **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

#### **Return Values**

Data Type	Description
int	-EBUSY Pin used by another module than the given ID.
	-EINVAL Invalid port or pin provided.
	-ERESTARTSYS Another instance is using the driver.
	0 OK, pin freed

# 14.2.10 ifx\_port\_clear\_stoff

## **Description**

Disable Schmitt Trigger for given pin.



**Parallel Port Support** 

This function disables the Schmitt Trigger for the given pin.

## **Prototype**

```
int ifx_port_clear_stoff (
          int port,
          int pin,
          int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

#### **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	-ERESTARTSYS Another instance is using the driver.	
	0 OK, pin freed	

# 14.2.11 ifx\_port\_set\_dir\_out

## **Description**

Set direction to output for given pin.

This function sets the direction for the given pin to output.

## **Prototype**

```
int ifx_port_set_dir_out (
        int port,
        int pin,
        int module_id );
```

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin



**Parallel Port Support** 

### **Return Values**

Data Type	Description
int	-EBUSY Pin used by another module than the given ID.
	-EINVAL Invalid port or pin provided.
	-ERESTARTSYS Another instance is using the driver.
	0 OK, pin freed

## 14.2.12 ifx\_port\_set\_dir\_in

### **Description**

Set direction to input for given pin.

This function sets the direction for the given pin to input.

### **Prototype**

```
int ifx_port_set_dir_in (
        int port,
        int pin,
        int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

### **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	-ERESTARTSYS Another instance is using the driver.	
	0 OK, pin freed	

# 14.2.13 ifx\_port\_set\_output

## **Description**

Set output bit for given pin.

This function sets the output bit to 1 for the given pin.

```
int ifx_port_set_output (
        int port,
        int pin,
        int module_id );
```



**Parallel Port Support** 

### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

### **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	-ERESTARTSYS Another instance is using the driver.	
	0 OK, pin freed	

# 14.2.14 ifx\_port\_clear\_output

## **Description**

Clear output bit for given pin.

This function clears the output bit for the given pin.

## **Prototype**

```
int ifx_port_clear_output (
        int port,
        int pin,
        int module_id );
```

## **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

#### **Return Values**

Data Type	Description
int	-EBUSY Pin used by another module than the given ID.
	-EINVAL Invalid port or pin provided.
	-ERESTARTSYS Another instance is using the driver.
	0 OK, pin freed

# 14.2.15 ifx\_port\_get\_input

## **Description**

Get input bit for given pin.



**Parallel Port Support** 

This function gets the value of the given pin.

### **Prototype**

```
int ifx_port_get_input (
          int port,
          int pin,
          int module_id );
```

#### **Parameters**

Data Type	Name	Description
int	port	Port number
int	pin	Pin to be used
int	module_id	Module ID to identify the owner of a pin

#### **Return Values**

Data Type	Description	
int	-EBUSY Pin used by another module than the given ID.	
	-EINVAL Invalid port or pin provided.	
	0 OK, pin freed	

# 14.2.16 ifx\_port\_open

## **Description**

Open port device.

This function is called when the port device is opend and it will increase the usage counter.

## **Prototype**

```
int ifx_port_open (
         struct inode * inode,
         struct file * filep );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filep	File structure of device

# **Return Values**

Data Type	Description
int	OK OK, device opened

**Parallel Port Support** 

# 14.2.17 ifx\_port\_release

## **Description**

Release port device.

This function is called when the port device is closed and it will decrease the usage counter.

## **Prototype**

```
int ifx_port_release (
          struct inode * inode,
          struct file * filelp );
```

#### **Parameters**

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filelp	File structure of device

#### **Return Values**

Data Type	Description
int	0 OK, device opened

# 14.2.18 ifx\_port\_ioctl

## **Description**

Port driver IOCTL handler.

The following IOCTLs are supported for the port device. (All command use the arg parameter, which is an struct defining port, pin and value to use.)

- IFX\_PORT\_IOCPUDEN
- IFX\_PORT\_IOCDIR
- IFX PORT IOCOUTPUT
- IFX PORT IOCINPUT
- IFX\_PORT\_IOCOD
- IFX\_PORT\_IOCSTOFF

### **Prototype**

```
int ifx_port_ioctl (
    struct inode * inode,
    struct file * filp,
    unsigned int cmd,
    unsigned long arg );
```

Data Type	Name	Description
struct inode *	inode	Inode of device
struct file *	filp	File structure of device



**Parallel Port Support** 

Data Type	Name	Description
unsigned int	cmd	IOCTL command
unsigned long	arg	Argument for some IOCTL commands

### **Return Values**

Data Type	Description	
int	0 OK	
	-EINVAL An invalid command was specified	
	-EFAULT An error occured on accessing the argument	
	-ERESTARTSYS The port driver is currently busy.	

## 14.3 IOCTL Reference

This chapter contains the IOCTL reference.

Table 21 DefineOverview

Name	Description	
IFX_PORT_IOCOD	Sets/clears the open drain enable bit.	
IFX_PORT_IOCPUDEN Sets/clears the pull up/down enable bit.		
IFX_PORT_IOCSTOFF Sets/clears the schmitt trigger enable bit.		
IFX_PORT_IOCDIR Sets/clears the direction selection bit.		
IFX_PORT_IOCOUTPUT	Sets/clears the output value bit.	
IFX_PORT_IOCINPUT Reads the input value bit and stores it in arg->value.		

# 14.3.1 IFX\_PORT\_IOCOD

## **Prototype**

#define IFX\_PORT\_IOCOD \_IOW(IFX\_PORT\_IOC\_MAGIC,0,struct ifx\_port\_ioctl\_parm)

## **Parameters**

Data Type	Name	Description
IFX_PORT_IOCOD	_IOW(IFX_PORT_IOC_MAGI	Sets/clears the open drain enable bit.
	C,0,struct ifx_port_ioctl_parm)	

# 14.3.2 IFX\_PORT\_IOCPUDEN

### **Prototype**

#define IFX\_PORT\_IOCPUDEN \_IOW(IFX\_PORT\_IOC\_MAGIC,2,struct ifx\_port\_ioctl\_parm)

Data Type	Name	Description
IFX_PORT_IOCPUDEN	_IOW(IFX_PORT_IOC_MAGI	Sets/clears the pull up/down enable bit.
	C,2,struct ifx_port_ioctl_parm)	

CONFIDENTIAL Parallel Port Support

# 14.3.3 IFX\_PORT\_IOCSTOFF

## **Prototype**

#define IFX\_PORT\_IOCSTOFF \_IOW(IFX\_PORT\_IOC\_MAGIC,3,struct ifx\_port\_ioctl\_parm)

### **Parameters**

Data Type	Name	Description
IFX_PORT_IOCSTOFF	_IOW(IFX_PORT_IOC_MAGI	Sets/clears the schmitt trigger enable bit.
	C,3,struct ifx_port_ioctl_parm)	

## 14.3.4 IFX\_PORT\_IOCDIR

### **Prototype**

#define IFX\_PORT\_IOCDIR \_IOW(IFX\_PORT\_IOC\_MAGIC,4,struct ifx\_port\_ioctl\_parm)

#### **Parameters**

Data Type	Name	Description
IFX_PORT_IOCDIR	_IOW(IFX_PORT_IOC_MAGI	Sets/clears the direction selection bit.
	C,4,struct ifx_port_ioctl_parm)	

# 14.3.5 IFX\_PORT\_IOCOUTPUT

#### **Prototype**

#define IFX\_PORT\_IOCOUTPUT \_IOW(IFX\_PORT\_IOC\_MAGIC,5,struct ifx\_port\_ioctl\_parm)

## **Parameters**

Data Type	Name	Description
IFX_PORT_IOCOUTPUT	_IOW(IFX_PORT_IOC_MAGI	Sets/clears the output value bit.
	C,5,struct ifx_port_ioctl_parm)	

# 14.3.6 IFX\_PORT\_IOCINPUT

## **Prototype**

#define IFX\_PORT\_IOCINPUT \_IOWR(IFX\_PORT\_IOC\_MAGIC,6,struct ifx\_port\_ioctl\_parm)

Data Type	Name	Description
IFX_PORT_IOCINPUT	GIC,6,struct	Reads the input value bit and stores it in arg- >value.
	ifx_port_ioctl_parm)	

CONFIDENTIAL TAPI V3.x

## 15 TAPI V3.x

With the introduction of version 3.0, TAPI is able to support the VoIP function of multiple Infineon devices/families, including the latest IP-Phone device, VoIP processor and residential gateway SoC.

Infineon TAPI is implemented in two layers: TAPI High Level (HL), abstracting the features up to a none device specific level, and TAPI Low Level (LL) implementing the device specific part (for example HW/FW access).

TAPI is able of supporting multiple Infineon devices belonging to different families. The most noticeable architectural change in the TAPI V3.x is delivering TAPI HL as a separate driver, the TAPI LL is implemented in a separate binary per supported device.

Both control and data paths use TAPI interfaces. **Figure 4** provides an overview of the TAPI architecture, in the particular configuration two different Infineon devices are controlled by TAPI. As shown in the figure, three device drivers must be loaded. To be noted that some Infineon device drivers include device specific commands (such as device initialization) that, although not part of TAPI, are passed through the TAPI OS interface. A classification of TAPI and non-TAPI commands is done by the ioctl dispatcher (see **Figure 4**).

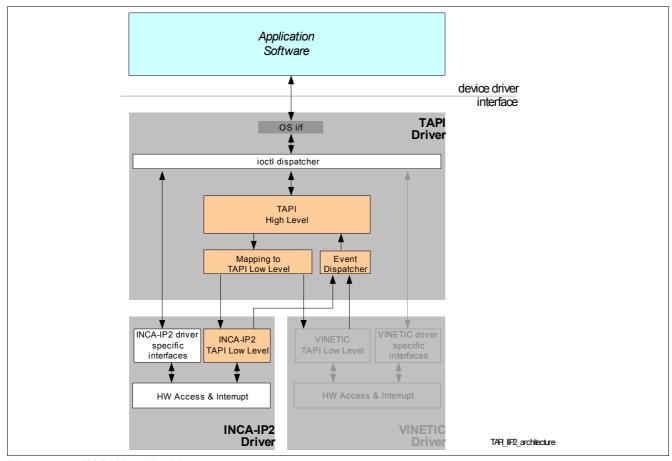


Figure 4 TAPI V3.x Architecture

#### 15.1 VMMC Interfaces Reference

# 15.1.1 FIO\_GET\_VERS

#### **Description**

Read relevant version information.



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## **Prototype**

```
void ioctl (
    int fd,
    FIO_GET_VERS,
    int param );
```

### **Parameters**

Data Type	Name	Description
int	fd	File descriptor
int	FIO_GET_VERS	I/O control identifier for this operation
VMMC_IO_VERSION*	param	Pointer to the struct containing the version
		information.

# 15.1.2 VMMC\_IO\_INIT

## **Description**

Structure used for device initialization

## **Prototype**

```
typedef struct
{
    unsigned char * pPRAMfw;
    unsigned long pram_size;
    unsigned char * pBBDbuf;
    unsigned long bbd_size;
    unsigned long nFlags;
    unsigned short nPhiCrc;
    unsigned short nDcCrc;
    unsigned short nAcCrc;
}
```

### **Parameters**

Data Type	Name	Description
unsigned char *	pPRAMfw	Firmware PRAM pointer or NULL if not needed.
unsigned long	pram_size	Size of PRAM firmware in bytes
unsigned char *	pBBDbuf	Pointer to block based download format data
unsigned long	bbd_size	Size of block based download buffer
unsigned long	nFlags	Flags for initialization. Reserved.

# 15.1.3 VMMC\_IO\_VERSION

## **Description**

Version Io structure.



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# **Prototype**

```
typedef struct
{
    unsigned char nType;
    unsigned char nChannel;
    unsigned short nChip;
    unsigned long nTapiVers;
    unsigned long nDrvVers;
    unsigned short nEdspVers;
    unsigned short nEdspIntern;
    unsigned short nDCCtrlVers;
}
```

Data Type	Name	Description
unsigned char	пТуре	Chip type
unsigned char	nChannel	Number of supported analog channels
unsigned short	nChip	
unsigned long	nTapiVers	Included TAPI version
unsigned long	nDrvVers	Driver version
unsigned short	nEdspVers	EDSP major version.
unsigned short	nEdspIntern	EDSP version step.
unsigned short	nDCCtrlVers	DC Ctrl version.

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