

TAPI

Telephone Application Programming Interface

Preliminary
User's Manual
Programmer's Reference
Revision 1.5

CONFIDENTIAL
Distribution with NDA only

Communication Solutions



Never stop thinking

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Page	Subjects (major changes since last revision)
Page 19	Chapter 1.2.1 , description of how to configure controller specific compiler options.
Page 22	Chapter 2.1 , added an important note on usage of ioctl parameters.
Page 22	Chapter 2.1.1 , added examples of device nodes for different systems.
Page 27	Chapter 2.2.2 , example of how to open file descriptors.
Page 30	Chapter 2.3.2 , added support of packet handling via Kernel Packet Interface (KPI).
Page 50	Chapter 2.9.1.2 , modified IP Phone in-call announcement to support OHVA feature.
Page 72	Chapter 3.2.4 , added notes on wideband support for IP Phone.
Page 99	Chapter 3.8.4 , CID RX example modified using event reporting interface.
Page 214	Added IFX_TAPI_AUDIO_AFE_CFG_SET ioctl.
Page 235	Chapter 4.2 , added KPI functions.
Page 340	Enum IFX_TAPI_MAP_TYPE_t enhanced to support audio diagnostics, audio loops.
	Important change: for IFX_TAPI_MAP_DATA_ADD and IFX_TAPI_MAP_DATA_REMOVE the mapping destination is selected out of enum IFX_TAPI_MAP_TYPE_t , this is the same enum used by all other IFX_TAPI_MAP_* ioctls. Backwards compatibility to the enum IFX_TAPI_MAP_DATA_TYPE is ensured via alias in TAPI.
	Correction throughout the document: the audio channel can be controlled only via channel file descriptors. Previous releases incorrectly documented that the audio channel can be controlled via device file descriptor

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Preface

This document describes the Infineon Telephone API (TAPI) driver usage.

Organization of this Document

This document is divided into 5 chapters. It is organized as follows:

- **Chapter 1, Development Environment Setup**
Overview of the TAPI device driver. Description of the device driver compilation and its configuration options.
- **Chapter 2, First Steps**
First steps necessary for software setup and TAPI usage for some basic operations.
- **Chapter 3, Feature Description**
Description of the TAPI services.
- **Chapter 4, TAPI Interfaces**
Reference for the TAPI interfaces.
- **Chapter 5, Operating System Porting**
Operating system porting guide for the TAPI driver.

Applicability to Infineon Products

The TAPI is a software layer used to control telephony features in Infineon products of the VINETIC® and DuSLIC® families as well as products including the Infineon voice engine (for example INCA-IP2, Danube and TwinPass-VE).

TAPI includes services common across all product lines as well as application specific services.

The description in **Chapter 2** and **Chapter 3** introduces a rough classification of the TAPI services, giving an explicit indication of the applicability to the different scenarios. For details on features supported for a specific product please refer to the product release note.

Code Examples

This document includes several fragments of C pseudo-code used to explain usage of the interfaces. Compilable C code and error checking has not been used in order to reduce the examples' complexity. Being written in pseudo-code format, the examples are not compilable.

1 Development Environment Setup

This chapter describes how to set up the TAPI software development environment.

1.1 Introduction to the TAPI V3.x

TAPI support has been 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).

With the introduction of version 3.0, TAPI is able to support¹⁾ the VoIP function on multiple Infineon devices/families, including the latest IP-Phone device, VoIP processor and residential gateway SoC.

The most noticeable architectural change in the TAPI V3.x is delivering TAPI HL as a separate²⁾ driver, the TAPI LL is implemented in a separate binary per supported device.

Both control and data paths use TAPI interfaces. [Figure 1](#) provides an overview of the TAPI architecture, in the particular configuration two different Infineon devices are controlled by TAPI³⁾. 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 TAPI⁴⁾, are passed through the TAPI OS interface. A classification of TAPI and non-TAPI commands is done by the ioctl dispatcher (see [Figure 1](#)).

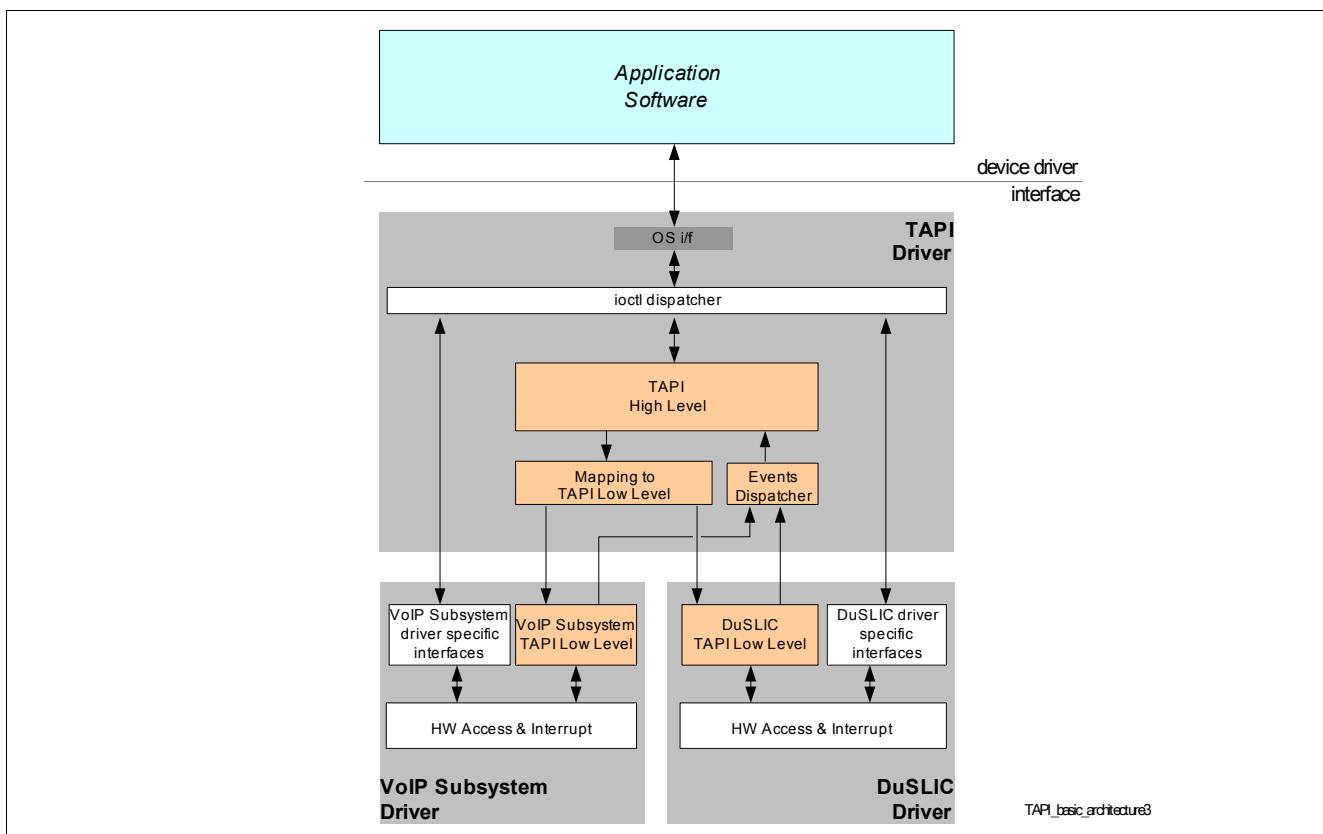


Figure 1 TAPI V3.x Architecture

- 1) TAPI V2.x supported only devices of the VINETIC family.
- 2) In TAPI V2.x HL and LL part were implemented in a unique binary.
- 3) TAPI controls the telephony features of the Infineon device.
- 4) And for this reason not described in this document, please refer to the device specific documentation.

1.2 Compilation

This chapter describes how to compile the TAPI device driver for Linux® (kernel 2.4 and 2.6, see also **Table 1**) and VxWorks® (version 5.4). For Linux®, the GNU toolchain (autoconf, automake) is used. For VxWorks®, the Tornado project files are required.

To retrieve the device driver sources and to obtain the execution rights and directory structure, the following command has to be used. It will extract all sources into a subdirectory.

```
tar xvzf drv_tapi-3.x.x.x.tar.gz
```

In addition to the tar.gz distribution package, Infineon ships the code in self extracting packages `drv_tapi_xxx.sh` to ensure the acceptance of the IFX SLA (Software Licence Agreement).

1.2.1 Linux®

Building the device driver is done in two steps:

- Go to the directory where you extracted the sources and type in `./configure` with the options described in **Table 1** and then
- Execute `make` or `make install`

Prerequisite are: the toolchain is in place, the path to the cross-compiler is included in the PATH and the availability of path to the Linux® kernel header files.

Starting from TAPI V3.6 the controller specific compiler options are removed from the configure file. The controller specific compiler option must be explicitly given using `--with-cflags=""`.

Example for Danube: `--with-cflags="-fno-pic -mno-abicalls -mlong-calls -mips32 -G 0"`

Example for MPC: `--with-cflags="-fno-strict-aliasing -fno-common -fomit-frame-pointer"`

Attention: Linux 2.6 configure must not be called with an absolute path.

Table 1 Linux® Compiler Flags

Option	Description	Required
<code>--enable-linux-26</code>	Support for kernel 2.6	Always for Kernel 2.6
<code>--enable-kernelbuild</code>	Set the Linux® 2.6 kernel build directory path.	Always for Kernel 2.6
<code>--enable-kernelincl</code>	Set the Linux® kernel include path.	Always
<code>--enable-debug</code>	Enable/disable debug messages.	Optional
<code>--disable-debug</code>		
<code>--enable-lt</code>	Enable/disable TAPI line testing services	Optional
<code>--disable-lt</code>		
<code>--enable-voice</code>	Enable/disable TAPI Voice support. ¹⁾	Optional
<code>--disable-voice</code>		
<code>--enable-dtmf</code>	Enable/disable TAPI DTMF detection support. ¹⁾	Optional
<code>--disable-dtmf</code>		
<code>--enable-cid</code>	Enable/disable TAPI Caller ID support. ¹⁾	Optional
<code>--disable-cid</code>		
<code>--enable-fax</code>	Enable/disable TAPI T.38 FAX support. ¹⁾	Optional
<code>--disable-fax</code>		
<code>--enable-kpi</code>	Enable support of TAPI KPI.	Optional
<code>--enable-extkeypad</code>	Enable TAPI EXT KEYPAD support. <i>Note: Valid only for IP Phone applications.</i>	Optional
<code>--enable-audioch</code>	Enable TAPI AUDIO CHANNEL support. <i>Note: Valid only for IP Phone applications.</i>	Optional

Table 1 Linux® Compiler Flags (cont'd)

Option	Description	Required
--enable-udp-redirect	Enable QoS - quality of service and UDP redirection.	Optional
--enable-trace	Enable runtime traces.	Optional
--enable-obsolete-lec-activation	Activate default mapping and activation of LEC on TAPI Channel Init (to be used for backward compatibility to TAPI versions up to V3.2).	Optional

1) Per default voice, dtmf, cid and fax are enabled. This will change in a next TAPI version.

1.2.1.1 Loading of the TAPI Modules and Registration

TAPI driver and low-level device drivers (including TAPI LL) are defined to be implemented as kernel modules, which can be inserted or removed from the kernel dynamically. The device drivers must be loaded after the High Level TAPI is loaded.

On insmod the version information of the device driver is displayed on the console.

If CONFIG_DEVFS_FS is supported, device nodes are created by the High Level TAPI on insmod of the low-level driver. The template is /dev/<devName>/<deviceNumber><channelNumber>

Example - Registration

```
/* TAPI Module is built as "drv_tapi" */
# insmod drv_tapi

/* Now load TAPI LL part with default parameters: */
/* Use default major number and device node name */
/* drv_vmmc is the TAPI LL for the VoIP subsystem */
# insmod drv_vmmc

/* As alternative, TAPI LL is loaded using customer parameters */
/* major = device driver major number */
/* devName = device node name to be used */
# insmod drv_vmmc major=244 devName=vmmc
```

1.2.1.2 Support of proc File System

If CONFIG_PROC_FS is supported, the proc file system reports the list of successfully registered low-level device drivers and version of the TAPI.

Example - Proc File System

```
/* Retrieves the registered low level drivers, example */
# cat /proc/driver/tapi/registered_drivers

Driver          version      major   devices      devname
=====
VMMC           0.9.2.2     230       1           /dev/vmmc

/* Retrieves the version information of High Level TAPI, example */
# cat /proc/driver/tapi/version
TAPI Driver, Version 3.2.0.1
Compiled on Feb 20 2006, 16:58:09 for Linux kernel 2.4.31-tqm-dpram-ralph
```

1.2.2 VxWorks®

It is expected that user has knowledge about Tornado (compiling, configuring, using target server, tftp, etc.) and that VxWorks sources are available.

Building image:

- Projects `drv_vinetic` (TAPI low-level) and `drv_tapi` (TAPI high level) are configured with [Table 2](#) compiler flags
- Add `drv_vinetic.wpj` and `drv_tapi.wpj` to the workspace and build. Link the resulting `.a` files to the bootable kernel image.

Table 2 VxWorks® Compiler Flags¹⁾²⁾

Flag	Description	Required
<code>-DTAPI</code>	Enable TAPI Interface.	Always
<code>-DTAPI_DTMF</code>	Enable/disable TAPI DTMF detection support.	Optional
<code>-DTAPI_CID</code>	Enable/disable TAPI Caller ID support.	Optional
<code>-DTAPI_VOICE</code>	Enable/disable TAPI Voice support.	Optional
<code>-DTAPI_FAX_T38</code>	Enable/disable TAPI T.38 FAX support.	Optional
<code>-DTAPI_LT</code>	Enable/disable TAPI line testing services.	Optional
<code>-DTAPI_GR909</code>	Enable TAPI GR-909 tests.	Optional
<code>-DKPI_SUPPORT</code>	Enable support of TAPI KPI.	Optional
<code>-DTAPI_EXT_KEYPAD</code>	Enable TAPI EXT KEYPAD support.	Optional
<code>-DTAPI_AUDIO_CHANNEL</code>	Enable TAPI AUDIO CHANNEL support.	Optional
<code>-DDEBUG</code>	Enable debug messages.	Optional
<code>-DENABLE_TRACE</code>	Enable trace outputs in general.	Optional
<code>-DRUNTIME_TRACE</code>	Enable runtime traces.	Optional
<code>-DENABLE_LOG</code>	Enable log (errors) outputs in general.	Optional
<code>-DTAPI_POLL</code>	Enable polling support. Important - the corresponding low-level device drivers have to be compiled with <code>-DTAPI_POLL</code> as well.	Optional

1) Here only flags for compiling the driver are described, not VxWorks® related flags.

2) If flag is not present then feature is disabled.

1.2.3 GR-909 Support

The GR-909 functionality is delivered in a separate library (`lib_tapi_lt_vincpe.c`, `lib_tapi_lt_gr909.h`) to allow also floating point calculations of the results which is not possible on driver level for some operating systems. To enable GR-909 support in the device driver, configure option `--enable-Lt` or the equivalent define shall be used (see compiler flags defined in [Table 1](#) and [Table 2](#)).

1.2.4 FXO Support

In order to use FXO features, the user has to load a board specific plugin for TAPI called `drv_daa`. It contains the implementation of state machines for Clare Litelink as well as the board specific pin mapping in the files `drv_daa_board_xxxx.c|h`. The code provides an explanation and examples to adapt it to a customer specific system.

2 First Steps

The topics described in this chapters are listed in [Table 3](#).

This chapter introduces the first steps using the device driver interfaces, from the initialization of the device driver to some simple connection scenarios. A series of commented code examples are given to demonstrate the usage of the driver interfaces.

Table 3 Topics of Chapter 2

Topic	Chapter	Applicability
Driver Interfaces.	Chapter 2.1	All type of applications.
Initialization of TAPI channels.	Chapter 2.2	All type of applications.
Interrupt and Polling Access. Details on packet handling.	Chapter 2.3	All type of applications.
Set-up line type (FXS or FXO).	Chapter 2.4	For ATA, and Gateway applications.
Set-up line feeding modes.	Chapter 2.5	For ATA, and Gateway applications.
Set-up audio modes (handset, headset, etc.) and acoustic echo canceller optimization.	Chapter 2.6	IP Phone application.
Events reporting.	Chapter 2.7	All type of applications.
Configure Hook, Pulse and DTMF detection parameters.	Chapter 2.8	For ATA and Gateway applications.
Prepare device resources for basic calls.	Chapter 2.9	All type of applications.
Establishment of conferences.	Chapter 2.10	All type of applications.

2.1 Driver Interfaces

Communication between application software and the driver is achieved through character device driver interfaces calls performed on specific file descriptors.

File descriptors are obtained through the POSIX-compliant open system call whose arguments specify the pathname to the device/channel special device file one wants to access.

The driver implements the following interfaces:

- Open/close, to get/release a file descriptor, see also [Chapter 2.1.1](#) and [Chapter 2.1.2](#).
- Select, to block on interrupts/events, see also [Chapter 2.3.1](#).
- Read/write, to receive/send packets from/to the device in interrupt mode, see also [Chapter 2.3.1](#).
- ioctl, to configure and control the device. [Chapter 2](#) and [Chapter 3](#) describe how to use the ioctl commands. A reference of all supported commands is given in [Chapter 4.1](#).

Attention: *Enumeration constants are defined to be used as parameters for a large part of the TAPI ioctls.*

Please refer to the present document (and especially to the API reference, [Chapter 4.1](#)) to know whether enumerations are defined for the used ioctls. It is recommended to use enumeration constants where possible since this practice is essential to ensure software compatibility across TAPI releases: TAPI internally makes extensive use of enumeration however its numerical value is not considered and can change from release to release. Backwards compatibility is guaranteed only when using enumeration constants!

2.1.1 File Descriptors

Two types of file descriptors are defined: device-specific and channel-specific. As the name suggests, the device file descriptors (one per device) are used for device-wide control, whereas the channel file descriptors (one per device channel) are for channel-specific actions, a channel being a subset of the available device hardware and firmware resources.

The driver can handle one or more devices connected to the same host controller, several device nodes are specified to give the programmer the ability to address a specific device and its channels.

The channel file descriptor addresses a given device channel, **Table 1** shows an example of mapping resources-device nodes for a driver controlling two devices. Different channel-file descriptors address different resource sets, reflecting the modular nature of the products.

The device-specific nodes are of the format “/dev/devnameX0”, where X corresponds to the device number. These device nodes are used for controlling the device as a whole. For example, in a system with two devices, /dev/devname10 addresses device number 1 and /dev/devname20 addresses device number 2.

The channel-specific nodes are of the format “/dev/devnameXY”, addressing device number X, channel Y. For example, in a system with two devices, /dev/devname11 addresses device number 1/channel 1 and /dev/devname23 addresses device number 2 channel 3.

A channel file descriptor must be opened for read and write access, implementing packet upstream and packet downstream. Exceptions are reported on the device file descriptors via interface **IFX_TAPI_EVENT_GET**.

Some examples of device nodes/file descriptors

- Two ports¹⁾ ATA/Gateway using Danube: See **Table 4** and **Figure 2**.
- Two ports ATA/Gateway using VINETIC-2CPE: See **Table 5** and **Figure 2**.
- IP Phones using INCA-IP2: See **Table 1** and **Figure 3**.

Table 4 Device Nodes for a Danube System

Device Node	Device Number	Addressed Channel	Included Resources
/dev/vmmc10	Danube Device 1	Entire device	Voice engine
/dev/vmmc11	Danube Device 1	Channel 1	ALM0, SIG0, COD0, PCM0 resources
/dev/vmmc12	Danube Device 1	Channel 2	ALM1, SIG1, COD1, PCM1 resources
/dev/vmmc13	Danube Device 1	Channel 3	SIG2, COD2, PCM2 resources
/dev/vmmc14	Danube Device 1	Channel 4	SIG3, COD3, PCM3 resources
/dev/vmmc15	Danube Device 1	Channel 5	PCM4 resource
/dev/vmmc16	Danube Device 1	Channel 6	PCM5 resource
/dev/vmmc17	Danube Device 1	Channel 7	PCM6 resource
/dev/vmmc18	Danube Device 1	Channel 8	PCM7 resource

Table 5 Device Nodes for a VINETIC-2CPE System

Device Node	Device Number	Addressed Channel	Included Resources
/dev/vin10	VINETIC Device 1	Entire device	Voice engine
/dev/vin11	VINETIC Device 1	Channel 1	ALM0, SIG0, COD0, PCM0 resources
/dev/vin12	VINETIC Device 1	Channel 2	ALM1, SIG1, COD1, PCM1 resources
/dev/vin13	VINETIC Device 1	Channel 3	SIG2, COD2, PCM2 resources
/dev/vin14	VINETIC Device 1	Channel 4	SIG3, COD3, PCM3 resources
/dev/vin15	VINETIC Device 1	Channel 5	PCM4 resource
/dev/vin16	VINETIC Device 1	Channel 6	PCM5 resource
/dev/vin17	VINETIC Device 1	Channel 7	PCM6 resource
/dev/vin18	VINETIC Device 1	Channel 8	PCM7 resource

1) For this and the following example, analog ports is meant: FXS with/without FXO.

Table 6 Device Nodes for an INCA-IP2 System

Device Node	Device Number	Addressed Channel	Included Resources
/dev/vmmc10	INCA-IP2 Device 1	Entire device	Voice engine
/dev/vmmc11	INCA-IP2 Device 1	Channel 1	AUDIO, SIG0, COD0, PCM0 resources
/dev/vmmc12	INCA-IP2 Device 1	Channel 2	SIG1, COD1, PCM1 resources
/dev/vmmc13	INCA-IP2 Device 1	Channel 3	SIG2, COD2, PCM2 resources
/dev/vmmc14	INCA-IP2 Device 1	Channel 4	SIG3, COD3, PCM3 resources

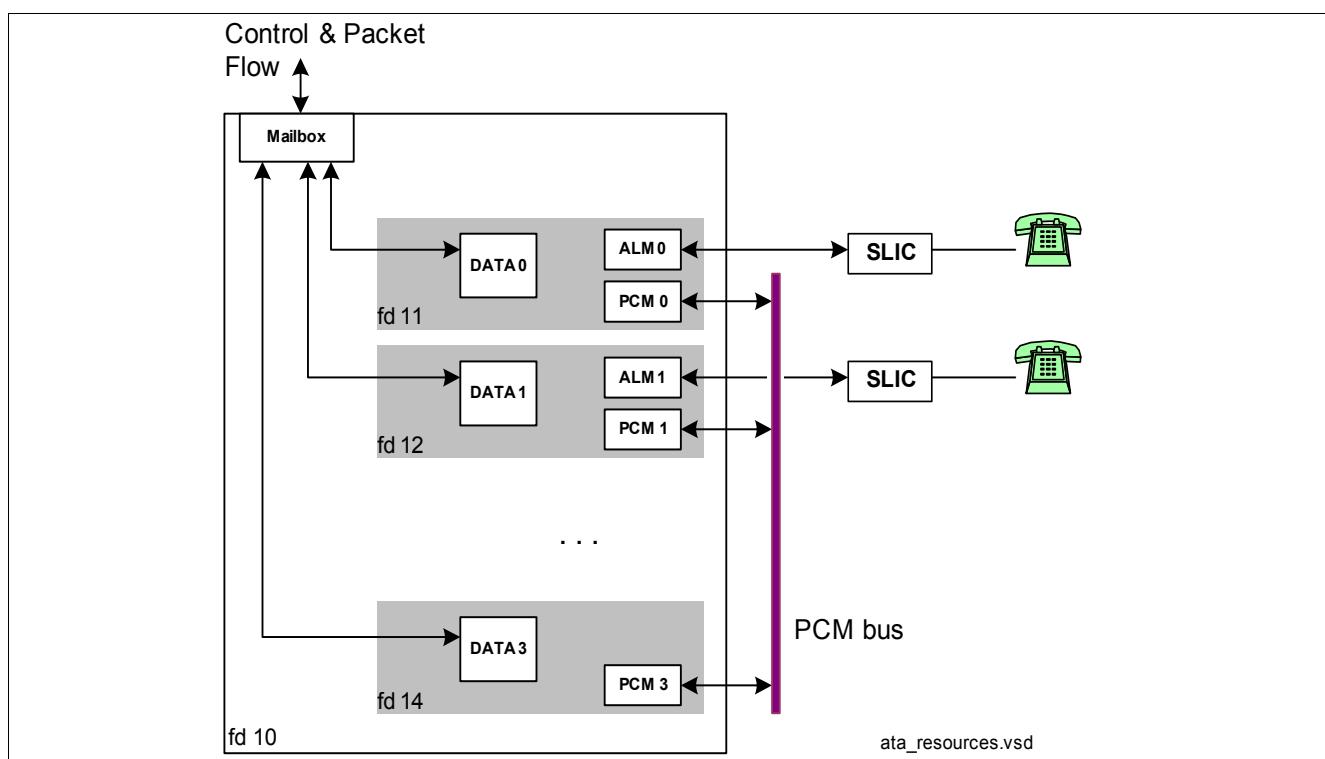


Figure 2 File Descriptors Example for a Danube/VINETIC-2CPE based ATA

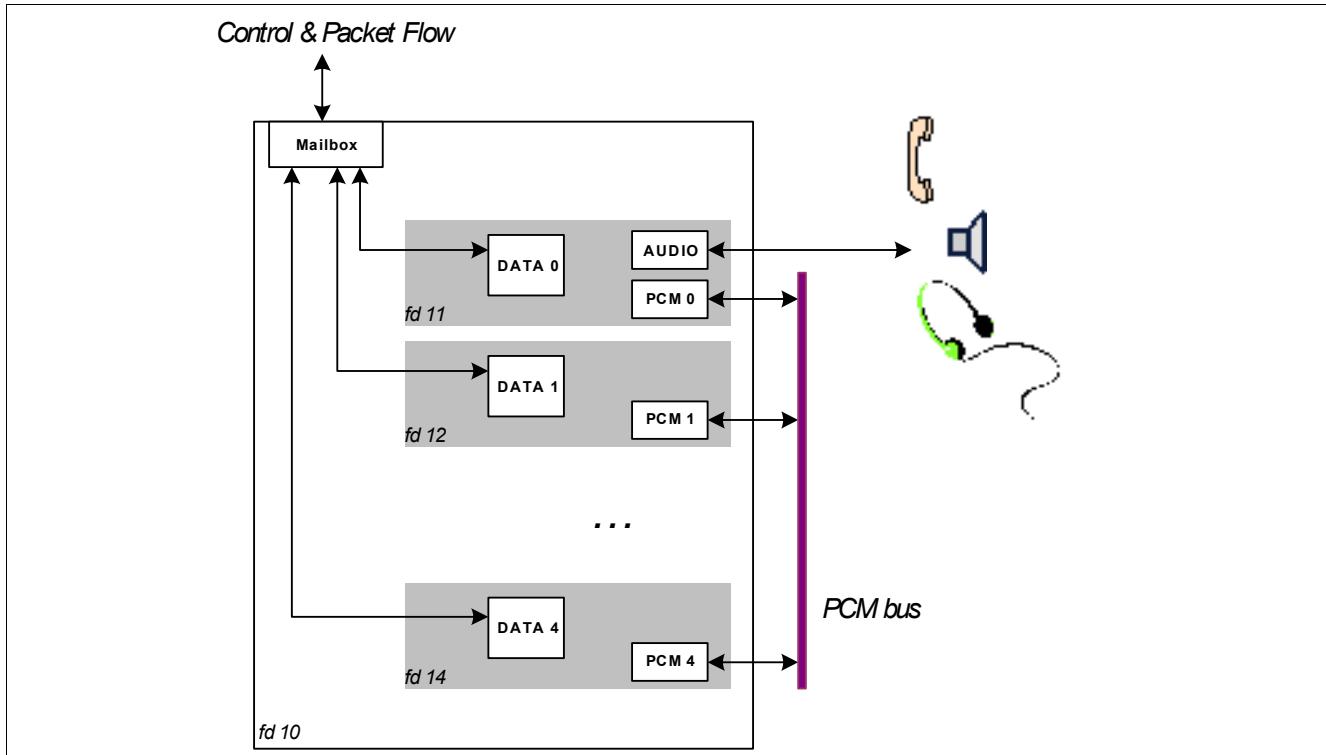


Figure 3 File Descriptors Example for an INCA-IP2 based IP Phone

2.1.2 Phone and Data Channel Resources

Within a channel, a distinction is made between “data channel” resources, in charge of complex signal processing (such as speech compression, signal generation/detection) and packetization, and “phone channel” resources, seen as a kind of I/O port for the digitalized voice.

For ATA, and VoIP Gateway applications PCM and analog line module (alias ALM) resources belong to phone channels while SIG and COD resources belong to data channels. See [Figure 2](#) for an example of ATA/Gateway file descriptors and addressed resources.

It is important to note that not all Infineon products contain data channel resources (COD and SIG). Data channels are available in Infineon devices including codec and packetized voice functionality¹⁾.

Unlike IP Phone, an Audio Channel is available instead of the ALMs. See [Figure 3](#) for an example of IP Phone file descriptors and addressed resources.

Data channel and Phone concept allows an effective usage of the device resources: the modular architecture permits to decouple data channel resources from phone channel resources within the same channel. This results in the possibility that any data channel can be linked to any other phone channel (see also example in [Figure 5](#)).

The selection of hardware and firmware modules is done indirectly through the ioctl interface issued for the given file descriptor. For example, command `IFX_TAPI_ENC_START` applies only to data channels, while `IFX_TAPI_LINE_FEED_SET` and `IFX_TAPI_PCM_CFG_SET` apply to phone channels (respectively ALM and PCM resources). [Chapter 4](#), in the reference description of each TAPI command, states whether a command must be applied to a data or phone channel.

Examples in [Figure 4](#) and [Figure 5](#) show two possible ways (for ATA and VoIP Gateway applications) of linking phone channels to data channels while implementing the same application scenario (two parallel calls involving local phone to VoIP party).

1) Such as VINETIC®-CPE and Danube. Devices of the DuSLIC® family do not include data channels.

In the example in [Figure 4](#), phone and data channels used by both voice calls belong to the same VINETIC® channel. It means that for handling of voice call, an **IFX_TAPI_ENC_START** and **IFX_TAPI_LINE_FEED_SET** will apply to the same file descriptor (fd0). In a similar fashion, voice call B is handled only using file descriptor (fd1).

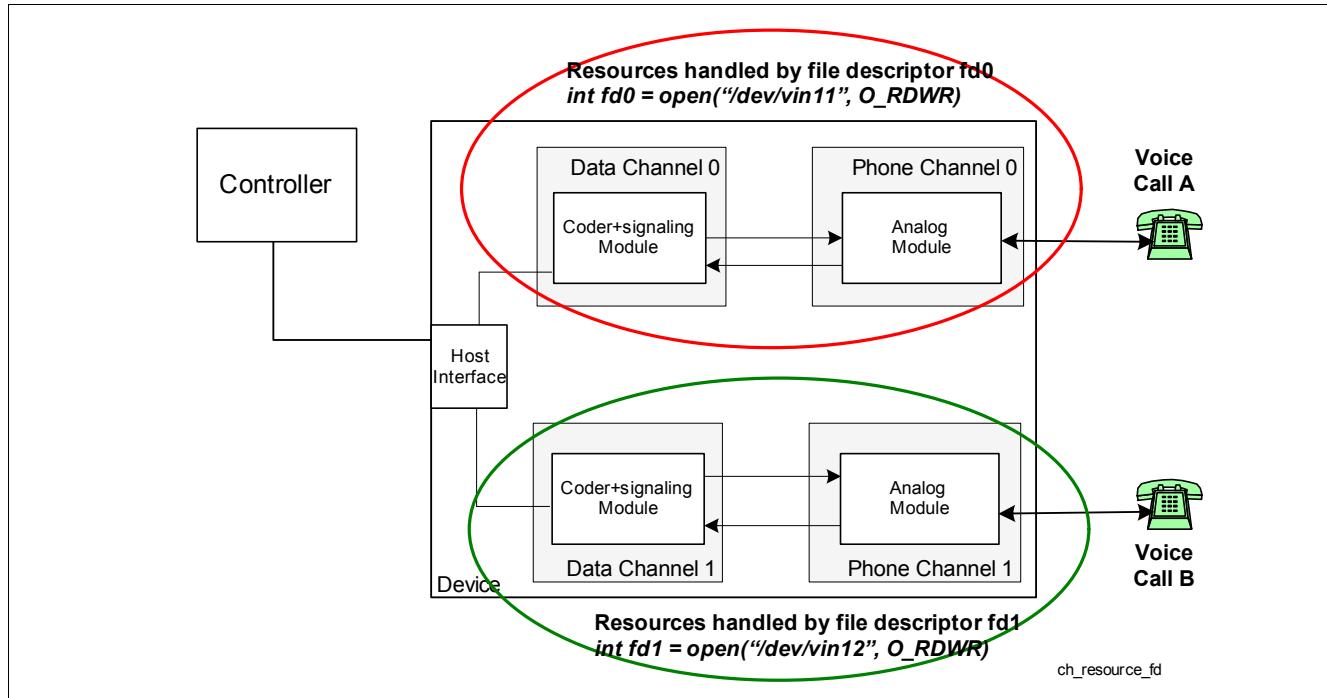


Figure 4 Example of File Descriptors and Resources (1)

In the example shown in [Figure 5](#), voice call A involves phone channel 0 and data channel 1. It means that for configuring voice call A, command **IFX_TAPI_ENC_START** must be issued on fd1 (to use data channel 1) and command **IFX_TAPI_LINE_FEED_SET** must be applied on fd0 (to use phone channel 0). The same principle applies to voice call B: phone channel commands must use fd1 and data channel commands must use fd0.

For information about linking of phone and data resources, please refer to [Chapter 2.9](#).

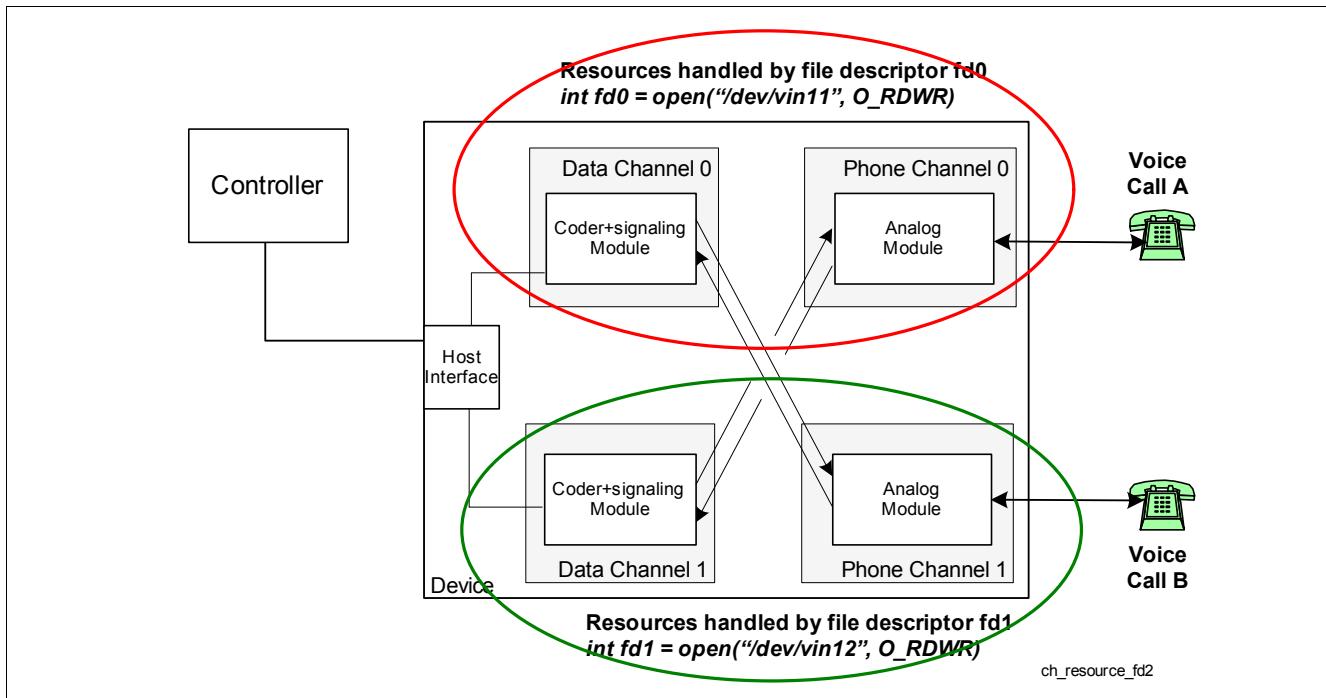


Figure 5 Example of File Descriptors and Resources (2)

2.2 Initialization

The foundation for all subsequent operations is the successful initialization of the device driver and the device itself. First operation is a device driver “open” on the device configuration node as well as on the channel nodes to initialize for further utilization.

2.2.1 Basic Device Driver Init

At compile time, the driver is configured with details about the access mode, and the number of devices in the system. Configuration of device base address and the interrupt line to attach its interrupt handler to, is done using device driver services. For more details please refer to the product device driver documentation.

2.2.2 Open File Descriptors

The following example shows how to get file descriptors..

Example - Open File Descriptors

```
/* The example is valid for a system containing a Danube + DuSLIC */

IFX_int32_t fd_vmmc_dev, fd_vmmc[4], fd_vmmc_dus, fd_dus[2];

/* File descriptors for the VoIP subsystem: 1 device fd and 4 channel fds */
fd_vmmc_dev = open("/dev/vmmc10", O_RDWR);
fd_vmmc[0] = open("/dev/vmmc11", O_RDWR);
fd_vmmc[1] = open("/dev/vmmc12", O_RDWR);
fd_vmmc[2] = open("/dev/vmmc13", O_RDWR);
fd_vmmc[3] = open("/dev/vmmc14", O_RDWR);

/* File descriptors for the DuSLIC: 1 device fd and 2 channel fds */
fd_dus_dev = open("/dev/dus10", O_RDWR);
```

```
fd_dus[0] = open( "/dev/dus11" , O_RDWR) ;  
fd_dus[1] = open( "/dev/dus12" , O_RDWR) ;
```

2.2.3 TAPI Channel Initialization

The channel initialization is done with command **IFX_TAPI_CH_INIT**, the argument is a pointer to **IFX_TAPI_CH_INIT_t**. It is necessary to configure:

- nMode: valid TAPI channel type is **IFX_TAPI_INIT_MODE_VOICE_CODER**. This configuration has to be done for each channel.
- pProc: a pointer to device-specific initialization details (depending on the device type, for example structure **VMMC_IO_INIT** for INCA-IP2) taking optionally as parameters the binaries for firmware and block based download (BBD) files.
 - Firmware download: issued only one time after device reset.
 - BBD files for ATA and VoIP Gateway: these contain coefficients that are dependent on SLIC/DAA and line type; it is possible to download a different set of coefficients per channel. This operation¹⁾ is defined only for channels including an analog port.
 - BBD files for IP Phone applications: optimized audio coefficients and volume levels

Attention: After the initialization of each channel (**IFX_TAPI_CH_INIT**), by default, TAPI versions until V3.2 connected a data channel to each analog/audio channel and enable detection of DTMF tones. Current TAPI implementation does not connect by default the data channels and enable tone detection²⁾. Please refer to [Chapter 2.9](#) for examples of how to prepare the channels for different application scenarios.

2.3 Interrupt and Polling Access, Packet Handling

TAPI implements packet handling and event reporting in interrupt and in polling access mode, the support of one or both modes depends on the accessed device³⁾. Usage of polling access mode is recommended in order to reduce the overall system interrupt load, for product implementations with a relatively⁴⁾ high number of devices/channels to be handled by TAPI.

In interrupt mode packets are exchanged with the application software using the read/write system calls. Interrupts are handled by a interrupt routine in TAPI low-level driver and reported to the application via file descriptors. The application software can make use of the select mechanism to be notified on asynchronous events.

- Interrupts reported on channel file descriptors indicate that a packet is ready to be read. For a description of the packet handling in interrupt mode see also [Chapter 2.3.1](#).
- Interrupts reported on device file descriptors indicate that one or more events have occurred (for example off-hook or tone detected) and can be read using the event reporting interfaces. For a description of the event reporting interfaces see also [Chapter 2.7](#).

In polling access mode the application software has to poll the devices in regular intervals to read/write packets⁵⁾ (see [Chapter 2.3.3](#)) and to read events (see [Chapter 2.7](#)). The devices to be polled have to be registered using **IFX_TAPI_POLL_DEV_ADD**, and a device can be unregistered using **IFX_TAPI_POLL_DEV_REM**.

1) **IFX_TAPI_CH_INIT** should be executed only while the analog line is in on-hook state.

2) Nevertheless a compiler option (see [Chapter 1.2](#)) is available to ensure backwards compatibility.

3) Please refer to the device system release notes to know whether the device supports polling access.

4) The number of device/channels can not be stated a priori, it depends on: application type, operating system, CPU performance, system load due to tasks running in parallel, etc.

5) It is applicable only to Infineon products supporting packetization.

Table 7 Topics of this Chapter

Topic	Chapter	Note
Packet Handling in Linux User Space	Chapter 2.3.1	
Example - Packet Handling in Linux Kernel Space (KPI)	Chapter 2.3.2	
Packet Handling in Polling Mode	Chapter 2.3.3	

2.3.1 Packet Handling in Linux User Space

Packet handling (RTP and T.38 data pump) is done via read/write system calls, to be noted that these are non blocking interfaces.

The file descriptor specifies which channel is used. It is important to note that, in the RTP case, buf is a pointer to a complete RTP frame (including header). [Table 8](#) explains the meaning of the possible read/write return values. The following example shows an example of read/write usage, with a simple read-write loop.

Table 8 Meaning of the read/write Return Values

ret	ret = read(fd, buf, bufsize)	ret = write(fd, buf, len)
ret > 0	ret = number of read bytes	ret = number of written bytes
ret == 0	No packets are available for read operation.	Zero bytes written to the device ¹⁾ .
ret == IFX_ERROR	Read error.	Write error.

- 1) For example because of a temporary mailbox congestion, in case a burst of packets are written to the mailbox. The application software has to decide whether to drop or re-send a packet after a minimum of 1 ms. The mailbox condition is also notified to the application by event [IFX_TAPI_EVENT_INFO_MBX_CONGESTION](#).

Attention: Products of the INCA-IP2 and Danube/TwinPass families erroneously returned [IFX_ERROR](#) in case of mailbox congestion, in TAPI versions until 3.5.1. This behavior has been corrected in TAPI version 3.5.2 and newer: if a mailbox congestion occurs, write() returns 0 and an event will be reported ([IFX_TAPI_EVENT_INFO_MBX_CONGESTION](#)). See also [Table 8](#).

Example - Packet Handling in Interrupt Mode

```
IFX_int32_t len, ret;

while (1)
{
    /* Now wait for data */
    memcpy((void*)&trfds, (void*)&rfds, sizeof(fd_set));
    select(width + 1, &trfds, IFX_NULL, IFX_NULL, IFX_NULL);

    if (FD_ISSET(fd[0], &trfds))
    {
        /* Read packet from channel 0 and sent it to local channel 1 */
        len = read(fd[0], buf, sizeof(buf));
        if (len == IFX\_ERROR)
        {
            printf("Packet read error\n");
        }
        if (len > 0)
        {
            ret = write(fd[1], buf, len);
        }
    }
}
```

```
    if (ret == IFX_ERROR)
    {
        printf("Packet write error\n");
    }
}

if (FD_ISSET(fd[1], &trfds))
{
    /* Read packet from channel 1 and send it to local channel 0 */
    len = read(fd[1], buf, sizeof(buf));
    if (len == IFX_ERROR)
    {
        printf("Packet read error\n");
    }
    if (len > 0)
    {
        ret = write(fd[0], buf, len);
        if (ret == IFX_ERROR)
        {
            printf("Packet write error\n");
        }
    }
}

} /* while */;
```

2.3.2 Packet Handling in Linux Kernel Space (KPI)

The main idea behind the TAPI Kernel Packet Interface (KPI) is to provide a packet exchange interface between TAPI and a so called KPI client, a Linux kernel thread. TAPI KPI allows contemporary access from multiple KPI clients. Packet exchange via TAPI KPI is more efficient than using char driver read/write interfaces: packet exchange is done via kernel function interfaces instead of using system calls.

2.3.2.1 KPI Groups and Channels

The packet exchange between TAPI KPI and KPI clients is based on the concept of KPI groups and channels. Each KPI client can access TAPI via one dedicated pool of KPI channels, these are bundled in a so called KPI group. 15 KPI groups are defined¹⁾: IFX_TAPI_KPI_GROUP1 to IFX_TAPI_KPI_GROUP15.

Each KPI group supports multiple channels (=multiple packet flows), the channels are defined as following

```
KPIchannel1 = IFX_TAPI_KPI_GROUP1 | 0;
KPIchannel2 = IFX_TAPI_KPI_GROUP1 | 1;
KPIchannel3 = IFX_TAPI_KPI_GROUP1 | 2;
KPIchannel4 = IFX_TAPI_KPI_GROUP1 | 3;
```

Each KPI channel can be used for a full duplex packet exchange. KPI channels are “virtual channels” defined only for Linux kernel access, a KPI channel might address any COD/DECT resource provided by the Infineon devices.

It is important to note that

- A defined KPI group number should be reserved only to one KPI client.
- All channels belonging to a KPI group should address the same resource type: COD or DECT.

1) 15 is the maximum number defined, nevertheless a typical application may support only one or two KPI groups.

2.3.2.2 Link TAPI Channels to KPI Channels

Before starting any packet flow using KPI it is essential to map the relevant FW resources (addressed by TAPI channels) to KPI channels. To be noted that one KPI channel can be used to handle packetization coming/directed to one COD or DECT resource.

The logical link between a FW resource and a KPI channel is done using ioctl **IFX_TAPI_KPI_CH_CFG_SET**.

See also the following example.

Example - Link TAPI Channels to KPI Channels

```
/* Configure channel referred by fd03 (/dev/vmmc13) */
/* with the correct KPI channels. */
/* In the example, for Danube, /dev/vmmc13 contains the resources
   COD2+SIG2 (data channel 2), ALM2, PCM2 and DECT2 */

/* Assuming that two kernel threads (KPI clients) are using KPI: */
/* One KPI client for RTP packet flow to/from IP stack, IFX_TAPI_KPI_GROUP1 */
/* One KPI client for communication to the DECT, IFX_TAPI_KPI_GROUP2 */
/* Note: DECT will be supported by a future TAPI version! */

IFX_TAPI_KPI_CH_CFG_t kpiChCfg;
memset (&kpiChCfg, 0, sizeof (IFX_TAPI_KPI_CH_CFG_t));

/* KPI channel used for packets generated/directed to resource COD2 */
/* The RTP packets are handled through IFX_TAPI_KPI_GROUP1 */
kpiChCfg.nStream = IFX_TAPI_KPI_STREAM_COD;
kpiChCfg.nKpiCh = IFX_TAPI_KPI_GROUP1 | 2;
ioctl(fd03, IFX_TAPI_KPI_CH_CFG_SET, &kpiChCfg);

/* KPI channel used for packets generated/directed to resource DECT2 */
/* The DECT packets are handled through IFX_TAPI_KPI_GROUP2 */
kpiChCfg.nStream = IFX_TAPI_KPI_STREAM_DECT;
kpiChCfg.nKpiCh = IFX_TAPI_KPI_GROUP2 | 2;
ioctl(fd03, IFX_TAPI_KPI_CH_CFG_SET, &kpiChCfg);
```

2.3.2.3 Packet Handling Using KPI

Packet handling is done via dedicated kernel functions:

- **IFX_TAPI_KPI_WaitForData**: this function returns as soon as a packet is available for the specified KPI group.
- **IFX_TAPI_KPI_ReadData**: to read one packet available for the specified KPI group. See also [Figure 7](#) for an example of upstream flow handling. [Table 9](#) give some details about the **IFX_TAPI_KPI_ReadData** parameters.
- **IFX_TAPI_KPI_WriteData**: to write a packet to the specified KPI channel. See also [Figure 7](#) for an example of downstream flow handling. [Table 10](#) give some details about the **IFX_TAPI_KPI_WriteData** parameters.

An example of simple KPI client handling is given in [Example - Packet Handling in Linux Kernel Space \(KPI\)](#).

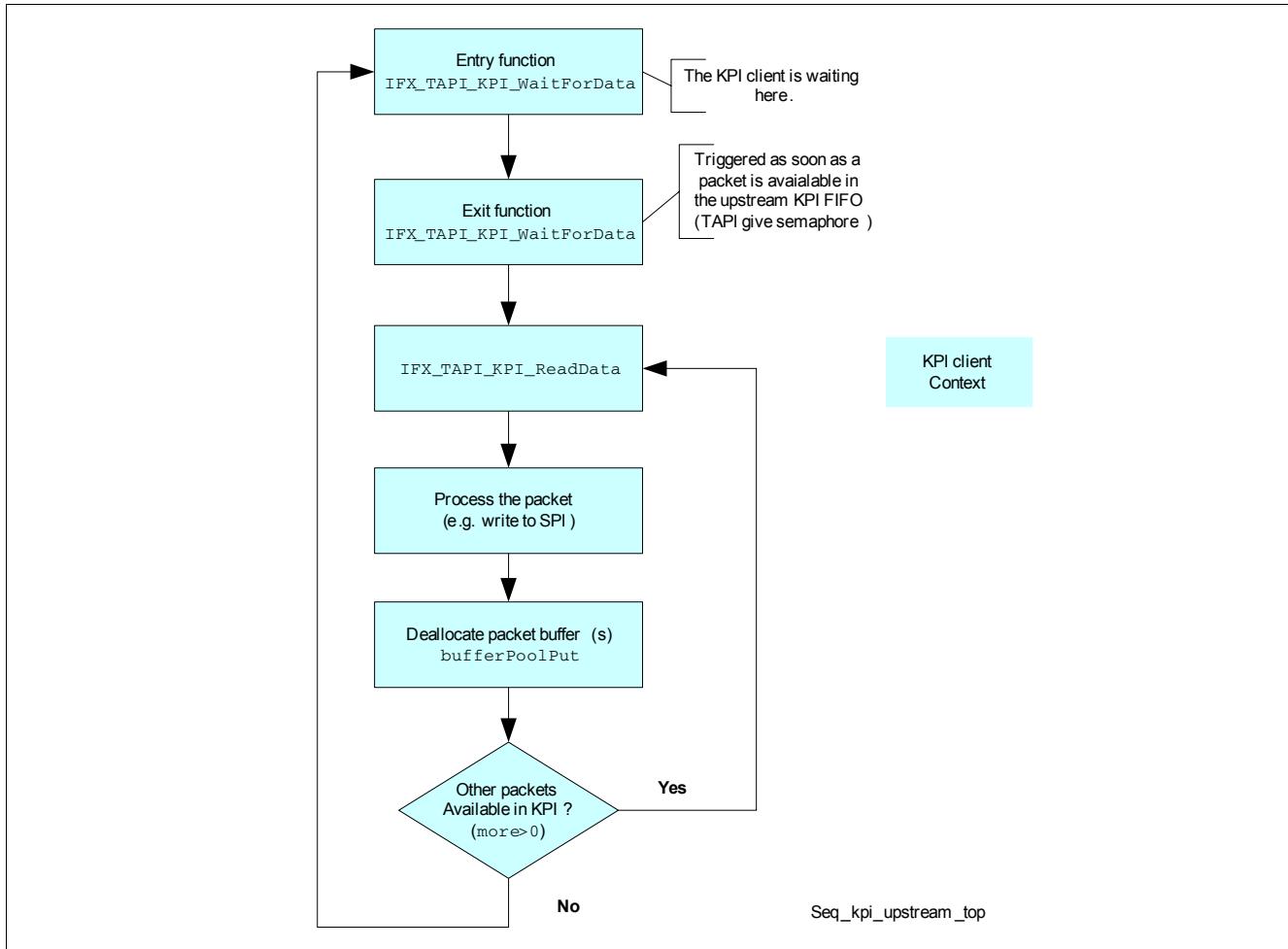
Attention: The KPI client has to take care of buffer handling using the bufferpool library! See also [Example - Using Bufferpool](#).

Table 9 Parameters for [IFX_TAPI_KPI_ReadData](#) Function

Parameter	Description	Note
nKpiGroup	KPI group where to read the packet from.	
*nKpiChannel	Pointer to KPI channel nummer for the read packet.	Parameter returned by the function.
**pPacket	Pointer to the bufferpool element containing the read packet.	Parameter returned by the function. The buffer allocation is done by the Infineon device drivers. The KPI client is responsible for buffer deallocation!
*nPacketLength	Pointer to length (in bytes) for the read packets.	Parameter returned by the function. If the returned length is 0, it means that no packets where available for read.
*nMore	Pointer to a flag signaling whether (1) or not (0) more packets are available for read in the same KPI group.	Parameter returned by the function.

Table 10 Parameters for [IFX_TAPI_KPI_WriteData](#) Function

Parameter	Description	Note
nKpiChannel	Destination KPI channel.	
*pPacket	Bufferpool element containing the packet.	The bufferpool element must be allocated by the KPI client
nPacketLength	Size of the bufferpool element.	


Figure 6 KPI - Upstream Packet Handling

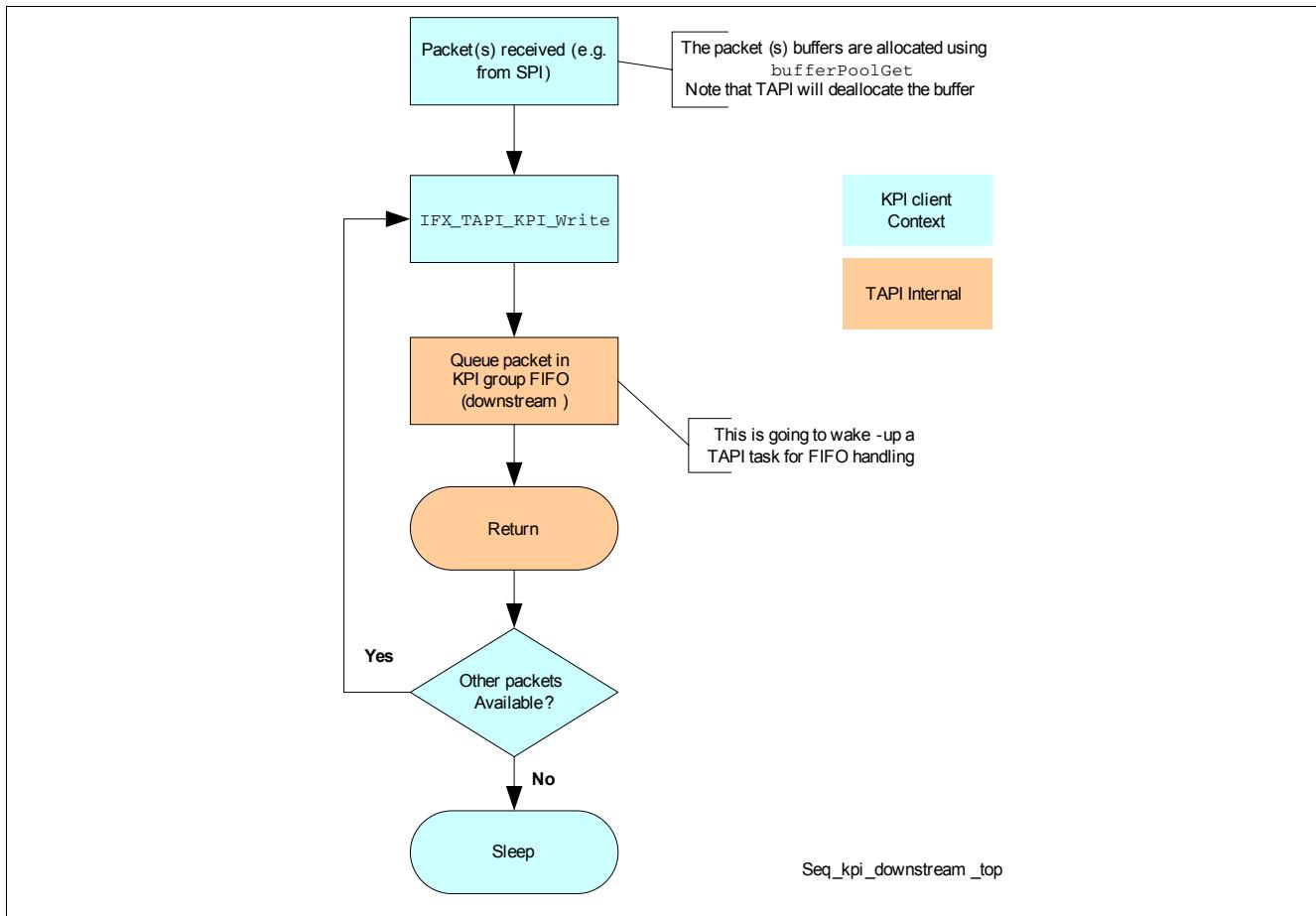


Figure 7 KPI - Downstream Packet Handling

Example - Packet Handling in Linux Kernel Space (KPI)

```

/* The example shows a simple loop: */

/* 1st step: wait for packets generated (encoded) by the DECT channel */
/* 2nd step: read DECT packet from KPI */
/* 3rd step: write DECT packet from KPI, write the packet in another channel */

/* Note: in this example the KPI client does not take care of buffer management. */
/* In typical applications the KPI client has to allocate and deallocate */
/* the packet buffers using bufferpool's library (bufferPoolGet/bufferPoolPut) */

/* Note: DECT will be supported by a future TAPI version! */

/* loop forever */
while (1)
{
    /* 1st step: blocking wait */
    IFX_TAPI_KPI_WaitForData ( IFX_TAPI_KPI_GROUP2 );

    /* when woken read the data */
    /* 2nd step: read DECT packet */
    ret = IFX_TAPI_KPI_ReadData( IFX_TAPI_KPI_GROUP2, &channel,

```

```
        &data, &data_length, &more_flag );
if (ret < 0)
{
    TRACE (TAPI_DRV, DBG_LEVEL_HIGH, ("LOOPBACK failed to read data\n"));
}
else
{
    /* toggle the LSB in the channel number for sending */
    channel = channel ^ 0x0001;

    /* 3rd step: write the data into the same group on a neighbouring channel */
    ret = IFX_TAPI_KPI_WriteData( channel, data, data_length );
    if (ret < 0)
    {
        TRACE (TAPI_DRV, DBG_LEVEL_HIGH, ("LOOPBACK failed to write data\n"));
    }
}
} /* while(1) */
```

Example - Using Bufferpool

```
/* create a bufferpool */
static BUFFERPOOL Bufferpool;
Bufferpool = bufferPoolInit (300, /* size of one buffer */
                           20, /* number of elements initially in the pool */
                           10) /* number of elements pool grows when empty */

/* request a buffer from the bufferpool */
pElem = bufferPoolGet (Bufferpool);

/* return a buffer to the bufferpool */
bufferPoolPut (pElem);
```

2.3.3 Packet Handling in Polling Mode

The polling interfaces handle reading/writing of multiple packets, each packet has to be put in a packet buffer containing information on the packet (type and length), addressed device and channel. The buffer format is shown in [Figure 8](#).

- nDev[8], 8 bits representing the addressed device. For the first device nDev=0.
- nCh[8], 8 bits representing the addressed channel. For the first channel nCh=0.
- nLen[12], 12 bits containing the packet data length, in bytes.
- nType[4], 4 bits containing the packet type. The packet types are defined in **IFX_TAPI_POLL_PKT_TYPE_t**.
- packetData[nLen], array of size nLen containing the packet.

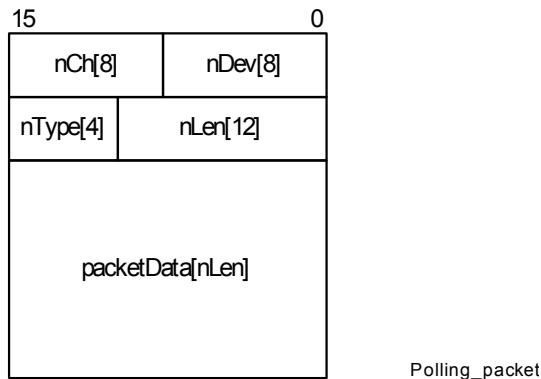


Figure 8 Polling Access - Packet Buffer Format

2.3.3.1 Packets Polling with VxWorks®

For VxWorks® implementations, the application software has to register buffer handling functions (get buffer and return buffer) to the TAPI using [IFX_TAPI_POLL_CFG_SET](#).

In downstream direction, the list of packet buffers (as in [Figure 8](#)) is passed to [TAPI_Poll_Down](#), this interface will write all packets to the correct pair device/channel.

In upstream direction, the application software provides an array of NULL pointers to [TAPI_Poll_Up](#), this function will read all available packets¹⁾ and fill the array with valid pointers to packet buffer (one per packet). The packet buffers are allocated automatically using the buffer handling functions registered with [IFX_TAPI_POLL_CFG_SET](#). The number of read packets is given by nPktsNum field in [IFX_TAPI_POLL_PKT_t](#).

2.4 Set-up Line Type

The analog channels can be used as FXS or FXO interfaces, major difference between the two interfaces is that in case of a FXS interface the analog channel is connected to a SLIC device while to support FXO interface functionality a DAA device is connected to the analog channel.

The task of the application software is to configure each analog channel in the correct mode: FXS or FXO mode. This is done by using the [IFX_TAPI_LINE_TYPE_SET](#) interface passing a [IFX_TAPI_LINE_TYPE_CFG_t](#) struct, the defined line types are listed in [IFX_TAPI_LINE_TYPE_t](#). This operation is required since FXS and FXO interfaces have complementary functionality and TAPI should be informed which type of functionality is going to be used for each analog channel.

In case of FXO line, a DAA channel²⁾ must be associated to the analog channel using the nDaaCh field. This is important especially in case where multiple DAA channels are available, it means that multiple FXO lines are available in the system and it is necessary to associate each analog channel to the correct DAA channel. See also [Figure 9](#) and [Figure 10](#) and related code examples in this chapter.

If [IFX_TAPI_LINE_TYPE_SET](#) is not used for an analog channel, TAPI assumes that the line is of type FXS.

Attention: *It is important to configure the correct line type, a wrong line type setting can lead to system instability and poor voice quality! A line can be set to FXO mode only if the DAA drivers have been already loaded, see also [Chapter 1.2.4](#).*

1) From each device registered for polling, using [IFX_TAPI_POLL_DEV_ADD](#).

2) The DAA channel numbers are assigned by the DAA driver (drv_daa).

Attention: Before changing the line type for a channel, it is necessary to initialize that channel using the `IFX_TAPI_CH_INIT` ioctl!

Example - Set-up Line Type - One FXO Line

```
/* Consider system in Figure 9 */
/* Configure one line as FXS (fd1) and one as FXO (fd2) */
/* FXS line: an analog phone/fax device is connected to the port */
/* FXO line: a PSTN line is connected to the port */

IFX_TAPI_LINE_TYPE_CFG_t lineTypeCfg;
memset (&lineTypeCfg, 0, sizeof (IFX_TAPI_LINE_TYPE_CFG_t));

/* Analog channel addressed by fd11 and fd12 are FXS Lines */
lineTypeCfg.nType = IFX_TAPI_LINE_TYPE_FXS;
ioctl(fd11, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);
ioctl(fd12, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);

/* Analog channel addressed by fd21 is a FXO Line */
/* fd21: FXO Line uses the DAA channel number 0, as defined in the DAA driver */
lineTypeCfg.nType = IFX_TAPI_LINE_TYPE_FXO;
lineTypeCfg.nDaaCh = 0;
ioctl(fd21, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);
```

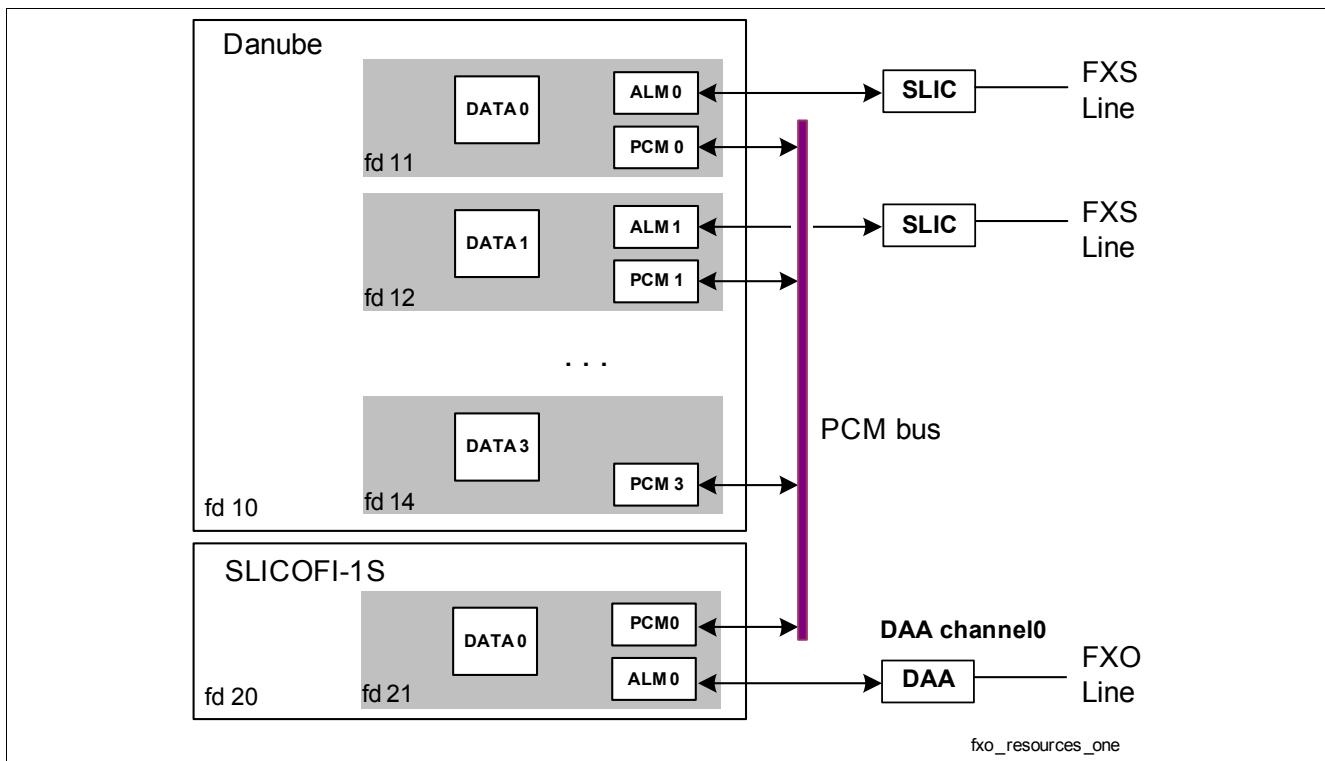


Figure 9 Example of System with One FXO Line

Example - Set-up Line Type - Multiple FXO Lines

```
/* Consider system of Figure 10 */
/* Configure two lines as FXS and two lines as FXO */
/* FXS line: an analog phone/fax device is connected to the port */
```

```

/* FXO line: a PSTN line is connected to the port */

IFX_TAPI_LINE_TYPE_CFG_t lineTypeCfg;
memset (&lineTypeCfg, 0, sizeof (IFX_TAPI_LINE_TYPE_CFG_t));

/* Analog channel addressed by fd11 and fd12 are FXS Lines */
lineTypeCfg.nType = IFX_TAPI_LINE_TYPE_FXS;
ioctl(fd11, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);
ioctl(fd12, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);

/* Analog channel addressed by fd21 and fd22 are FXO Lines */
/* fd21: FXO Line uses the DAA channel number 0, as defined in the DAA driver */
/* fd22: FXO Line uses the DAA channel number 1, as defined in the DAA driver */
lineTypeCfg.nType = IFX_TAPI_LINE_TYPE_FXO;
lineTypeCfg.nDaaCh = 0;
ioctl(fd21, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);
lineTypeCfg.nDaaCh = 1;
ioctl(fd22, IFX_TAPI_LINE_TYPE_SET, (IFX_int32_t) &lineTypeCfg);

```

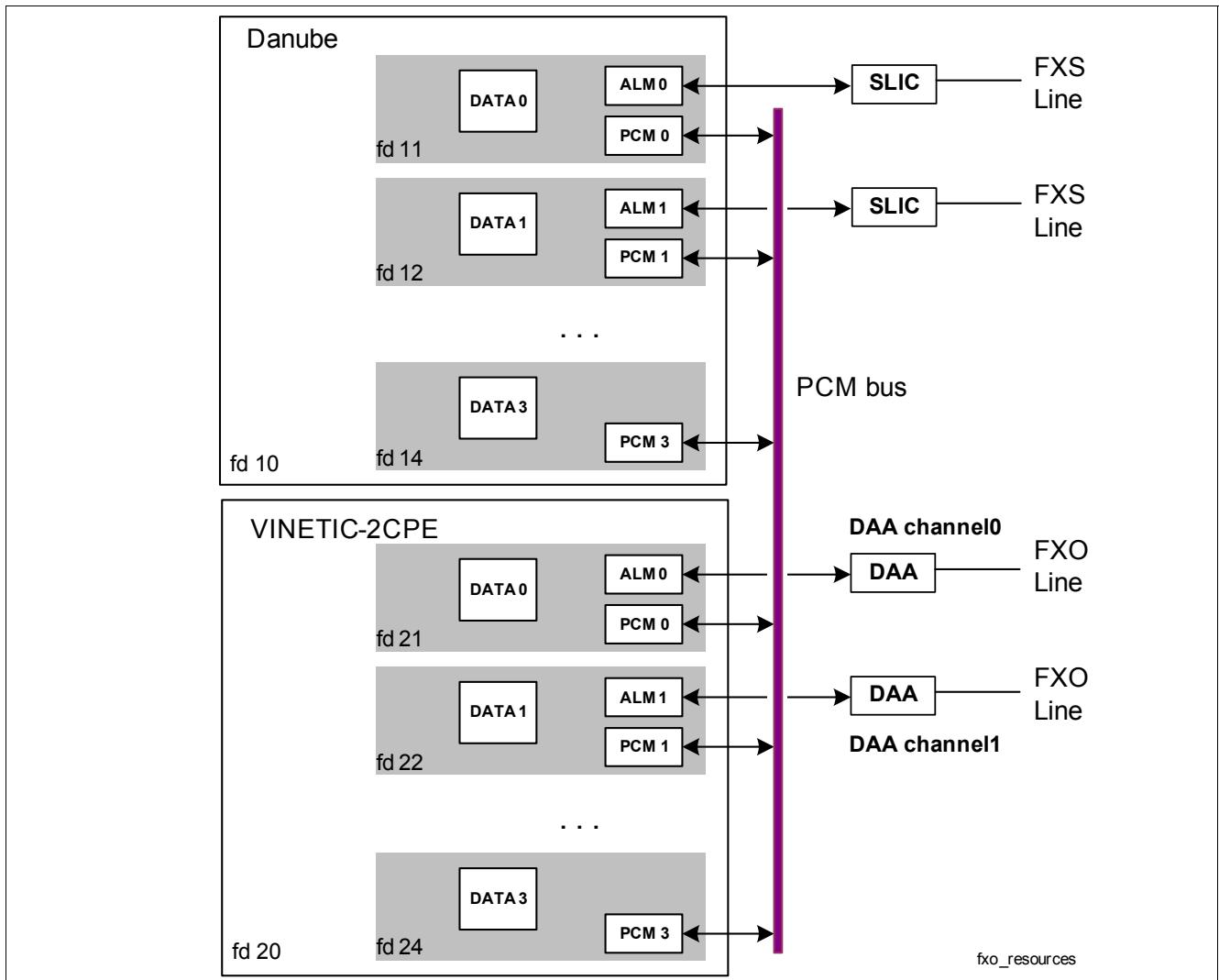


Figure 10 Example of System with Multiple FXO Lines

2.5 Set-up Line Feeding Modes

It is possible to change the line feeding mode using **IFX_TAPI_LINE_FEED_SET**. The line feeding modes are defined in **IFX_TAPI_LINE_FEED_t**.

Figure 11 depicts a sequence of line feeding modes used in typical systems (example for outgoing calls).

For incoming calls, the flow depends on Caller ID standard (for example using line reversal or not). Furthermore, during ringing, some special line feeding modes are used internally by the driver.

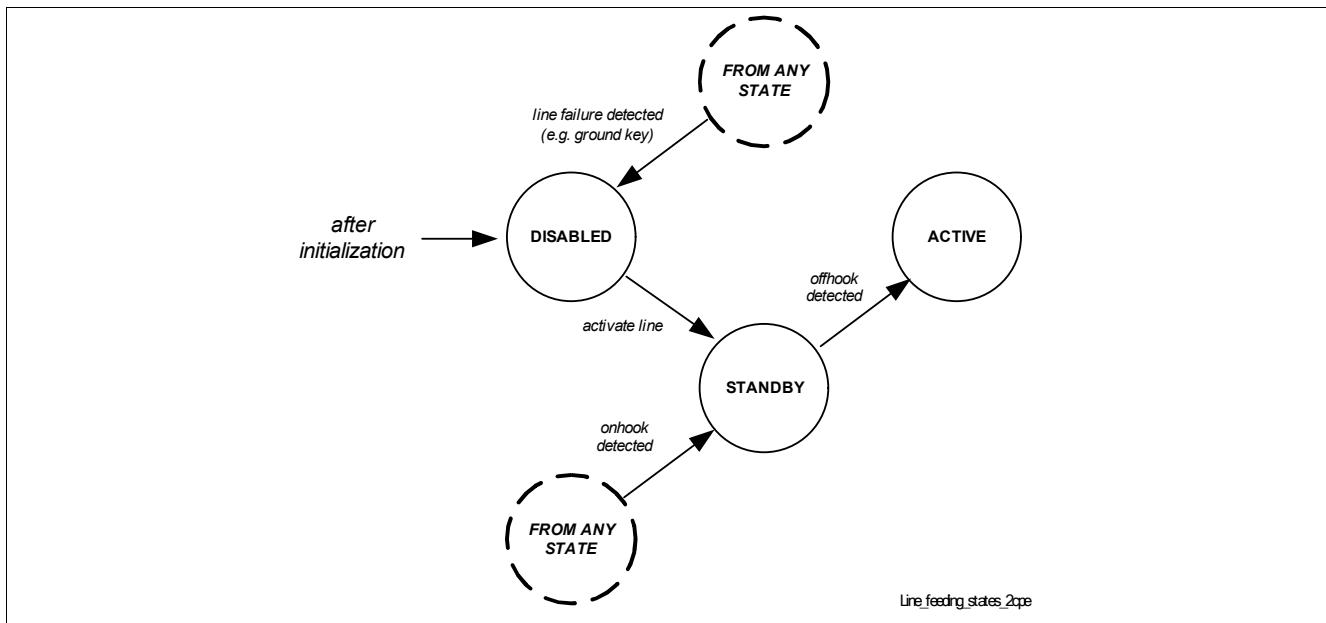


Figure 11 Example of Sequence of Line Feeding Modes

Example - Set-up Line Feeding Mode

```

/* Device already initialized with IFX_TAPI_CH_INIT */
/* It means that all lines are already set to IFX_TAPI_LINE_FEED_DISABLED */
IFX_TAPI_LINE_FEED_t lineMode;

/* Enable line addressed by fd */
lineMode = IFX_TAPI_LINE_FEED_STANDBY;
ioctl(fd, IFX_TAPI_LINE_FEED_SET, (IFX_int32_t) lineMode);

/* Off-hook detected for the line, now switch immediately */
/* to ACTIVE mode */
/* Required to have the possibility to detect DTMF and */
/* playing a busy tone */
lineMode = IFX_TAPI_LINE_FEED_ACTIVE;
ioctl(fd, IFX_TAPI_LINE_FEED_SET, (IFX_int32_t) lineMode);

/* On-hook detected, call is terminated, now switch */
/* to STANDBY mode */
/* Line feeding is enough for hook detection */
/* and line testing */
lineMode = IFX_TAPI_LINE_FEED_STANDBY;
ioctl(fd, IFX_TAPI_LINE_FEED_SET, (IFX_int32_t) lineMode);

```

2.6 Set-up Audio Modes

The **IFX_TAPI_AUDIO_MODE_SET** Command must be used to select the audio channel working mode, for example handset (**IFX_TAPI_AUDIO_MODE_HANDSET**). The audio modes are defined in **IFX_TAPI_AUDIO_MODE_t**.

Interface **IFX_TAPI_AUDIO_ROOM_TYPE_SET** can be used in case of hands-free mode (**IFX_TAPI_AUDIO_MODE_HANDSFREE**) in order to optimize the acoustic echo cancellation (AEC) algorithm; giving an indication of the room type (with respect to acoustic echo characteristics). Enum **IFX_TAPI_AUDIO_ROOM_TYPE_t** defines the room type.

A few usage examples for the documented interfaces are listed below.

Example - Set-up Audio Mode

```
IFX_int32_t audioMode;

/* Choose handset mode */
audioMode = IFX_TAPI_AUDIO_MODE_HANDSET;
ioctl(fd, IFX_TAPI_AUDIO_MODE_SET, audioMode);

/* ... */

/* Key pressed: user wants to switch to headset mode */
audioMode = IFX_TAPI_AUDIO_MODE_HEADSET;
ioctl(fd, IFX_TAPI_AUDIO_MODE_SET, audioMode);
/* ... */

/* Key pressed: user wants to use the open listening feature */
/* while in headset mode */
audioMode = IFX_TAPI_AUDIO_MODE_HEADSET_OPENL;
ioctl(fd, IFX_TAPI_AUDIO_MODE_SET, audioMode);
```

Example - Select Room Type

```
IFX_int32_t audioMode;
IFX_TAPI_AUDIO_ROOM_TYPE_t roomType;

/* Audio channel is in handsfree mode */
audioMode = IFX_TAPI_AUDIO_MODE_HANDSFREE;
ioctl(fd, IFX_TAPI_AUDIO_MODE_SET, audioMode);

/* Optimize the AEC for an echoic room */
roomType = IFX_TAPI_AUDIO_ROOM_TYPE_ECHOIC;
ioctl(fd, IFX_TAPI_AUDIO_ROOM_TYPE_SET, (IFX_int32_t) roomType);
```

2.7 Event Reporting

TAPI provides interfaces for masking and reporting of detected “events” such as detection of DTMF tone, on-/off-hook in the analog line, and fax/modem tone detected.

In interrupt access mode, events not masked are reported by waking up a device file descriptor. The application can sleep on the file descriptor with the system call “select” provided by many operating systems (Linux®, VxWorks®,...).

The application software can read (get) the event message, coded in a **IFX_TAPI_EVENT_t** structure, by using **IFX_TAPI_EVENT_GET**. A typical flow is depicted in [Figure 12](#).

In polling access mode, before reading the event message (using [IFX_TAPI_EVENT_GET](#)) the application software has to periodically collect all interrupts occurred in a device. This is achieved using

- VxWorks®: function [TAPI_Poll_Events](#)

Attention: Tone detection (such as DTMF, CPTD, fax/modem) is possible only if a data channel is connected to an analog or PCM channel!

Table 11 Topics of this Chapter

Topic	Chapter	Note
Event Message Format	Chapter 2.7.1	
Enable/Disable Event Reporting	Chapter 2.7.2	
Examples of Event Reporting and Masking	Chapter 2.7.3	Event handling, in both interrupt and polling modes.

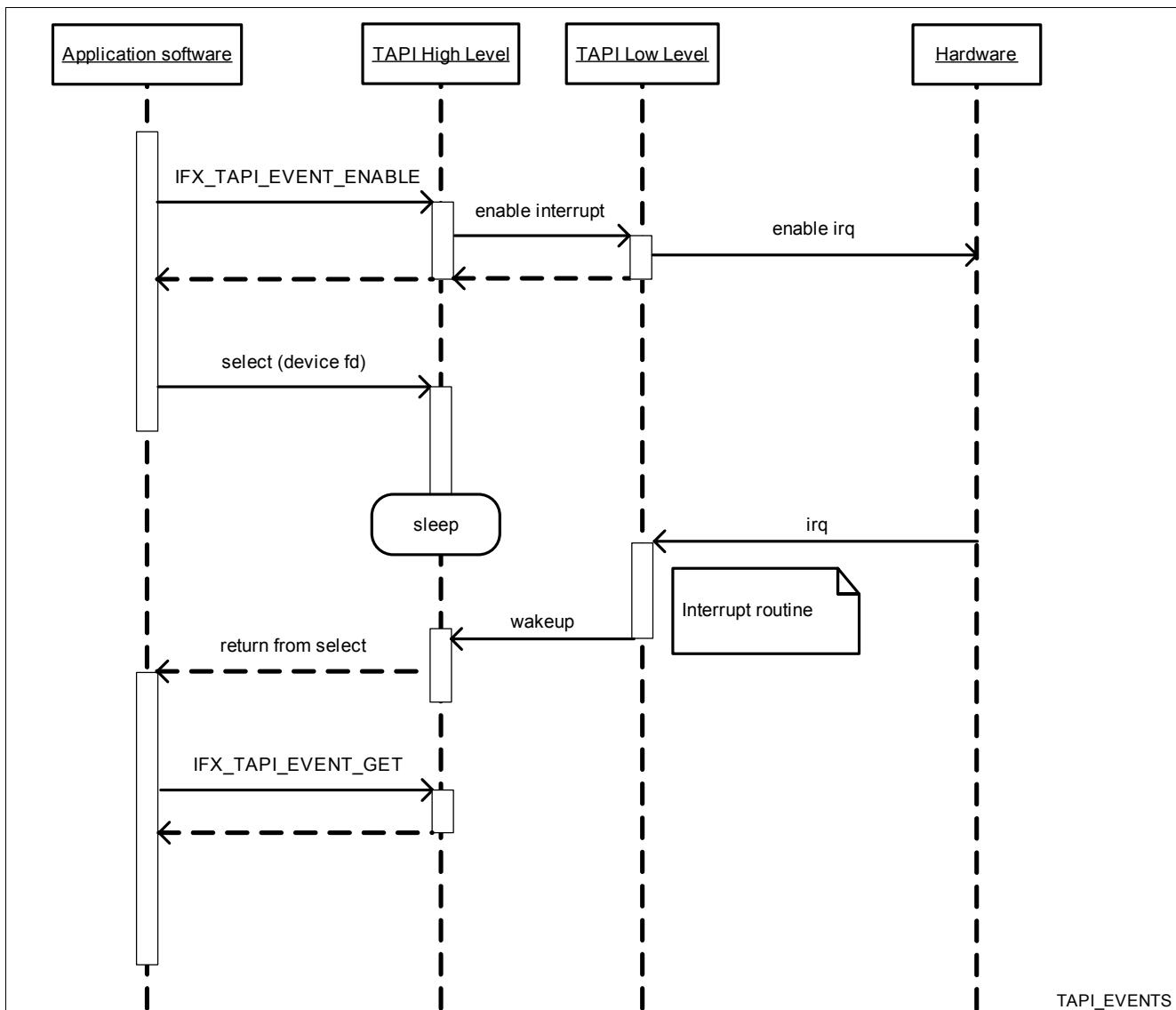


Figure 12 Sequence for Event Reporting (Interrupt Access Mode)

[IFX_TAPI_EVENT_GET](#) gives an indication that more events can be retrieved with this ioctl. The information is provided in the "more" field of the returned [IFX_TAPI_EVENT_t](#) structure.

IFX_TAPI_EVENT_GET always returns **IFX_SUCCESS** as long as the channel parameter is not out of range, or if no event was available. If the parameter is out of range then **IFX_ERROR** is returned.

Value **IFX_TAPI_EVENT_NONE** is returned in the "id" field of the event message, if the event message is not valid.

See also the following chapters for more details.

2.7.1 Event Message Format

Table 12 describes the composition of the event message (structure **IFX_TAPI_EVENT_t**).

Table 12 Event Message Format

Field	Data Type	Description	Note
id	IFX_TAPI_EVENT_ID_t	Field used to identify a certain event.	Enum IFX_TAPI_EVENT_ID_t defines the events that can be reported. If the event message is not valid this field contains IFX_TAPI_EVENT_NONE .
ch	IFX_uint16_t	Channel where the event occurred. The first channel in a device is ch=0.	For example, in a device with four channels: <ul style="list-style-type: none"> • ch=0 for the first channel • ch=3 for the fourth channel ch= IFX_TAPI_EVENT_ALL_CHANNELS to indicate "any channel" and for events that can not be assigned to a specific channel (such as hardware errors).
more	IFX_uint16_t	This field contains the information whether a new event message is ready (IFX_TRUE) or not (IFX_FALSE) in the event message queue.	This field is filled only by IFX_TAPI_EVENT_GET .
data	IFX_TAPI_EVENT_DATA_t	Additional information necessary to characterize a certain event. This field is defined only for a few event types.	Table 13 reports the event IDs using the data field.

Table 13 Event IDs Requiring the data Field

Event ID	Used Field	Data Type
IFX_TAPI_EVENT_PULSE_DIGIT	pulse	IFX_TAPI_EVENT_DATA_PULSE_t
IFX_TAPI_EVENT_DTMF_DIGIT	dtmf	IFX_TAPI_EVENT_DATA_DTMF_t
IFX_TAPI_EVENT_DEBUG_CERR	cerr	IFX_TAPI_EVENT_DATA_CERR_t
IFX_TAPI_EVENT_TONE_GEN_END	tone_gen	IFX_TAPI_EVENT_DATA_TONE_GEN_t
IFX_TAPI_EVENT_TONE_DET_CPT	tone_gen	IFX_TAPI_EVENT_DATA_TONE_GEN_t
IFX_TAPI_EVENT_RFC2833_EVENT	rfc2833	IFX_TAPI_EVENT_DATA_RFC2833_t
IFX_TAPI_EVENT_COD_DEC_CHG	dec_chg	IFX_TAPI_EVENT_DATA_DEC_CHG_t

Table 13 Event IDs Requiring the data Field (cont'd)

Event ID	Used Field	Data Type
All event IDs derived from event type IFX_TAPI_EVENT_TYPE_FAXMODEM_SIGNAL	fax_sig	IFX_TAPI_EVENT_DATA_FAX_SIG_t
IFX_TAPI_EVENT_DEBUG_CERR	value	IFX_uint16_t <i>Note: The error messages are enumerated in DEV_ERR.</i>

Table 14 DTMF Encoding in IFX_TAPI_EVENT_DATA_DTMF_t

DTMF Key	Field digit	Field ascii
0	0B _H	30 _H
1	01 _H	31 _H
2	02 _H	32 _H
3	03 _H	33 _H
4	04 _H	34 _H
5	05 _H	35 _H
6	06 _H	36 _H
7	07 _H	37 _H
8	08 _H	38 _H
9	09 _H	39 _H
*	0A _H	2A _H
#	0C _H	23 _H
A	1C _H	41 _H
B	1D _H	42 _H
C	1E _H	43 _H
D	1F _H	44 _H
No key	00 _H	00 _H

2.7.2 Enable/Disable Event Reporting

The reporting of events to the application can be enabled/disabled by using the interfaces **IFX_TAPI_EVENT_ENABLE** and **IFX_TAPI_EVENT_DISABLE** on a device file descriptor representing the device where to enable/disable the event) and passing a pointer to a **IFX_TAPI_EVENT_t** structure with appropriate configuration.

Table 15 contains some examples of how to fill **IFX_TAPI_EVENT_t** structure to enable/disable events.

Table 15 Enable/Disable Event Reporting - Examples

Event	id	ch	data
DTMF digit from FXS or FXO port, channel 1	IFX_TAPI_EVENT_DTMF_DIGIT	1	local=1 network=0 digit=unused ascii=unused
DTMF digit from VoIP port (RTP inband), channel 1	IFX_TAPI_EVENT_DTMF_DIGIT	1	local=0 network=1 digit=unused ascii=unused

Table 15 Enable/Disable Event Reporting - Examples (cont'd)

Event	id	ch	data
RFC2833 packet received, channel 1	IFX_TAPI_EVENT_RFC2833_EVENT	1	unused
Pulse digit from FXS port, channel 1	IFX_TAPI_EVENT_PULSE_DIGIT	1	digit=unused
Off hook on FXS port, channel 3	IFX_TAPI_EVENT_FXS_OFFHOOK	3	unused
On hook on FXS port, channel 3	IFX_TAPI_EVENT_FXS_ONHOOK	3	unused
Flash hook on FXS port, channel 3	IFX_TAPI_EVENT_FXS_FLASH	3	unused
Ringing on FXS port, channel 3	IFX_TAPI_EVENT_FXS_RING	3	unused
End of CID information TX on data channel 3	IFX_TAPI_EVENT_CID_TX_INFO_END	3	unused
Tone generation ended on local port, channel 3	IFX_TAPI_EVENT_TONE_GEN_END	3	local=1 network=0 index=unused
Call progress tone detection from local port, channel 3	IFX_TAPI_EVENT_TONE_DET_CPT	3	local=1 network=0 digit=unused
Call progress tone index detection from VoIP port, channel 3	IFX_TAPI_EVENT_TONE_DET_CPT	3	local=0 network=1 digit=unused
Fax signal DIS detected from local port, channel 2	IFX_TAPI_EVENT_FAXMODEM_DIS	2	local=1 network=0

2.7.3 Examples of Event Reporting and Masking

In interrupt access mode, after enabling the detection of events, the application software has to block on a select system call for a device file descriptor. As soon as an event is detected the event message will be internally queued (event message queue) and select will return.

In polling access mode, interface [IFX_TAPI_POLL_EVENT_UPDATE](#) ([TAPI_Poll_Events](#)) has to be periodically called to queue all events occurred in the device.

Interface [IFX_TAPI_EVENT_GET](#) has to be used to get the event message from the top of the event message queue, using a device file descriptor (representing the device where the event is expected) and specifying the event source in the ch field:

- ch = [IFX_TAPI_EVENT_ALL_CHANNELS](#) to get the event message from any channel
- ch = <channel number>, to get the event message from a specific channel

The “more” field of the event message indicates whether at least one additional event message is available in the message queue, see also [Table 12](#).

The “ch” field of the event message reports in which channel the event took place. For events that cannot be associated¹⁾ to a channel, the “ch” field is set to [IFX_TAPI_EVENT_ALL_CHANNELS](#).

The “id” field of the event message reports the detected event, the supported events are defined in [IFX_TAPI_EVENT_ID_t](#). Each entry in [IFX_TAPI_EVENT_TYPE_FAXMODEM_SIGNAL](#) is derived from one entry in [IFX_TAPI_EVENT_TYPE_t](#), for example²⁾

```
IFX\_TAPI\_EVENT\_FAXMODEM\_DIS = IFX\_TAPI\_EVENT\_TYPE\_FAXMODEM\_SIGNAL | 0x0001
IFX\_TAPI\_EVENT\_FAXMODEM\_CED = IFX\_TAPI\_EVENT\_TYPE\_FAXMODEM\_SIGNAL | 0x0002
IFX\_TAPI\_EVENT\_FAXMODEM\_PR = IFX\_TAPI\_EVENT\_TYPE\_FAXMODEM\_SIGNAL | 0x0003
```

1) For example hardware errors cannot be associated to a specific channel.

2) Assuming that the system supports fax/modem signal detection. This is only an example to show how the events are grouped, a similar example could be given for any other event type.

It means that, upon reception of an event message, the application software can make a pre-classification of the events based on the event type, for example

```
#define IFX_TAPI_EVENT_TYPE_MASK          0xFFFF0000
IFX_int32_t eventType, ret;

ret = ioctl(fd_dev, IFX_TAPI_EVENT_GET, (IFX_int32_t) &tapiEvent);
eventType = tapiEvent.id & IFX_TAPI_EVENT_TYPE_MASK;
if ((ret == IFX_SUCCESS) && (eventType == IFX_TAPI_EVENT_TYPE_FAXMODEM_SIGNAL))
{
    printf("Fax/modem event occurred in channel %d \n", i);
}
```

Table 16 contains some examples of how events messages are returned by **IFX_TAPI_EVENT_GET** in structure **IFX_TAPI_EVENT_t**.

Table 16 Event Reporting Examples

Event	id	ch	data
DTMF digit "3" from FXS or FXO port, channel 1	IFX_TAPI_EVENT_DTMF_DIGIT	1	local=1 network=0 digit=3 ascii=0x33
DTMF digit "3" from VoIP port (RTP inband), channel 1	IFX_TAPI_EVENT_DTMF_DIGIT	1	local=0 network=1 digit=3
RFC2833 packet received with DTMF digit "3", channel 1	IFX_TAPI_EVENT_RFC2833_EVENT	1	rfc2833=3
Pulse digit "3" from FXS port, channel 1	IFX_TAPI_EVENT_PULSE_DIGIT	1	digit=3
Off hook on FXS port, channel 3	IFX_TAPI_EVENT_FXS_OFFHOOK	3	unused
On hook on FXS port, channel 3	IFX_TAPI_EVENT_FXS_ONHOOK	3	unused
Flash hook on FXS port, channel 3	IFX_TAPI_EVENT_FXS_FLASH	3	unused
Ringing on FXS port, channel 3	IFX_TAPI_EVENT_FXS_RING	3	unused
End of CID sequence on FXS port, channel 3	IFX_TAPI_EVENT_CID_TX_INFO_END	3	unused
Tone generation ended to local port, channel 3	IFX_TAPI_EVENT_TONE_GEN_END	3	local=1 network=0 index=55
Call progress tone index 44 detected from local port, channel 3	IFX_TAPI_EVENT_TONE_DET_CPT	3	local=1 network=0 digit=44
Call progress tone index 44 detected from VoIP port, channel 3	IFX_TAPI_EVENT_TONE_DET_CPT	3	local=0 network=1 digit=44
Fax signal DIS detected from local port, channel 3	IFX_TAPI_EVENT_FAXMODEM_DIS	3	local=1 network=0

Example - Event Reporting

```
IFX_TAPI_EVENT_t tapiEvent;
IFX_int32_t fd_dev, fd[2], i;
fd_set rfds;
IFX_int32_t width;
```

```
IFX_return_t ret;

FD_ZERO(&rfds);
/* Open device file descriptor */
fd_dev = open("/dev/vin10", O_RDWR);
FD_SET(fd_dev, &rfds);
width = fd_dev;
/* Open channel file descriptor for channel 0 */
fd[0] = open("/dev/vin11", O_RDWR, 0x644);
FD_SET(fd[0], &rfds);
if (width < fd[0])
{
    width = fd[0];
}
fd[1] = open("/dev/vin12", O_RDWR, 0x644);
/* Open channel file descriptor for channel 1 */
FD_SET(fd[1], &rfds);
if (width < fd[1])
{
    width = fd[1];
}

/* Now wait for events and data */
ret = select(width + 1, &rfds, IFX_NULL, IFX_NULL, IFX_NULL);
/* Select woke up from exception on fd_dev or data on fd[x] */
if (FD_ISSET(fd_dev, &rfds))
{
    /* an exception occurred, get status of two channels */
    for (i=0;i<2;i++)
    {
        memset (&tapiEvent, 0, sizeof(tapiEvent));
        tapiEvent.ch = i;
        ret = ioctl(fd_dev, IFX_TAPI_EVENT_GET, (IFX_int32_t) &tapiEvent);
        if ((ret == IFX_SUCCESS) && (tapiEvent.id != IFX_TAPI_EVENT_NONE))
        {
            printf("Event %d occurred in channel %d \n", tapiEvent.id, i);
        }
    }
}

for (i = 0; i < 2; i++)
{
    if (FD_ISSET(fd[i], &rfds))
    {
        printf("Handle data\n");
    }
}
```

Example - Detect Digit

```
/* This example shows the call of the status information of one channel */
IFX_TAPI_EVENT_t tapiEvent;
```

```
IFX_int32_t ret;

/* Get the status only for channel 0 ("/dev/vin11") */
while (1)
{
    /* Only query this channel */
    tapiEvent.ch = 0;
    ret = ioctl(fd, IFX_TAPI_EVENT_GET, (IFX_int32_t) &tapiEvent);
    /* Check whether a DTMF digit has been detected */
    if (tapiEvent.id == IFX_TAPI_EVENT_DTMF_DIGIT)
    {
        printf("Digit pressed\n");
    }
}
```

Example - Masking Events

```
/* Mask reporting of exceptions */
IFX_TAPI_EVENT_t tapiEvent;

/* Mask DTMF event on local side in channel 1 */
tapiEvent.id = IFX_TAPI_EVENT_DTMF_DIGIT;
tapiEvent.data.dtmf.local = IFX_TRUE;
tapiEvent.data.ch = 1;

/* Now mask the selected exceptions */
ioctl(fd, IFX_TAPI_EVENT_DISABLE, (IFX_int32_t) &tapiEvent);
```

2.8 Configure Hook, Pulse and DTMF Detection

Interfaces are provided to configure detection parameters for

- Off-on-hook, see [Chapter 2.8.1](#).
- Flash-hook, see [Chapter 2.8.1](#).
- Pulse dialing digits, see [Chapter 2.8.1](#).
- DTMF digits, see [Chapter 2.8.2](#)

2.8.1 Configure Hook and Pulse Validation Timing

By using ioctl **IFX_TAPI_LINE_HOOK_VT_SET** it is possible to configure detection timing for the following parameters. To be noted that for some parameters only minimum time can be configured.

- on-hook: minimum time
- off-hook: minimum time
- Flash hook (alias register recall): validation interval
- Pulse dialing: digit low time (alias break, open loop) validation interval
- Pulse dialing: digit high time (alias make, close loop) validation interval
- Pulse dialing: minimum time between digits (interdigit pause)

The ioctl can configure one timing at time using structure **IFX_TAPI_LINE_HOOK_VT_t** and specifying

- Field nType: Kind of timing to be configured, selecting one value out of enum **IFX_TAPI_LINE_HOOK_VALIDATION_TYPE_t**
- Field nMinTime: minimum time (if required)
- Field nMaxTime: maximum time (if required)

Example - Configure Hook Validation Timing - Hook Events

```
IFX_TAPI_LINE_HOOK_VT_t param;
IFX_int32_t fd;

/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);
memset (&param, 0, sizeof (IFX_TAPI_LINE_HOOK_VT_t));

/* Set onhook timing: minimum 400 ms */
param.nType = IFX_TAPI_LINE_HOOK_VT_ONHOOK_TIME;
param.nMinTime = 400;
/* Note that nMaxTime is not required for onhook detection! */
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);

/* Set offhook timing: minimum 40 ms */
param.nType = IFX_TAPI_LINE_HOOK_VT_OFFHOOK_TIME;
param.nMinTime = 40;
/* Note that nMaxTime is not required for offhook detection! */
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);

/* Set flash hook timing: minimum 40 ms, maximum 200 ms */
param.nType = IFX_TAPI_LINE_HOOK_VT_FLASHHOOK_TIME;
param.nMinTime = 40;
param.nMaxTime = 200;
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);

/* Close open fd */
close(fd);
```

Example - Configure Hook Validation Timing - Pulse Dialing

```
IFX_TAPI_LINE_HOOK_VT_t param;
IFX_int32_t fd;

/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

memset (&param, 0, sizeof (IFX_TAPI_LINE_HOOK_VT_t));
/* Set pulse dialing */
param.nType = IFX_TAPI_LINE_HOOK_VT_DIGITLOW_TIME;
param.nMinTime = 40;
param.nMaxTime = 60;
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);
param.nType = IFX_TAPI_LINE_HOOK_VT_DIGITHIGH_TIME;
param.nMinTime = 40;
param.nMaxTime = 60;
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);

/* Close open fd */
close(fd);
```

2.8.2 Configure DTMF Detection Parameters

By using ioctl **IFX_TAPI_DTMF_RX_CFG_SET** it is possible to configure DTMF detection parameters.

The parameters to be configured are contained in struct **IFX_TAPI_DTMF_RX_CFG_t**

- Field nLevel: Minimal signal level, in dB.
- Field nTwist: Maximum allowed signal twist, in dB.
- Field nGain: Gain adjustment of the input signal, in dB.

Example - Configure DTMF Detection Parameters

```
IFX_TAPI_DTMF_RX_CFG_t dtmfCfg;  
  
memset (&dtmfCfg, 0, sizeof (IFX_TAPI_DTMF_RX_CFG_t));  
  
/* Example of parameters for the DTMF detector */  
dtmfCfg.nLevel = -56;  
dtmfCfg.nTwist = 9;  
dtmfCfg.nGain = 0;  
ioctl(fd, IFX_TAPI_DTMF_RX_CFG_SET, (IFX_int32_t) &dtmfCfg);
```

2.9 Establishing Connections

Several connection types are supported; for ATA and Gateway applications, any phone connected to an ALM/PCM port can be connected to another ALM/PCM port or to a VoIP party. In case of IP Phone applications, the audio channel can be connected to any data channel or to the PCM port. Three-party conferencing is also possible considering any combination of ports.

This chapter introduces the API required for linking the device ports, and describes how to establish different type of calls.

- [Chapter 2.9.1](#), IP Phone applications.
- [Chapter 2.9.2](#), Gateway-like applications.

Table 17 Interfaces for Mapping Services

Interfaces	Addressed Resource Set	Note
IFX_TAPI_MAP_DATA_ADD	To be used for adding/removing a link between a data resource (it means a set of coder and signaling firmware resources) to any other type of resource (analog, audio or PCM).	These interfaces are relevant for establishing a VoIP call with a phone attached to the analog/audio or to the PCM port.
IFX_TAPI_MAP_PCM_ADD	To be used for adding/removing a link between a PCM port to other PCM port or an analog/audio port.	These interfaces are relevant for scenarios where a voice connection is going through the PCM interface.
IFX_TAPI_MAP_PHONE_ADD	To be used for adding/removing a link between analog module ports (ALM) to other analog ports or PCM ports.	Applicable only to ATA and Gateway applications.
IFX_TAPI_MAP_PHONE_REMOVE		

Attention: For typical applications, each used analog/audio used must be linked to one dedicated data channel. Without such a link caller ID, tone generation and detection are not possible!

2.9.1 IP Phone Applications

This chapter describes how to prepare the device before establishing a voice connection.

2.9.1.1 Voice Call

Figure 13 depicts the usage of the resources for one VoIP call in IP Phone applications.

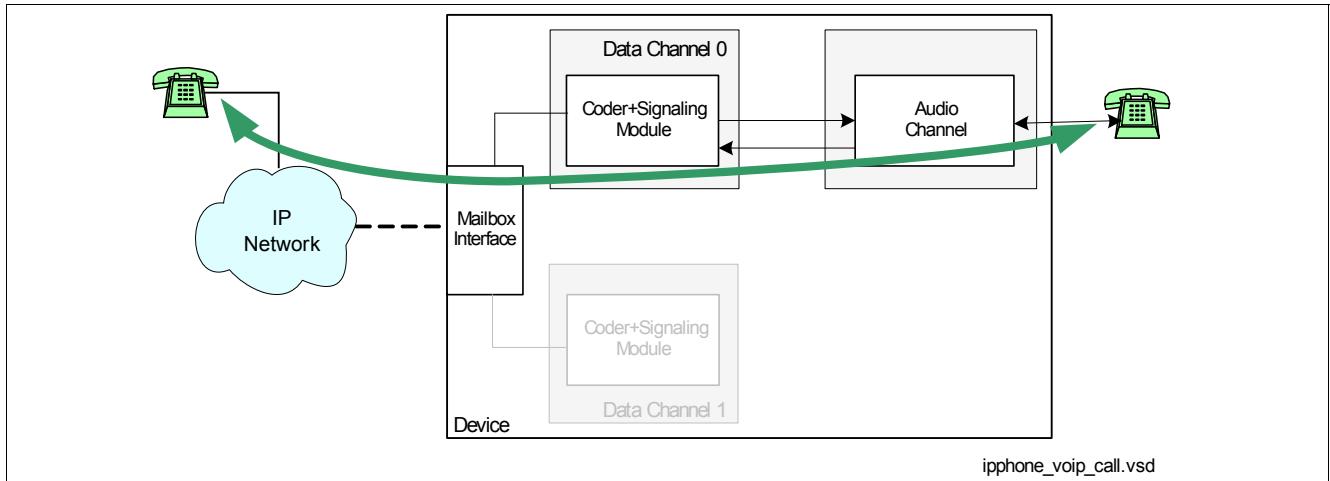


Figure 13 One VoIP Call

Example - IP Phone VoIP Call

```

IFX_TAPI_CH_INIT_t InitCh1;
IFX_TAPI_MAP_DATA_t datemap;

memset(&InitCh1, 0, sizeof(IFX_TAPI_CH_INIT_t));
memset(&datemap, 0, sizeof(IFX_TAPI_MAP_DATA_t));

/* Initialize the channel for VoIP applications */
InitCh1.nMode = IFX_TAPI_INIT_MODE_VOICE_CODER;

ioctl(fd0, IFX_TAPI_CH_INIT, &InitCh1);

/* Connect data channel 0 (fd0) */
/* to audio channel 0 (nChType=IFX_TAPI_MAP_TYPE_AUDIO and nDstCh=0) */
datemap.nDstCh = 0;
datemap.nChType = IFX_TAPI_MAP_TYPE_AUDIO;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datemap);

/* Now the channel is initialized as in Figure */
/* It is possible to start all call services


```

2.9.1.2 In-call Announcement

Figure 14 depicts the usage of the resources for in-call announcement (ICA).

The in-call announcement has to be directed to the auxiliary input of the audio channel, this is achieved using **IFX_TAPI_MAP_DATA_ADD** with channel type (nChType) **IFX_TAPI_MAP_TYPE_AUDIO_AUX**.

Interface **IFX_TAPI_AUDIO_ICA_SET** has to be used to control activation/deactivation of the in-call announcement: **IFX_TAPI_AUDIO_ICA_OUT** to have only an ICA output, **IFX_TAPI_AUDIO_ICA_INOUT** to enable ICA in input/output mode (also called OHVA, Off-Hook-Voice-Announcement). ICA can be disabled using parameter **IFX_TAPI_AUDIO_ICA_DISABLED**.

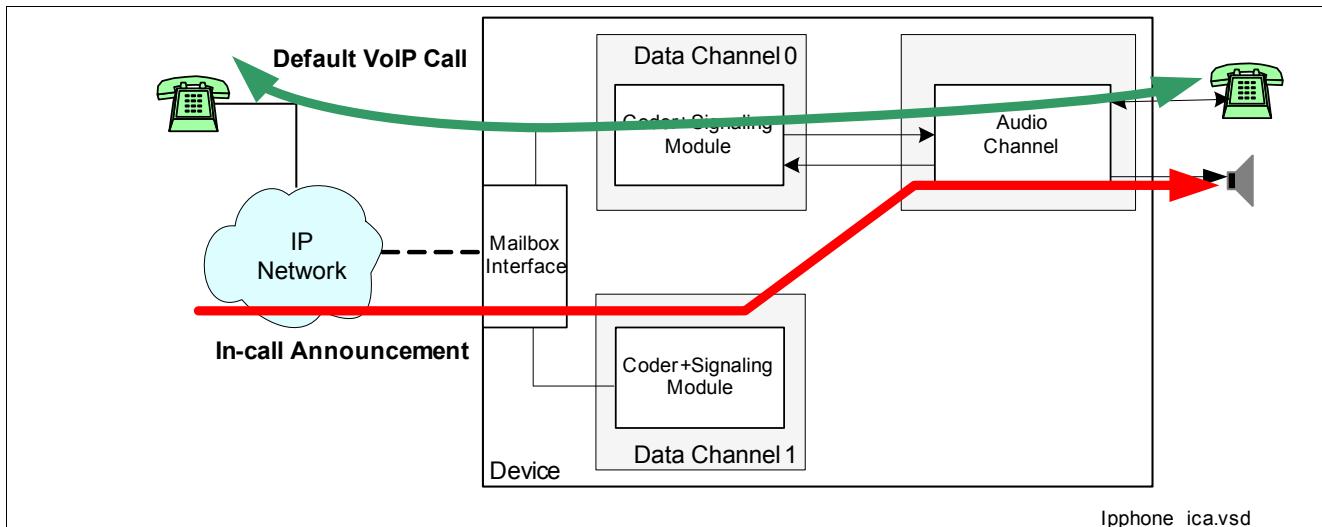


Figure 14 In-call Announcement (only output)

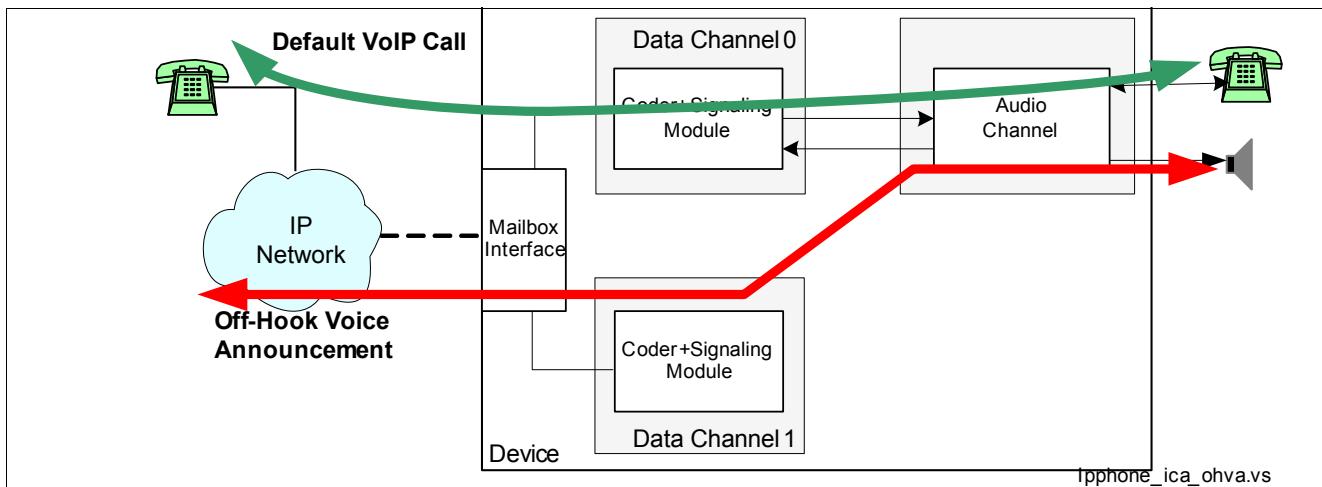


Figure 15 In-call Announcement (input/output, Off-Hook-Voice-Announcement)

Example - In-call Announcement

```

IFX_TAPI_CH_INIT_t InitCh1;
IFX_int32_t fd1;
IFX_TAPI_MAP_DATA_t datamap;

memset(&InitCh1, 0, sizeof(IFX_TAPI_CH_INIT_t));
memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));

/* Initialize the channel for VoIP applications */
InitCh1.nMode = IFX_TAPI_INIT_MODE_VOICE_CODER;
ioctl(fd1, IFX_TAPI_CH_INIT, &InitCh1);

```

```

/* ... */
/* Assume a VoIP call is already ongoing using data channel 0 */

/* In-call announcement using data channel 1 */
/* Connect data channel 1(fd1) */
/* to aux of the audio ch (nChType=IFX_TAPI_MAP_TYPE_AUDIO_AUX and nDstCh=0) */
datemap.nDstCh = 0;
datemap.nChType = IFX_TAPI_MAP_TYPE_AUDIO_AUX;
ioctl(fd1, IFX_TAPI_MAP_DATA_ADD, (IFX_int32_t) &datemap);

/* Now the data channel 1 is connected to the audio channel */

/* In-call announcement must be enabled */
ioctl(fd1, IFX_TAPI_AUDIO_ICA_SET, (IFX_int32_t) IFX_TAPI_AUDIO_ICA_OUT);
/* In case of OHVA, the ioctl parameter must be IFX_TAPI_AUDIO_ICA_INOUT */

```

2.9.2 Gateway-like Applications

For ATA and Gateway applications.

2.9.2.1 Internal Call

Internal calls can be established on ATA and VoIP Gateway applications simply connecting the two phone channels using interface **IFX_TAPI_MAP_PHONE_ADD**.

Figure 16 depicts a typical example. It is very important to note the role of the data channel: it is required for signal detection/generation (such as DTMF, Fax/Modem tones, call progress tones, caller ID, ...) while the coder part is idle (jitter buffer and RTP are inactive).

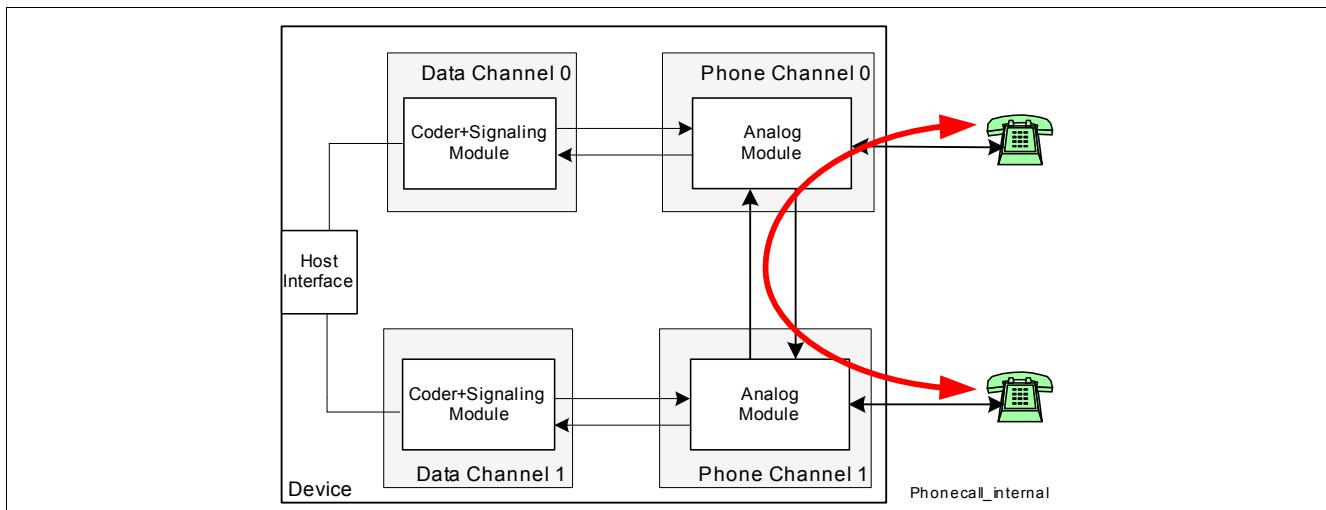


Figure 16 Internal Call

Example - Internal Call

```

IFX_TAPI_CH_INIT_t InitCh;
IFX_TAPI_MAP_DATA_t datemap;
IFX_TAPI_MAP_PHONE_t param;
IFX_int32_t fd0, fd1;

memset(&InitCh, 0, sizeof(IFX_TAPI_CH_INIT_t));

```

```
memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));
memset(&param, 0, sizeof(IFX_TAPI_MAP_PHONE_t));

/* Open channels the two channels */
fd0 = open("/dev/vin11", O_RDWR, 0x644);
fd1 = open("/dev/vin12", O_RDWR, 0x644);

/* Initialize the channels */
/* Each channel contains one analog and one data resource */
InitCh.nMode = IFX_TAPI_INIT_MODE_VOICE_CODER;
ioctl(fd0, IFX_TAPI_CH_INIT, &InitCh);
ioctl(fd1, IFX_TAPI_CH_INIT, &InitCh);

/* Connect data channel 0 (fd0) */
/* to analog channel 0 (nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=0) */
datamap.nDstCh = 0;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);

/* Connect data channel 1(fd1) */
/* to analog channel 1(nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=1) */
datamap.nDstCh = 1;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);

/* Now connect the two analog channels, as in Figure */
/* Connect phone channel 0 (fd0) to phone channel 1 (nPhoneCh=1) */
param.nPhoneCh = 1;
param.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_PHONE_ADD, &param);

/* Or the same result can be achieved with the following code */
/* Connect phone channel 1 (fd1) to phone channel 0 (nPhoneCh=0) */
param.nPhoneCh = 0;
param.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd1, IFX_TAPI_MAP_PHONE_ADD, &param);
```

2.9.2.2 Voice Call with External VoIP Party

Figure 17 depicts the usage of the resources for two VoIP calls in parallel for ATA and VoIP Gateway applications.

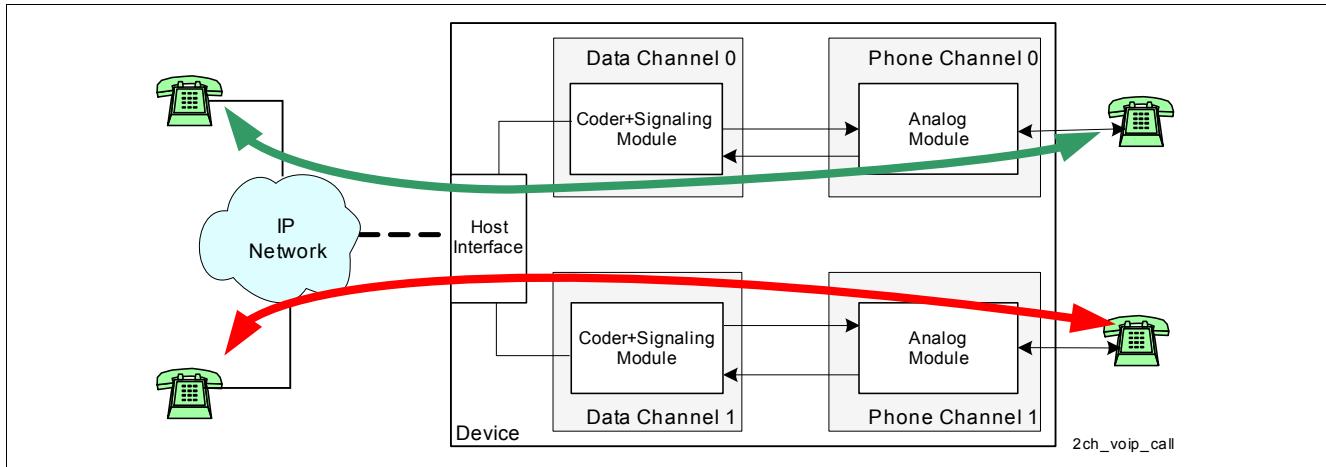


Figure 17 Two Independent VoIP Calls

Example - Two Independent VoIP Calls - Directly After Channel Initialization

```

IFX_TAPI_CH_INIT_t InitCh;
IFX_TAPI_MAP_DATA_t datamap;

memset(&InitCh, 0, sizeof(IFX_TAPI_CH_INIT_t));
memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));

/* Initialize the channels for VoIP applications */
/* Each channel contains one analog and one data resource */
InitCh.nMode = IFX_TAPI_INIT_MODE_VOICE_CODER;
ioctl(fd0, IFX_TAPI_CH_INIT, &InitCh);
ioctl(fd1, IFX_TAPI_CH_INIT, &InitCh);

/* Connect data channel 0 (fd0) */
/* to analog channel 0 (nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=0) */
datamap.nDstCh = 0;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);

/* Connect data channel 1(fd1) */
/* to analog channel 1(nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=1) */
datamap.nDstCh = 1;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);

/* Now the two channels are initialized as in Figure */
/* It is possible to start all call services */

```

Example - Two Independent VoIP Call - Unmap Default Resources (old TAPI implementations)

```

/* Before TAPI V3.3, IFX_TAPI_CH_INIT linked by default a data channel */
/* to each analog module. Newer TAPI implementation don't do it.*/
/* This example shows how to ummap the data channels assigned by default */
/* and relink the data channels */

```

```
IFX_TAPI_CH_INIT_t InitCh;
IFX_TAPI_MAP_DATA_t datemap;

memset(&InitCh, 0, sizeof(IFX_TAPI_CH_INIT_t));
/* Initialize the channels */
InitCh.nMode = IFX_TAPI_INIT_MODE_VOICE_CODER;
ioctl(fd0, IFX_TAPI_CH_INIT, &InitCh);
ioctl(fd1, IFX_TAPI_CH_INIT, &InitCh);

/* Unmap the data channels that are per default mapped */

memset(&datemap, 0, sizeof(IFX_TAPI_MAP_DATA_t));
/* Remove connection between data channel 0 (fd0) and */
/* phone channel 0 (nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=0) */
datemap.nDstCh = 0;
datemap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_REMOVE, &datemap);

/* Remove connection between data channel 1 (fd1) and */
/* phone channel 1 (nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=1) */
datemap.nDstCh = 1;
datemap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd1, IFX_TAPI_MAP_DATA_REMOVE, &datemap);
/* Now phone and data resources are unmapped */

/* Connect data channel 0 (fd0) */
/* to analog channel 0 (nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=0) */
datemap.nDstCh = 0;
datemap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datemap);

/* Connect data channel 1(fd1) */
/* to analog channel 1(nChType=IFX_TAPI_MAP_TYPE_PHONE and nDstCh=1) */
datemap.nDstCh = 1;
datemap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datemap);
```

2.10 Conferencing

This chapter lists the conferencing services with some scenarios. Conferencing is implicitly supported by the mapping services **IFX_TAPI_MAP_***.

In case of conferencing, the TAPI distinguishes between external and (device) internal calls.

External calls are established using a data channel. Internal calls can also be established connecting phone channels internally in the chip. The following subchapter show how to establish conferences, please note that **Chapter 2.10.1** and **Chapter 2.10.3** are the only relevant for IP Phone applications.

In the following examples, *fd0* refers to data and phone channel 0, *fd1* to data and phone channel 1, and so on.

2.10.1 Initialization

If using TAPI conferencing with resource management, the data channels should be assigned (linked) to an analog/audio channel only as soon as required (for example off-hook detected). This ensures that the maximum number of data channel resources are available in a system.

```
/* The example is valid for ATA/VoIP GW applications */
/* For IP Phone applications IFX_TAPI_MAP_TYPE_AUDIO has to be used */;
/* instead of IFX_TAPI_MAP_TYPE_PHONE */;

IFX_TAPI_CH_INIT_t Init;
IFX_TAPI_CAP_t cap;

/* Initialize the device and all channels. It sets up the configuration */
memset(&Init, 0, sizeof(IFX_TAPI_CH_INIT_t));
ioctl(fd0, IFX_TAPI_CH_INIT, &Init);
ioctl(fd1, IFX_TAPI_CH_INIT, &Init);

/* Check coder channel amount */
cap.capttype = IFX_TAPI_CAP_TYPE_CODEC;
ioctl(fd0, IFX_TAPI_CAP_CHECK, (int)&cap);
printf("%d available data channels \n", cap.cap);
/* Resource manager must check all managed capabilities */
```

2.10.2 Conference with an Internal and an External VoIP Party

This scenario is not applicable to IP Phone applications.

Continuing the setup from [Chapter 2.9.2.1](#), an external party can be added (see [Figure 18](#)). The mapped data channel can be either of type coder or PCM.

Note: The resource handling must consider the limitation of the chip for coder and for PCM. To be noted that the signaling module services of a data channel can be used only by the first phone mapped to it; for example, data channel 0 is used to detect DTMF tones only from phone channel 0, tone generated from phone channel 1 will be detected by data channel 1. The same applies to other tone detectors and CID generation.

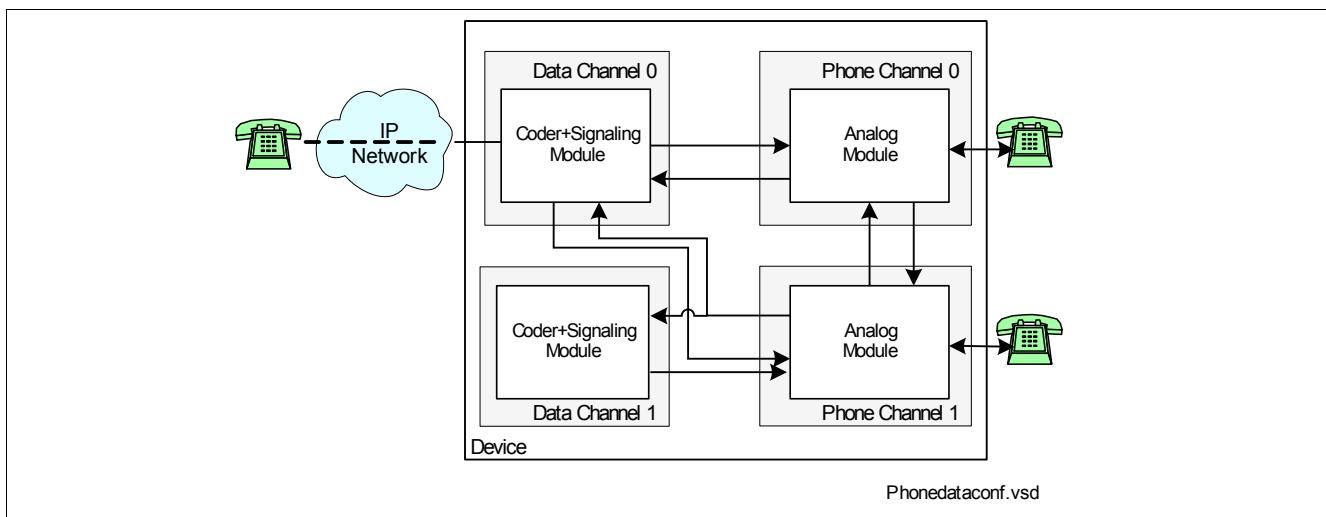


Figure 18 External and Internal Conference

In this example the data channel 0 is mapped to the first phone (channel 0):

```
IFX_TAPI_MAP_PHONE_t phonemap;
```

```
IFX_TAPI_MAP_DATA_t datamap;

memset(&phonemap, 0, sizeof(IFX_TAPI_MAP_PHONE_t));
memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));

/* Add phone 0 to phone 1 */
phonemap.nPhoneCh = 0;
phonemap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd1, IFX_TAPI_MAP_PHONE_ADD, &phonemap);
/* Add phone 0 to data 0 */
datamap.nDstCh = 0;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);
/* Add phone 1 to data 0 */
datamap.nDstCh = 1;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);
/* Add phone 1 to data 1 */
datamap.nDstCh = 1;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd1, IFX_TAPI_MAP_DATA_ADD, &datamap);
```

Removing the Connection

To get back the setup as after the initialization described in [Chapter 2.10.1](#), the connections are removed with the following commands:

```
IFX_TAPI_MAP_PHONE_t phonemap;
IFX_TAPI_MAP_DATA_t datamap;

memset(&phonemap, 0, sizeof(IFX_TAPI_MAP_PHONE_t));
memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));

/* Remove phone 0 from data 0 */
datamap.nDstCh = 0;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_REMOVE, &datamap);
/* The data channel is still connected to phone 1 -> remove the connection */
datamap.nDstCh = 1;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_REMOVE, &datamap);
/* Remove phone 0 from phone 1 */
phonemap.nPhoneCh = 1;
phonemap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_PHONE_REMOVE, &phonemap);
/* Remove phone 1 from data 1 */
datamap.nDstCh = 1;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd1, IFX_TAPI_MAP_DATA_REMOVE, &datamap);
```

Note: Without removing the data channel 0 from phone 1, the connection still exists. This can be a requirement, when phone 0 hangs up and phone 1 should be still in the call.

2.10.3 Conference with Two VoIP Parties

Starting from the setup from [Chapter 2.10.1](#), two external parties can be added to the local phone channel 0 (see [Figure 19](#)). In this case, data channels 0 and 1 are mapped to the phone channel 0. The connection between the data channels is done automatically by TAPI.

```
/* The example is valid for ATA/VoIP GW applications */
/* For IP Phone applications IFX_TAPI_MAP_TYPE_AUDIO has to be used */;
/* instead of IFX_TAPI_MAP_TYPE_PHONE */;

IFX_TAPI_MAP_DATA_t datamap;
IFX_int32_t fd0, fd1;

memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));

/* Add the phone channel 0 to the data channel 0 (fd0) */
datamap.nDstCh = 0;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_ADD, &datamap);
/* Add the phone channel 0 to the data channel 1 (fd1) */
ioctl(fd1, IFX_TAPI_MAP_DATA_ADD, &datamap);

/* Enable the data transfer for both data channels */
ioctl(fd0, IFX_TAPI_ENC_START, 0);
ioctl(fd1, IFX_TAPI_ENC_START, 0);
```

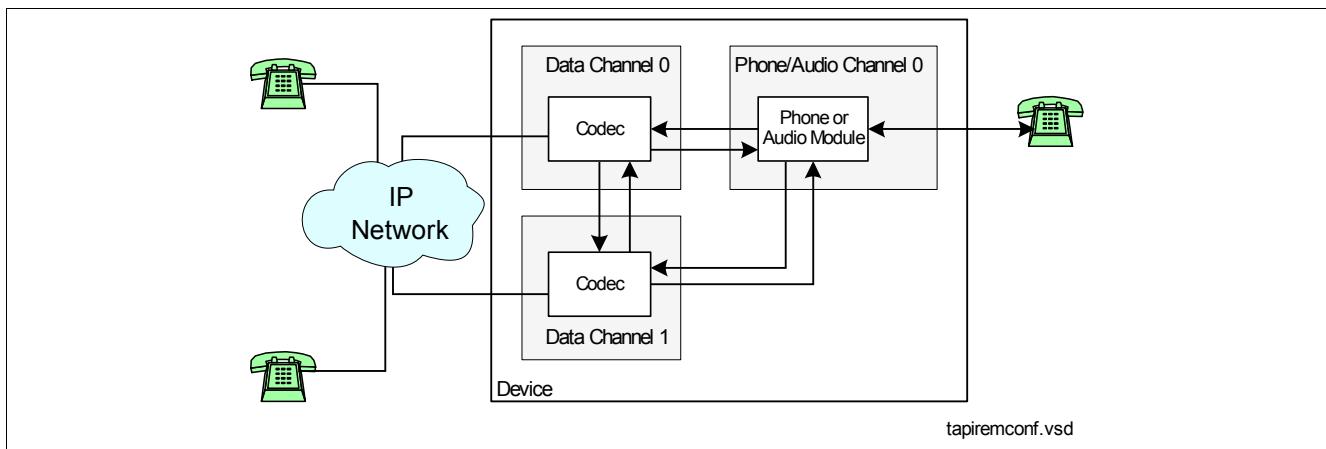


Figure 19 VoIP Conference

Removing the Connection

To get back the setup as after the initialization described in [Chapter 2.10.1](#), the connections are removed with the following commands:

```
/* The example is valid for ATA/VoIP GW applications */
/* For IP Phone applications IFX_TAPI_MAP_TYPE_AUDIO has to be used */;
/* instead of IFX_TAPI_MAP_TYPE_PHONE */;

IFX_TAPI_MAP_DATA_t datamap;

memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));
ioctl(fd0, IFX_TAPI_ENC_STOP, 0);
```

```
ioctl(fd1, IFX_TAPI_ENC_STOP, 0);
/* Unmap data channels */;
datamap.nDstCh = 0;
datamap.nChType = IFX_TAPI_MAP_TYPE_PHONE;
ioctl(fd0, IFX_TAPI_MAP_DATA_REMOVE, &datamap);
ioctl(fd1, IFX_TAPI_MAP_DATA_REMOVE, &datamap);
```

3 Feature Description

The topics described in this chapters are reported in [Table 18](#).

Table 18 Topics of Chapter 3

Topic	Chapter	Applicability
Channel configuration	Chapter 3.1	All application types.
Configuration and control of encoder/decoder	Chapter 3.2	All application types.
Connection statistics retrieval	Chapter 3.3	All application types.
Insert RFC2833 frames from application software	Chapter 3.4	All application types.
Tone management (play, detect call progress tones, etc)	Chapter 3.5	All application types.
IP Phone ringing support	Chapter 3.6	For IP Phone applications.
Ringing on FXS Interfaces	Chapter 3.7	For ATA and Gateway applications.
Caller ID support	Chapter 3.8	For ATA and Gateway applications.
Fax/modem support	Chapter 3.9	For ATA and Gateway applications.
FXO support	Chapter 3.10	For ATA and Gateway applications.
GR-909 line testing support	Chapter 3.11	For ATA and Gateway applications.

3.1 Channel Configuration

This chapter describes configuration options for a TAPI channel, in particular how to set up and/or use.

Table 19 Topics of Chapter 3.1

Topic	Chapter	Applicability
Analog Line Channel Volume (RX and TX gains)	Chapter 3.1.1	For ATA and Gateway applications.
Audio Channel Volume and Mute	Chapter 3.1.2	For IP Phone applications.
PCM interface	Chapter 3.1.3	All application types.
Line Echo Canceller (LEC)	Chapter 3.1.4	For ATA and Gateway applications.
Jitter Buffer parameters	Chapter 3.1.5	All application types.
RTP parameters	Chapter 3.1.6	All application types.

3.1.1 Analog Line Channel Volume

It is possible to tune input (RX) and output (TX) gains independently for the analog phone port¹⁾ using the interface [IFX_TAPI_PHONE_VOLUME_SET](#) for the channel file descriptor.

Programming RX and TX gains directly influences input and output level; however the absolute signal levels are given by several components.

The measured output level is normally given by:

- Source level: level of the signal source, for example when playing a busy tone the level is specified when configuring the tone table. Output gain of the FW blocks processing the signal: these are configurable through FW coefficient download.
- TX gain: configured using [IFX_TAPI_PHONE_VOLUME_SET](#).
- Downloaded country-specific coefficients and line impedance (depending on HW design and line characteristics).

1) Note that in a typical VINETIC® or DANUBE® system, not all channels contain an analog phone port (ALM).

For playing tones with relatively high absolute levels (above about 3 dBm), please also refer to [Chapter 3.5.7](#).

The absolute input level that will be coded in the RTP flow is normally given by:

- Source level at tip&ring.
- Analog coefficients downloaded to the device and line impedance (depending on HW design and line characteristics).
- RX gain: configured using [IFX_TAPI_PHONE_VOLUME_SET](#).
- Input gain of the FW blocks processing the signal. Possible to configure through FW coefficient download.

Attention: *The relative gain in the TX/RX Paths should be always set using the BBD coefficients, while keeping the programmable TX-RX gain to the default values of 0 dB. The latter might be used for any variation of the downloaded BBD coefficients, or for any application requiring an "on-the-fly" adaptation of the signal levels. Moreover, any arbitrary change of RX and/or TX gains may influence the overall system performance. Therefore the allowed range of the gain variation must be carefully evaluated.*

Example - Volume

```
/* Configure RX and TX gains */
IFX_TAPI_LINE_VOLUME_t volume;

memset(&volume, 0, sizeof(IFX_TAPI_LINE_VOLUME_t));

/* Set the input gain to, for example, -2 dB */
volume.nGainRx = -2;
/* Set the output gain to, for example, 0 dB */
volume.nGainTx = 0;

ioctl(fd, IFX_TAPI_PHONE_VOLUME_SET, (IFX_int32_t) &volume);
```

3.1.2 Audio Channel Volume and Mute

It is possible to set the volume level step for the audio channel using interface [IFX_TAPI_AUDIO_VOLUME_SET](#) for the channel file descriptor. The volume levels steps are downloaded.

The audio channel can be muted at any time using interface [IFX_TAPI_AUDIO_MUTE_SET](#).

Attention: *The volume level steps to be supported must be downloaded in a BBD file.*

Example - Audio Channel Volume and Mute

```
/* Configure Audio Channel Volume and Mute */
IFX_int32_t volume;
IFX_operation_t mute;

/* Configure volume step 3 */
volume = 3;
ioctl(fd, IFX_TAPI_AUDIO_VOLUME_SET, (IFX_int32_t) volume);

/* Do something ... */

/* Now mute the audio channel */
mute = IFX_ENABLE;
ioctl(fd, IFX_TAPI_AUDIO_MUTE_SET, (IFX_int32_t) mute);

/* Do something ... */
```

```

/* Now unmute the audio channel, restoring the voice path */
mute = IFX_DISABLE;
ioctl(fd, IFX_TAPI_AUDIO_MUTE_SET, (IFX_int32_t) mute);

```

3.1.3 PCM

PCM interface communication can be used to connect the product (for example the VINETIC® or DANUBE®) to an external device (such as DuSLIC or DECT chip set). Each product can communicate with external devices over the PCM interface.

Table 20 PCM Programming Steps

Step	Action	ioctl	Note
1	Configure PCM interface: master/slave, clock, bit offset, ...	IFX_TAPI_PCM_IF_CFG_SET	This must be done only one time after system initialization and before execution of any other TAPI PCM service. See also Chapter 3.1.3.1 .
2	Configure PCM channel communication parameters: used time slot, used codec, ...	IFX_TAPI_PCM_CFG_SET	This should be done for each used PCM channel. See also Chapter 3.1.3.2 .
3	Activate PCM communication for the channel.	IFX_TAPI_PCM_ACTIVATION_SET	

3.1.3.1 PCM Interface Configuration

The PCM interface can be configured with ioctl **IFX_TAPI_PCM_IF_CFG_SET** pointing to a struct **IFX_TAPI_PCM_IF_CFG_t**.

Table 21 lists all possible¹⁾ PCM interface parameters that can be configured, **Table 22** gives additional details about configuration of DCL (data clock) frequency.

The following examples are given

- [Example - Program PCM Interface - Slave Mode](#)
- [Example - Program PCM Interface - Master Mode](#)

Table 21 PCM Interface Configuration

Parameter	Description	Note
nOpMode	Master, slave .	
nDCLFreq	Program the DCL frequency, see nOpMode.	Manual selection of DCL frequency.
nMCTS	Program the clock tracking for the master mode.	
nNTRFreq	NTR Frequency, to be configured if NTR is used as source for the master mode clock tracking.	
nSlopeTX	Slope for TX direction.	Selection between rising and falling edge.
nSlopeRX	Slope for RX direction.	Selection between rising and falling edge.
nDoubleClk	Usage of double clock mode.	

1) The table shows the parameters that can be configured using TAPI, for a list of supported parameters please refer to the product's system release notes. For example, the VINETIC®-CPE devices do not support master mode.

Table 21 PCM Interface Configuration (cont'd)

Parameter	Description	Note
nDrive	Drive bit 0 during the first half or the entire clock period.	Applicable only in single clock mode.
nShift	Shifts the access edges by one clock cycle.	Applicable only in double clock mode.
nOffsetTX	Bit offset for TX time slot.	
nOffsetRX	Bit offset for RX time slot.	

Table 22 PCM Interface - DCL Frequency Configuration

DCL Frequency Mode	nOpMode	nDCLFreq
Slave mode. The DCL is generated by an external device.	IFX_TAPI_PCM_IF_MODE_SLAVE	This field reports the DCL frequency to be used. Selected from IFX_TAPI_PCM_IF_DCLFREQ_t
Master mode, the DCL is generated by the device.	IFX_TAPI_PCM_IF_MODE_MASTER	

Example - Program PCM Interface - Slave Mode

```

IFX\_TAPI\_PCM\_IF\_CFG\_t pcm_if;

memset(&pcm_if, 0, sizeof(IFX\_TAPI\_PCM\_IF\_CFG\_t));

/* Use PCM clock slave mode */
pcm_if.nOpMode      = IFX\_TAPI\_PCM\_IF\_MODE\_SLAVE;

/* It is required to specify the DCL frequency, for example 1536 kHz */
pcm_if.nDCLFreq = IFX\_TAPI\_PCM\_IF\_DCLFREQ\_1536;

/* Double DCL clock mode is not used */
pcm_if.nDoubleClk = IFX\_DISABLE;

/* Rising edge is used for TX timeslots */
pcm_if.nSlopeTX    = IFX\_TAPI\_PCM\_IF\_SLOPE\_RISE;

/* Falling edge is used for RX timeslots */
pcm_if.nSlopeRX    = IFX\_TAPI\_PCM\_IF\_SLOPE\_FALL;

/* TX offset not used */
pcm_if.nOffsetTX   = IFX\_TAPI\_PCM\_IF\_OFFSET\_NONE;

/* RX offset not used */
pcm_if.nOffsetRX   = IFX\_TAPI\_PCM\_IF\_OFFSET\_NONE;

err = ioctl(fd, IFX\_TAPI\_PCM\_IF\_CFG\_SET, &pcm_if);

```

Example - Program PCM Interface - Master Mode

```

IFX\_TAPI\_PCM\_IF\_CFG\_t pcm_if;

memset(&pcm_if, 0, sizeof(IFX\_TAPI\_PCM\_IF\_CFG\_t));

```

```
/* Use PCM clock master mode */
pcm_if.nOpMode      = IFX_TAPI_PCM_IF_MODE_MASTER;  
  
/* It is required to specify the DCL frequency, for example 1536 kHz */
pcm_if.nDCLFreq = IFX_TAPI_PCM_IF_DCLFREQ_1536;  
  
/* Clock tracking in master mode is not used */
pcm_if.nMCTS = 0;  
  
/* Double DCL clock mode is not used */
pcm_if.nDoubleClk = IFX_DISABLE;  
  
/* Rising edge is used for TX timeslots */
pcm_if.nSlopeTX    = IFX_TAPI_PCM_IF_SLOPE_RISE;  
  
/* Falling edge is used for RX timeslots */
pcm_if.nSlopeRX    = IFX_TAPI_PCM_IF_SLOPE_FALL;  
  
/* TX offset not used */
pcm_if.nOffsetTX   = IFX_TAPI_PCM_IF_OFFSET_NONE;  
  
/* RX offset not used */
pcm_if.nOffsetRX   = IFX_TAPI_PCM_IF_OFFSET_NONE;  
  
err = ioctl(fd, IFX_TAPI_PCM_IF_CFG_SET, &pcm_if);
```

3.1.3.2 PCM Channel Communication

After configuration of the PCM interface, the application software should use **IFX_TAPI_PCM_CFG_SET** to configure the PCM channel communication parameters: RX/TX time slots, used PCM highway and used coding (8-bit A-law, 8-bit μ-law or 16-bit linear).

Once the communication is configured, command **IFX_TAPI_PCM_ACTIVATION_SET** activates the communication from the product side: the device will start transmitting/receiving on the programmed time slots and highway.

Attention: Activation of LEC in the PCM interface might be required; see also [Chapter 3.1.4](#). It is not possible to deactivate the PCM communication if a LEC is currently active in the same PCM interface. Please ensure that the LEC is disabled before deactivating the PCM communication!

Example - Program PCM Channel Communication

```
IFX_TAPI_PCM_CFG_t pcmConf;  
  
memset(&pcmConf, 0, sizeof (IFX_TAPI_PCM_CFG_t));  
  
/* Use PCM highway number 0 */
pcmConf.nHighway = 0;  
  
/* Use Alaw coding for the RX/TX timeslots */
/* Note: only one timeslot is required in RX and TX */
pcmConf.nResolution = IFX_TAPI_PCM_RES_ALAW_8BIT;  
  
/* Configure used RX and TX timeslots */
```

```
pcmConf.nTimeslotRX = 0;  
pcmConf.nTimeslotTX = 0;  
  
ioctl(fd, IFX_TAPI_PCM_CFG_SET, (IFX_int32_t) &pcmConf);  
  
/* PCM channel has been configured, however the communication is not active yet */  
ioctl(fd0, IFX_TAPI_PCM_ACTIVATION_SET, (IFX_int32_t) 1);  
  
/* Now PCM communication is started */
```

3.1.3.3 Set-up PCM Channel for RFC 4040

In order to support communication per RFC 4040 (64 kbit/s clear channel) the following settings are needed:

- Select **IFX_TAPI_PCM_RES_ALAW_8BIT** as encoding
- Disable high-pass filter with **IFX_TAPI_PCM_DEC_HP_SET**
- Set gains to 0 dB using **IFX_TAPI_PCM_VOLUME_SET**

3.1.3.4 Example of System using PCM Interface

The example in [Figure 20](#) shows some possible flows for a scenario including the voice engine and a DuSLIC-S chip set (only codec + SLIC, DSP functionality not provided).

- Flow A: Classical VoIP call, not involving PCM.
- Flow B: Call switched between voice engine and DuSLIC, data resources are used only for signal detection, tone generation and Caller ID, not for RTP and JB.
- Flow C: DuSLIC VoIP call using voice engine resources.

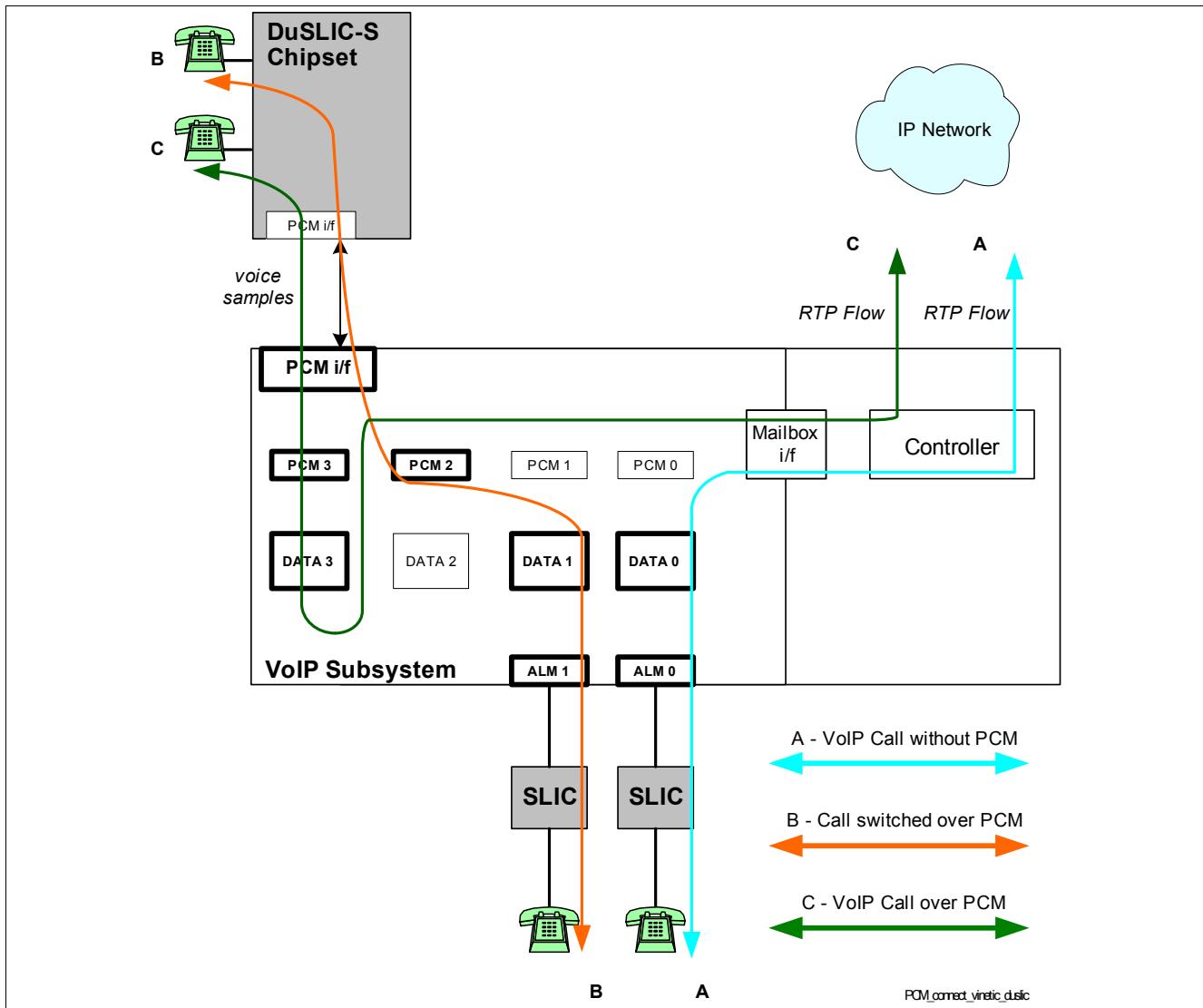


Figure 20 Connection of a DuSLIC via PCM Interface

3.1.4 LEC

The LEC services are used to choose the LEC type¹⁾ (near-end or near-end plus far-end) and to select whether or not to activate NLP (Non-Linear Processing).

The LEC (Line Echo Canceller) can be activated in the analog phone interface ([IFX_TAPI_WLEC_PHONE_CFG_SET](#)) or in the PCM interface ([IFX_TAPI_WLEC_PCM_CFG_SET](#)); decision where to activate the LEC depends on the phone channel resource used (ALM or PCM). The Parameter is a pointer to an [IFX_TAPI_WLEC_CFG_t](#) structure:

- Field nType must be used to control the LEC
 - [IFX_TAPI_WLEC_TYPE_NE](#) to activate near-end echo cancellation.
 - [IFX_TAPI_WLEC_TYPE_NFE](#) to activate both near-end and far-end cancellation.
 - [IFX_TAPI_WLEC_TYPE_OFF](#) to disable the LEC functionality.
- Field bNlp must be used to control the non-linear processing (if the LEC is active)
 - [IFX_TAPI_WLEC_NLP_ON](#) to activate the NLP

1) Please refer to the system release notes for the list of supported LEC types.

- **IFX_TAPI_WLEC_NLP_OFF** to deactivate the NLP

In systems where the analog telephone is directly connected to analog interface (for example flow A in [Figure 20](#)), the LEC has to be activated in the analog interface. For systems using PCM to connect additional analog lines (for example flow C in [Figure 20](#)), the LEC must¹⁾ be activated in the PCM interface.

Attention: *WLEC is the name of a new type of LEC FW algorithm, included in some Infineon products to add far-end line echo cancellation. Although referring to the new WLEC, the interfaces documented in this chapter can be used with any near-end LEC implementation already supported by older TAPI versions. Customer using interfaces IFX_TAPI_LEC_* should migrate to the new IFX_TAPI_WLEC interfaces.*

Example - LEC Configuration

```
/* Activate LEC with NLP for analog port */

IFX_TAPI_WLEC_CFG_t lecConf;
memset(&lecConf, 0, sizeof (IFX_TAPI_WLEC_CFG_t));

/* Enable LEC: near-end cancellation */;
lecConf.nType = IFX_TAPI_WLEC_TYPE_NE;
/* Activate NLP */;
lecConf.bNlp = IFX_TAPI_WLEC_NLP_ON;
ioctl(fd, IFX_TAPI_WLEC_PHONE_CFG_SET, (IFX_int32_t) &lecConf);

/* Now deactivate LEC */
lecConf.nType = IFX_TAPI_WLEC_TYPE_OFF;
ioctl(fd, IFX_TAPI_WLEC_PHONE_CFG_SET, (IFX_int32_t) &lecConf);
```

3.1.5 Jitter Buffer

Configuration of the Jitter Buffer (JB) is done using service **IFX_TAPI_JB_CFG_SET**, which makes it possible to set the following JB properties:

- Type: fixed or adaptive JB
- Local adaptation type
- Optimization for voice traffic or data (fax/modem) traffic
- Scaling
- Initial, minimum and maximum size

Example - Jitter Buffer

```
IFX_TAPI_JB_CFG_t jbCfgVoice;

memset (&jbCfgVoice, 0, sizeof(IFX_TAPI_JB_CFG_t));

/* Adaptive JB */
jbCfgVoice.nJbType = IFX_TAPI_JB_TYPE_ADAPTIVE;
/* Optimization for voice */
jbCfgVoice.nPckAdpt = IFX_TAPI_JB_PKT_ADAPT_VOICE;
/* nScaling multiplied by the packet length determines the play-out delay */
jbCfgVoice.nScaling = 0x10;
/* Initial JB size, in 125 µs steps: 90 ms = 0x2D0 * 125 µs */
```

1) Only if the device providing the analog interface does not use the LEC.

```
jbCfgVoice.nInitialSize = 0x2D0;  
/* Minimum JB size, in 125 µs steps: 10 ms = 0x50 * 125 µs */  
jbCfgVoice.nMinSize = 0x50;  
/* Minimum JB size, in 125 µs steps: 180 ms = 0x5A0 * 125 µs */  
jbCfgVoice.nMaxSize = 0x5A0;  
  
ioctl(fd, IFX_TAPI_JB_CFG_SET, (IFX_int32_t) &jbCfgVoice);
```

3.1.6 RTP

Before starting any RTP session, the application software has to set up several RTP connection parameters for each channel (specified by the channel fd). Two interfaces are provided for it:

- **IFX_TAPI_PKT_RTP_PT_CFG_SET** to configure the payload type tables, see [Chapter 3.1.6.1](#).
- **IFX_TAPI_PKT_RTP_CFG_SET** to configure RTP session parameters, see [Chapter 3.1.6.2](#).

3.1.6.1 RTP Payload Type Tables

Interface **IFX_TAPI_PKT_RTP_PT_CFG_SET** must be used to configure, on a per-channel basis, the association vocoder-payload type in so-called payload tables. It is possible to configure payload types independently for upstream and downstream direction. The list of encoding types is defined in **IFX_TAPI_COD_TYPE_t**.

In downstream, only RTP frames with “known” payload types will be decoded. RTP frames with payload type not programmed using **IFX_TAPI_PKT_RTP_PT_CFG_SET** will be discarded. This means that the tables must be carefully programmed with all vocoders to be supported.

In upstream direction, the generated RTP frames will use the payload type associated with the operating vocoder.

Attention: *For some algorithms the same payload type value must be used for different bitrates (for example G.723, see also example), for some other algorithms (for example G.726) a dynamic¹⁾ payload type value is defined for different bitrates. For detailed information on how to choose the correct payload type please refer to RFC 3551 (especially Section 6)!*

Example - RTP Payload Types Tables

```
/* Configure RTP Payload Type tables */  
IFX_TAPI_PKT_RTP_PT_CFG_t rtpPTConf;  
  
memset(&rtpPTConf, 0, sizeof(IFX_TAPI_PKT_RTP_PT_CFG_t));  
  
/* First prepare the table values */  
/* Payload Types, assuming the application supports G.711 A/µLaw, */  
/* G.729AB and iLBC */  
/* Assign different payload type for iLBC in upstream and downstream */  
/* Values for G.711, G.722 and G.729 are taken from RFC 3551 */  
/* Values for iLBC are choosen just for this example */  
  
/* Payload types table - Upstream */  
rtpPTConf.nPTUp[IFX_TAPI_COD_TYPE_MLAW] = 0;  
rtpPTConf.nPTUp[IFX_TAPI_COD_TYPE_ALAW] = 8;  
rtpPTConf.nPTUp[IFX_TAPI_COD_TYPE_G723_63] = 4;  
rtpPTConf.nPTUp[IFX_TAPI_COD_TYPE_G723_53] = 4;  
rtpPTConf.nPTUp[IFX_TAPI_COD_TYPE_G729_AB] = 18;  
rtpPTConf.nPTUp[IFX_TAPI_COD_TYPE_ILBC_152] = 99;
```

1) RFC 3551 terminology.

```
/* Payload types table - Downstream*/
rtpPTConf.nPTdown[IFX_TAPI_COD_TYPE_MLAW] = 0;
rtpPTConf.nPTdown[IFX_TAPI_COD_TYPE_ALAW] = 8;
rtpPTConf.nPTdown[IFX_TAPI_COD_TYPE_G723_63] = 4;
rtpPTConf.nPTdown[IFX_TAPI_COD_TYPE_G723_53] = 4;
rtpPTConf.nPTdown[IFX_TAPI_COD_TYPE_G729_AB] = 18;
rtpPTConf.nPTdown[IFX_TAPI_COD_TYPE_ILBC_152] = 97;

/* Program the channel (addressed by fd) with the specified payload types */
ioctl(fd, IFX_TAPI_PKT_RTP_PT_CFG_SET, (IFX_int32_t) &rtpPTConf);
```

3.1.6.2 RTP Session Parameters

Parameters relevant for the RTP session, according to RFC 3550, are configured using **IFX_TAPI_PKT_RTP_CFG_SET**: initial value for the sequence number, SSRC for voice and SID frames, and payload type for RFC 2833 packets.

Handling of DTMF and Fax/Modem signal events are also configured with the same interface; in particular, the user can select whether the events will be sent in-band and/or out-of-band using RFC 2833.

Example - RTP Session Parameters

```
/* This is only an example to demonstrate how the API can be used */
/* The used configuration parameters must be adapted to the real product */
IFX_TAPI_PKT_RTP_CFG_t rtpConf;

memset(&rtpConf, 0, sizeof(IFX_TAPI_PKT_RTP_CFG_t));

rtpConf.nSeqNr = 0;
rtpConf.nSsrc = 0;

/* Enable only out-of-band (RFC 2833 packet) transmission */
rtpConf.nEvents = IFX_TAPI_PKT_EV_OOB_ONLY;
/* Configure payload type for RFC 2833 packets*/
rtpConf.nEventPT = 18;
/* Play out the signal upon RFC 2833 packets reception */
rtpConf.nEventsPlay = IFX_TAPI_PKT_EV_OOBPLAY_PLAY;
ioctl(fd, IFX_TAPI_PKT_RTP_CFG_SET, (IFX_int32_t) &rtpConf);
```

3.2 Encoder/Decoder

[Chapter 3.2.1](#) describes how to configure and [Chapter 3.2.2](#) how to control encoder/decoder.

Room noise detection support is described in [Chapter 3.2.3](#).

3.2.1 Encoder/Decoder Configuration

Configuration of the encoder is done using interfaces:

- **IFX_TAPI_ENC_CFG_SET**, to select the encoder (alias vocoder) type and packetization length.
- **IFX_TAPI_ENC_VAD_CFG_SET**, to enable/disable¹⁾ Voice Activity Detection (silence compression and comfort noise generation)
- **IFX_TAPI_COD_VOLUME_SET**, to configure encoder and encoder gains.

1) VAD is enabled by default.

- **IFX_TAPI_COD_DEC_HP_SET**, to enable/disable the high-pass filter in decoder direction.

The sections show examples of how to configure encoder/decoder.

Example - Encoder/Decoder Configuration

```
IFX_int32_t encFrameLen, encType, encVAD;
IFX_boolean_t highPass;
IFX_TAPI_ENC_CFG_t encCfg;
IFX_TAPI_PKT_VOLUME_t codVolume;

memset(&codVolume, 0, sizeof(IFX_TAPI_PKT_VOLUME_t));
memset(&encCfg, 0, sizeof(IFX_TAPI_ENC_CFG_t));

/* Set the encoder type (G.711 µLaw) and length (20 ms)*/
encCfg.nEncType = IFX_TAPI_COD_TYPE_MLAW;
encCfg.nFrameLen = IFX_TAPI_COD_LENGTH_20;
ioctl(fd, IFX_TAPI_ENC_CFG_SET, (IFX_int32_t) &encCfg);

/* Set the VAD on */
encVAD = IFX_TAPI_ENC_VAD_ON;
ioctl(fd, IFX_TAPI_ENC_VAD_CFG_SET, (IFX_int32_t) encVAD);

/* Configure encoder and decoder gains : 0 dB */
codVolume.nEnc = 0;
codVolume.nDec = 0;
ioctl(fd, IFX_TAPI_COD_VOLUME_SET, &codVolume);

/* Activate high-pass filter */
highPass = IFX_TRUE;
ioctl(fd, IFX_TAPI_COD_DEC_HP_SET, highPass);
```

Example - Encoder/Decoder Configuration for RFC 4040

```
/* In order to support RFC 4040, the following configuration must be done */
/* Use G.711, disable high-pass filters, VAD and set gains to 0 dB */

IFX_int32_t encFrameLen, encType, encVAD;
IFX_boolean_t highPass;
IFX_TAPI_ENC_CFG_t encCfg;
IFX_TAPI_PKT_VOLUME_t codVolume;

memset(&codVolume, 0, sizeof(IFX_TAPI_PKT_VOLUME_t));
memset(&encCfg, 0, sizeof(IFX_TAPI_ENC_CFG_t));

/* Set the encoder type (G.711 ALaw) and length (10 ms)*/
encCfg.nEncType = IFX_TAPI_COD_TYPE_ALAW;
encCfg.nFrameLen = IFX_TAPI_COD_LENGTH_10;
ioctl(fd, IFX_TAPI_ENC_CFG_SET, (IFX_int32_t) &encCfg);

/* Set the VAD off */
encVAD = IFX_TAPI_ENC_VAD_NOVAD;
ioctl(fd, IFX_TAPI_ENC_VAD_CFG_SET, (IFX_int32_t) encVAD);
```

```
/* Configure encoder and decoder gains : 0 dB */
codVolume.nEnc = 0;
codVolume.nDec = 0;
ioctl(fd, IFX_TAPI_COD_VOLUME_SET, &codVolume);

/* Disable high-pass filter */
highPass = IFX_FALSE;
ioctl(fd, IFX_TAPI_COD_DEC_HP_SET, highPass);
```

3.2.2 Encoder/Decoder Control

After configuration of the encoder parameters, start/stop encoding can be controlled via **IFX_TAPI_ENC_START** and **IFX_TAPI_ENC_STOP**. This will also automatically start/stop generation of RTP frames.

Interface **IFX_TAPI_ENC_HOLD** should be used to temporarily stop and restart packet encoding, for example to hold/unhold the remote VoIP party.

Before starting encoding, packetization session parameters have to be set (for RTP see also [Chapter 3.1.6](#)); otherwise, random RTP parameters will apply!

In a similar fashion, decoding of the RTP frames can be also controlled with **IFX_TAPI_DEC_START** and **IFX_TAPI_DEC_STOP**.

Attention: *ioctl IFX_TAPI_ENC_CFG_SET replaces the iocts IFX_TAPI_ENC_TYPE_SET and IFX_TAPI_ENC_FRAME_LEN_SET. Usage of the obsolete interfaces is not supported.*

Attention: *Issuing IFX_TAPI_DEC_STOP and/or IFX_TAPI_ENC_STOP, lead to reset of the connection statistics maintained in the device!*

Example - Encoder/Decoder Control

```
IFX_operation_t operation;

/* Start encoding: it starts also RTP packet flow */
/* Parameter is not needed */
ioctl(fd, IFX_TAPI_ENC_START, (IFX_int32_t) 0);

/* Do something ... */

/* Now the remote (VoIP) party has to be put on hold */
/* Enable encoder hold */
operation = IFX_ENABLE;
ioctl(fd, IFX_TAPI_ENC_HOLD, (IFX_int32_t) operation);

/* Do something ... */

/* Now restart (unhold) the communication with the remote (VoIP) party */
/* Disable encoder hold to restart packetization */
operation = IFX_DISABLE;
ioctl(fd, IFX_TAPI_ENC_HOLD, (IFX_int32_t) operation);

/* Stop encoding: it stops also RTP packet flow */
/* Parameter is not needed */
ioctl(fd, IFX_TAPI_ENC_STOP, (IFX_int32_t) 0);
```

3.2.3 Room Noise Detection

Room noise detection is realized using data channel's encoder and voice activity detection: presence of silence packets indicates a silence condition and presence of voice packets indicates a noise condition.

The room noise detection feature is controlled via ioctl **IFX_TAPI_ENC_ROOM_NOISE_DETECT_START** and **IFX_TAPI_ENC_ROOM_NOISE_DETECT_STOP**. The noise/silence characteristics are defined in struct **IFX_TAPI_ENC_ROOM_NOISE_DETECT_t**.

Parameter nVoicePktCnt determines how many consecutive voice packets must arrive before the event **IFX_TAPI_EVENT_COD_ROOM_NOISE** is reported. Likewise parameter nSilencePktCnt determines how many consecutive silence packets must arrive before **IFX_TAPI_EVENT_COD_ROOM_SILENCE** is reported. With a value of 1 in both parameters the events are reported after detection of each packet. Higher values will smooth the reporting from toggeling in uncertain detection phases. The coder is configured to generate voice packets every 10 ms. Silence packets are generated at least every 100 ms.

It is also possible to configure the detection level via parameter nThreshold. This is adjustable over range 0 dB to -96 dB in steps of 3 dB. The parameter itself is unsigned and has to be interpreted as negative dB value.

Immediately after **IFX_TAPI_ENC_ROOM_NOISE_DETECT_START**, an event will be reported to reflects the current state of the detection. The next events are then generated when the conditions described above trigger the events generations.

Attention: After starting room noise detection, the data channel is reserved for this feature and it is not possible to use the data channel resource to establish an RTP stream. The voice and silence frames will not be passed to application software.

Example - Room Noise Detection

```
IFX_TAPI_ENC_ROOM_NOISE_DETECT_t noiseCfg;  
  
memset(&noiseCfg, 0, sizeof(IFX_TAPI_ENC_ROOM_NOISE_DETECT_t));  
  
/* Threshold = -12 dB */  
/* IFX_TAPI_EVENT_COD_ROOM_NOISE, event after 20 voice packets = 20 x 10 ms */  
/* IFX_TAPI_EVENT_COD_ROOM_SILENCE, event after 2 silence packets = 2 x 100 ms */  
noiseCfg.nThreshold = 12;  
noiseCfg.nVoicePktCnt = 20;  
noiseCfg.nSilencePktCnt = 2;  
ioctl(fd, IFX_TAPI_ENC_ROOM_NOISE_DETECT_START, &noiseCfg);  
/* Now noise/silence detection started */
```

3.2.4 Note on Wideband Support (IP Phone Only)

As soon as a wideband¹⁾ vocoder is used, such as G.722, TAPI reconfigures the FW to support the new sampling rate.

The sampling rate will be switched again to narrowband only upon usage of a narrowband vocoder, such as G.729.

3.3 RTCP and Jitter Buffer Statistics

RTCP and jitter buffer statistics, for a certain channel, can be read at any time using respectively **IFX_TAPI_PKT_RTCP_STATISTICS_GET** and **IFX_TAPI_JB_STATISTICS_GET**.

Attention: Disabling encoder and/or decoder will reset all statistics!

1) 16 kHz sampling rate.

Example - Read Statistics

```
/* Configure RTP Payload Type tables */
/* This is only an example to demonstrate how the API can be used */
/* Read all connection statistics available in firmware */
IFX_TAPI_PKT_RTCP_STATISTICS_t rtcpStat;
IFX_TAPI_JB_STATISTICS_t jbStat;

memset(&rtcpStat, 0, sizeof(rtcpStat));
memset(&jbStat, 0, sizeof(jbStat));

ioctl(fd, IFX_TAPI_PKT_RTCP_STATISTICS_GET, &rtcpStat);
ioctl(fd, IFX_TAPI_JB_STATISTICS_GET, &jbStat);
```

3.4 Generation of RFC2833 Frames from Application Software

ioctl **IFX_TAPI_PKT_EV_GENERATE** gives the possibility to control, at any time, insertion of RFC2833 frames in an already established RTP flow. The ioctl requires to specify RFC2833 encoding, duration and whether to start or stop the generation.

For example, if the event duration is specified set 80 ms, one RFC2833 frame will be sent immediately, one after 50 ms and the three end frames after 80 ms. The generation can be stopped at any time (field **action**).

If the encoding corresponds to DTMF digits, it is also possible to play the DTMF on the local port. ioctl **IFX_TAPI_PKT_EV_GENERATE_CFG** has to be used to specify this option.

Example - Generation of RFC2833 Frames from Application Software

```
IFX_TAPI_PKT_EV_GENERATE_t rfc2833Event;
IFX_TAPI_PKT_EV_GENERATE_CFG_t rfc2833EventCfg;

memset(&rfc2833Event, 0, sizeof(rfc2833Event));
memset(&rfc2833EventCfg, 0, sizeof(rfc2833EventCfg));

/* If DTMF are inserted, the same tone will be played out to the local interface */
rfc2833EventCfg.local = IFX_TRUE;
ioctl(fd, IFX_TAPI_PKT_EV_GENERATE_CFG, &rfc2833EventCfg);

/* Insert RFC2833 frames with DTMF digit 4 and duration 80 ms */
rfc2833Event.event = 4;
rfc2833Event.action = IFX_TAPI_EV_GEN_ACTION_START;
rfc2833Event.duration = 8;
ioctl(fd, IFX_TAPI_PKT_EV_GENERATE, &rfc2833Event);

/* Another example */

/* Insert RFC2833 frame with on-hook event */
/* According to RFC2833, the coding for on-hook is 65 */
rfc2833Event.event = 65;
rfc2833Event.action = IFX_TAPI_EV_GEN_ACTION_START;
rfc2833Event.duration = 50;
ioctl(fd, IFX_TAPI_PKT_EV_GENERATE, &rfc2833Event);
```

3.5 Tone API

The tone management API allows generation and detections of tones specified and stored in an internal table called "Tone Table." Besides typical DTMF and call progress tones¹⁾, it is possible to define tones with more complex cadences and combinations of frequencies.

Table 23 Topics of Chapter 3.4

Topic	Chapter	Applicability
Usage of the Tone Table	Chapter 3.5.1	All application types.
Play tones	Chapter 3.5.2	All application types.
Definition of simple tones	Chapter 3.5.3	All application types.
Definition of composed tones	Chapter 3.5.4	All application types.
Predefined tones	Chapter 3.5.5	All application types.
Play tones with high output level	Chapter 3.5.6	For ATA and Gateway applications.
Play special tones	Chapter 3.5.7	All application types.
Call progress tone detection	Chapter 3.5.8	All application types.

3.5.1 Tone Table

Before tones can be generated (and also recognized), tones have to be defined using a tone descriptor ([IFX_TAPI_TONE_SIMPLE_t](#) and/or [IFX_TAPI_TONE_COMPOSED_t](#)) and stored in an internal Tone Table, using [IFX_TAPI_TONE_TABLE_CFG_SET](#). The Tone Table can store up to 256 different tones. The first 32 entries of the table (0-31) are predefined for DTMF and some other predefined tones²⁾. The rest of the table can be used to store simple and composed tones.

The following figure shows examples of a simple and a composed tone.

1) For example busy tone, ring back, disconnect tone, etc.

2) Example of dial tone, busy tone and ringing tone and other tones often used in telephony.

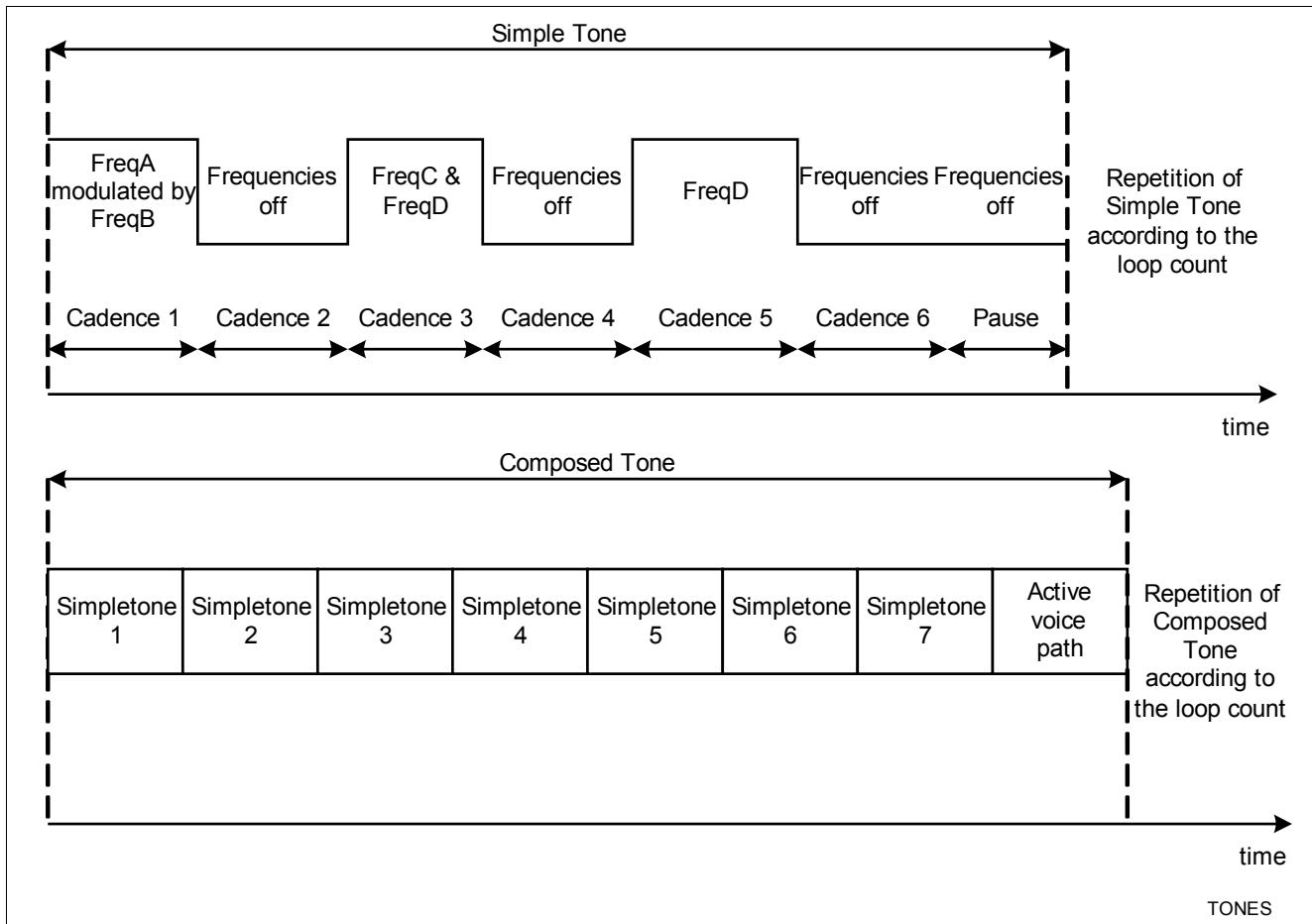


Figure 21 Simple and Composed Tones

As depicted in [Figure 21](#), a simple tone can consist of four to six different cadences using four frequencies (f_1, f_2, f_3, f_4), and it is possible to define the level for each of the four frequencies. For each cadence, up to four frequencies can be active at the same time. Optionally it is possible to enable modulation; in this case, frequency f_1 will be modulated using frequency f_2 ; frequencies f_3 and f_4 will be summed up (see also [IFX_TAPI_TONE_SIMPLE_t](#)).

The composed tones consist of up to seven simple tones that are played in a sequence. If the loop count of a composed tone is greater than zero, it is also possible to activate the voice path between the loops.

3.5.2 Playing Tones

Playing tones is possible only for tones already present in the tone table using [IFX_TAPI_TONE_LOCAL_PLAY](#) and passing the tone index as a parameter.

For generation of tones towards the network, [IFX_TAPI_TONE_NET_PLAY](#) must be used.

In order to stop the tone generation, tone index 0 (zero) must be passed (to [IFX_TAPI_TONE_LOCAL_PLAY/IFX_TAPI_TONE_NET_PLAY](#)) or the interface [IFX_TAPI_TONE_STOP](#) can be used.

Attention: At one point in time, one or two tones per channel can be played. It depends on the number of tone generators available per data channel. Please refer to the system release note document.

Examples

```
/* start playing one simple tone, tone defined in tone table index 71 */
```

```
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) 71);

/* wait a little, but wait enough to hear whole tone */
sleep(5);

/* stop playing tone */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) 0);

/* pause */
sleep(5);

/* now start playing a complex tone, tone defined in tone table index 100 */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) 100);
/* wait a little, but wait enough to hear whole tone */
sleep(15);

/* stop playing tone */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) 0);
```

3.5.3 Defining Simple Tones

The definition of a simple tone is done by filling up an **IFX_TAPI_TONE_t** union using the “simple” fields: This means that the **IFX_TAPI_TONE_SIMPLE_t** structure is used. After filling the relevant fields, the structure must be inserted in the tone table using **IFX_TAPI_TONE_TABLE_CFG_SET**.

Example - Tone Configuration

```
IFX_TAPI_TONE_t tone;

memset(&tone, 0, sizeof(IFX_TAPI_TONE_t));
/* define a simple tone for tone table index 71 */
tone.simple.format = IFX_TAPI_TONE_TYPE_SIMPLE;
/* tone table index where to insert the tone */
tone.simple.index = 71;
/* using two frequencies */
/* 0 <= till < 4000 Hz */
tone.simple.freqA = 480;
tone.simple.freqB = 620;
/* tone level for freqA */
/* -300 < till < 0 */
tone.simple.levelA = -15;
/* tone level for freqB */
tone.simple.levelB = -20;
/* program first cadences (on time) */
tone.simple.cadence[0] = 2000;
/* program second cadences (off time) */
tone.simple.cadence[1] = 2000;
/* in the first cadence, both frequencies must be played */
tone.simple.frequencies[0] = IFX_TAPI_TONE_FREQA | IFX_TAPI_TONE_FREQB;
/* in the second cadence, all frequencies are off */
tone.simple.frequencies[1] = IFX_TAPI_TONE_FREQNONE;
/* the tone will be played two times (2 loops) */
```

```
tone.simple.loop = 2;
/* at the end of each loop there is a pause */
tone.simple.pause = 200;

/* update the tone table with the simple tone */
ioctl(fd, IFX_TAPI_TONE_TABLE_CFG_SET, (IFX_int32_t) &tone);
/* now the simple tone is added to the tone table at index 71 */

/* define a simple tone for tone table index 72 */
memset(&tone, 0, sizeof(IFX_TAPI_TONE_t));
tone.simple.format = IFX_TAPI_TONE_TYPE_SIMPLE;
/* tone table index where to insert the tone */
tone.simple.index = 72;
tone.simple.freqA = 480;
tone.simple.levelA = -15;
tone.simple.cadence[0] = 2000;
tone.simple.cadence[1] = 500;
tone.simple.frequencies[0] = IFX_TAPI_TONE_FREQA;
tone.simple.frequencies[1] = IFX_TAPI_TONE_FREQNONE;
/* the tone will be played one time (1 loop) */
tone.simple.loop = 1;
tone.simple.pause = 0;

/* add simple tone to the tone table */
ioctl(fd, IFX_TAPI_TONE_TABLE_CFG_SET, (IFX_int32_t) &tone);
/* now the simple tone is added to the tone table at index 72 */
```

3.5.4 Defining Composed Tones

The definition of a composed tone is done by filling up an **IFX_TAPI_TONE_t** union using the “composed” fields: This means that the **IFX_TAPI_TONE_COMPOSED_t** structure is used. After filling the relevant fields the structure must be inserted in the tone table using **IFX_TAPI_TONE_TABLE_CFG_SET**.

Example - Composed Tone Configuration

```
IFX_TAPI_TONE_t tone;

/* define a complex tone for tone table index 100 */
memset(&tone, 0, sizeof(IFX_TAPI_TONE_t));

tone.composed.format = IFX_TAPI_TONE_TYPE_COMPOSED;
/* tone table index where to insert the tone */
tone.composed.index = 100;
/* the complex tone uses two simple tones already present in the */
/* tone table */
tone.composed.count = 2;
/* now list the simple tones that compose the complex tone */
/* assumption that two simple tones are defined in tone table */
/* indexes 71 and 72 */
/* First simple tone 71 will be played (so many times as his loop is) */
/* then second simple tone 72 will be played (so many times as his loop is) */
tone.composed.tones[0] = 71;
```

```

tone.composed.tones[1] = 72;
/* add complex tone to the tone table */
ioctl(fd, IFX_TAPI_TONE_TABLE_CFG_SET, (IFX_int32_t) &tone);
/* now the complex tone is added to the tone table at index 100

```

3.5.5 Predefined Tones

The same interfaces can be used to play and stop predefined tones. The only difference between handling of predefined and user-defined tones is that for the reserved tone table indexes, interface **IFX_TAPI_TONE_TABLE_CFG_SET** can be used only to define on/off time (using the first two elements of the cadence array) and level. Other parameters defined in **IFX_TAPI_TONE_SIMPLE_t** are ignored; frequencies are predefined and can not be modified.

Table 24 lists the predefined tones entries in the tone table.

Table 24 Tone Table - Predefined Tones

Index	Frequency 1	Level1 [dB]	Frequency 2	Level 2 [dB]	Note
1	697	-11	1209	-9	DTMF digit 1
2	697	-11	1336	-9	DTMF digit 2
3	697	-11	1477	-9	DTMF digit 3
4	770	-11	1209	-9	DTMF digit 4
5	770	-11	1336	-9	DTMF digit 5
6	770	-11	1477	-9	DTMF digit 6
7	852	-11	1209	-9	DTMF digit 7
8	852	-11	1336	-9	DTMF digit 8
9	852	-11	1477	-9	DTMF digit 9
10	941	-11	1209	-9	DTMF digit * (star)
11	941	-11	1336	-9	DTMF digit 0 (zero)
12	941	-11	1477	-9	DTMF digit # (number)
13	800	-9	-	0	-
14	1000	-9	-	0	-
15	1250	-9	-	0	-
16	950	-9	-	0	-
17	1100	-9	-	0	CNG Tone
18	1400	-9	-	0	-
19	1500	-9	-	0	-
20	1600	-9	-	0	-
21	1800	-9	-	0	-
22	2100	-9	-	0	CED Tone
23	2300	-9	-	0	-
24	2450	-9	-	0	-
25	350	-11	440	-9	Dial tone example
26	440	-11	480	-9	Ringing tone example
27	480	-11	620	-9	Busy tone example
28	697	-11	1633	-9	DTMF digit A
29	770	-11	1633	-9	DTMF digit B

Table 24 Tone Table - Predefined Tones (cont'd)

Index	Frequency 1	Level1 [dB]	Frequency 2	Level 2 [dB]	Note
30	852	-11	1633	-9	DTMF digit C
31	941	-11	1633	-9	DTMF digit D

3.5.6 Generating Tones with High-level Output

This chapter is relevant only to ATA and VoIP Gateway applications.

Some howler tones require relative high levels (BT howler tone requires up to +15 dBm) in order to enable the output levels above the maximum level normally permitted (about 3.14 dBm). The service **IFX_TAPI_LINE_LEVEL_SET** for the ALM fd should be used to enable maximum output level path. If this is not done, the maximum output level will be limited to about +3.14 dBm. Interface **IFX_TAPI_PHONE_VOLUME_SET** can be used to fine-tune the signal output level (see also “[Analog Line Channel Volume](#)” on Page 60).

Assuming that the signal stored in the RTP sequence is encoded to reach up to level $7FFF_H$ (maximum digital value) and with output gain of 0 dB and path set to “high level,” the output signal will reach the maximum level permitted by the device.

Attention: *Immediately after playing an howler tone, if previously enabled, the high-level path must be now disabled using the service **IFX_TAPI_LINE_LEVEL_SET**. Furthermore, if a dedicated output gain (using **IFX_TAPI_PHONE_VOLUME_SET**) has been set because of the howler tone, it is important to reconfigure the output gain to the original value.*

Example - Howler Tones with High-level Output

```
/* Example of playing Howler tone with output level exceeding +3.14 dBm */
IFX_TAPI_LINE_VOLUME_t gains_normal, gains_howler;

memset(&gains_normal, 0, sizeof(IFX_TAPI_LINE_VOLUME_t));
memset(&gains_howler, 0, sizeof(IFX_TAPI_LINE_VOLUME_t));

/* set gains for normal operation mode */
gains_normal.nGainRx = -3;
gains_normal.nGainTx = 0;

/* set TX gain for howler tone, if required */
gains_howler.nGainRx = 24; /* more than 3 dB */
/* initialize system with default gains */
ioctl(fd, IFX_TAPI_PHONE_VOLUME_SET, (IFX_int32_t) &gains_normal);

/* do something else... */

/* now play the howler tone (the tone has been defined earlier) */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) TONE_INDEX_HOWLER);

/* wait a little to play tone */
sleep(5);

/* after some time the device can stop playing the tone */
ioctl(fd, IFX_TAPI_TONE_STOP, (IFX_int32_t) TONE_INDEX_HOWLER);

/* application decides that the howler tone must be played */
/* (if required) change TX gain */
```

```
ioctl(fd, IFX_TAPI_PHONE_VOLUME_SET, (IFX_int32_t) &gains_howler);
/* enable device to generate high level output */
ioctl(fd, IFX_TAPI_LINE_LEVEL_SET, (IFX_int32_t) IFX_TAPI_LINE_LEVEL_ENABLE );
/* now play the howler tone (the tone has been defined earlier) */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) TONE_INDEX_HOWLER);

/* wait a little to play tone */
sleep(5);

/* after some time the device can stop playing the tone */
ioctl(fd, IFX_TAPI_TONE_STOP, (IFX_int32_t) TONE_INDEX_HOWLER);
/* return to normal output level */
ioctl(fd, IFX_TAPI_LINE_LEVEL_SET,
(IFX_int32_t) IFX_TAPI_LINE_LEVEL_DISABLE);
/* (if gain changed at the beginning of the sequence) change TX gain */
ioctl(fd, IFX_TAPI_PHONE_VOLUME_SET, (IFX_int32_t) &gains_normal);
```

3.5.7 Generating Special Tones

The Infineon products can automatically generate a variety of tones; nevertheless some special tones (such as the howler tone defined by BT) can not be directly generated by using internal product resources. In order to generate this kind of special tone, support from application software is required. The application software has to provide the TAPI with RTP packets containing the encoding¹⁾ of the special tone.

3.5.8 Call Progress Tone Detection

Some Infineon devices can be programmed to detect Call Progress Tones (CPTs, for example a busy tone) or in general, all tones that can be defined as simple tones in the tone table. In order to detect a tone, it must first be added to the tone table.

Detection starts on a certain data channel after programming the CPT detector with command **IFX_TAPI_TONE_CPTD_START** for the channel file description, and giving as parameter a pointer to a structure **IFX_TAPI_TONE_CPTD_t** that must be programmed with the tone table index in order to be detected, and the direction (receive or transmit).

The detection of the tone is signaled through the event reporting interface, with event id **IFX_TAPI_EVENT_TONE_DET_CPT**, reporting the direction (local or network).

Disabling detection of the tone, for the same file descriptor, is done using the interface **IFX_TAPI_TONE_CPTD_STOP**. This command does not require additional parameters.

Examples

```
IFX_TAPI_TONE_CPTD_t cpt;

memset (&cpt, 0, sizeof(IFX_TAPI_TONE_CPTD_t));
/* Detect busy tone, present in the tone table at index BUSY_TONE */
cpt.tone = BUSY_TONE;
/* Tone to be detected in transmit direction (typical for FXO) */
cpt.signal = IFX_TAPI_TONE_CPTD_DIRECTION_TX;
/* Start CPT detector */
ioctl(fd, IFX_TAPI_TONE_CPTD_START, (IFX_int32_t) &cpt);
```

1) The coding type must be one of the vocoders supported by the product.

```

/* Applications waits for CPTD event */

/* Wait for IFX_TAPI_EVENT_TONE_DET_CPT event */

/* After some time, application wants to stop CPT detection */
ioctl(fd, IFX_TAPI_TONE_CPTD_STOP, (IFX_int32_t) 0);

```

3.6 IP Phone Ringing

Command **IFX_TAPI_AUDIO_RING_START** must be used to start ringing, giving as parameter the tone table index where the ringing cadence is defined.

Command **IFX_TAPI_AUDIO_RING_STOP** is used to stop ringing.

The ringing volume can be selected using **IFX_TAPI_AUDIO_RING_VOLUME_SET**.

Example - IP Phone Ringing

```

IFX_int32_t ringCadenceIndex;

/* Position of the ring cadence in the tone table */
ringCadenceIndex = RING_TONE;

ioctl(fd, IFX_TAPI_AUDIO_RING_START, ringCadenceIndex);

/* .... do something.... */

/* Stop ringing */
ioctl(fd, IFX_TAPI_AUDIO_RING_STOP, 0);

```

3.7 Ringing on FXS Interfaces

Ringing on FXS ports should be handled in two steps: first program the ring cadence pattern and ringing type, then start periodical ringing (using the preprogrammed cadence pattern).

Attention: For caller ID transmission associated to ringing please refer to [Chapter 3.8](#).

Table 25 Topics of the Power Ringing Chapter

Topic	Chapter	Applicability
Configure Ringing Type	Chapter 3.7.1	For ATA and Gateway applications.
Configure Ringing Cadence	Chapter 3.7.2	For ATA and Gateway applications.
Start / Stop Ringing	Chapter 3.7.3	For ATA and Gateway applications.

3.7.1 Configure Ringing Type

Service **IFX_TAPI_RING_CFG_SET** shall be used to choose ringing mode for example internal or external (listed ringing mode listed in **IFX_TAPI_RING_CFG_MODE_t**) and the ring trip type (listed ringing mode listed in **IFX_TAPI_RING_CFG_SUBMODE_t**).

Example - Ringing Type Configuration

```

/* Configure Ringing Type */
IFX_TAPI_RING_CFG_t ringingType;
memset (&ringingType, 0, sizeof (IFX_TAPI_RING_CFG_t));
ringingType.mode = IFX_TAPI_RING_CFG_MODE_INT_BALANCED;

```

```
ringingType.submode = IFX_TAPI_RING_CFG_SUBMODE_DC RNG TRIP_FAST;  
ret = ioctl(fd, IFX_TAPI_RING_CFG_SET, (IFX_int32_t) &ringingType)
```

3.7.2 Configure Ring Cadence

Interface **IFX_TAPI_RING_CADENCE_HR_SET** has to be used to program the ringing cadence pattern associated to an FXS line. The cadence is stored and will be used by the next ringing issued on the same FXS line. The cadence pattern is coded in a bit sequence: each 1 corresponds to a 50 ms ring burst and each 0 corresponds to a 50 ms ring pause. For programming convenience, the bit sequence is represented in an array of char. Each entry in the array (8 bits) corresponds to 400 ms, which means that an array entry 0xFF corresponds to a 400 ms ring burst and 0x00 corresponds to 400 ms ring pause. A ring cadence has to start with a ring burst, which means that at least the first bit of the coded cadence must be a 1.

The array is part of the **IFX_TAPI_RING_CADENCE_t** structure, also containing a field specifying the number of valid bits in the array.

Some examples of cadence patterns:

- 1-second ring burst and 1-second ring pause is represented as FF FF F0 00 00, with 40 valid bits (2000 ms / 50 ms = 40).
- 3-second ring burst and 1-second ring pause is represented as FF FF FF FF FF FF FF F0 00 00, with 80 valid bits (4000 ms / 50 ms = 80).
- 0.5-second ring burst and 0.4-second ring pause is represented as FF C0 00, with 18 valid bits (900 ms / 50 ms = 18).

3.7.3 Start / Stop Ringing

Two possibilities are given for starting ringing:

- For applications requiring ringing without CID, service **IFX_TAPI_RING_START**¹⁾ starts ringing.
- In applications requiring a CID transmission²⁾ associated with ringing, service **IFX_TAPI_CID_TX_SEQ_START** starts a sequence synchronizing ringing with CID transmission.

The ringing cadence used is the one configured via **IFX_TAPI_RING_CADENCE_HR_SET** for the same line.

Ringing can be stopped using **IFX_TAPI_RING_STOP**. Ringing stops automatically upon off-hook detection.

Attention: IFX_TAPI_RING_STOP does not stop a CID sequence, only the ringing will be stopped!

Example - Ringing Support

```
/* Cadence pattern of 3 sec. ring and 1 sec. pause */  
IFX_char_t data[10] = {0xFF, 0xFF, 0xFF, 0xFF, 0xFF,  
                      0xFF, 0xFF, 0xF0, 0x00, 0x00};  
IFX_TAPI_RING_CADENCE_t ringCadence;  
memset(&ringCadence, 0, sizeof(IFX_TAPI_RING_CADENCE_t));  
  
/* Program the cadence */  
memcpy(&ringCadence.data, data, sizeof(data));  
ringCadence.nr = sizeof(data) * 8;  
ioctl(fd, IFX_TAPI_RING_CADENCE_HR_SET, &ringCadence);  
  
/* Do ringing (NO CID will be sent with this Interface) */  
ioctl(fd, IFX_TAPI_RING_START, 0);  
/* .... do something.... */
```

1) CID cannot be issued with this interface; this was supported with driver up to release 1.0.x.

2) Please also refer to [Chapter 3.8](#).

```
sleep(2);  
/* Stop ringing */  
ioctl(fd, IFX_TAPI_RING_STOP, 0);
```

3.8 Caller ID Support

The following sections in this chapter describe how to program caller ID (CID) support.

Table 26 Topics of the Caller ID Chapter

Topic	Chapter	Applicability
Introduction to CID Support	Chapter 3.8.1	For ATA and Gateway applications.
CID Configuration	Chapter 3.8.2	For ATA and Gateway applications.
CID Transmission	Chapter 3.8.3	For ATA and Gateway applications.
CID Reception	Chapter 3.8.4	For ATA and Gateway applications.

3.8.1 Introduction to Caller ID Support

TAPI interfaces are provided for CID transmission/reception and ringing, the following services are provided

- Caller ID transmission associated with ringing
- Caller ID transmission not associated with ringing
- Ringing without Caller ID transmission
- Caller ID reception

An overview of implemented CID types is shown in [Table 27](#); the various types are supported¹⁾ according to Telcordia, ETSI, BT and NTT standards.

Table 27 Caller ID Types

Type	Associated with Ringing	Hook Status
Caller ID type 1	Yes	On-hook
Caller ID type 2	No	Off-hook
Message Waiting Indication/Visual Message Waiting Indication	No	On-hook

A fundamental step before starting any type of CID service is the configuration of the CID “engine” ([Chapter 3.8.2](#)). It allows selection among CID standards, and optionally tunes the automatic generation of the CID sequences (for example program timing, ack tone).

After configuration of the CID engine, the application starts CID transmission ([Chapter 3.8.3](#)) or CID reception ([Chapter 3.8.4](#)) for a given channel. Before starting a CID type 1, a ringing cadence must also be programmed.

A service is available for issuing a ring without CID transmission (ringing support is described in [Chapter 3.7](#))

3.8.1.1 Information on Caller ID

Generation of Caller ID can be divided into four phases:

- Phase 1 - Send Alert
- Phase 2 - Wait for ACK (not always required, depends on type and standard)
- Phase 3 - Send CID information
- Phase 4 - Ringing (only for CID type 1)

The operations required in the four phases are summarized in [Table 28](#) (on-hook transmission associated with ringing), [Table 29](#) (on-hook transmission not associated with ringing), [Table 30](#) (off-hook transmission) and [Table 31](#) (abbreviations used).

1) For a reference list of supported CID feature and standards, please refer to the driver release notes.

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Feature Description

Table 28 Caller ID Generation - On-hook CID (type 1)

Standard	Phase 1 - Alert	Phase 2 - ACK	Phase 3 - CID Tx	Phase 4 - Ringing
Telcordia on-hook	Ring (RB)	N/A	FSK	Periodical ringing
ETSI "during ringing"	Ring (RB)	N/A	FSK/DTMF	Periodical ringing
ETSI "prior to ringing" with DTAS	DTAS	N/A	FSK/DTMF	Periodical ringing
ETSI "prior to ringing" with LR	LR - DTAS	N/A	FSK/DTMF	LR - Periodical ringing
ETSI "prior to ringing" with RP	Ring (RP)	N/A	FSK/DTMF	Periodical ringing
SIN 227 (BT) on-hook	LR - DTAS	N/A	FSK	LR - Periodical ringing
NTT (Japan) on-hook	LR - CAR	Off-hook	FSK - on-hook	LR - Periodical ringing

Table 29 Caller ID Generation - On-hook MWI

Standard	Phase 1 - Alert	Phase 2 - ACK	Phase 3 - CID Tx	Phase 4 - Ringing
Telcordia on-hook	OSI	N/A	FSK	N/A
ETSI "during ringing"	N/A	N/A	N/A	N/A
ETSI "prior to ringing" with DTAS	DTAS	N/A	FSK/DTMF	N/A
ETSI "prior to ringing" with LR	LR - DTAS	N/A	FSK/DTMF	N/A
ETSI "prior to ringing" with RP	Ring (RP)	N/A	FSK/DTMF	N/A
SIN 227 (BT) on-hook	LR - DTAS	N/A	FSK	N/A
NTT (Japan) on-hook	N/A	N/A	N/A	N/A

Table 30 Caller ID Generation - Off-hook CID (type 2) and off-hook MWI

Standard	Phase 1 - Alert	Phase 2 - ACK	Phase 3 - CID Tx	Phase 4 - Ringing
Telcordia off-hook	CAS	'D'	FSK	N/A
ETSI off-hook	DTAS	'D'. Optional 'A', 'B', 'C'.	FSK	N/A
SIN 227 (BT) off-hook	DTAS	'D'	FSK	N/A
NTT (Japan) off-hook	AS	N/A	FSK	N/A

Table 31 Caller ID Generation - Abbreviations

Abbreviation	Definition	Note
RB	Ring Burst	
RP	Ring Pulse	It is a short Ring Burst (defined by ETSI)
CAR	Signal Receiver Seizing Signal	It is a short Ring Burst (defined by NTT)
FSK	Frequency Shift Keying	CID data are transmitted using FSK modem modulation, using V.23 or Bell202 standard. Japanese CID uses a modified V.23 data coding.
DTMF	Dual Tone Multi-Frequency	CID data are transmitted as sequence of DTMF tones.
ACK	Acknowledge	Signal produced by CPE to indicate "ready" for processing CID protocol. It is typically a DTMF digit or a short off-hook.
DTAS	Dual Tone Alert Signal	Tone used to alert the CPE that a CID protocol transmission is going to start. ETSI / SIN terminology.

Table 31 Caller ID Generation - Abbreviations (cont'd)

Abbreviation	Definition	Note
CAS	CPE Alert Signal	Tone used to alert the CPE that a CID protocol transmission is going to start. Telcordia terminology.
AS	Alert Signal	Tone used to alert the CPE that a CID protocol transmission is going to start. NTT (Japan) terminology.
LR	Line Reversal (alias Polarity Reversal)	Normal Polarity is re-established with the beginning of the periodic ringing.
OSI	Open Switching Interval	A period of line high impedance.

3.8.2 CID Configuration

Selection of CID standard to be used is done with service **IFX_TAPI_CID_CFG_SET** and structure **IFX_TAPI_CID_CFG_t**, and minimum configuration required is to specify which CID standard shall be used for CID operations; this is selectable through field **nStandard**.

Furthermore, the user has the possibility to modify several parameters CID standard specific through **IFX_TAPI_CID_STD_TYPE_t**, which is a union of structures defining parameters (such as timing, FSK or DTMF parameters, etc.) typical for each supported CID standard. **Figure 22** gives an overview of the **IFX_TAPI_CID_CFG_t** structure.

The application software does not have to configure all fields of structure replacing **IFX_TAPI_CID_STD_TYPE_t**; for fields not configured, default values will be used. Default values for all configurable fields are given in the structure documentation. As an example, if a pointer to a **IFX_TAPI_CID_TIMING_t** structure is not given, default values for the CID timing apply.

Ring cadence must be programmed (using **IFX_TAPI_RING_CADENCE_HR_SET**) before starting a CID sequence associated with ringing; see also **Chapter 3.7**.

Please refer to the coding examples on **Page 92**.



Figure 22 Overview of the Configuration Structure

CID Timing Configuration

It is possible to adjust timing of CID sequence transmission ([IFX_TAPI_CID_TX_SEQ_START](#)) modifying parameters included in structure [IFX_TAPI_CID_TIMING_t](#).

Table 32 reports which parameters apply to which CID transmission standard, to be noted that some fields are located in the standard specific structure, not in [IFX_TAPI_CID_TIMING_t](#).

Figure 23 up to **Figure 29** represent the parameters in different CID transmission scenarios. For a description of the timing parameters shown in the diagrams, please refer to the structure reference description. For each caller ID standard a table summarizes the relevant timing diagrams. See **Table 33** up to **Table 36**.

Attention: *The ring cadence used by CID type 1 is programmed using different interfaces, please refer to Chapter 3.7.2!*

Table 32 Relevant Timings Applicable to the Different Standards

Timing Parameter	Telcordia /Bellcore	ETSI	SIN (BT)	NTT	Parameter Location
beforeData	N/A	N/A	N/A	Off-hook	IFX_TAPI_CID_TIMING_t
dataOut2restoreTimeOn hook	N/A	On-hook ¹⁾	On-hook	On-hook	IFX_TAPI_CID_TIMING_t
dataOut2restoreTimeOff hook	Off-hook	Off-hook	Off-hook	Off-hook	IFX_TAPI_CID_TIMING_t
ack2dataOutTime	Off-hook	Off-hook	Off-hook	On-hook	IFX_TAPI_CID_TIMING_t
cas2ackTime	Off-hook	Off-hook	Off-hook	N/A	IFX_TAPI_CID_TIMING_t
afterAckTimeout	Off-hook	Off-hook	Off-hook	N/A	IFX_TAPI_CID_TIMING_t
afterFirstRing	On-hook associated with ringing	On-hook associated with ringing ²⁾	N/A	N/A	IFX_TAPI_CID_TIMING_t
afterRingPulse	N/A	On-hook ³⁾	N/A	N/A	IFX_TAPI_CID_TIMING_t
afterDTASOnhook	N/A	On-hook ⁴⁾	On-hook	N/A	IFX_TAPI_CID_TIMING_t
afterLineReversal	N/A	On-hook ⁵⁾	On-hook	On-hook	IFX_TAPI_CID_TIMING_t
afterOSI	On-hook	N/A	N/A	N/A	IFX_TAPI_CID_TIMING_t
ringPulseTime	N/A	N/A	N/A	On-hook	IFX_TAPI_CID_STD_NTT_t
ringPulseTimeLoop	N/A	N/A	N/A	On-hook	IFX_TAPI_CID_STD_NTT_t
ringPulseOffTime	N/A	N/A	N/A	On-hook	IFX_TAPI_CID_STD_NTT_t
dataOut2incomingSuccessfulTimeout	N/A	N/A	N/A	On-hook	IFX_TAPI_CID_STD_NTT_t

1) Only for data transmission before ringing, not defined for data transmission during ringing

2) Only for data transmission between first and second ring

3) Only for data transmission after a ring pulse (RP)

4) Only for data transmission after DTAS alert or line reversal and DTAS alert

5) Only for data transmission after line reversal and DTAS alert

Table 33 Caller ID - Timing Diagrams for Telcordia¹⁾

Caller ID Type	Timing Diagram	Note
Type 1	Figure 23	
Type 2	Figure 27	
Message Waiting Indication	Figure 26	

1) Please refer to [5].

Table 34 Caller ID - Timing Diagrams for ETSI¹⁾

Caller ID Type	Timing Diagram	Note
Type 1 on-hook transmission after the first ring	Figure 23	On-hook transmission associated to ringing
Type 1 on-hook transmission prior to ringing	Figure 24	On-hook transmission associated to ringing

Table 34 Caller ID - Timing Diagrams for ETSI¹⁾ (cont'd)

Caller ID Type	Timing Diagram	Note
Type 2	Figure 28 Figure 29	
Message Waiting Indication	Figure 24	Please do not consider the ring pattern blocks.

1) Please refer to [6] and [7].

Table 35 Caller ID - Timing Diagrams for BT¹⁾

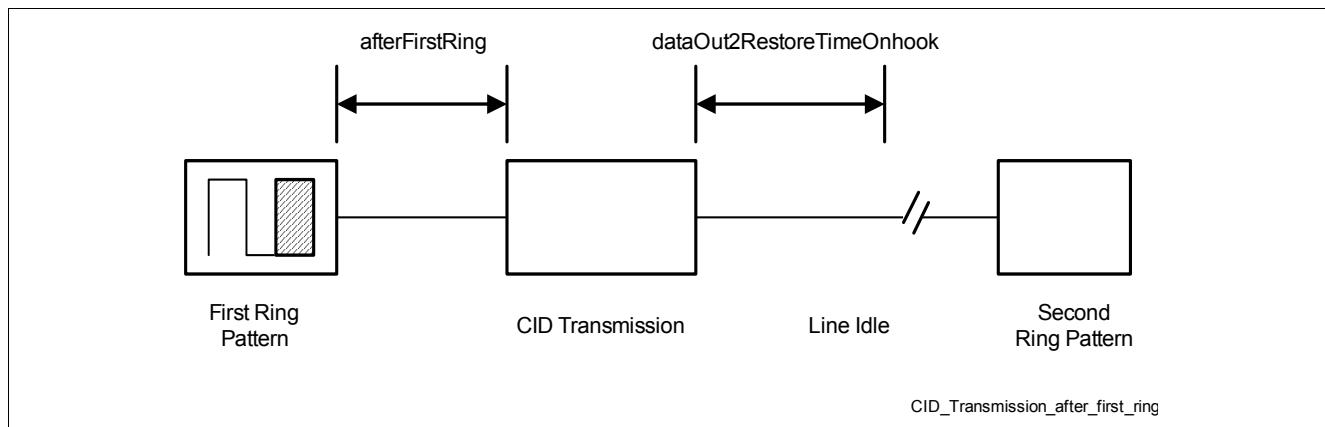
Caller ID Type	Timing Diagram	Note
Type 1	Figure 24	Please consider only bottom diagram.
Type 2	Figure 28 Figure 29	

1) Please refer to [8].

Table 36 Caller ID - Timing Diagrams for NTT¹⁾

Caller ID Type	Timing Diagram	Note
Type 1	Figure 25	
Type 2	Figure 30	

1) Please refer to [9].

**Figure 23 Timing for Telcordia and ETSI CID Type 1 with Transmission After First Ring**

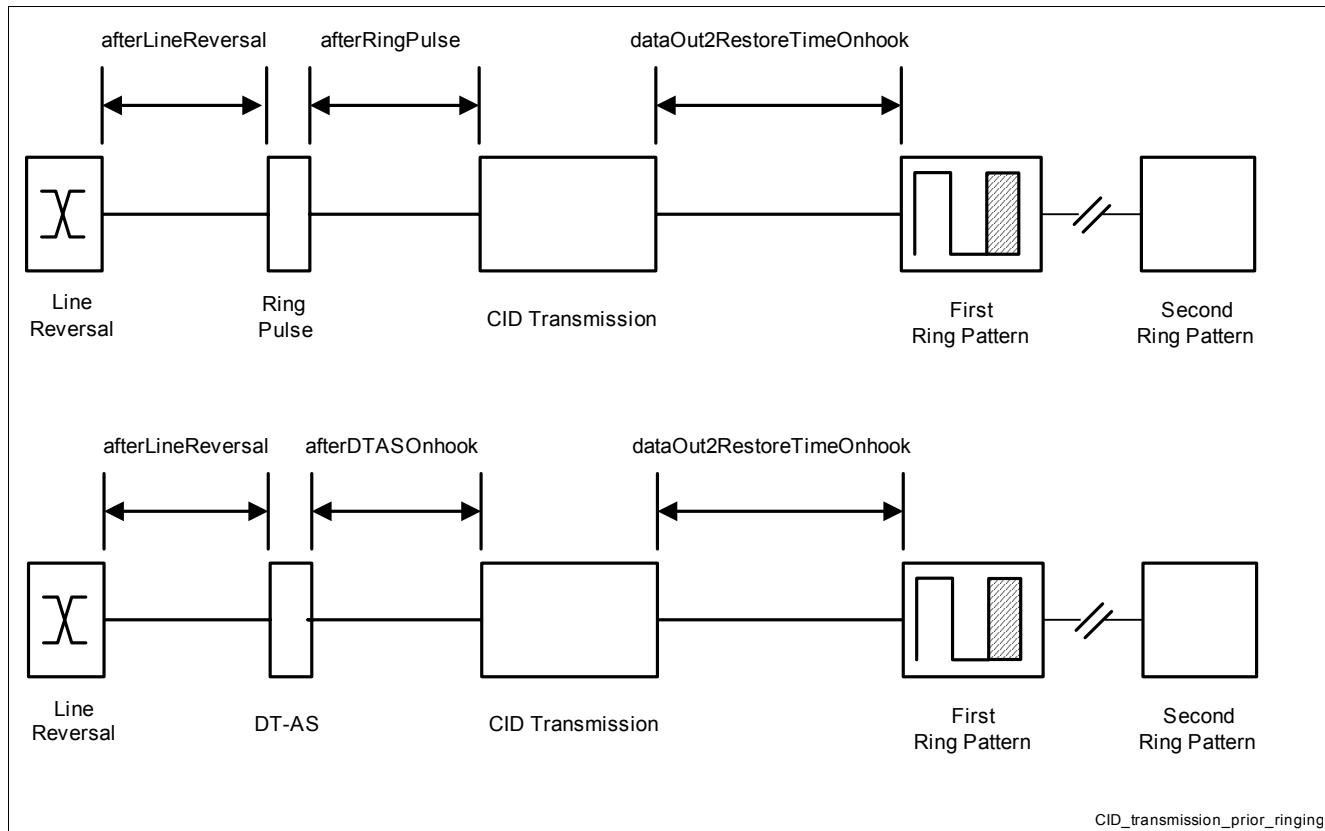


Figure 24 Timing for some Possible ETSI CID Type 1 with Transmission Prior to Ringing

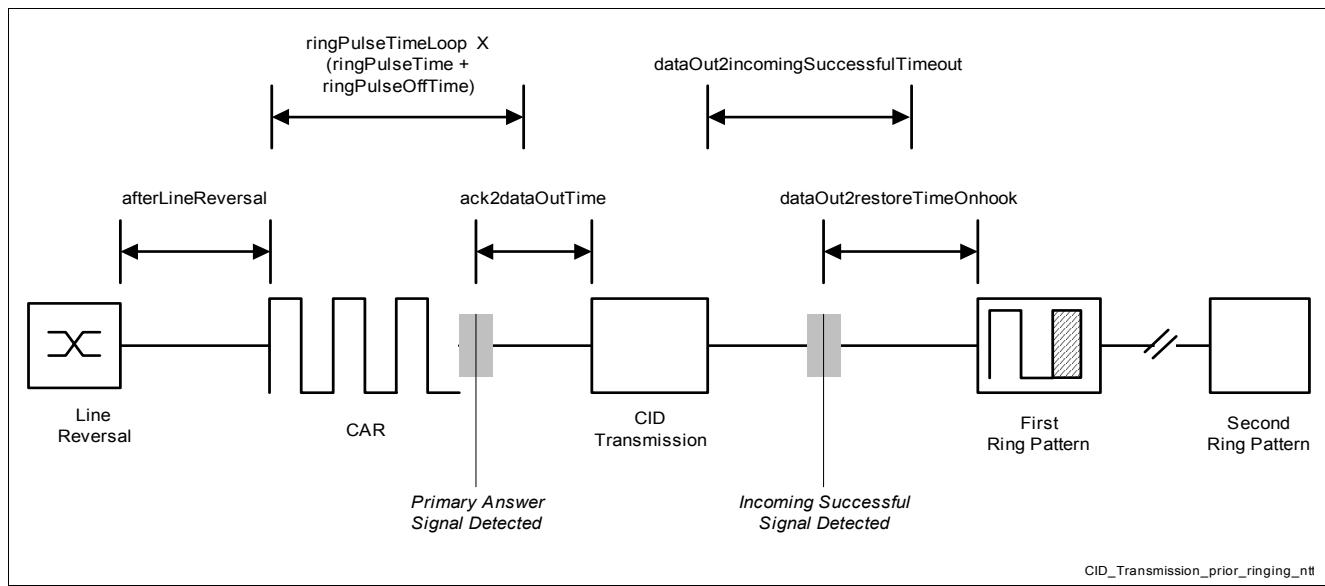


Figure 25 Timing for NTT CID Type 1 with Transmission Prior to Ringing

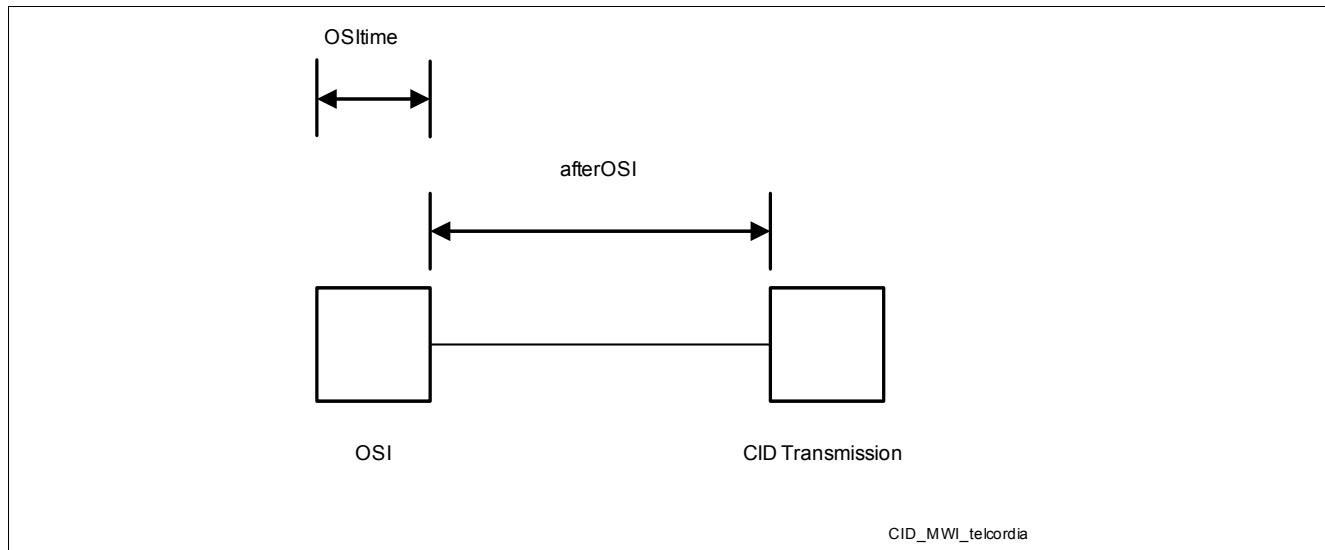


Figure 26 Timing for Telcordia MWI

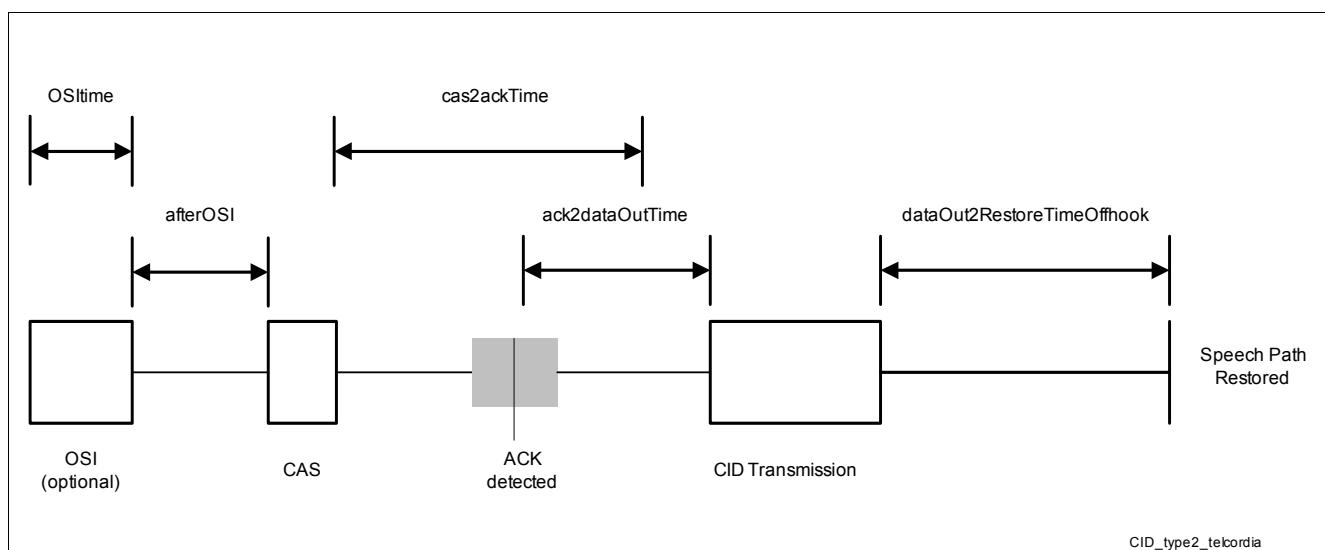


Figure 27 Timing for Telcordia CID Type 2

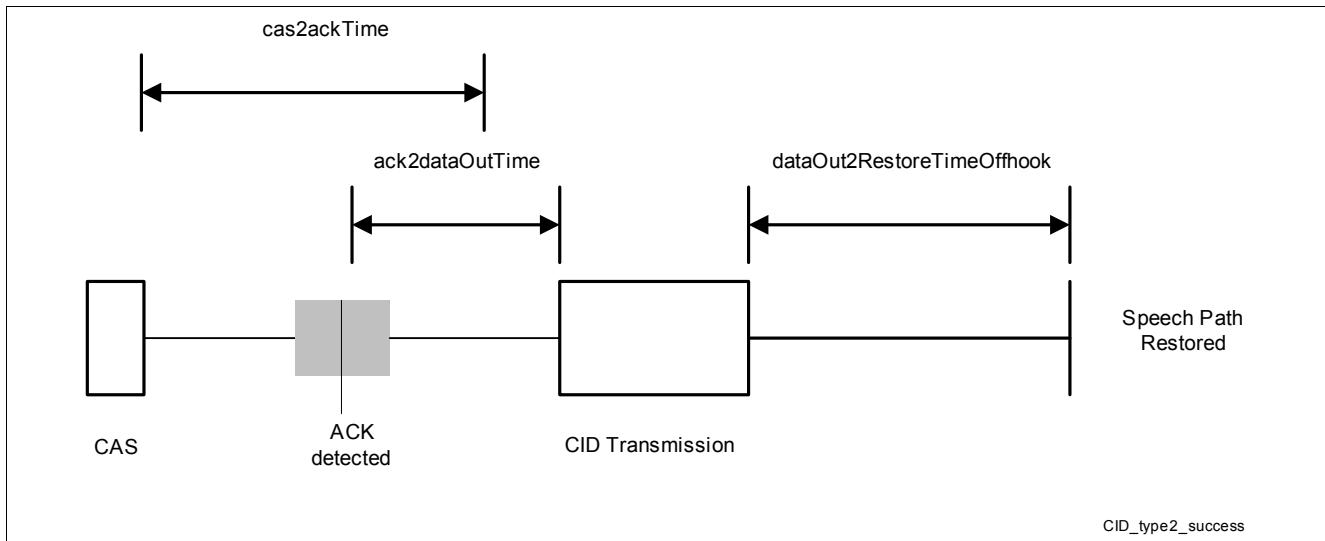


Figure 28 Timing for ETSI CID Type 2, Successful Transmission

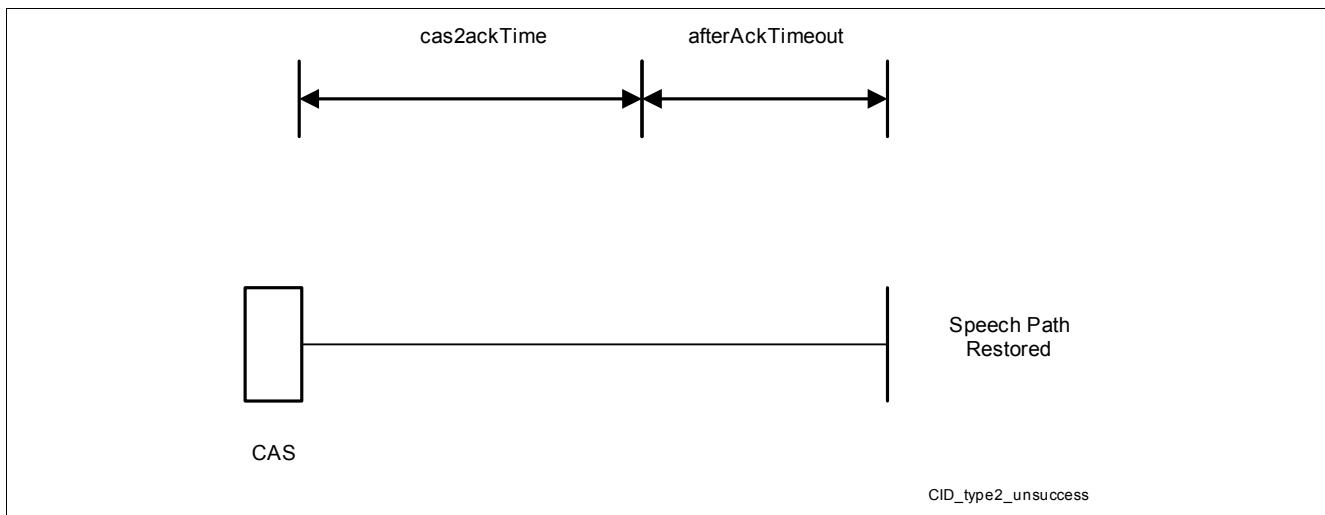


Figure 29 Timing for ETSI CID Type 2, Unsuccessful Transmission

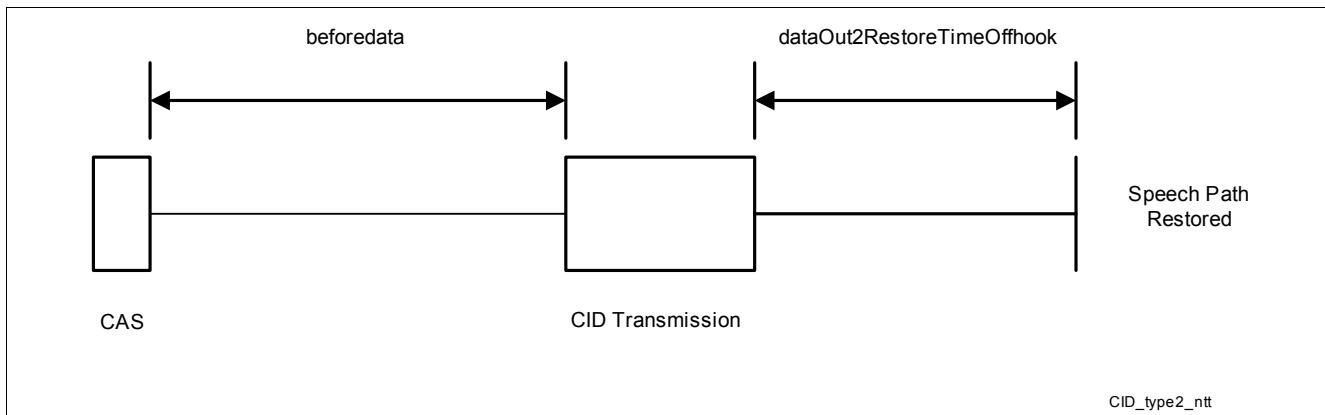


Figure 30 Timing for NTT CID Type 2

Example - CID Configuration using Default Values

```
/* Configure Caller ID support, selecting only used standard */
```

```
/* The driver uses default parameters */
/* For example use caller ID settings for UK SIN227 standard */
IFX_TAPI_CID_CFG_t cidConf;

memset(&cidConf, 0, sizeof(cidConf));

/* Standard selection is done in the following line */
cidConf.nStandard = IFX_TAPI_CID_STD_SIN;

ioctl(fd, IFX_TAPI_CID_CFG_SET, &cidConf);
/* From now on the SIN227 default configuration is used */
```

Example - CID Configuration Modifying some Default Values

```
/* Configuration of Caller ID, modifying several parameters */
/* Use Telcordia/Bellcore CID standard for USA */
/* Variable fskConf contains FSK transmission parameters */
IFX_TAPI_CID_FSK_CFG_t fskConf;
/* Variable timingConf contains timing parameters */
IFX_TAPI_CID_TIMING_t timingConf;
/* Variable telcordiaConf contains Telcordia specific parameters */
/* and is used to link fskConf and timingConf */
IFX_TAPI_CID_STD_TELCORDIA_t telcordiaConf;
/* cidConf to select CID standard and contains telcordiaConf*/
IFX_TAPI_CID_CFG_t cidConf;

memset(&fskConf, 0, sizeof(fskConf));
memset(&timingConf, 0, sizeof(timingConf));
memset(&telcordiaConf, 0, sizeof(telcordiaConf));
memset(&cidConf, 0, sizeof(cidConf));
/* Choose Telcordia standard */
cidConf.nStandard = IFX_TAPI_CID_STD_TELCORDIA;

/* Modify some FSK parameters */
/* for example FSK TX level to -10 dB and minimum FSK RX level to -20 dB */
fskConf.levelTX = -10;
fskConf.levelRX = -20;

/* To see all FSK parameters please refer to IFX_TAPI_CID_FSK_CFG_t */
/* For all remaining parameters default values will be used */
/* Modify timing */
/* for example modify delay 1st ring to FSK and timeout for CID type 2 ack */
timingConf.afterFirstRing = 400;
timingConf.cas2ackTime = 200;

/* To see all timing parameters please refer to IFX_TAPI_CID_TIMING_t */
/* For all remaining parameters default values will be used */
/* Modify some other CID parameters, relevant for Telcordia standard */
/* for example reconfigure offhook DTAS and OSI length to 150 ms */
/* New DTAS tone already added to the tone table at position DTAS_OFFHOOK_INDEX */
telcordiaConf.nAlertToneOffhook = DTAS_OFFHOOK_INDEX;
telcordiaConf.OSITime = 150;
```

```
/* For all Telcordia parameters please refer to IFX_TAPI_CID_STD_TELCORDIA */
/* For all remaining parameters default values will be used */
/* Now it is important to link all structures together */
telcordiaConf.pCIDTiming = &timingConf;
telcordiaConf.pFSKConf = &fskConf;

cidConf.cfg = (IFX_TAPI_CID_STD_TYPE_t) &telcordiaConf;
ioctl(fd, IFX_TAPI_CID_CFG_SET, &cidConf);
```

3.8.3 CID TX

Two possible ways of transmitting CID are supported:

- **IFX_TAPI_CID_TX_SEQ_START**, to issue execution of the CID transmission sequence according to the preconfigured CID standard.
- **IFX_TAPI_CID_TX_INFO_START**, to encode and transmit only a data link message. In this case, the application software implements CID signaling sequence: issue and synchronize alert signal/ACK, polarity reversal, ringing, etc.

Both interfaces receive as a parameter a pointer to **IFX_TAPI_CID_MSG_t**, containing the CID information to be transmitted and also some information on the CID transmission type (type 1/2 and MWI).

Chapter 3.8.3.1 describes how to prepare the CID message, and **Chapter 3.8.3.2** gives some examples of CID transmission.

3.8.3.1 Prepare CID Message

CID transmission type and message are set up in a **IFX_TAPI_CID_MSG_t** variable that contains the following fields:

- txMode, for example, on-hook or off-hook.
- messageType, for example, call set-up (for caller ID) or MWI.
- message, pointer to an array of CID message elements, each element representing a part of the CID message to be transmitted, such as calling/called number or name, date and time, ...
- nMsgElements, CID message element array size.

Fields txMode and messageType determine CID type; see also **Table 37** for configuration examples. Note that Visual Message Waiting Indication (VMWI) is an MWI on-hook with service type **IFX_TAPI_CID_ST_VISINDIC**.

Each entry in the array can be one of the message element types supported by union **IFX_TAPI_CID_MSG_ELEMENT_t**. The idea is that information to be transmitted can be represented as a string (for example, calling number and name), date/time or value.

In some scenarios, application software already has available a message coded in the correct data link format (for FSK already including message framing, parameter coding and CRC). This is supported as “transparent transmission” (see example on [Page 98](#)). In this case, field messageType is ignored by TAPI and the message element array shall consist of only one element, containing the entire CID message.

Examples of CID message preparation for CID type 1, type 2, VMWI and transparent transmission are given in **Chapter 3.8.3.2**.

Table 37 Caller ID/MWI Type Selection

CID/MWI Type	txMode	messageType
CID type 1	IFX_TAPI_CID_HM_ONHOOK	IFX_TAPI_CID_MT_CSUP
CID type 2	IFX_TAPI_CID_HM_OFFHOOK	IFX_TAPI_CID_MT_CSUP

Table 37 Caller ID/MWI Type Selection (cont'd)

CID/MWI Type	txMode	messageType
MWI on-hook	IFX_TAPI_CID_HM_ONHOOK	IFX_TAPI_CID_MT_MWI
MWI off-hook	IFX_TAPI_CID_HM_OFFHOOK	IFX_TAPI_CID_MT_MWI

Transmission modes

- On-hook, **IFX_TAPI_CID_HM_ONHOOK**
- Off-hook, **IFX_TAPI_CID_HM_OFFHOOK**

Message types

- Call setup, **IFX_TAPI_CID_MT_CSUP**
- Message Waiting Indication, **IFX_TAPI_CID_MT_MWI**

Service types

- Date and Time, **IFX_TAPI_CID_ST_DATE**
- Calling Line Identity, **IFX_TAPI_CID_ST_CLI**
- Reason for absence of Calling line Identity, **IFX_TAPI_CID_ST_ABSCLI** (Unavailable and Private)
- Calling party name, **IFX_TAPI_CID_ST_NAME**
- Reason for absence of calling party name, **IFX_TAPI_CID_ST_ABSNAME** (Unavailable and Private)
- (only for MWI) Visual Indicator, **IFX_TAPI_CID_ST_VISINDIC** (Indicator off and Indicator on)
- Information to be sent with transparent transmission **IFX_TAPI_CID_ST_TRANSPARENT**

3.8.3.2 Examples of CID TX

This chapter gives some examples of CID TX

- Example 1 - CID Configuration and Caller ID type 1**
- Example 2 - Caller ID type 2**
- Example 3 - Caller ID type 2 and calling number not available**
- Example 4 - Visual Message Waiting Indication**
- Example 5 - Transparent Transmission**

Example 1 - CID Configuration and Caller ID type 1

```

const IFX_char_t* PHONE_NUMBER = "123456789\0";
const IFX_char_t* PHONE_NAME = "test\0";
const IFX_int32_t MAX_MSG_LENGTH = 3;

/* Application decides to issue a CID Type 1 */
IFX_TAPI_CID_CFG_t cidType1;
IFX_TAPI_CID_MSG_ELEMENT_t message[MAX_MSG_LENGTH];
IFX_TAPI_CID_CFG_t cidConfiguration;

/* Fill cidConfiguration with information about standard */
/* For example, use Telcordia/Bellcore standard */
memset(&cidConfiguration, 0, sizeof (IFX_TAPI_CID_CFG_t));
cidConfiguration.nStandard = IFX_TAPI_CID_STD_TELCORDIA;

/* Default parameters apply to the CID configuration for */
/* Telcordia/Bellcore */
ioctl(fd, IFX_TAPI_CID_CFG_SET, &cidConfiguration);
/* Now TAPI is configured with a CID standard */

```

```
/* Normally execution of IFX_TAPI_CID_CFG_SET is required only */
/* one time after boot */

memset(&cidType1, 0, sizeof(cidType1));
memset(&message, 0, sizeof(message));

/* Caller ID type 1: On hook transmission & Call Set-Up service */
cidType1.txMode = IFX_TAPI_CID_HM_ONHOOK;
cidType1.messageType = IFX_TAPI_CID_MT_CSUP;
/* Three message elements to be send(calling number, date/time and name) */
cidType1.nMsgElements = MAX_MSG_LENGTH;
/* Prepare message to be displayed: calling number */
message[0].string.elementType = IFX_TAPI_CID_ST_CLI;
/* Calling number size */
message[0].string.len = strlen(PHONE_NUMBER);
/* Calling number formatted as string */
strncpy(message[0].string.element, &PHONE_NUMBER[0],
       sizeof(message[0].string.element));
/* Prepare message to be displayed: date & time */
message[1].date.elementType = IFX_TAPI_CID_ST_DATE;
/* Date and time 11.01.2006 16:10*/
message[1].date.day = 11;
message[1].date.month = 1;
message[1].date.hour = 16;
message[1].date.mn = 10;
/* setup name element */
message[2].string.elementType = IFX_TAPI_CID_ST_NAME;
message[2].string.len = strlen(PHONE_NAME);
strncpy(message[2].string.element, PHONE_NAME,
       sizeof(message[2].string.element));

/* Message is now prepared */
cidType1.message = message;
/* Start caller id sequence */
ioctl(fd, IFX_TAPI_CID_TX_SEQ_START, &cidType1);
```

Example 2 - Caller ID type 2

```
const IFX_char_t* PHONE_NUMBER = "123456789";
const IFX_int32_t MAX_MSG_LENGTH = 3;

/* Application decides to issue a CID Type 2 */
/* Sending only calling number */
IFX_TAPI_CID_MSG_t cidType2;
IFX_TAPI_CID_MSG_ELEMENT_t message[MAX_MSG_LENGTH];

memset(&cidType2, 0, sizeof(cidType2));
memset(&message, 0, sizeof(message));
/* Caller ID type 2: Off hook transmission & Call Set-Up service */
cidType2.txMode = IFX_TAPI_CID_HM_OFFHOOK;
cidType2.messageType = IFX_TAPI_CID_MT_CSUP;
```

```
/* One message element to be transmitted (calling number) */
cidType2.nMsgElements = 1;
/* Prepare message to be displayed: calling number */
message[0].string.elementType = IFX_TAPI_CID_ST_CLI;
/* Calling number size */
message[0].string.len = strlen(PHONE_NUMBER);
/* Calling number formatted as string */
strncpy(message[0].string.element, PHONE_NUMBER, message[0].string.len);
/* Message is now prepared */
cidType2.message = message;
/* Start caller id sequence */
ioctl(fd, IFX_TAPI_CID_TX_SEQ_START, &cidType2);
```

Example 3 - Caller ID type 2 and calling number not available

```
/* Application decides to issue a CID Type 2 */
/* However calling number is not available */
IFX_TAPI_CID_MSG_t cidType2;
IFX_TAPI_CID_MSG_ELEMENT_t message[MAX_MSG_LENGTH];

memset ( &cidType2, 0, sizeof(cidType2) );
memset ( &message, 0, sizeof(message) );

/* Caller ID type 2: Off-hook transmission & Call Set-Up service */
cidType2.txMode = IFX_TAPI_CID_HM_OFFHOOK;
cidType2.messageType = IFX_TAPI_CID_MT_CSUP;
/* One message element to be transmitted (absence reason of calling number) */
cidType2.nMsgElements = 1;
/* Prepare message to be displayed: absence reason of calling number */
message[0].value.elementType = IFX_TAPI_CID_ST_ABSCLI;
/* Absence reason: number unavailable/unknown */
message[0].value.element = IFX_TAPI_CID_ABSREASON_UNAV;
/* Message is now prepared */
cidType2.pMessage = message;
/* Start caller id sequence */
ioctl ( fd, IFX_TAPI_CID_TX_SEQ_START, &cidType2 );
```

Example 4 - Visual Message Waiting Indication

```
const IFX_char_t* PHONE_NUMBER = "123456789";
const IFX_int32_t MAX_MSG_LENGTH = 3;

/* Application decides to issue a VMWI, to light the CPE LED */
/* Implemented only for on-hook */
IFX_TAPI_CID_MSG_t cidTypeVMWI;
IFX_TAPI_CID_MSG_ELEMENT_t message[MAX_MSG_LENGTH];

memset(&cidTypeVMWI, 0, sizeof(cidTypeVMWI));
memset(&message, 0, sizeof(message));

/* VMWI: On hook transmission & Message Waiting Indication service */
cidTypeVMWI.txMode = IFX_TAPI_CID_HM_ONHOOK;
cidTypeVMWI.messageType = IFX_TAPI_CID_MT_MWI;
```

```
/* One message element to be transmitted (enable VMWI) */
cidTypeVMWI.nMsgElements = 1;
/* Prepare message to be displayed: Visual Indication */
message[0].value.elementType = IFX_TAPI_CID_ST_VISINDIC;
/* VMWI Enable (to light the LED) */
message[0].value.element = IFX_TAPI_CID_VMWI_EN;

/* Message is now prepared */
cidTypeVMWI.message = message;

/* If the complete on-hook sequence is required (e.g. Telcordia standard) */
ioctl(fd, IFX_TAPI_CID_TX_SEQ_START, &cidTypeVMWI);
/* Otherwise, if only the FSK transmission is required */
ioctl(fd, IFX_TAPI_CID_TX_INFO_START, &cidTypeVMWI);
```

Example 5 - Transparent Transmission

```
/* Application decides to send a CID type 1, already coded in the right */
/* FSK format */
IFX_TAPI_CID_MSG_t cid_info;
IFX_TAPI_CID_MSG_ELEMENT_t message;

/* FSK string to present the number "08923403330" */
IFX_uint8_t data[16] = {0x80, 0x0D, 0x02, 0x0B, 0x30, 0x38, 0x39, 0x32,
                      0x33, 0x34, 0x30, 0x33, 0x33, 0x33, 0x30, 0x33};

memset(&message, 0, sizeof(message));
memset(&cid_info, 0, sizeof(cid_info));

/* setup message */
message.transparent.elementType = IFX_TAPI_CID_ST_TRANSPARENT;
message.transparent.len = sizeof(data);
message.transparent.data = data;

/* setup cid info for transparent transmission */
/* to be noted that cid_info.messageType is not required */
/* and that the only one message element is allowed */
cid_info.txMode = IFX_TAPI_CID_HM_ONHOOK;
cid_info.messageType = IFX_TAPI_CID_MT_CSUP;
cid_info.nMsgElements = 1;
cid_info.msg = &message;

/* Send sequence */
ioctl(fd, IFX_TAPI_CID_TX_SEQ_START, &cid_info);
```

3.8.3.3 Additional Information on Caller ID Transmission

This chapter reports special handling that has been implemented for caller ID transmission.

- [NTT Caller ID Type 1 - CAR Signal on Page 99](#).
- [NTT Caller ID Type 1 - Acknowledge Signals on Page 99](#).
- [CID Type 2 During a Conference on Page 99](#).

NTT Caller ID Type 1 - CAR Signal

It is possible to configure the on-/off-time for the CAR signal separately, allowing to fine tune the CAR ring pattern. To achieve this the structure `IFX_TAPI_CID_STD_NTT_t` contains the parameters `ringPulseTime` and `ringPulseOffTime`. If `ringPulseOffTime` is set to 0 the value from `ringPulseTime` is used also for the off-time.

NTT Caller ID Type 1 - Acknowledge Signals

The CID type 1 transmitter waits for the incoming successful signal before starting the normal ringing. After the transmission of the FSK data, the signal is expected to arrive within typically 7 seconds for voice service lines. Because for data service lines a timeout of 2 seconds is required the timeout can be configured in the structure `IFX_TAPI_CID_STD_NTT_t`. In the field `dataOut2incomingSuccessfulTimeout` the timeout value in milliseconds can be set. Please note, that the granularity of timers will only allow for steps of 500 ms.

A missing 1st or 2nd acknowledge signal in the NTT CID onhook TX sequence is reported with the events `IFX_TAPI_EVENT_CID_TX_NOACK_ERR` or `IFX_TAPI_EVENT_CID_TX_NOACK2_ERR`. The event `IFX_TAPI_EVENT_CID_TX_NOACK_ERR` signals that the telephone did not start the CID reception by internally going offhook. The event `IFX_TAPI_EVENT_CID_TX_NOACK2_ERR` reports that the telephone did not internally go onhook again after the CID data was sent.

For CID the value `IFX_TAPI_RT_ERROR_CIDTX_NOACK` and `IFX_TAPI_RT_ERROR_CIDTX_NOACK2` report that an expected acknowledge by the phone device was not received within the given timeout.

CID Type 2 During a Conference

While CID is transmitted towards a local ALM or PCM module, only this module must receive the CID data. For CID type 2 it is possible that the channel is taking part in a conference with other parties. These parties must not receive the CID transmission. In order to achieve this, the channel currently transmitting the CID is temporarily muted in the conference and restored after the CID transmission is finished. As a result the party currently receiving a CID transmission temporarily will not be able to speak or listen to the other parties for the duration of the CID transmission. This is indeed a typical behavior of phone receiving caller ID type 2.

While the channel is muted, the `IFX_TAPI_MAP_DATA_REMOVE` ioctl cannot remove the primary local ALM or PCM channel from the data channel. All other add or remove operations will be possible, and parties added new to a conference will also not get the CID transmission that is currently in progress.

3.8.4 CID RX - FSK Receiver

Using the CID RX interfaces it is possible to control a FSK detection capability provided by some Infineon devices:

- `IFX_TAPI_CID_RX_START`, to start the FSK detector. It is necessary to pass as parameter the hook mode, defined in enum `IFX_TAPI_CID_HOOK_MODE_t`.
 - `IFX_TAPI_CID_HM_ONHOOK` for on-hook reception (required, for example, for CID type 1)
 - `IFX_TAPI_CID_HM_OFFHOOK` for off-hook reception (required, for example, for CID type 2)
- `IFX_TAPI_CID_RX_STOP`, to stop the detector. It is recommended to stop the FSK detector as soon as the CID message has been detected (event `IFX_TAPI_EVENT_CID_RX_FSK_END`).
- `IFX_TAPI_CID_RX_DATA_GET`, to read the received message. To be noted that this interface provides the data link layer information of the message, with exception of mark and seizure bits.
- `IFX_TAPI_CID_RX_STATUS_GET`, to report receiver status (active/inactive), reception progress (ongoing, data ready) and errors during CID reception. This can be used as alternative to the event reporting interface, to poll the status of the CID receiver.

Caller ID reception should start as soon as the application software gets an indication that a CID information is about to be transmitted on the line.

For example, in case of CID type 1 (Telcordia standard), the CID receiver must be enabled as soon as an incoming ringing signal is detected on the FXO port. In case of CID type 2, the start of a CID transmission is typically indicated by an `IFX_TAPI_EVENT_FAXMODEM_CAS_BELL` event.

Attention: For caller ID reception, it is necessary to distinguish between DTMF and FSK transmission: the interfaces documented in this chapter can be used only for FSK caller ID. In case of DTMF caller ID, the single digits must be collected using the event reporting interface.

Note about Detection of Long FSK Messages

The ioctl **IFX_TAPI_CID_RX_DATA_GET** returns a maximum of 128 bytes of the detected FSK message. It means that if the FSK message is smaller than 128 bytes it is enough to issue only one time the ioctl. If the message is longer, say, 192 bytes, it is necessary to issue two times the ioctl **IFX_TAPI_CID_RX_DATA_GET**: with the first the initial 128 bytes chunk are returned, with the second ioctl call the remaining 64 bytes are returned.

Example - CID RX - FSK Receiver

```
IFX_TAPI_CID_HOOK_MODE_t cidHookMode;
IFX_TAPI_CID_RX_STATUS_t cidRxStatus;
IFX_TAPI_CID_RX_DATA_t cidRxData;
IFX_EVENT_t tapiEvent;
IFX_return_t ret;

memset(&cidRxStatus, 0, sizeof(IFX_TAPI_CID_RX_STATUS_t));
memset(&cidRxData, 0, sizeof(IFX_TAPI_CID_RX_DATA_t));
memset(&tapiEvent, 0, sizeof(IFX_EVENT_t));

/* Start CID RX Engine, on-hook detection*/
cidHookMode = IFX_TAPI_CID_HM_ONHOOK;
ret = ioctl(fd, IFX_TAPI_CID_RX_START, (IFX_int32_t) cidHookMode);

/* Block on select for the relevant device file descriptor */
/* .... */
/* Return from select: now check event */

ret = ioctl(fd, IFX_TAPI_EVENT_GET, (IFX_int32_t) &tapiEvent);

/* Check if CID information is available for reading */
if ((ret == IFX_SUCCESS) && (tapiEvent.id=IFX_TAPI_EVENT_CID_RX_FSK_END)) */
{
    /* CID RX engine should be stopped immediately */
    ret = ioctl(fd, IFX_TAPI_CID_RX_STOP, 0);
    /* CID information available, now read it */
    ret = ioctl(fd, IFX_TAPI_CID_RX_DATA_GET, (IFX_int32_t) &cidRxData);
} /* if */
```

3.9 Fax/Modem Support

This chapter describes TAPI support for fax/modem transmission

- Detection of Fax/Modem signals; see [Chapter 3.9.1](#) for details.
- Pass-through mode (also called transparent mode) is supported for both fax and modem; see [Chapter 3.9.2](#) for details.
- Fax relay mode: control T.38 data pump¹⁾; see [Chapter 3.9.3](#) for details.

¹⁾ The T.38 data pump runs in VINETIC® firmware and complements the T.38 protocol implementation running on top of TAPI.

3.9.1 Detect Fax/Modem Signals

ioctl **IFX_TAPI_SIG_DETECT_ENABLE** has to be used to enable detection of fax/modem signals. The parameter is a pointer to a struct of type **IFX_TAPI_SIG_DETECTION_t** and the signals to be detected are chosen out of **IFX_TAPI_SIG_t** and **IFX_TAPI_SIG_EXT_t**.

With a similar mechanism, ioctl **IFX_TAPI_SIG_DETECT_DISABLE** has to be used to disable signal detection.

Upon signal detection an interrupt is generated and the application software gets the information from **IFX_TAPI_EVENT_GET**.

Attention: Only **IFX_TAPI_SIG_DETECT_ENABLE** and **IFX_TAPI_SIG_DETECT_DISABLE** can be used to control activation of the fax/modem signal detection algorithms in the Infineon product. Current implementation of ioctls **IFX_TAPI_EVENT_ENABLE** and **IFX_TAPI_EVENT_DISABLE** gives the possibility to enable/disable reporting of the signals to the applications software.

Example - Enable/Disable Detection of Fax/Modem Signals

```
IFX_TAPI_SIG_DETECTION_t startSig;
IFX_TAPI_SIG_DETECTION_t stopSig;

memset(&startSig, 0, sizeof (IFX_TAPI_SIG_DETECTION_t));
memset(&stopSig, 0, sizeof (IFX_TAPI_SIG_DETECTION_t));

/* Example: start detection of Fax DIS and CNG for Fax and Modem */
startSig.sig = IFX_TAPI_SIG_DISRX | IFX_TAPI_SIG_CNGFAXRX
    | IFX_TAPI_SIG_CNGMODRX;
ioctl(fd, IFX_TAPI_SIG_DETECT_ENABLE, (IFX_int32_t) &startSig);

/* The detection will be signaled via select() and ioctl IFX_TAPI_EVENT_GET */

/* Disable detection of the signals */
ioctl(fd, IFX_TAPI_SIG_DETECT_DISABLE, (IFX_int32_t) &startSig);

/* Now detect end of fax/modem transmission using tone holding detector */
stopSig.sig = IFX_TAPI_SIG_TONEHOLDING_END;
ioctl(fd, IFX_TAPI_SIG_DETECT_ENABLE, (IFX_int32_t) &startSig );

/* The detection will be signaled via select() and ioctl IFX_TAPI_EVENT_GET */
/* After detection of stop signal or onhook : the fax/modem connection */
/* ended */

/* Disable detection of the stop signal */
ioctl(fd, IFX_TAPI_SIG_DETECT_DISABLE, (IFX_int32_t) &stopSig);
```

3.9.2 Pass-Through Mode

The pass-through mode is required to facilitate fax/modem communication using a VoIP link actually set up for voice traffic.

Switching to pass-through mode should be triggered by the detection of a fax/modem signal, either from the local subscriber or from the network (in-band or out-of-band).

TAPI support for pass-through mode is given through interfaces

- **IFX_TAPI_JB_CFG_SET** to configure JB as fixed and in data mode.
- **IFX_TAPI_LEC_PHONE_CFG_SET** (or **IFX_TAPI_LEC_PCM_CFG_SET**) to enable LEC with NLP disabled.

- **IFX_TAPI_ENC_TYPE_SET** to configure vocoder to G.711 A-law or μ-law; this parameter must be first negotiated with the remote VoIP party.

In some application scenarios, a voice call follows the fax/modem call without first going on-hook: as soon as the end of a fax/modem call is detected, the application software should restore LEC and JB configuration to the values preceding the switch to pass-through mode.

Example - Pass-Through Mode

```
IFX_TAPI_JB_CFG_t jbCfgVoice, jbCfgData;
IFX_TAPI_WLEC_CFG_t lecConf;
IFX_TAPI_COD_TYPE_t encTypeVoice, encTypeData;

memset(&jbCfgVoice, 0, sizeof (IFX_TAPI_JB_CFG_t));
memset(&jbCfgData, 0, sizeof (IFX_TAPI_JB_CFG_t));
memset(&encTypeVoice, 0, sizeof (IFX_TAPI_COD_TYPE_t));
memset(&encTypeData, 0, sizeof (IFX_TAPI_COD_TYPE_t));

/* .... */
/* jbCfgVoice populated and used to configure JB */
/* lecConf populated and used to configure LEC */
/* .... */
/* During operations fax/modem signals have been detected */
/* It is necessary to switch to fax/modem pass-through mode */
/* VoIP signaling negotiated G.711 ALaw vocoder */
encTypeData = IFX_TAPI_COD_TYPE_MLAW;
ioctl(fd, IFX_TAPI_ENC_TYPE_SET, (IFX_int32_t) encTypeData);

/* Reconfigure JB for fax/modem communications */
jbCfgData.nJbType = IFX_TAPI_JB_TYPE_FIXED;
jbCfgData.nPckAdpt = IFX_TAPI_JB_PKT_ADAPT_DATA;
/* The JB size are strictly application dependent */

/* Initial JB size 90 ms = 0x2D0 * 125 μs */
jbCfgVoice.nInitialSize = 0x02D0;
/* Minimum JB size 10 ms = 0x50 * 125 μs */
jbCfgVoice.nMinSize = 0x50;
/* Maximum JB size 180 ms = 0x5A0 * 125 μs */
jbCfgVoice.nMaxSize = 0x5A0;

ioctl(fd, IFX_TAPI_JB_CFG_SET, (IFX_int32_t) &jbCfgData);

/* Enable LEC without NLP */
lecConf.nType = IFX_TAPI_WLEC_TYPE_NE;
lecConf.bNlp = TAPI_LEC_NLP_OFF;
ioctl(fd, IFX_TAPI_WLEC_PHONE_CFG_SET, (IFX_int32_t) &lecConf);

/* Now detect end of fax/modem transmission using tone holding detector */
stopSig.sig = IFX_TAPI_SIG_TONEHOLDING_END;
ioctl(fd, IFX_TAPI_SIG_DETECT_ENABLE, (IFX_int32_t) &startSig );

....
```

3.9.3 T.38 Data-Pump Mode

TAPI includes interfaces for controlling the T.38 data pump¹⁾ available in Infineon products.

After device initialization, a channel is normally ready for supporting packetized voice. Command **IFX_TAPI_T38_MOD_START** and **IFX_TAPI_T38_DEMOD_START** start the T.38 data pump modulator and demodulator operations. The specified data channel will switch from voice packetization to T.38 data-pump mode, configured using the given parameters (primary and alternative standard, training sequence, levels, etc.).

TAPI handles T.38 data-pump frames with the same interfaces defined for packetized voice: the read interface to get modulated data-pump frames from the device, and write for sending fax frames to the demodulator.

A call to **IFX_TAPI_T38_STOP** switches the device back to voice-processing mode, and the read and write interface will serve voice data (RTP or AAL packets). All T.38 interfaces apply to data channels except otherwise stated.

Interface **IFX_TAPI_T38_STATUS_GET** is used to read the functional and/or error status of the T.38 data pump.

Attention: Before starting usage of T.38 services, it must be ensured that encoding, decoding and LEC are disabled (see [Chapter 3.2.1](#) and [Chapter 3.1.4](#)). Deactivation of fax/modem signal detectors (see [Chapter 3.9.1](#)) is also recommended; optionally a tone- holding detector might be enabled to detect the end of fax transmission.

3.10 FXO Support

Some interfaces are provided to control one or multiple FXO lines: [Chapter 3.10.1](#) describes the events that can be reported by an FXO analog line (for example incoming ringing); [Chapter 3.10.2](#) and [Chapter 3.10.3](#) report how to issue hooks and how to dial on the FXO line.

Attention: Before using the FXO services some initialization is required, please refer to [Chapter 1.2.4](#).

Important prerequisite is that before issuing any FXO service on a channel the analog line must be configured as of type FXO as described in [Chapter 2.4](#)!

Table 38 Topics of this Chapter

Topic	Chapter	Applicability
FXO line status events	Chapter 3.10.1	For ATA and Gateway applications.
Issue hooks (on/off/flash-hook) on FXO line	Chapter 3.10.2	For ATA and Gateway applications.
Dialing on FXO line.	Chapter 3.10.3	For ATA and Gateway applications.

3.10.1 FXO Line Status Events

Table 39 reports the events that can be detected on the FXO line.

Attention: The events will be reported on the device file descriptor of the FXO analog channel.

Table 39 FXO Line Status Events

Event	Description	Note
IFX_TAPI_EVENT_FXO_RING_START	Line is ringing: it signals an incoming call.	
IFX_TAPI_EVENT_FXO_RING_STOP	This event signals the end of a ring burst.	The end of the first ring burst might trigger a CID reception.

1) Not to be confused with T.38 frames generated by application software: T.38 data-pump frames are used by the T.38 protocol implementation in software to generate the well-known T.38 TCP/UDP frames. Infineon T.38 stack implementation is described in [\[1\]](#) and [\[2\]](#).

Table 39 FXO Line Status Events (cont'd)

Event	Description	Note
IFX_TAPI_EVENT_FXO_POLARITY	FXO line polarity: it reports a change in the tip to ring polarity (normal or reversed).	he polarity status can be read using IFX_TAPI_FXO_POLARITY_GET .
IFX_TAPI_EVENT_FXO_BAT_DROPPED	It reports whether the line is powered (battery) or not. It indicated whether or not the FXO port is connected to the PSTN.	Battery high is asserted by the DAA as soon as the tip-ring voltage is above a certain threshold. About 2 V in current systems. The battery status can be read using IFX_TAPI_FXO_BATTERY_GET .
IFX_TAPI_EVENT_FXO_OSI	An open interval where DC voltage applied between tip and ring on the line is removed; it is generated by the CO to signal the start of a CID transmission.	
IFX_TAPI_EVENT_FXO_APOH	It reports that another phone went off-hook on the FXO line.	APOH is asserted as soon as the tip-ring voltage is below a certain threshold. About 10 V in typical systems. The APOH status can be read using IFX_TAPI_FXO_APOH_GET .
IFX_TAPI_EVENT_FXO_NOPOH	It reports that the FXO line is not used anymore by the other phone.	

3.10.2 Issue Hook on FXO Line

It is possible to issue hook signals (on-hook, off-hook and flash-hook) on the FXO line. These will be generated with appropriate usage of the DAA HOOK signal. The following ioctls are provided

- [IFX_TAPI_FXO_HOOK_SET](#) to change the on-/off-hook state of the FXO line.
- [IFX_TAPI_FXO_FLASH_SET](#) to issue flash-hook. It is defined only during off-hook FXO operations.
- [IFX_TAPI_FXO_FLASH_CFG_SET](#) to program flash-hook timing.

Attention: The ioctls listed in this chapter expect a file descriptor referring to the FXO analog channel.

Example - On-hook and Off-hook on FXO Line

```

IFX_TAPI_FXO_HOOK_t hook;
IFX_return_t ret;

/* The FXO line is on-hook */

/* Put the FXO line in off-hook state */
hook = IFX\_TAPI\_FXO\_HOOK\_ONHOOK;
ret = ioctl(fd, IFX\_TAPI\_FXO\_HOOK\_SET, (IFX_int32_t)hook );

/* Set-up FXO call...*/

/* ...after a while tear-down FXO call*/

/* Put the FXO line in on-hook state */

```

```
hook = IFX_TAPI_FXO_HOOK_OFFHOOK;  
ret = ioctl(fd, IFX_TAPI_FXO_HOOK_SET, (IFX_int32_t)hook );
```

Example - Issue Flash Hook on FXO Line

```
IFX_TAPI_FXO_FLASH_CFG_t flashCfg;  
IFX_return_t ret;  
  
memset(&flashCfg, 0, sizeof (IFX_TAPI_FXO_FLASH_CFG_t));  
  
/* Configure flash-hook break time */  
flashCfg.nTime = 200;  
ret = ioctl(fd, IFX_TAPI_FXO_FLASH_CFG_SET, (IFX_int32_t) &flashCfg);  
  
/* Generate a flash-hook on FXO */  
ret = ioctl(fd, IFX_TAPI_FXO_FLASH_SET, (IFX_int32_t)0 );
```

3.10.3 Dialing on FXO Line

DTMF¹⁾ dialing on the FXO line is possible with the following ioctls

- **IFX_TAPI_FXO_DIAL_START** to start the DTMF dialing, the digits are passed in a **IFX_TAPI_FXO_DIAL_t** struct.
- **IFX_TAPI_FXO_DIAL_STOP** to stop the DTMF dialing.
- **IFX_TAPI_FXO_DIAL_CFG_SET** to program DTMF dialing timing, struct **IFX_TAPI_FXO_DIAL_CFG_t** contains the interdigit and play time.

Attention: *FXO dialing functionality requires usage of a data channel connected to the FXO analog channel: the ioctls listed in this chapter expect a file descriptor referring to the data channel to be used.*

Example - Dialing on FXO Line

```
IFX_TAPI_FXO_DIAL_CFG_t dialCfg;  
IFX_TAPI_FXO_DIAL_t dialDigits;  
IFX_return_t ret;  
  
/* Number to be dialed */  
IFX_char_t data[10] = { '0', '1', '2', '3', '4', '5',  
                      '6', '7', '8', '9' };  
  
memset(&dialCfg, 0, sizeof (IFX_TAPI_FXO_DIAL_CFG_t));  
memset(&dialDigits, 0, sizeof (IFX_TAPI_FXO_DIAL_t));  
  
/* Configure dial timing */  
dialCfg.nInterDigitTime = 100;  
dialCfg.nDigitPlayTime = 100;  
ret = ioctl(fd, IFX_TAPI_FXO_DIAL_CFG_SET, (IFX_int32_t) &dialCfg);  
  
/* Now dial on FXO, the digits are stored in data[10] */  
memcpy(&dialDigits.data, data, sizeof(data));  
dialDigits.nr = sizeof(data);
```

1) Pulse dialing is not supported on FXO lines.

```
ret = ioctl(fd, IFX_TAPI_FXO_DIAL_START, (IFX_int32_t) &dialDigits );
```

3.11 GR-909 Measurements

The first step is to define a subset of measurements to be executed and start them using **Ifxphone_LT_GR909_Start()**. In the example below all 5 measurements are selected. The second parameter selects the powerline frequency (for example EU like (50Hz) or US like (60Hz)). Now the thread is put to sleep using the select() mechanism.

Once the measurement is completed on driver level, the driver will wakeup the thread again (event **IFX_TAPI_EVENT_LT_GR909_RDY**) and the application can retrieve the results using **Ifxphone_LT_GR909_GetResults()**.

Struct **IFX_LT_GR909_RESULT_t** returns the measurement results. Field valid_mask reports validity for a measurement: invalid is set if the measurement was skipped because of a failed result (according to GR-909) or the measurement was not selected to be executed.

To get also the individual results of the measurements, details of the system specific voltage divider must be configured using **Ifxphone_LT_GR909_Config()** (not part of this example).

Attention: The line mode after the measurement is **IFX_TAPI_LINE_FEED_DISABLED**.

Example - GR-909 Line Testing

```
/* Display measurement result */
#define GR909_RESULT(str, res) \
printf("%s : %s\n\r", (str), \
      ((IFX_TRUE == (res)) ? "Passed\0" : "Failed\0"));

IFX_TAPI_EVENT_t tapi_event = {0};
IFX_LT_GR909_RESULT_t gr909_res = {0};
fd_set rfd;
IFX_return_t ret = IFX_SUCCESS;
IFX_int32_t fd = -1, fdcfg = -1;

FD_ZERO(&rfd);

/* open device file descriptor */
fdcfg = open("/dev/vin10", O_RDWR);
FD_SET (fdcfg, &rfd);

/* open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

ret = Ifxphone_LT_GR909_Start(fd, IFX_TRUE,
                           (IFX_LT_GR909_HPT_MASK |
                            IFX_LT_GR909_FEMF_MASK |
                            IFX_LT_GR909_RTF_MASK |
                            IFX_LT_GR909_ROH_MASK |
                            IFX_LT_GR909_RIT_MASK));

/* error handling */
if (ret != IFX_SUCCESS)
{
}
```

```
if (0 < select(fdcfg + 1, &rfds, IFX_NULL, IFX_NULL, 0))
{
    /* control device has events ? */
    if (FD_ISSET(fdcfg, &rfds))
    {
        memset(&tapi_event, 0, sizeof(IFX_TAPI_EVENT_t));
        tapi_event.ch = 0;
        /* get the status of this channel */
        ret = ioctl(fd, IFX_TAPI_EVENT_GET, (IFX_int32_t) &tapi_event);
        if (ret != IFX_SUCCESS)
        {
            printf("GR909: error occurred at status event reading.\n");
            return IFX_ERROR;
        }
        switch (tapi_event.id)
        {
            case IFX_TAPI_EVENT_NONE:
                printf("GR909: No events available on this channel.\n");
                return IFX_SUCCESS;
                break;
            case IFX_TAPI_EVENT_LT_GR909_RDY:
            {
                ret = Ifxphone_LT_GR909_GetResults(fd, &gr909_res);
                if (ret != IFX_ERROR)
                {
                    /* print some traces */
                    printf("gr909: valid results = 0x%X\n\r",
                           gr909_res.valid_mask);

                    /* Hazardous Potential Tests (HPT) */
                    if (gr909_res.valid_mask & IFX_LT_GR909_HPT_MASK)
                    {

                        GR909_RESULT("Hazardous Potential Tests (HPT)\n",
                                     gr909_res.hpt.b_result);
                    }

                    /* Foreign electromotive Force Tests (FEMT) */
                    if (gr909_res.valid_mask & IFX_LT_GR909_FEMF_MASK)
                    {

                        GR909_RESULT("Foreign electromotive Force Tests (FEMT)\n",
                                     gr909_res.femf.b_result);
                    }

                    /* Resistive Fault Tests (RFT) */
                    if (gr909_res.valid_mask & IFX_LT_GR909_RTF_MASK)
                    {

```

```
GR909_RESULT("Resistive Fault Tests (RFT) \n",
              gr909_res.rft.b_result);

}

/* Receiver Offhook Tests (ROH) */
if (gr909_res.valid_mask & IFX_LT_GR909_ROH_MASK)
{

{
    GR909_RESULT("Receiver Offhook Tests (ROH) \n",
                 gr909_res.roh.b_result);
}

/* Ringer Impedance Tests (RIT) */
if (gr909_res.valid_mask & IFX_LT_GR909_RIT_MASK)
{
    GR909_RESULT("Ringer Impedance Tests (RIT) \n",
                 gr909_res.rit.b_result);
}
else
{
    /* Error handling */
    printf("GR909: Retrieving GR909 result.\n");
}

}
break;
}
} /* if */
} /* if */
```

4 TAPI Interfaces

This section describes all TAPI interfaces.

- [Chapter 4.1](#) provides a reference for the ioctl services, grouped by functionality.
- [Chapter 4.3](#) provides the reference for all types defined by TAPI, including
 - [Chapter 4.3.1](#), basic type definition
 - [Chapter 4.3.2](#), summary of all ioctl
 - [Chapter 4.3.3](#), constant reference
 - [Chapter 4.3.5](#), structure reference
 - [Chapter 4.3.4](#), union reference
 - [Chapter 4.3.6](#), enum reference

4.1 ioctl Commands of TAPI Interfaces

This chapter describes the entire interfaces to the TAPI. The ioctl commands are explained by mentioning the return values for each function. The organization is as follows:

Table 40 TAPI Interface Overview

Name	Description
CID Features Service	Control of Caller ID functionality
Connection Control Services	Connection Control Service
Dial Services	Dial Service
Fax T.38 Service	Fax T.38 Service
Initialization Service	Initialization Service
Metering Service	Metering Service
Miscellaneous Services	Miscellaneous Services
Event Reporting Services	Event Reporting Services
Operation Control Services	Operation Control Services
PCM Support	PCM Service
Power Ringing Services	Power Ringing Services
Signal Detection Services	Signal Detection Services
Test Services	Test Services
Tone Control Services	Tone Control Services
Audio Channel Control	Audio Channel Service
Polling Services	Polling Services
FXO Services	FXO Services

4.1.1 CID Features Service

Caller ID support.

Table 41 IO-control Overview of CID Features

Name	Description
IFX_TAPI_CID_CFG_SET	Configures the CID transmitter.
IFX_TAPI_CID_RX_DATA_GET	Reads CID Data collected since Caller ID receiver was started.
IFX_TAPI_CID_RX_START	Setup the CID receiver to start receiving CID Data.
IFX_TAPI_CID_RX_STATUS_GET	Retrieves the current status information of the CID receiverCID receiver.
IFX_TAPI_CID_RX_STOP	Stop the CID receiver.
IFX_TAPI_CID_TX_INFO_START	This interfaces transmits only CID message.
IFX_TAPI_CID_TX_SEQ_START	This interfaces handles the entire CID sequence generation.

Table 42 Structure Overview of CID Features

Name	Description
IFX_TAPI_CID_ABS_REASON_t	ABSCLI/ABSNAME settings.
IFX_TAPI_CID_CFG_t	Structure containing CID configuration possibilities.
IFX_TAPI_CID_DTMF_CFG_t	Structure containing the configuration information for DTMF CID.
IFX_TAPI_CID_FSK_CFG_t	Structure containing the configuration information for FSK transmitter and receiver.
IFX_TAPI_CID_MSG_DATE_t	Structure containing date and time information.
IFX_TAPI_CID_MSG_STRING_t	Structure for element types (IFX_TAPI_CID_SERVICE_TYPE_t) with dynamic length (line numbers or names).
IFX_TAPI_CID_MSG_t	Structure containing the CID message type and content.
IFX_TAPI_CID_MSG_VALUE_t	Structure for element types (IFX_TAPI_CID_SERVICE_TYPE_t) with one value (length 1).
IFX_TAPI_CID_STD_ETSI_DTMF_t	Structure containing CID configuration for ETSI standard using DTMF transmission.
IFX_TAPI_CID_STD_ETSI_FSK_t	Structure containing CID configuration for ETSI standard using FSK transmission.
IFX_TAPI_CID_STD_NTT_t	Structure containing CID configuration for NTT standard.
IFX_TAPI_CID_STD_SIN_t	Structure containing CID configuration for BT SIN227 standard.
IFX_TAPI_CID_STD_TELCORDIA_t	Structure containing CID configuration for Telcordia standard.
IFX_TAPI_CID_TIMING_t	Structure containing the timing for CID transmission.

Table 43 Union Overview of CID Features

Name	Description
IFX_TAPI_CID_MSG_ELEMENT_t	CID Message Element
IFX_TAPI_CID_STD_TYPE_t	CID Standard Type

Table 44 Enumerator Overview of CID Features

Name	Description
IFX_TAPI_CID_ABSREASON_t	List of ABSCLI/ABSNAME settings.
IFX_TAPI_CID_ALERT_ETSI_t	List of ETSI Alerts.
IFX_TAPI_CID_HOOK_MODE_t	Caller ID transmission modes.
IFX_TAPI_CID_MSG_TYPE_t	Caller ID message types (defined in ETSI EN 300 659-3).
IFX_TAPI_CID_RX_ERROR_t	CID receiver Errors.
IFX_TAPI_CID_RX_STATE_t	CID receiver Status.
IFX_TAPI_CID_SERVICE_TYPE_t	Caller ID Services (defined in ETSI EN 300 659-3).
IFX_TAPI_CID_STD_t	List of CID standards.
IFX_TAPI_CID_VMWI_t	List of VMWI settings.

4.1.1.1 [IFX_TAPI_CID_CFG_SET](#)

Description

Configures the CID transmitter.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CID_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_CID_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

The delay must be programmed in that way, that the CID data still fits between the ring burst in case of appearance mode 1 and 2, otherwise the ioctl [IFX_TAPI_RING_START](#) may return an error. CID is stopped when the ringing is stopped or the phone goes off-hook.

Example

```
IFX_TAPI_CID_CFG_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_CID_CFG_t));
/* Set CID standard to Telcordia/Bellcore default values */
param.nStandard = IFX_TAPI_CID_STD_TELCORDIA;
ioctl(fd, IFX_TAPI_CID_CFG_SET, &param);
```

4.1.1.2 IFX_TAPI_CID_RX_DATA_GET

Description

Reads CID data collected since caller Id receiver was started.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CID_RX_DATA_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_RX_DATA_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_CID_RX_DATA_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

This request can be sent after the CID receiver status signaled that data is ready for reading or that data collection is ongoing. In the last case, the number of data read correspond to the number of data received since CID receiver was started. Once the data is read after the status signaled that data is ready, new data can be read only if CID receiver detects new data.

Example

```
IFX_TAPI_CID_RX_STATUS_t cidStatus;
IFX_TAPI_CID_RX_DATA_t cidData;
IFX_int32_t fd;
IFX_return_t ret;
```

```
/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

memset(&cidStatus, 0, sizeof(IFX_TAPI_CID_RX_STATUS_t));
memset(&cidData, 0, sizeof(IFX_TAPI_CID_RX_DATA_t));
/* Read actual status */
ret = ioctl(fd, IFX_TAPI_CID_RX_STATUS_GET, (IFX_int32_t)&cidStatus);
/* Check if cid data are available for reading */
if ((IFX_SUCCESS == ret)
    && (IFX_TAPI_CID_RX_ERROR_NONE == cidStatus.nError)
    && (IFX_TAPI_CID_RX_STATE_DATA_READY == cidStatus.nStatus))
{
    ret = ioctl(fd, IFX_TAPI_CID_RX_DATA_GET, (IFX_int32_t) &cidData);
}

/* Close all open fds */
close(fd);
```

4.1.1.3 IFX_TAPI_CID_RX_START

Description

Setup the CID receiver to start receiving CID Data.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CID_RX_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_RX_START	I/O control identifier for this operation.
IFX_int32_t	param	Hook mode for the reception to be chosen from IFX_TAPI_CID_HOOK_MODE_t enum.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

This command must be sent so that the driver can start collecting CID Data.

Example

```
ioctl(fd, IFX_TAPI_CID_RX_START, (IFX_int32_t) IFX_TAPI_CID_HM_ONHOOK);
```

4.1.1.4 IFX_TAPI_CID_RX_STATUS_GET

Description

Retrieves the current status information of the CID receiver.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CID_RX_STATUS_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_RX_STATUS_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_CID_RX_STATUS_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Once the CID receiver is activated it signals the status with an exception. The exception is raised if data has been received completely or an error occurred. Afterwards this interface is used to determine if data has been received. In that case it can be read with the interface **IFX_TAPI_CID_RX_DATA_GET**. This interface can also be used without exception to determine the status of the receiver during reception.

Example

```
IFX_TAPI_CID_RX_STATUS_t cidStatus;
IFX_int32_t fd;
IFX_return_t ret;

memset(&cidStatus, 0, sizeof (IFX_TAPI_CID_RX_STATUS_t));
ret = ioctl(fd, IFX_TAPI_CID_RX_STATUS_GET, (IFX_int32_t) &cidStatus);
/* Check if cid information are available for reading */
if ((IFX_SUCCESS == ret)
    && (IFX_TAPI_CID_RX_ERROR_NONE == cidStatus.nError)
    && (IFX_TAPI_CID_RX_STATE_DATA_READY == cidStatus.nStatus))
```

```
{  
    printf ( "Data are ready for reading\n\r" );  
}
```

4.1.1.5 IFX_TAPI_CID_RX_STOP

Description

Stop the CID receiver.

Prototype

```
IFX_int32_t ioctl (  
    IFX_int32_t fd,  
    IFX_TAPI_CID_RX_STOP,  
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_RX_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_CID_RX_STOP, 0);
```

4.1.1.6 IFX_TAPI_CID_TX_INFO_START

Description

This interface transmits CID message.

Prototype

```
IFX_int32_t ioctl (  
    IFX_int32_t fd,  
    IFX_TAPI_CID_TX_INFO_START,  
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_TX_INFO_START	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_CID_MSG_t , containing the CID / MWI information to be transmitted.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Before issuing this service, CID engine must be configured with **IFX_TAPI_CID_CFG_SET** at least one time after boot. This is required to configure country specific settings.

Example

```

IFX_TAPI_CID_MSG_t Cid_Info;
IFX_TAPI_CID_MSG_ELEMENT_t Msg_El[2];
IFX_int32_t fd;
IFX_return_t ret;
IFX_char_t* number = "12345";

/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

/* Reset and fill the caller id structure */
memset(&Cid_Info, 0, sizeof(Cid_Info));
memset(&Msg_El, 0, sizeof(Msg_El));

Cid_Info.txMode = IFX_TAPI_CID_HM_ONHOOK;
/* Message Waiting */
Cid_Info.messageType = IFX_TAPI_CID_MT_MWI;
Cid_Info.nMsgElements = 2;
Cid_Info.message = Msg_El;
/* Mandatory for Message Waiting: set Visual Indicator on */
Msg_El[0].value.elementType = IFX_TAPI_CID_ST_VISINDIC;
Msg_El[0].value.element = IFX_TAPI_CID_VMWI_EN;
/* Add optional CLI (number) element */
Msg_El[1].string.elementType = IFX_TAPI_CID_ST_CLI;
Msg_El[1].string.len = ret;
strncpy(Msg_El[1].string.element, number, sizeof(Msg_El[1].string.element));
/* Transmit the caller id */

```

```
ioctl(fd, IFX_TAPI_CID_TX_INFO_START, &Cid_Info);  
  
/* close all open fds */  
close(fd);
```

4.1.1.7 **IFX_TAPI_CID_TX_SEQ_START**

This service starts a pre-programmed CID sequence driven by TAPI. This is a non-blocking service, the driver will signal the end of the CID sequence.

Before issuing this service, CID engine must be configured with **IFX_TAPI_CID_CFG_SET** at least one time after boot. This is required to configure country specific settings.

Prototype

```
IFX_void_t ioctl (  
    IFX_int32_t fd,  
    IFX_TAPI_CID_TX_SEQ_START,  
    IFX_int32_t pCIDInfo );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File Descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_CID_TX_SEQ_START	I/O control identifier for this operation
IFX_int32_t	pCIDInfo	Pointer to IFX_TAPI_CID_MSG_t , defining the CID/MWI type and containing the information to be transmitted.

Return Values

Data Type	Description
IFX_void_t	No return value

Remarks

For FSK transmission, decision of seizure and mark length is based on configured standard and CID transmission type.

4.1.2 Connection Control Services

Contains all services used for RTP or AAL connection. It also contains services for conferencing.

Table 45 IO-control Overview of Connection Control Services

Name	Description
<code>IFX_TAPI_COD_DEC_HP_SET</code>	Switches on/off the HP filter of the decoder path in the COD module
<code>IFX_TAPI_COD_VOLUME_SET</code>	Volume settings for the COD module.
<code>IFX_TAPI_DEC_START</code>	Start the playout of data.
<code>IFX_TAPI_DEC_STOP</code>	Stop the playout of data.
<code>IFX_TAPI_DEC_VOLUME_SET</code>	Sets the playout volume.
<code>IFX_TAPI_DTMF_RX_CFG_SET</code>	This service is used to set DTMF receiver coefficients.
<code>IFX_TAPI_ENC_CFG_SET</code>	This service is used to configure encoding type and length.
<code>IFX_TAPI_ENC_FRAME_LEN_GET</code>	This service gets the frame length for the audio packets.
<code>IFX_TAPI_ENC_FRAME_LEN_SET</code>	This service sets the frame length for the audio packets.
<code>IFX_TAPI_ENC_HOLD</code>	This service is used to control the encoder hold functionality.
<code>IFX_TAPI_ENC_LEVEL_SET</code>	This service sets the level of the most recently recorded signal.
<code>IFX_TAPI_ENC_ROOM_NOISE_DETECT_START</code>	This service configures and starts room noise detection.
<code>IFX_TAPI_ENC_ROOM_NOISE_DETECT_STOP</code>	This service stops room noise detection.
<code>IFX_TAPI_ENC_START</code>	Start recording on the data channel.
<code>IFX_TAPI_ENC_STOP</code>	Stop recording (generating packets) on this channel.
<code>IFX_TAPI_ENC_TYPE_SET</code>	Select a codec for the data channel.
<code>IFX_TAPI_ENC_VAD_CFG_SET</code>	Configures the voice activity detection and silence handling. Voice Activity Detection (VAD) is a feature that allows the codec to determine when to send voice data or silence data.
<code>IFX_TAPI_ENC_VOLUME_SET</code>	Sets the recording volume.
<code>IFX_TAPI_JB_CFG_SET</code>	Configures the Jitter Buffer.
<code>IFX_TAPI_JB_STATISTICS_GET</code>	Reads out Jitter Buffer statistics.
<code>IFX_TAPI_JB_STATISTICS_RESET</code>	Resets the jitter buffer statistics.
<code>IFX_TAPI_MAP_DATA_ADD</code>	This interface adds the data channel to an analog phone device.
<code>IFX_TAPI_MAP_DATA_REMOVE</code>	This interface removes a data channel from an analog phone device.
<code>IFX_TAPI_MAP_PCM_ADD</code>	This interface adds the PCM channel to an analog phone device.
<code>IFX_TAPI_MAP_PCM_REMOVE</code>	This interface removes the PCM channel to an analog phone device.
<code>IFX_TAPI_MAP_PHONE_ADD</code>	This interface adds the phone channel to another analog phone channel.
<code>IFX_TAPI_MAP_PHONE_REMOVE</code>	This interface removes a phone channel from an analog phone device.
<code>IFX_TAPI_PKT_AAL_CFG_SET</code>	This interface configures AAL fields for a new connection.
<code>IFX_TAPI_PKT_AAL_PROFILE_SET</code>	AAL profile configuration.

Table 45 IO-control Overview of Connection Control Services (cont'd)

Name	Description
IFX_TAPI_PKT_EV_GENERATE	This service is used to generate RFC2833 event from the application software.
IFX_TAPI_PKT_EV_GENERATE_CFG	This service is used to configure the generation of RFC2833 events from the application software.
IFX_TAPI_PKT_RTCP_STATISTICS_GET	Retrieves RTCP statistics.
IFX_TAPI_PKT_RTCP_STATISTICS_RESET	Resets the RTCP statistics.
IFX_TAPI_PKT_RTP_CFG_SET	This interface configures RTP and RTCP fields for a new connection.
IFX_TAPI_PKT_RTP_PT_CFG_SET	Change the payload type table.

Table 46 Structure Overview of Connection Control Service

Name	Description
IFX_TAPI_ENC_CFG_t	Structure for encoding type and length.
IFX_TAPI_JB_CFG_t	Structure for jitter buffer configuration used by IFX_TAPI_JB_CFG_SET .
IFX_TAPI_JB_STATISTICS_t	Structure for Jitter Buffer statistics used by ioctl IFX_TAPI_JB_STATISTICS_GET .
IFX_TAPI_MAP_DATA_t	Phone channel mapping structure used for IFX_TAPI_MAP_DATA_ADD and IFX_TAPI_MAP_DATA_REMOVE .
IFX_TAPI_MAP_PHONE_t	Phone channel mapping structure used for IFX_TAPI_MAP_PHONE_ADD and IFX_TAPI_MAP_PHONE_REMOVE .
IFX_TAPI_PCK_AAL_CFG_t	Structure used for ioctl IFX_TAPI_PKT_AAL_CFG_SET
IFX_TAPI_PCK_AAL_PROFILE_t	AAL profile setup structure used for IFX_TAPI_PKT_AAL_PROFILE_SET .
IFX_TAPI_PKT_EV_GENERATE_t	This structure is used to report a DTMF event to the TAPI from an external software module.
IFX_TAPI_PKT_EV_GENERATE_CFG_t	This structure is used to configure support for the reporting of external DTMF events.
IFX_TAPI_PKT_RTCP_STATISTICS_t	Structure for RTCP Statistics.
IFX_TAPI_PKT_RTP_CFG_t	Structure for RTP Configuration.
IFX_TAPI_PKT_RTP_PT_CFG_t	Structure for RTP payload configuration.
IFX_TAPI_PKT_VOLUME_t	Packet path volume settings.

Table 47 Enumerator Overview of Connection Control Service

Name	Description
IFX_TAPI_DATA_MAP_START_STOP_t	Start/Stop information for data channel mapping.
IFX_TAPI_COD_LENGTH_t	Defines packetization length.
IFX_TAPI_COD_TYPE_t	Defines encoding type.
IFX_TAPI_COD_TYPE_t	Defines encoding type.
IFX_TAPI_ENC_VAD_t	Enumeration used for ioctl IFX_TAPI_ENC_VAD_CFG_SET .

Table 47 Enumerator Overview of Connection Control Service (cont'd)

Name	Description
IFX_TAPI_MAP_DATA_TYPE_t	Data channel destination types (conferencing).
IFX_TAPI_PKT_AAL_PROFILE_RANGE_t	Used for IFX_TAPI_PCK_AAL_PROFILE_t in case one coder range.
IFX_TAPI_PKT_EV_GEN_ACTION_t	Start/stop event generation.
IFX_TAPI_PKT_EV_NUM_t	Out of band or in band definition.
IFX_TAPI_PKT_EV_OOB_t	Enumeration for IFX_TAPI_PKT_RTP_CFG_t event setting.
IFX_TAPI_PKT_EV_OOBPLAY_t	Defines the play out of received RFC2833 event packets.

4.1.2.1 IFX_TAPI_COD_DEC_HP_SET

Description

This service switches on/off the high-pass (HP) filters of the decoder path in the COD module.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_COD_DEC_HP_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_COD_DEC_HP_SET	I/O control identifier for this operation.
IFX_int32_t	param	IFX_TRUE switches HP filter ON. IFX_FALSE switches HP filter OFF.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_boolean_t bON;
bON = IFX_FALSE;
ret = ioctl(fd, IFX_TAPI_COD_DEC_HP_SET, bON);
```

4.1.2.2 IFX_TAPI_COD_VOLUME_SET

Description

Sets the volume settings of the COD module, both for the receiving(downstream) and transmitting (upstream) paths.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_COD_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_COD_VOLUME_SET	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects a pointer to a IFX_TAPI_PKT_VOLUME_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_PKT_VOLUME_t param;
memset (&param, 0, sizeof(IFX_TAPI_PKT_VOLUME_t));
param.nEnc = 0;      // dB
param.nDec = 0;      // dB
ret = ioctl(fd, IFX_TAPI_COD_VOLUME_SET, &param);
```

4.1.2.3 IFX_TAPI_DEC_START

Description

Starts the decoding of data.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_DEC_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_DEC_START	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_DEC_START, 0);
```

4.1.2.4 IFX_TAPI_DEC_STOP

Description

Stops the decoding of data.

Attention: Stop of the decoding will lead to a reset of the connection statistics.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_DEC_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_DEC_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

Example

```
ioctl(fd, IFX_TAPI_DEC_STOP, 0);
```

4.1.2.5 IFX_TAPI_DEC_VOLUME_SET

Description

Sets the decoding playout volume.

Attention: This ioctl is not supported and will not be implemented in future. It is possible to configure gains for encoding/decoding using `IFX_TAPI_COD_VOLUME_SET`.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_DEC_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
<code>IFX_int32_t</code>	fd	File descriptor. It is applicable to data channel file descriptors.
<code>IFX_int32_t</code>	<code>IFX_TAPI_DEC_VOLUME_SET</code>	I/O control identifier for this operation.
<code>IFX_int32_t</code>	param	Playout volume, default 0x100.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

Example

```
ioctl(fd, IFX_TAPI_DEC_VOLUME_SET, 0x100 * 2);
```

4.1.2.6 IFX_TAPI_ENC_CFG_SET

Description

This service is used to configure encoding type and length.

Attention: The ioctl `IFX_TAPI_ENC_TYPE_SET` and `IFX_TAPI_ENC_FRAME_LEN_SET` are obsolete and have been replaced by `IFX_TAPI_ENC_CFG_SET`.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
<code>IFX_int32_t</code>	fd	File descriptor. It is applicable to data channel file descriptors.
<code>IFX_int32_t</code>	<code>IFX_TAPI_ENC_CFG_SET</code>	I/O control identifier for this operation.
<code>IFX_int32_t</code>	param	Pointer to a <code>IFX_TAPI_ENC_CFG_t</code> struct.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

4.1.2.7 `IFX_TAPI_ENC_FRAME_LEN_GET`

Description

This service reads the configured encoding length.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_FRAME_LEN_GET,
    IFX_int32_t* param );
```

Parameters

Data Type	Name	Description
<code>IFX_int32_t</code>	fd	File descriptor. It is applicable to data channel file descriptors.
<code>IFX_int32_t</code>	<code>IFX_TAPI_ENC_FRAME_LEN_GET</code>	I/O control identifier for this operation.
<code>IFX_int32_t*</code>	param	Pointer to the length of frames in milliseconds

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t nFrameLength;

ioctl(fd, IFX_TAPI_ENC_FRAME_LEN_GET, &nFrameLength);
```

4.1.2.8 IFX_TAPI_ENC_FRAME_LEN_SET

Description

This service configures the encoding length.

Attention: This ioctl is obsolete and is replaced by **IFX_TAPI_ENC_CFG_SET**.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_FRAME_LEN_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_FRAME_LEN_SET	I/O control identifier for this operation.
IFX_int32_t	param	Length of frames in milliseconds

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
FX_int32_t fd;
IFX_int32_t nFrameLength;

nFrameLength = 10;
ioctl(fd, IFX_TAPI_ENC_FRAME_LEN_SET, nFrameLength);
```

4.1.2.9 IFX_TAPI_ENC_HOLD

Description

This service is used to control the encoder hold functionality.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_HOLD,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_HOLD	I/O control identifier for this operation.
IFX_int32_t	param	Enable or disable hold, selected out of IFX_operation_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.2.10 IFX_TAPI_ENC_LEVEL_SET

Description

This service sets the encoding level.

Attention: This ioctl is not supported and will not be implemented in future. It is possible to configure gains for encoding/decoding using [IFX_TAPI_COD_VOLUME_SET](#).

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_LEVEL_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_LEVEL_SET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to an integer for the level.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t nRecLevel;

/* Get the record level */
ioctl(fd, IFX_TAPI_ENC_LEVEL_SET, &nRecLevel);
/* Output level in dB can be calculated via formula: */
/* outlvl_in_dB = +3.17 + 20 log10 (nRecLevel/32767) */
```

4.1.2.11 IFX_TAPI_ENC_ROOM_NOISE_DETECT_START

Description

Configuration and start of room noise detection.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_ROOM_NOISE_DETECT_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_ROOM_NOISE_DETECT_START	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to an IFX_TAPI_ENC_ROOM_NOISE_DETECT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.2.12 IFX_TAPI_ENC_ROOM_NOISE_DETECT_STOP

Description

This function stops room noise detection.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_ROOM_NOISE_DETECT_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_ROOM_NOISE_DETECT_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.2.13 IFX_TAPI_ENC_START

Description

Start encoding and packetization.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_START	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

The voice is serviced with the drivers read and write interface. The data format is dependent on the selected setup (coder, chip setup, and so on). For example, a RTP setup will receive RTP packets. Read and write are always non-blocking. If the codec has not been set before with **IFX_TAPI_ENC_CFG_SET** the encoder is started with G711.

Example

```
ioctl(fd, IFX_TAPI_ENC_START, 0);
```

4.1.2.14 IFX_TAPI_ENC_STOP

Description

Stop encoding and packetization on this channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_ENC_STOP, 0);
```

4.1.2.15 IFX_TAPI_ENC_TYPE_SET

Description

Select a vocoder for the encoding.

Attention: This ioctl is obsolete and is replaced by [IFX_TAPI_ENC_CFG_SET](#).

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_TYPE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_TYPE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter specifies the codec as defined in IFX_TAPI_COD_TYPE_t . Default codec is G711, µ-law.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
/* Set the codec */
ioctl(fd, IFX_TAPI_ENC_TYPE_SET, IFX_TAPI_COD_TYPE_G726_16);
```

4.1.2.16 IFX_TAPI_ENC_VAD_CFG_SET

Description

Configures the voice activity detection and silence handling. Voice Activity Detection (VAD) is a feature that allows the codec to determine when to send voice data or silence data.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_VAD_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_VAD_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	Select the VAD mode out of IFX_TAPI_ENC_VAD_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Codecs G.723.1 and G.729A/B have a built in comfort noise generation (CNG). Explicitly switching on the CNG is not necessary. Voice activity detection may not be available for G.728 and G.729E.

Example

```
/* Set the VAD on */
ioctl(fd, IFX_TAPI_ENC_VAD_CFG_SET, IFX_TAPI_ENC_VAD_ON);
```

4.1.2.17 IFX_TAPI_ENC_VOLUME_SET

Description

Sets the encoding volume.

Attention: This ioctl is not supported and will not be implemented in future. It is possible to configure gains for encoding/decoding using **IFX_TAPI_COD_VOLUME_SET**.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_VOLUME_SET	I/O control identifier for this operation.
IFX_int32_t	param	Recording volume, default 0x100.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_ENC_VOLUME_SET, 0x100 * 2);
```

4.1.2.18 IFX_TAPI_JB_CFG_SET

Description

Configures the Jitter Buffer.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_JB_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_JB_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_JB_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

Select fixed or adaptive Jitter Buffer and set parameters. Modifies the Jitter Buffer settings during run-time.

Example

```
IFX_TAPI_JB_CFG_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_JB_CFG_t));
/* Set to adaptive jitter buffer type */
```

```
param.nJbType = IFX_TAPI_JB_TYPE_ADAPTIVE;  
ret = ioctl(fd, IFX_TAPI_JB_CFG_SET, param);
```

4.1.2.19 IFX_TAPI_JB_STATISTICS_GET

Description

Reads out Jitter Buffer statistics.

Prototype

```
IFX_int32_t ioctl (  
    IFX_int32_t fd,  
    IFX_TAPI_JB_STATISTICS_GET,  
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_JB_STATISTICS_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_JB_STATISTICS_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_JB_STATISTICS_t param;  
IFX_int32_t fd;  
  
memset(&param, 0, sizeof(IFX_TAPI_JB_STATISTICS_t));  
ioctl(fd, IFX_TAPI_JB_STATISTICS_GET, param);
```

4.1.2.20 IFX_TAPI_JB_STATISTICS_RESET

Description

Resets the jitter buffer statistics.

Prototype

```
IFX_int32_t ioctl (  
    IFX_int32_t fd,  
    IFX_TAPI_JB_STATISTICS_RESET,
```

```
IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_JB_STATISTICS_RESET	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_JB_STATISTICS_RESET, 0);
```

4.1.2.21 IFX_TAPI_MAP_DATA_ADD

Description

This interface connects the data channel to a phone channel. See also description in [Chapter 2.9](#).

Attention: *It is recommended to choose the destination using enum **IFX_TAPI_MAP_TYPE_t**! TAPI includes enum **IFX_TAPI_MAP_DATA_TYPE_t** for backwards compatibility reasons only.*

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_MAP_DATA_ADD,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_MAP_DATA_ADD	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_MAP_DATA_t struct.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none"> • <code>IFX_SUCCESS</code> 0 • <code>IFX_ERROR</code> -1

Remarks

Applies to a data file descriptor. The host has to take care about the resource management. It has to count the data channel (codec) resource usage and maintains a list, which data channel is mapped to which phone channel. The available resources can be queried by `IFX_TAPI_CAP_CHECK`.

Example

```
IFX_TAPI_MAP_DATA_t datamap;
IFX_int32_t fd;

memset(&datamap, 0, sizeof (IFX_TAPI_MAP_DATA_t));
/* Add phone 0 to data 0 */
ioctl(fd, IFX_TAPI_MAP_DATA_ADD, &datamap);
datamap.nDstCh = 1;
/* Add phone 1 to data 0*/
ioctl(fd, IFX_TAPI_MAP_DATA_ADD, &datamap);
```

4.1.2.22 IFX_TAPI_MAP_DATA_REMOVE

Description

This interface removes a data channel from a phone channel.

Attention: It is recommended to choose the destination using enum `IFX_TAPI_MAP_TYPE_t`! TAPI includes enum `IFX_TAPI_MAP_DATA_TYPE_t` for backwards compatibility reasons only.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_MAP_DATA_REMOVE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
<code>IFX_int32_t</code>	fd	File descriptor. It is applicable to data channel file descriptors.
<code>IFX_int32_t</code>	IFX_TAPI_MAP_DATA_REMOVE	I/O control identifier for this operation.
<code>IFX_int32_t</code>	param	The parameter points to a <code>IFX_TAPI_MAP_DATA_t</code> struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

Applies to a data file descriptor. The host has to take care about the resource management. It has to count the data channel (codec) resource usage and maintains a list, which data channel is mapped to which phone channel. The available resources can be queried by **IFX_TAPI_CAP_CHECK**.

Example

```
IFX_TAPI_MAP_DATA_t datamap;
IFX_int32_t fd;

memset(&datamap, 0, sizeof(IFX_TAPI_MAP_DATA_t));
/* Do something .... */
/* Remove connection between phone channel 1 (nDstCh=1)
and data channel 1 (fd) */
datamap.nDstCh = 1;
ioctl(fd, IFX_TAPI_MAP_DATA_REMOVE, &datamap);
/* Now phone and data resources are unmapped */
```

4.1.2.23 IFX_TAPI_MAP_PCM_ADD

Description

This interface connects the PCM channel to a phone channel. See also description in [Chapter 2.9](#).

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_MAP_PCM_ADD,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_MAP_PCM_ADD	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_MAP_PCM_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_TAPI_MAP_PCM_t pcmMap;
IFX_int32_t fd;

memset(&pcmMap, 0, sizeof(IFX_TAPI_MAP_PCM_t));
/* Connect PCM2 (addressed by fd) to phone channel 1 (analog) */
pcmMap.nDstCh = 1;
ioctl(fd, IFX_TAPI_MAP_PCM_ADD, &pcmMap);
```

4.1.2.24 IFX_TAPI_MAP_PCM_REMOVE

Description

This interface removes the PCM channel from the phone channel. See also description in [Chapter 2.9](#).

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_MAP_PCM_REMOVE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_MAP_PCM_REMOVE	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_MAP_PCM_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_TAPI_MAP_PCM_t param;
IFX_int32_t fd;
```

```
memset(&param, 0, sizeof (IFX_TAPI_MAP_PCM_t));
/* PCM channel 1 is removed from the phone channel 2 */
param.nDstCh = 2;
/* fd1 represents PCM channel 1 */
ioctl(fd, IFX_TAPI_MAP_PCM_REMOVE, &param);
```

4.1.2.25 IFX_TAPI_MAP_PHONE_ADD

Description

This interface connects a phone channel to another phone channel. See also description in [Chapter 2.9](#).

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_MAP_PHONE_ADD,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_MAP_PHONE_ADD	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_MAP_PHONE_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Applies to a phone channel file descriptor. The host has to take care about the resource management.

Example

```
IFX_TAPI_MAP_PHONE_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_MAP_PHONE_t));
param.nPhoneCh = 1;
ioctl(fd, IFX_TAPI_MAP_PHONE_ADD, &param);
```

4.1.2.26 IFX_TAPI_MAP_PHONE_REMOVE

Description

This interface removes a phone channel from a phone channel. See also description in [Chapter 2.9](#).

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_MAP_PHONE_REMOVE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_MAP_PHONE_REMOVE	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_MAP_PHONE_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Applies to a phone channel file descriptor.

Example

```
IFX_TAPI_MAP_PHONE_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_MAP_PHONE_t));
param.nPhoneCh = 1;
ioctl(fd, IFX_TAPI_MAP_PHONE_REMOVE, &param);
```

4.1.2.27 IFX_TAPI_PKT_AAL_CFG_SET

Description

This interface configures AAL fields for a new connection.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
```

```
IFX_TAPI_PKT_AAL_CFG_SET,
IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_PKT_AAL_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PCK_AAL_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_TAPI_PKT_AAL_CFG_SET param;
memset (&param, 0, sizeof (IFX_TAPI_PKT_AAL_CFG_SET));
param.nTimestamp = 0x1234;
ret = ioctl(fd, IFX_TAPI_PKT_AAL_CFG_SET, &param)
```

4.1.2.28 IFX_TAPI_PKT_AAL_PROFILE_SET

Description

AAL profile configuration.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_AAL_PROFILE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_PKT_AAL_PROFILE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PCK_AAL_PROFILE_t struct.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

Remarks

Sets each row in a profile. A maximum number of 10 rows can be set up. This interface is called on initialization to program the selected AAL profile. The following example programs the ATMF profiles 3, 4 and 5

Example

```
IFX_TAPI_PCK_AAL_PROFILE_t Profile;
switch (nProfile)
{
    case 3:
    case 4:
        /* ATMF profile 3 and 4 */
        Profile.rows = 1;
        Profile.codec[0] = IFX_TAPI_COD_TYPE_MLAW;
        Profile.len[0] = 43;
        Profile.nUUID[0] = IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_7;
        break ;
    case 5:
        /* ATMF profile 5 */
        Profile.rows = 2;
        Profile.codec[0] = IFX_TAPI_COD_TYPE_MLAW;
        Profile.len[0] = 43;
        Profile.nUUID[0] = IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_7;
        Profile.codec[1] = IFX_TAPI_COD_TYPE_G726_32;
        Profile.len[1] = 43;
        Profile.nUUID[1] = IFX_TAPI_PKT_AAL_PROFILE_RANGE_8_15;
        break ;
}
ret = ioctl (fd, IFX_TAPI_PKT_AAL_PROFILE_SET, (INT)&Profile);
```

4.1.2.29 IFX_TAPI_PKT_EV_GENERATE

Description

This service is used to generate RFC2833 event from the application software.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_EV_GENERATE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Channel file descriptor.
IFX_int32_t	IFX_TAPI_PKT_EV_GENERATE	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_PKT_EV_GENERATE_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.2.30 IFX_TAPI_PKT_EV_GENERATE_CFG

Description

This service is used to configure the generation of RFC2833 events from the application software.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_EV_GENERATE_CFG,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Channel file descriptor.
IFX_int32_t	IFX_TAPI_PKT_EV_GENERATE_CFG	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_PKT_EV_GENERATE_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.2.31 IFX_TAPI_PKT_RTCP_STATISTICS_GET

Description

Retrieves RTCP statistics.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_RTCP_STATISTICS_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_PKT_RTCP_STATISTICS_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_PKT_RTCP_STATISTICS_t struct according to RFC 3550/3551 for a sender report.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Not all statistics may be supported by the Infineon device.

Example

```
IFX_TAPI_PKT_RTCP_STATISTICS_t param;
IFX_int32_t fd;

ioctl(fd, IFX_TAPI_PKT_RTCP_STATISTICS_GET, (IFX_int32_t) &param);
```

4.1.2.32 IFX_TAPI_PKT_RTCP_STATISTICS_RESET

Description

Resets the RTCP statistics.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_RTCP_STATISTICS_RESET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_PKT_RTCP_STATISTICS_RESET	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_PKT_RTCP_STATISTICS_RESET, 0);
```

4.1.2.33 IFX_TAPI_PKT_RTP_CFG_SET

Description

This interface configures RTP and RTCP fields for a new connection.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_RTP_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_PKT_RTP_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PKT_RTP_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_PKT_RTP_CFG_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_PKT_RTP_CFG_t));
param.nSeqNr = 0x1234;
ioctl(fd, IFX_TAPI_PKT_RTP_CFG_SET, &param);
```

4.1.2.34 IFX_TAPI_PKT_RTP_PT_CFG_SET

Description

Configure the payload type table.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_RTP_PT_CFG_SET,
    IFX_int32_t *param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_PKT_RTP_PT_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	*param	The parameter points to a IFX_TAPI_PKT_RTP_PT_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

The requested payload type should have been negotiated with the peer prior to the connection set-up. Event payload types are negotiated during signaling phase and the driver and the device can be programmed accordingly at the time of starting the media session. Event payload types shall not be modified when the session is in progress.

Example

```
IFX_TAPI_PKT_RTP_PT_CFG_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_PKT_RTP_PT_CFG_t));
param.nPTup[6D] = 0x5;
param.nPTdown[12D] = 0x4;
```

```
ioctl(fd, IFX_TAPI_PKT_RTP_PT_CFG_SET, &param);
```

4.1.3 Dial Services

Contains services for dialing.

Table 48 IO-control Overview of Dial Service

Name	Description
IFX_TAPI_PKT_EV_OOB_SET	This service controls the DTMF sending mode.
IFX_TAPI_PULSE_ASCII_GET	This service reads the ASCII character representing the pulse digit out of the receive buffer.
IFX_TAPI_PULSE_GET	This service reads the dial pulse digit out of the receive buffer.
IFX_TAPI_PULSE_READY	This service checks if a pulse digit was received.
IFX_TAPI_TONE_DTMF_ASCII_GET	This service reads the ASCII character representing the DTMF digit out of the receive buffer.
IFX_TAPI_TONE_DTMF_GET	This service reads the DTMF digit out of the internal receive buffer.
IFX_TAPI_TONE_DTMF_READY_GET	This service checks if a DTMF digit was received.

4.1.3.1 IFX_TAPI_PKT_EV_OOB_SET

Description

This service controls the DTMF sending mode of out-of-band (OOB) information: RFC 2833 packets.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PKT_EV_OOB_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_PKT_EV_OOB_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter must be selected from IFX_TAPI_PKT_EV_OOB_t enum

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
/* Set the DTMF sending mode to out of band */
ioctl(fd, IFX\_TAPI\_PKT\_EV\_OOB\_SET, IFX\_TAPI\_PKT\_EV\_OOB\_ONLY);
```

4.1.3.2 IFX_TAPI_PULSE_ASCII_GET

Description

This service reads the ASCII character representing the pulse digit out of the receive buffer.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PULSE_ASCII_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_PULSE_ASCII_GET	I/O control identifier for this operation.
IFX_int32_t	param	This service reads the dial pulse digit out of the receive buffer, in ASCII format.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.3.3 IFX_TAPI_PULSE_GET

Description

This service reads the dial pulse digit out of the receive buffer.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PULSE_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.

Data Type	Name	Description
IFX_int32_t	IFX_TAPI_PULSE_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to the detected digit. It returns the following HEX values: <ul style="list-style-type: none">• 0: no digit detected• 1: Digit 1• ...• 9: Digit 9• B: Digit 0

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.3.4 IFX_TAPI_PULSE_READY

Description

This service checks if a pulse digit was received.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PULSE_READY,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_PULSE_READY	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to the status. It returns the following values: <ul style="list-style-type: none">• 0: No pulse digit is in the receive queue• 1: pulse digit is in the receive queue

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t ready;

/* Check the pulse dialing status */
ioctl(fd, IFX_TAPI_PULSE_READY, &ready);
if (1 == ready)
{
    /* Digit arrived */
}
else
{
    /* No digit in the buffer */
}
```

4.1.3.5 IFX_TAPI_TONE_DTMF_ASCII_GET

Description

This service reads the ASCII character representing the DTMF digit out of the receive buffer.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_DTMF_ASCII_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_DTMF_ASCII_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to the detected digit in ASCII representation.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t digit;

/* Get DTMF digit */
ret = ioctl(fd, IFX_TAPI_TONE_DTMF_ASCII_GET, &digit);
```

4.1.3.6 IFX_TAPI_TONE_DTMF_GET

Description

This service reads the DTMF digit out of the internal receive buffer.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_DTMF_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_DTMF_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to the detected digit. It returns the following HEX values: <ul style="list-style-type: none">• 0: no digit detected• 1: Digit 1• ...• 9: Digit 9• A: * (star)• B: Digit 0• C: Digit # (hash)• 1C: Digit A• 1D: Digit B• 1E: Digit C• 1F: Digit D

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t digit;

/* Get DTMF digit */
ret = ioctl(fd, IFX_TAPI_TONE_DTMF_GET, &digit);
```

4.1.3.7 IFX_TAPI_TONE_DTMF_READY_GET

Description

This service checks if a DTMF digit was received.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_DTMF_READY_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_DTMF_READY_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to an integer for the status information. It returns the following values: <ul style="list-style-type: none">• 0: No DTMF digit is in the receive queue• 1: DTMF digit is in the receive queue

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t ready;

/* Check the DTMF status */
ioctl(fd, IFX_TAPI_TONE_DTMF_READY_GET, &ready);
if (1 == ready)
{
    /* digit arrived */
}
else
{
    /* no digit in the buffer */
}
```

4.1.4 Fax T.38 Service

The FAX services switch the corresponding data channel from voice to T.38 data pump.

All fax services apply to data channels except otherwise stated.

Table 49 IO-control Overview of Fax T.38 Service

Name	Description
IFX_TAPI_T38_DEMOD_START	This service configures and enables the demodulator during a T.38 fax session.
IFX_TAPI_T38_MOD_START	This service configures and enables the modulator during a T.38 fax session.
IFX_TAPI_T38_STATUS_GET	This service provides the T.38 fax status on query.
IFX_TAPI_T38_STOP	This service disables the T.38 fax data pump and activates the voice path again.

Table 50 Structure Overview of Fax T.38 Service

Name	Description
IFX_TAPI_T38_DEMOD_DATA_t	Structure to setup the demodulator for T.38 fax and used for IFX_TAPI_T38_DEMOD_START .
IFX_TAPI_T38_MOD_DATA_t	Structure to setup the modulator for T.38 fax and used for IFX_TAPI_T38_MOD_START .
IFX_TAPI_T38_STATUS_t	Structure to read the T.38 fax status and used for IFX_TAPI_T38_STATUS_GET .

Table 51 Enumerator Overview of Fax T.38 Service

Name	Description
IFX_TAPI_T38_ERROR_t	T38 Fax errors.
IFX_TAPI_T38_STATUS_t	T38 Fax Datapump states.
IFX_TAPI_T38_STD_t	T38 Fax standard and rate.

4.1.4.1 [IFX_TAPI_T38_DEMOD_START](#)

Description

This service configures and enables the demodulator during a T.38 fax session.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_T38_DEMOD_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_T38_DEMOD_START	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_T38_DEMOD_DATA_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

This service deactivates the voice data path and configures the driver for a fax session.

Example

```
IFX_TAPI_T38_DEMOD_DATA_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_T38_DEMOD_DATA_t));
/* Set V.21 standard as standard used for fax */
param.nStandard1 = 0x01;
/* Set V.17/14400 as alternative standard */
param.nStandard2 = 0x09;
ioctl(fd, IFX_TAPI_T38_DEMOD_START, &param);
```

4.1.4.2 IFX_TAPI_T38_MOD_START

Description

This service configures and enables the modulator during a T.38 fax session.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_T38_MOD_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_T38_MOD_START	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_T38_MOD_DATA_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

This service deactivates the voice data path and configures the channel for a fax session.

Example

```

IFX_TAPI_T38_MOD_DATA_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_T38_MOD_DATA_t));
/* Set V.21 standard */
param.nStandard = 0x01;
ioctl(fd, IFX_TAPI_T38_MOD_START, &param);

```

4.1.4.3 IFX_TAPI_T38_STATUS_GET

Description

This service provides the T.38 fax status on query.

Prototype

```

IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_T38_STATUS_GET,
    IFX_int32_t param );

```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.

Data Type	Name	Description
IFX_int32_t	IFX_TAPI_T38_STATUS_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_T38_STATUS_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

This interface must be used when a fax exception has occurred to know the status. An error or a change of status will be indicated with TAPI exceptions, refer to [IFX_TAPI_EXCEPTION_t](#).

Example

```
IFX_TAPI_T38_STATUS_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_T38_STATUS_t));
/* Request status */
ioctl(fd, IFX_TAPI_T38_STATUS_GET, &param);
```

4.1.4.4 IFX_TAPI_T38_STOP

Description

This service disables the T.38 fax data pump and activates the voice path again.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_T38_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_T38_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LINE_VOLUME_t param;  
IFX_int32_t fd;  
  
ioctl(fd, IFX_TAPI_T38_STOP, 0);
```

4.1.5 Initialization Service

This service sets the default initialization of device and hardware.

Table 52 IO-control Overview of Initialization Service

Name	Description
IFX_TAPI_CH_INIT	This service sets the default initialization of device and hardware.
IFX_TAPI_DWLD	Download service.

Table 53 Structure Overview of Initialization Service

Name	Description
IFX_TAPI_CH_INIT_t	TAPI initialization structure used for IFX_TAPI_CH_INIT .
IFX_TAPI_DWLD_t	Structure used for download.

Table 54 Enumerator Overview of Initialization Service

Name	Description
IFX_TAPI_CH_INIT_COUNTRY_t	Country selection for IFX_TAPI_CH_INIT_t .
IFX_TAPI_CH_INIT_MODE_t	TAPI initialization modes, selection for target system.
IFX_TAPI_DWLD_TYPE_t	Definition of download type.

4.1.5.1 [IFX_TAPI_CH_INIT](#)

Description

This service sets the default initialization of the device and of the specific channel.

It applies to channel file descriptors.

Prototype

```
IFX_void_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CH_INIT,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor
IFX_int32_t	IFX_TAPI_CH_INIT	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_CH_INIT_t struct.

Return Values

Data Type	Description
IFX_void_t	No return value

Example

```
IFX_TAPI_CH_INIT_t Init;  
  
Init.nMode = 0;  
Init.nCountry = 2;  
Init.pProc = &DevInitStruct;  
ioctl(fd, IFX_TAPI_CH_INIT, &Init);
```

4.1.5.2 IFX_TAPI_DWLD

Description

This service issues a download.

The type of download must be configured in **IFX_TAPI_DWLD_t**. The different download types are defined in **IFX_TAPI_DWLD_TYPE_t**.

It applies to channel file descriptors.

Attention: Interface not implemented yet.

Prototype

```
IFX_void_t ioctl (  
    IFX_int32_t fd,  
    IFX_TAPI_DWLD,  
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Channel file descriptor.
IFX_int32_t	IFX_TAPI_DWLD	I/O control identifier for this operation..
IFX_int32_t	param	The parameter points to a IFX_TAPI_DWLD_t struct.

Return Values

Data Type	Description
IFX_void_t	No return value.

4.1.6 Metering Service

Contains services for metering.

All metering services apply to phone channels except otherwise stated.

Table 55 IO-control Overview of Metering Service

Name	Description
IFX_TAPI_METER_CFG_SET	This service sets the characteristic for the metering service.
IFX_TAPI_METER_START	This service starts the metering.
IFX_TAPI_METER_STOP	This service stops the metering.

Table 56 Structure Overview of Metering Service

Name	Description
IFX_TAPI_METER_CFG_t	Structure for metering config.

4.1.6.1 IFX_TAPI_METER_CFG_SET

Description

This service sets the characteristic for the metering service.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_METER_CFG_Set,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_METER_CFG_Set	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_METER_CFG_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

If burst_cnt is not zero the burst number is defined by burst_cnt and stopping is not necessary. If burst_cnt is set to zero the bursts are sent out until a [IFX_TAPI_METER_STOP](#) ioctl is called.

Example

```
IFX_TAPI_METER_CFG_t Metering;
memset (&Metering, 0, sizeof (IFX_TAPI_METER_CFG_t));
/* Metering mode is already set to 0 */
/* 100ms burst length */
Metering.burst_len = 100;
/* 2 min. burst distance */
Metering.burst_dist = 120;
/* send out 2 bursts */
Metering.burst_cnt = 2;
/* set metering characteristic */
ioctl(fd, IFX_TAPI_METER_CFG_SET, &Metering);
```

4.1.6.2 IFX_TAPI_METER_START

Description

This service starts the metering.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_METER_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_METER_START	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

Before this service can be used, the metering characteristic must be set (service [IFX_TAPI_METER_CFG_SET](#)) and the line mode must be set to normal (service [IFX_TAPI_LINE_FEED_SET](#)).

Example

```
ioctl(fd, IFX_TAPI_METER_START, 0);
```

4.1.6.3 IFX_TAPI_METER_STOP

Description

This service stops the metering.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_METER_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_METER_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

If the metering has not been started before this service returns an error

Example

```
ioctl(fd, IFX_TAPI_METER_STOP, 0);
```

4.1.7 Miscellaneous Services

Contains services for status and version information. This is applicable to phone channels except otherwise stated.

Table 57 IO-control Overview of Miscellaneous Services

Name	Description
IFX_TAPI_CAP_CHECK	This service checks if a specific capability is supported.
IFX_TAPI_CAP_LIST	This service returns the capability lists.
IFX_TAPI_CAP_NR	This service returns the number of capabilities.
IFX_TAPI_DEBUG_REPORT_SET	Set the report levels if the driver is compiled with ENABLE_TRACE.
IFX_TAPI_VERSION_CHECK	Check the supported TAPI interface version.
IFX_TAPI_VERSION_GET	Retrieves the TAPI version string.

Table 58 Structure Overview of Miscellaneous Services

Name	Description
IFX_TAPI_CAP_t	Capability structure.
IFX_TAPI_VERSION_t	Structure used for the TAPI version support check.

Table 59 Enumerator Overview of Miscellaneous Services

Name	Description
IFX_TAPI_CAP_PORT_t	Lists the ports for the capability list.
IFX_TAPI_CAP_SIG_DETECT_t	Lists the signal detectors for the capability list.
IFX_TAPI_CAP_TYPE_t	Enumeration used for phone capabilities types.
IFX_TAPI_DIALING_STATUS_t	Enumeration for dial status events.
IFX_TAPI_LINE_HOOK_STATUS_t	Enumeration for hook status events.
IFX_TAPI_LINE_STATUS_t	Enumeration for phone line status information.

4.1.7.1 IFX_TAPI_CAP_CHECK

Description

This service checks if a specific capability is supported.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CAP_CHECK,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.

Data Type	Name	Description
IFX_int32_t	IFX_TAPI_CAP_CHECK	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_CAP_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0 (capability not supported)• IFX_ERROR -1 (error)• 1 (capability supported)

Example

```
IFX_TAPI_CAP_t CapList;
IFX_int32_t fd;
IFX_return_t ret;

/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

memset(&CapList, 0, sizeof(IFX_TAPI_CAP_t));
/* Check if G726, 16 kBit/s is supported */
CapList.capttype = IFX_TAPI_CAP_TYPE_CODEC;
CapList.cap = IFX\_TAPI\_COD\_TYPE\_G726\_16;
ret = ioctl(fd, IFX\_TAPI\_CAP\_CHECK, &CapList);
if (ret > 0)
{
    printf( "G726_16 supported\n" );
}
/* Check how many data channels are supported */
CapList.capttype = IFX_TAPI_CAP_TYPE_CODECS;
ret = ioctl(fd, IFX\_TAPI\_CAP\_CHECK, &CapList);
if (ret > 0)
{
    printf( "%d data channels supported\n" , CapList.cap);
}
/* Check if POTS port is available */
CapList.capttype = IFX_TAPI_CAP_TYPE_PORT;
CapList.cap = IFX_TAPI_CAP_PORT_POTS;
ret = ioctl(fd, IFX\_TAPI\_CAP\_CHECK, &CapList);
if (ret > 0)
{
    printf( "POTS port supported\n" );
}

/* close all open fds */
close(fd);
```

4.1.7.2 IFX_TAPI_CAP_LIST

Description

This service returns the capability lists.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CAP_LIST,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_CAP_LIST	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_CAP_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_CAP_t *pCapList;
IFX_int32_t fd;
IFX_return_t ret;
IFX_int32_t nCapNr;
IFX_int32_t i;

/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

/* Get the cap list size */
ioctl(fd, IFX\_TAPI\_CAP\_NR, &nCapNr);
pCapList = (IFX\_TAPI\_CAP\_t*) malloc (nCapNr * sizeof(IFX\_TAPI\_CAP\_t));
/* Get the cap list */
ioctl(fd, IFX\_TAPI\_CAP\_LIST, pCapList);
for (i = 0; i < nCapNr; i++)
{
    switch (pCapList[i].capttype)
    {
        case IFX_TAPI_CAP_TYPE_CODEC:
            printf( "Codec: %s\n\r" , pCapList[i].desc);
            break;
```

```
        case IFX_TAPI_CAP_TYPE_PCM:
            printf( "PCM: %d\n\r" , pCapList[i].cap);
            break;
        case IFX_TAPI_CAP_TYPE_CODECS:
            printf( "CODER: %d\n\r" , pCapList[i].cap);
            break;
        case IFX_TAPI_CAP_TYPE_PHONES:
            printf( "PHONES: %d\n\r" , pCapList[i].cap);
            break;
        default:
            break;
    }
}

/* Free the allocated memory */
free(pCapList);
pCapList = IFX_NULL;

/* Close all open fds */
close(fd);
```

4.1.7.3 IFX_TAPI_CAP_NR

Description

This service returns the number of capabilities.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_CAP_NR,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_CAP_NR	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to the number of capabilities which are returned.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LINE_VOLUME_t param;
IFX_int32_t fd;
IFX_int32_t nCapNr;

/* Get the cap list size */
ioctl(fd, IFX_TAPI_CAP_NR, &nCapNr);
```

4.1.7.4 IFX_TAPI_DEBUG_REPORT_SET

Description

Set the report levels if the driver is compiled with `ENABLE_TRACE`.

Prototype

```
IFX_void_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_DEBUG_REPORT_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_DEBUG_REPORT_SET	I/O control identifier for this operation.
IFX_int32_t	param	A valid argument is one value of IFX_TAPI_DEBUG_REPORT_SET_t

Return Values

Data Type	Description
IFX_void_t	No return value

4.1.7.5 IFX_TAPI_VERSION_CHECK

Description

Check the supported TAPI interface version.

Prototype

```
IFX_void_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_VERSION_CHECK,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_VERSION_CHECK	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_VERSION_t struct.

Return Values

Data Type	Description
IFX_void_t	No return value

Remarks

Since an application is always build against one specific TAPI interface version it should check if it is supported. If not the application should abort. This interface checks if the current TAPI version supports a particular version. For example the TAPI versions 2.1 will support TAPI 2.0. But version 3.0 might not support 2.0.

Example

```
IFX_TAPI_VERSION_t version;
IFX_int32_t fd;

memset(&version, 0, sizeof(IFX_TAPI_VERSION_t));
version.major = 2;
version.minor = 1;
if (0 == ioctl(fd, IFX_TAPI_VERSION_CHECK, (IFX_int32_t) &version))
{
    printf( "Version 2.1 supported\n");
}
```

4.1.7.6 IFX_TAPI_VERSION_GET

Description

Retrieves the TAPI version string.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_VERSION_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_VERSION_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to version character string

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_char_t Version[80];

ioctl(fd, IFX_TAPI_VERSION_GET, (IFX_char_t*) &Version[0]);
printf("Version:%s\n" , Version);
```

4.1.8 Event Reporting Services

Contains services for event reporting. This is applicable to device file descriptors except otherwise stated.

Table 60 IO-control Overview of Miscellaneous Services

Name	Description
IFX_TAPI_EVENT_GET	Get event.
IFX_TAPI_EVENT_ENABLE	Enable event detection.
IFX_TAPI_EVENT_EXT_DTMF	Report DTMF event from application software.
IFX_TAPI_EVENT_EXT_DTMF_CFG	Configure reporting of DTMF event from application software.
IFX_TAPI_EVENT_DISABLE	Disable event detection.

Table 61 Structure Overview of Miscellaneous Services

Name	Description
IFX_TAPI_EVENT_t	Event structure.
IFX_TAPI_EVENT_DATA_DEC_CHG_t	Decoder change event details.
IFX_TAPI_EVENT_DATA_CERR_t	Information about a DTMF event.
IFX_TAPI_EVENT_DATA_EXT_KEYPA_D_t	This structure is used to report a DTMF event to the TAPI from an external software module.
IFX_TAPI_EVENT_DATA_FAX_SIG_t	Information about a fax/modem signal event.
IFX_TAPI_EVENT_DATA_PULSE_t	Information about a pulse event.
IFX_TAPI_EVENT_DATA_RFC2833_t	Information about an RFC2833 event.
IFX_TAPI_EVENT_DATA_TONE_GEN_t	Information about a tone generation/detection event.
IFX_TAPI_EVENT_EXT_DTMF_t	External DTMF event structure.
IFX_TAPI_EVENT_EXT_DTMF_CFG_t	External DTMF event configuration structure.

Table 62 Union Overview of Miscellaneous Services

Name	Description
IFX_TAPI_EVENT_DATA_t	Union for the possible events to be reported.

Table 63 Enumerator Overview of Miscellaneous Service

Name	Description
IFX_TAPI_EVENT_ID_t	Event ID.
IFX_TAPI_EVENT_TYPE_t	Event type.

4.1.8.1 [IFX_TAPI_EVENT_GET](#)

Description

[IFX_TAPI_EVENT_GET](#) always returns [IFX_SUCCESS](#) as long as the channel parameter is not out of range, or if no event was available. If the parameter is out of range then [IFX_ERROR](#) is returned.

To find that the event data is not valid in this case the value [IFX_TAPI_EVENT_NONE](#) is returned in the "id" field of the event.

This ioctl indicates that additional events are be ready to be retrieved. The information is provided in the "more" field of the returned [IFX_TAPI_EVENT_t](#) struct.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_EVENT_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Device file descriptor.
IFX_int32_t	IFX_TAPI_EVENT_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_EVENT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.8.2 IFX_TAPI_EVENT_ENABLE

Description

Enable detection of an event.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_EVENT_ENABLE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Device file descriptor.
IFX_int32_t	IFX_TAPI_EVENT_ENABLE	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_EVENT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.8.3 IFX_TAPI_EVENT_EXT_DTMF

Description

This service is used to signal a DTMF event from an external software module. It means that an external software communicated to TAPI that a DTMD digit has been detected.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_EVENT_EXT_DTMF ,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Device file descriptor.
IFX_int32_t	IFX_TAPI_EVENT_EXT_DTMF	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_EVENT_EXT_DTMF_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.8.4 IFX_TAPI_EVENT_EXT_DTMF_CFG

Description

Configure the support of external DTMF event signaled to TAPI.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_EVENT_EXT_DTMF_CFG ,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Device file descriptor.
IFX_int32_t	IFX_TAPI_EVENT_EXT_DTMF_CFG	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_EVENT_EXT_DTMF_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.8.5 IFX_TAPI_EVENT_DISABLE

Description

Disable detection of an event.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_EVENT_DISABLE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	Device file descriptor.
IFX_int32_t	IFX_TAPI_EVENT_DISABLE	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_EVENT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9 Operation Control Services

Table 64 IO-control Overview of Operation Control Services

Name	Description
IFX_TAPI_ENC_AGC_CFG	Set the AGC coefficient for a coder module.
IFX_TAPI_ENC_AGC_CFG_GET	Get the AGC coefficient for a coder module.
IFX_TAPI_ENC_AGC_ENABLE	Enable/Disable the AGC.
IFX_TAPI_LEC_PCM_CFG_GET	Get the LEC configuration for PCM.
IFX_TAPI_LEC_PCM_CFG_SET	Set the line echo canceller (LEC) configuration for PCM.
IFX_TAPI_LEC_PHONE_CFG_GET	Get the LEC configuration.
IFX_TAPI_LEC_PHONE_CFG_SET	Set the line echo canceller (LEC) configuration.
IFX_TAPI_LINE_FEED_SET	This service sets the line feeding mode.
IFX_TAPI_LINE_HOOK_STATUS_GET	This service reads the hook status from the driver.
IFX_TAPI_LINE_HOOK_VT_SET	Specifies the time for hook, pulse digit and hook flash validation.
IFX_TAPI_LINE_LEVEL_SET	This service enables or disables a high level path of a phone channel.
IFX_TAPI_LINE_TYPE_SET	This service configures the line type.
IFX_TAPI_PCM_VOLUME_SET	Sets the PCM interface volume settings.
IFX_TAPI_PHONE_VOLUME_SET	Sets the speaker phone and microphone volume settings.
IFX_TAPI_WLEC_PCM_CFG_GET	Get the LEC configuration for PCM.
IFX_TAPI_WLEC_PCM_CFG_SET	Set the line echo canceller (LEC) configuration for PCM.
IFX_TAPI_WLEC_PHONE_CFG_GET	Set the line echo canceller (LEC) configuration.
IFX_TAPI_WLEC_PHONE_CFG_SET	Get the LEC configuration.

Table 65 Structure Overview of Operation Control Services

Name	Description
IFX_TAPI_ENC_AGC_CFG_t	Structure used for AGC configuration.
IFX_TAPI_LEC_CFG_t	Line echo canceller (LEC) configuration.
IFX_TAPI_LINE_HOOK_VT_t	Structure used for validation times of hook, hook flash and pulse dialing.
IFX_TAPI_LINE_VOLUME_t	Structure used to configure volume settings. Used for IFX_TAPI_PHONE_VOLUME_SET ioctl.

Table 66 Enumerator Overview of Operation Control Services

Name	Description
IFX_TAPI_ENC_AGC_CFG_t	Structure used for AGC configuration.
IFX_TAPI_LEC_GAIN_t	LEC Gain Levels.
IFX_TAPI_LEC_NLP_t	LEC NLP (Non Linear Processor) Settings.
IFX_TAPI_LEC_TYPE_t	LEC type selection.

4.1.9.1 IFX_TAPI_ENC_AGC_CFG

Description

Configure AGC coefficients of a Coder module.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_AGC_CFG,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_AGC_CFG	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_ENC_AGC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9.2 IFX_TAPI_ENC_AGC_CFG_GET

Description

Get the current AGC coefficients of a Coder module.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_AGC_CFG_GET ,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_AGC_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_ENC_AGC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.9.3 IFX_TAPI_ENC_AGC_ENABLE

Description

Enable/disable the AGC.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_ENC_AGC_ENABLE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to data channel file descriptors.
IFX_int32_t	IFX_TAPI_ENC_AGC_ENABLE	I/O control identifier for this operation.
IFX_int32_t	param	The valid parameters are defined in the IFX_TAPI_ENC_AGC_MODE_t enum.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.9.4 IFX_TAPI_LEC_PCM_CFG_GET

Description

Get the LEC configuration for PCM.

Attention: It is strongly recommended to use the new [IFX_TAPI_WLEC_*](#) interfaces. This interface is going to be discontinued in a next TAPI release.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LEC_PCM_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_LEC_PCM_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9.5 IFX_TAPI_LEC_PCM_CFG_SET

Description

Set the line echo canceller (LEC) configuration for PCM.

Attention: *It is strongly recommended to use the new IFX_TAPI_WLEC_* interfaces. This interface is going to be discontinued in a next TAPI release.*

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LEC_PCM_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_LEC_PCM_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LEC_CFG_t param;
```

```
IFX_int32_t fd;

memset(&param, 0, sizeof (IFX_TAPI_LEC_CFG_t));
param.nGainOut = IFX_TAPI_LEC_GAIN_MEDIUM;
param.nGainIn = IFX_TAPI_LEC_GAIN_MEDIUM;
param.nLen = 16; /* 16ms */
param.bNlp = IFX_TAPI_LEC_NLP_DEFAULT;
ioctl(fd, IFX_TAPI_LEC_PCM_CFG_SET, &param);
```

4.1.9.6 IFX_TAPI_LEC_PHONE_CFG_GET

Description

Get the LEC configuration.

Attention: It is strongly recommended to use the new **IFX_TAPI_WLEC_*** interfaces. This interface is going to be discontinued in a next TAPI release.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LEC_PHONE_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_LEC_PHONE_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9.7 IFX_TAPI_LEC_PHONE_CFG_SET

Description

Set the line echo canceller (LEC) configuration.

Attention: It is strongly recommended to use the new **IFX_TAPI_WLEC_*** interfaces. This interface is going to be discontinued in a next TAPI release.

Prototype

```
IFX_int32_t ioctl (
```

```
IFX_int32_t fd,
IFX_TAPI_LEC_PHONE_CFG_SET_t,
IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_LEC_PHONE_CFG_SET_t	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LEC_CFG_t param;
IFX_int32_t fd;

memset (&param, 0, sizeof (IFX_TAPI_LEC_CFG_t));
param.nGainOut = IFX_TAPI_LEC_GAIN_MEDIUM;
param.nGainIn = IFX_TAPI_LEC_GAIN_MEDIUM;
param.nLen = 16; /* 16ms */
param.bNlp = IFX_TAPI_LEC_NLP_DEFAULT;
ioctl(fd, IFX_TAPI_LEC_PHONE_CFG_SET, &param);
```

4.1.9.8 IFX_TAPI_LINE_FEED_SET

Description

This service sets the line feeding mode.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LINE_FEED_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_LINE_FEED_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter represents a mode value of IFX_TAPI_LINE_FEED_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

For all battery switching modes the hardware must be able to support it for example by programming coefficients.

Example

```
/* Set line mode to power down */
ioctl(fd, IFX_TAPI_LINE_FEED_SET, IFX_TAPI_LINE_FEED_DISABLED);
```

4.1.9.9 IFX_TAPI_LINE_HOOK_STATUS_GET

Description

This service reads the hook status from the driver.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LINE_HOOK_STATUS_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_LINE_HOOK_STATUS_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is a pointer to the status: <ul style="list-style-type: none"> • 0: no hook detected • 1: hook detected

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_int32_t fd;
IFX_int32_t nHook;

ioctl(fd, IFX_TAPI_LINE_HOOK_STATUS_GET, &nHook);
switch (nHook)
{
    case 0:
        /* On hook */
        break;
    case 1:
        /* Off hook */
        break;
    default :
        /* Unknown state */
        break;
}
```

4.1.9.10 IFX_TAPI_LINE_HOOK_VT_SET

Description

Specifies the time for hook, pulse digit and hook flash validation.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LINE_HOOK_VT_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_LINE_HOOK_VT_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LINE_HOOK_VT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

The following conditions must be met:

- DIGIT_LOW_TIME min. and max < HOOKFLASH_TIME min. and max
- HOOKFLASH_TIME min. and max < HOOKON_TIME min. and max

Example

```
IFX_TAPI_LINE_HOOK_VT_t param;
IFX_int32_t fd;

memset (&param, 0, sizeof (IFX_TAPI_LINE_HOOK_VT_t));
/* Set pulse dialing */
param.nType = IFX_TAPI_LINE_HOOK_VT_DIGITLOW_TIME;
param.nMinTime = 40;
param.nMaxTime = 60;
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);
param.nType = IFX_TAPI_LINE_HOOK_VT_DIGITHIGH_TIME;
param.nMinTime = 40;
param.nMaxTime = 60;
ioctl(fd, IFX_TAPI_LINE_HOOK_VT_SET, (IFX_int32_t) &param);
```

4.1.9.11 IFX_TAPI_LINE_LEVEL_SET

Description

This service enables or disables a high level path of a phone channel. The high level path might be required to play howler tones.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LINE_LEVEL_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_LINE_LEVEL_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter represents a boolean value of IFX_TAPI_LINE_LEVEL_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

This service is intended for phone channels only and must be used in combination with **IFX_TAPI_PHONE_VOLUME_SET** or **IFX_TAPI_PCM_VOLUME_SET** to set the max. level or to restore level.

Example

```
IFX_TAPI_LINE_HOOK_VT_t param;
IFX_int32_t fd;

ioctl(fd, IFX_TAPI_LINE_LEVEL_SET, IFX_TAPI_LINE_LEVEL_ENABLE );
/* Play out some high level tones or samples */
ioctl(fd, IFX_TAPI_LINE_LEVEL_SET, IFX_TAPI_LINE_LEVEL_DISABLE);
```

4.1.9.12 IFX_TAPI_LINE_TYPE_SET

Description

This service configures the line type: FXS or FXO.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_LINE_TYPE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_LINE_TYPE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is a pointer to a IFX_TAPI_LINE_TYPE_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.9.13 IFX_TAPI_PHONE_VOLUME_SET

Description

Sets the speaker phone and microphone volume settings.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PHONE_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_PHONE_VOLUME_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LINE_VOLUME_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LINE_VOLUME_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_LINE_VOLUME_t));
param.nGainTx = 24;
param.nGainRx = 0;
ioctl(fd, IFX_TAPI_PHONE_VOLUME_SET, &param);
```

4.1.9.14 IFX_TAPI_WLEC_PCM_CFG_GET

Description

Get the LEC configuration for PCM.

Attention: The ioctl [IFX_TAPI_LEC_PCM_CFG_GET](#) is obsolete and has been replaced by this ioctl.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_WLEC_PCM_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_WLEC_PCM_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_WLEC_CFG_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9.15 IFX_TAPI_WLEC_PCM_CFG_SET

Description

Set the line echo canceller (LEC) configuration for PCM.

*Attention: The ioctl **IFX_TAPI_LEC_PCM_CFG_SET** is obsolete and has been replaced by this ioctl.*

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_WLEC_PCM_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_WLEC_PCM_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_WLEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9.16 IFX_TAPI_WLEC_PHONE_CFG_GET

Description

Get the LEC configuration.

Attention: The ioctl [IFX_TAPI_LEC_PHONE_CFG_GET](#) is obsolete and has been replaced by this ioctl.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_WLEC_PHONE_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.
IFX_int32_t	IFX_TAPI_WLEC_PHONE_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_WLEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.9.17 IFX_TAPI_WLEC_PHONE_CFG_SET

Description

Set the line echo canceller (LEC) configuration.

Attention: The ioctl [IFX_TAPI_LEC_PHONE_CFG_GET](#) is obsolete and has been replaced by this ioctl.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_WLEC_PHONE_CFG_SET_t ,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors.

Data Type	Name	Description
IFX_int32_t	IFX_TAPI_WLEC_PHONE_CFG_SET_t	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_WLEC_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.10 PCM Support

Contains services for PCM configuration. This applies to phone channels unless otherwise stated.

Table 67 IO-control Overview of PCM Services

Name	Description
IFX_TAPI_PCM_ACTIVATION_GET	This service gets the activation status of the PCM time slots configured for this channel.
IFX_TAPI_PCM_ACTIVATION_SET	This service activates/deactivates the PCM time slots configured for this channel.
IFX_TAPI_PCM_CFG_GET	This service gets the configuration of the PCM channel.
IFX_TAPI_PCM_CFG_SET	This service sets the configuration of the PCM channel.
IFX_TAPI_PCM_DEC_HP_SET	This service switches on/off the HP filter of the decoder path in PCM module
IFX_TAPI_PCM_IF_CFG_GET	This service gets the configuration of the PCM interface.
IFX_TAPI_PCM_IF_CFG_SET	This service sets the configuration of the PCM interface.
IFX_TAPI_PCM_VOLUME_SET	This service sets the PCM interface gains.
IFX_TAPI_TDM_IF_TYPE_SET	This service sets the configuration of the TDM interface.

Table 68 Structure Overview of PCM Services

Name	Description
IFX_TAPI_PCM_CFG_t	Structure for PCM channel configuration.
IFX_TAPI_PCM_IF_CFG_t	Structure for PCM interface configuration.

Table 69 Enumerator Overview of PCM Services

Name	Description
IFX_TAPI_PCM_IF_DCLFREQ_t	DCL frequency for the PCM interface.
IFX_TAPI_PCM_IF_DRIVE_t	Drive mode for bit 0, in single clocking mode.
IFX_TAPI_PCM_IF_MCTS_t	Source for the master mode clock tracking..
IFX_TAPI_PCM_IF_OFFSET_t	PCM interface mode transmit/receive offset.
IFX_TAPI_PCM_IF_SLOPE_t	Slope for the PCM interface transmit/receive.
IFX_TAPI_PCM_IF_MODE_t	PCM interface mode (for example master, slave, etc).
IFX_TAPI_PCM_RES_t	Coding for the PCM channel.

4.1.10.1 IFX_TAPI_PCM_ACTIVATION_GET

Description

This service gets the activation status of the PCM time slots configured for this channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_ACTIVATION_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_PCM_ACTIVATION_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to an integer which returns the following status: <ul style="list-style-type: none">• 0: The time slot is not active• 1: The time slot is active

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LINE_VOLUME_t param;
IFX_int32_t fd;
IFX_return_t ret;
IFX_int32_t bAct;

ret = ioctl(fd, IFX_TAPI_PCM_ACTIVATION_GET, &bAct);
if ((IFX_SUCCESS == ret) && (1 == bAct))
{
    printf("Activated\n");
}
```

4.1.10.2 IFX_TAPI_PCM_ACTIVATION_SET

Description

This service activates / deactivates the PCM time slots configured for this channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_ACTIVATION_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_PCM_ACTIVATION_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter defines the activation status: 0 deactivate the time slot 1 activate the time slot

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
/* Activate the PCM timeslot */
ioctl(fd, IFX_TAPI_PCM_ACTIVATION_SET, 1);
```

4.1.10.3 IFX_TAPI_PCM_CFG_GET

Description

This service gets the configuration of the PCM channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_PCM_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PCM_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_TAPI_PCM_CFG_t Pcm;
IFX_int32_t fd;

memset(&Pcm, 0, sizeof(IFX_TAPI_PCM_CFG_t));
ioctl(fd, IFX_TAPI_PCM_CFG_GET, &Pcm);
```

4.1.10.4 IFX_TAPI_PCM_CFG_SET

Description

This service sets the configuration of the PCM channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_PCM_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PCM_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

The parameter rate must be set to the PCM rate, which is applied to the device, otherwise error is returned.

4.1.10.5 IFX_TAPI_PCM_DEC_HP_SET

Description

This service switches on/off the HP filter of the decoder path in PCM module.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_DEC_HP_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_PCM_DEC_HP_SET	I/O control identifier for this operation.
IFX_int32_t	param	Value of IFX_TRUE switches HP filter ON. Value of IFX_FALSE switches HP filter OFF.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_boolean_t bON;
bON = IFX_FALSE; // switch off decoder HP filter
ret = ioctl(fd, IFX_TAPI_PCM_DEC_HP_SET, bON);
\endcode
```

4.1.10.6 IFX_TAPI_PCM_IF_CFG_GET

Description

This service gets the configuration of the PCM interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_IF_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to device file descriptors.
IFX_int32_t	IFX_TAPI_PCM_IF_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PCM_IF_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.10.7 IFX_TAPI_PCM_IF_CFG_SET

Description

This service sets the configuration of the PCM interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_IF_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It applies to device file descriptors.
IFX_int32_t	IFX_TAPI_PCM_IF_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_PCM_IF_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.10.8 IFX_TAPI_PCM_VOLUME_SET

Description

Sets the PCM interface volume settings.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_PCM_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing a PCM interface.
IFX_int32_t	IFX_TAPI_PCM_VOLUME_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_LINE_VOLUME_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
IFX_TAPI_LINE_VOLUME_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof(IFX_TAPI_LINE_VOLUME_t));
param.nGainTx = 24;
param.nGainRx = 0;
ioctl(fd, IFX_TAPI_PCM_VOLUME_SET, &param);
```

4.1.10.9 IFX_TAPI_TDM_IF_TYPE_SET

Description

This service sets the type of the TDM interface to be used.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TDM_IF_TYPE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_TDM_IF_TYPE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is defined in enum IFX_TAPI_TDM_IF_TYPE_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.11 Power Ringing Services

Table 70 IO-control Overview of Ringing Services

Name	Description
IFX_TAPI_RING_CADENCE_HR_SET	This service sets the high resolution ring cadence for the non-blocking ringing services.
IFX_TAPI_RING_CADENCE_SET	This service sets the ring cadence for the non-blocking ringing services.
IFX_TAPI_RING_CFG_GET	This service gets the ring configuration for the non-blocking ringing services.
IFX_TAPI_RING_CFG_SET	This service sets the ring configuration for the non-blocking ringing services.
IFX_TAPI_RING_START	This service starts the non-blocking ringing on the phone line using the preconfigured ring cadence..
IFX_TAPI_RING_STOP	This service stops non-blocking ringing on the phone line which was started before with service IFX_TAPI_RING_START service.

Table 71 Structure Overview of Ringing Servicea

Name	Description
IFX_TAPI_RING_CADENCE_t	Structure for ring cadence used in IFX_TAPI_RING_CADENCE_HR_SET .
IFX_TAPI_RING_CFG_t	Ringing configuration structure used for ioctl IFX_TAPI_RING_CFG_SET .

4.1.11.1 [IFX_TAPI_RING_CADENCE_HR_SET](#)

Description

This service sets the high resolution ring cadence for the non-blocking ringing services.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_RING_CADENCE_HR_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_RING_CADENCE_HR_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_RING_CADENCE_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```

/* Pattern of 3 sec. ring and 1 sec. pause */
char data[10] = { 0xFF, 0xFF, 0xFF, 0xFF, 0xFF,
                  0xFF, 0xFF, 0xF0, 0x00, 0x00};

/* Initial 1 sec. ring and 600 ms non ringing signal before ringing */
char initial[4] = { 0xFF, 0xFF, 0xF0, 0x00 };

IFX_TAPI_RING_CADENCE_t Cadence;
IFX_int32_t fd;

memset(&Cadence, 0, sizeof(IFX_TAPI_RING_CADENCE_t));
memcpy(&Cadence.data[0], data, sizeof(data));
Cadence.nr = sizeof (data) * 8;
/* Set size in bits */
memcpy(&Cadence.initial[0], initial, sizeof(initial));
Cadence.initialNr = 4 * 8;
/* Set the cadence sequence */
ioctl(fd, IFX_TAPI_RING_CADENCE_HR_SET, &Cadence);

```

4.1.11.2 IFX_TAPI_RING_CADENCE_SET

Description

This service sets the ring cadence for the non-blocking ringing services.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_RING_CADENCE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_RING_CADENCE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter defines the cadence. This value contains the encoded cadence sequence. One bit represents ring cadence voltage for 0.5 sec.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

The number of ring bursts can be counted via events PSTN line is ringing.

Example

```
/* pattern of 3 sec. ring and 1 sec. pause : 1111 1100 1111 1100 ... */
IFX_uint32_t nCadence = 0xFCFCFCFC;
IFX_int32_t fd;

/* set the cadence sequence */
ioctl(fd, IFX\_TAPI\_RING\_CADENCE\_SET, nCadence);
```

4.1.11.3 IFX_TAPI_RING_CFG_GET

Description

This service gets the ring configuration for the non-blocking ringing services.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_RING_CFG_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_RING_CFG_GET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_RING_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.11.4 IFX_TAPI_RING_CFG_SET

Description

This service sets the ring configuration for the non-blocking ringing services.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_RING_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_RING_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_RING_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

The configuration has to be set before ringing starts using the interface [IFX_TAPI_RING_START](#).

Example

```
IFX_TAPI_RING_CFG_t param;
memset (&param, 0, sizeof (IFX_TAPI_RING_CFG_t));
param.mode = 0;
param.submode = 1;
ret = ioctl(fd, IFX_TAPI_RING_CFG_SET, &param)
```

4.1.11.5 IFX_TAPI_RING_START

Description

This service starts the non-blocking ringing on the phone line using the preconfigured ring cadence.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_RING_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_RING_START	I/O control identifier for this operation.
IFX_int32_t	param	Parameter is ignored.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Remarks

This interface does not provide caller ID services.

4.1.11.6 IFX_TAPI_RING_STOP

Description

This service stops non-blocking ringing on the phone line which was started before with service **IFX_TAPI_RING_START**.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_RING_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to phone channel file descriptors containing an analog interface.
IFX_int32_t	IFX_TAPI_RING_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
ioctl(fd, IFX_TAPI_RING_STOP, 0);
```

4.1.12 Signal Detection Services

Table 72 IO-control Overview of Signal Detection Service

Name	Description
IFX_TAPI_DTMF_RX_CFG_SET	This service is used to set DTMF receiver coefficients.
IFX_TAPI_SIG_DETECT_DISABLE	Disables the signal detection for Fax or modem signals.
IFX_TAPI_SIG_DETECT_ENABLE	Enables the signal detection for Fax or modem signals.
IFX_TAPI_TONE_CPTD_START	Start the call progress tone detection based on a previously defined simple tone.
IFX_TAPI_TONE_CPTD_STOP	Stops the call progress tone detection.

Table 73 Structure Overview of Signal Detection Service

Name	Description
IFX_TAPI_DTMF_RX_CFG_t	Struct used for setting DTMF Receiver coefficients.
IFX_TAPI_SIG_DETECTION_t	Structure used for enable and disable signal detection.

Table 74 Enumerator Overview of Signal Detection Service

Name	Description
IFX_TAPI_SIG_t	List the tone detection options.
IFX_TAPI_SIG_EXT_t	Additional list the tone detection options.
IFX_TAPI_TONE_CPTD_DIRECTION_t	Specifies the CPT signal for CPT detection.

4.1.12.1 IFX_TAPI_DTMF_RX_CFG_SET

Description

This service is used to set DTMF Receiver coefficients.

Note: If enabled, the DTMF receiver will be temporarily disabled during the writing of the coefficients.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_DTMF_RX_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_DTMF_RX_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_TAPI_DTMF_RX_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_TAPI_DTMF_RX_CFG_t DtmfCoef;
DtmfCoef.nLevel    = -56;      // dB
DtmfCoef.nTwist    = 9;        // dB
DtmfCoef.nGain     = 0;        // dB
ioctl(fd, IFX_TAPI_DTMF_RX_CFG_SET, (int)&DtmfCoef);
\endcode
```

4.1.12.2 IFX_TAPI_SIG_DETECT_DISABLE

Description

Disables the signal detection for Fax or modem signals.

Attention: It is strongly recommended to use the new event reporting interfaces, see [Chapter 4.1.8](#). This interface is going to be discontinued in a next TAPI release.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_SIG_DETECT_DISABLE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_SIG_DETECT_DISABLE	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_SIG_DETECTION_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.12.3 IFX_TAPI_SIG_DETECT_ENABLE

Description

Enables the signal detection for fax/modem signals.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_SIG_DETECT_ENABLE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_SIG_DETECT_ENABLE	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_SIG_DETECTION_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.12.4 IFX_TAPI_TONE_CPTD_START

Description

Start the call progress tone detection based on a previously defined simple tone.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_CPTD_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_CPTD_START	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_TONE_CPTD_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
IFX_TAPI_TONE_CPTD_t param;
IFX_int32_t fd;

memset(&param, 0, sizeof (IFX_TAPI_TONE_CPTD_t));
param.tone = 74;
param.signal = IFX_TAPI_TONE_CPTD_DIRECTION_TX;
ioctl (fd, IFX_TAPI_TONE_CPTD_START, &param);
```

4.1.12.5 IFX_TAPI_TONE_CPTD_STOP

Description

Stops the call progress tone detection.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_CPTD_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_CPTD_STOP	I/O control identifier for this operation.
IFX_int32_t	param	This interface expects no parameter. It should be set to 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.13 Test Services

4.1.13.1 IFX_TAPI_TEST_HOOKGEN

Description

Force generation of on-/off-hook.

Prototype

```
void ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TEST_HOOKGEN,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TEST_HOOKGEN	I/O control identifier for this operation.
IFX_int32_t	param	The parameter defines off hook or on hook generation 0 _D IFX_FALSE Generate on hook 1 _D IFX_TRUE Generate off hook

Remarks

After switching the hook state, the hook event gets to the hook state machine for validation. Depending on the timing of calling this interface also hook flash and pulse dialing can be verified. The example shows the generation of a flash hook with a timing of 100 ms..

Example

```
// generate on hook
ret = ioctl(fd, IFX_TAPI_TEST_HOOKGEN, 0);
// generate off hook for 100 ms
ret = ioctl(fd, IFX_TAPI_TEST_HOOKGEN, 1);
sleep (100);
ret = ioctl(fd, IFX_TAPI_TEST_HOOKGEN, 0);
```

4.1.13.2 IFX_TAPI_TEST_LOOP

Description

Enables a local test loop in the analog part. The digital voice data is transparently looped back to the network without affecting the downstream transmission. The reception of local voice (upstream) is disabled. That means, that voice applied to the local phone is not being processed, but data sent to the phone can still be heard.

Prototype

```
void ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TEST_LOOP,
```

```
IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TEST_LOOP	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_TEST_LOOP_t struct.

Example

```
IFX_TAPI_TEST_LOOP_t parm;  
memset (&param, 0, sizeof (IFX_TAPI_TEST_LOOP_t));  
param.bAnalog = 1;  
ret = ioctl(fd, IFX_TAPI_TEST_LOOP, &param);
```

4.1.14 Tone Control Services

All tone services apply to data channels file descriptors unless otherwise stated.

Table 75 IO-control Overview of Tone Control Service

Name	Description
IFX_TAPI_TONE_LOCAL_PLAY	Plays a tone, the tone has to be predefined in the tone table.
IFX_TAPI_TONE_NET_PLAY	Plays a tone to the network side, the tone has to be predefined in the tone table.
IFX_TAPI_TONE_STATUS_GET	This service gets the tone playing state.
IFX_TAPI_TONE_STOP	Stop playing of an already started tone.
IFX_TAPI_TONE_TABLE_CFG_SET	Define a tone and adds it to the tone table.

Table 76 Constant Overview of Tone Control Service

Name	Description
IFX_TAPI_TONE_SRC_DEFAULT	Tone is played out on default source.
IFX_TAPI_TONE_SRC_DSP	Tone is played out on DSP, default, if available.
IFX_TAPI_TONE_SRC_TG	Tone is played out on local tone generator in the analog part of the device.
IFX_TAPI_TONE_STEPS_MAX	Maximum tone generation steps, also called cadences.

Table 77 Structure Overview of Tone Control Service

Name	Description
IFX_TAPI_TONE_COMPOSED_t	Structure for definition of composed tones.
IFX_TAPI_TONE_SIMPLE_t	Structure for definition of simple tones.

Table 78 Union Overview of Tone Control Service

Name	Description
IFX_TAPI_TONE_t	Tone descriptor.

Table 79 Enumerator Overview of Tone Control Service

Name	Description
IFX_TAPI_TONE_COMPOSED_t	This chapter define the structure of the tone descriptor.
IFX_TAPI_TONE_FREQ_t	Frequency setting for a cadence step.
IFX_TAPI_TONE_FREQ_t	
IFX_TAPI_TONE_GROUP_t	Tone grouping.
IFX_TAPI_TONE_MODULATION_t	Modulation setting for a cadence step.
IFX_TAPI_TONE_SIMPLE_t	
IFX_TAPI_TONE_t	This chapter define a union for the tone descriptor.
IFX_TAPI_TONE_TG_t	Defines the tone generator usage.
IFX_TAPI_TONE_TYPE_t	Tone types.

4.1.14.1 IFX_TAPI_TONE_LOCAL_PLAY

Description

Start/stop generation of a tone towards local port, the parameter (if greater than 0) gives the tone table index of the tone to be played.

If the parameter is equal to zero, stop current tone generation.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_LOCAL_PLAY,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_LOCAL_PLAY	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is the index of the tone to the predefined tone table (range 1 - 31) or custom tones added previously (index 32 - 255). Index 0 means tone stop. Using the upper bits modify the default tone playing source.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

This can be a predefined, simple or a composed tone. The tone codes are assigned previously on system start. Index 1 - 31 is predefined by the driver and covers the original TAPI.

Example

```
IFX_TAPI_LINE_VOLUME_t param;
IFX_int32_t fd;

/* Play tone index 34 */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, 34);
```

4.1.14.2 IFX_TAPI_TONE_NET_PLAY

Description

Start/stop generation of a tone towards network, the parameter (if greater than 0) gives the tone table index of the tone to be played.

If the parameter is equal to zero, stop current tone generation.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_NET_PLAY,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_NET_PLAY	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is the index of the tone to the predefined tone table (range 1 - 31) or custom tones added previously (index 32 - 255). Index 0 means tone stop. Using the upper bits modify the default tone playing source.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

This can be a predefined, simple or a composed tone. The tone codes are assigned previously on system start. Index 1 - 31 is predefined by the driver and covers the original TAPI.

Example

```
/* Play tone index 34 */
ioctl(fd, IFX_TAPI_TONE_NET_PLAY, 34);
```

4.1.14.3 IFX_TAPI_TONE_STATUS_GET

Description

This service gets the tone playing state.

It applies to data channel file descriptors.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_STATUS_GET,
    IFX_int32_t* param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor
IFX_int32_t	IFX_TAPI_TONE_STATUS_GET	I/O control identifier for this operation.
IFX_int32_t*	param	The parameter points to the tone state: <ul style="list-style-type: none"> • 0: no tone is played • 1: tone is played (tone is within on-time) • 2: silence (tone is within off-time)

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

```
int nToneState;
/* get the tone state */
ret = ioctl(fd, IFX_TAPI_TONE_STATUS_GET, &nToneState);
```

4.1.14.4 IFX_TAPI_TONE_STOP**Description**

Stop tone generation.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_STOP	I/O control identifier for this operation.
IFX_int32_t	param	Tone table index of the tone to be stopped or index = 0.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

```
/* Stop playing tone index 34 */
ioctl(fd, IFX_TAPI_TONE_STOP, 34);
```

4.1.14.5 IFX_TAPI_TONE_TABLE_CFG_SET

Description

Configures a tone based on simple or composed tones. The tone is also added to the tone table.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_TONE_TABLE_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors.
IFX_int32_t	IFX_TAPI_TONE_TABLE_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_TONE_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

A simple tone specifies a tone sequence composed of several single frequency tones or dual frequency tones. The sequence can be transmitted only one time, several times or until the transmission is stopped by client. This interface can add a simple tone to the internal table with maximum 222 entries, starting from 32. At least one cadence must be defined otherwise this interface returns an error. The tone table provides all tone frequencies in 5 Hz steps with a 5% tolerance and are defined in RFC 2833. For composed tones the loop count of each simple tone must be different from 0.

Example

```
IFX_TAPI_CH_INIT_t tapi;
IFX_TAPI_TONE_t tone;
IFX_int32_t fd;

/* Open channel file descriptor for channel 0 */
fd = open("/dev/vin11", O_RDWR, 0x644);

memset(&tapi, 0, sizeof(IFX_TAPI_CH_INIT_t));
memset(&tone, 0, sizeof(IFX_TAPI_TONE_t));
ioctl(fd, IFX_TAPI_CH_INIT, (IFX_int32_t) &tapi);
tone.simple.format = IFX_TAPI_TONE_TYPE_SIMPLE;
tone.simple.index = 71;
tone.simple.freqA = 480;
tone.simple.freqB = 620;
tone.simple.levelA = -300;
tone.simple.cadence[0] = 2000;
tone.simple.cadence[1] = 2000;
tone.simple.frequencies[0] = IFX_TAPI_TONE_FREQA | IFX_TAPI_TONE_FREQB;
tone.simple.loop = 2;
tone.simple.pause = 200;
ioctl(fd, IFX_TAPI_TONE_TABLE_CFG_SET, (IFX_int32_t) &tone);
memset(&tone, 0, sizeof(IFX_TAPI_TONE_t));
tone.composed.format = IFX_TAPI_TONE_TYPE_COMPOSED;
tone.composed.index = 100;
tone.composed.count = 2;
tone.composed.tones[0] = 71;
tone.composed.tones[1] = 71;
ioctl(fd, IFX_TAPI_TONE_TABLE_CFG_SET, (IFX_int32_t) &tone);
/* Now start playing the simple tone */
ioctl(fd, IFX_TAPI_TONE_LOCAL_PLAY, (IFX_int32_t) 71);
/* Stop playing tone */
ioctl(fd, IFX_TAPI_TONE_STOP, (IFX_int32_t) 71);

/* Close all open fds */
close(fd);
```

4.1.15 Audio Channel Control

All audio channel services apply to channel file descriptors except otherwise stated.

Table 80 IO-control Overview of Tone Control Service

Name	Description
<code>IIFX_TAPI_AUDIO_AFE_CFG_SET</code>	This service sets the Inputs and Outputs of the Analog Frontent (AFE) for Handset, Headset and Hands-free Mode.
<code>IFX_TAPI_AUDIO_MODE_SET</code>	Selection of audio mode.
<code>IFX_TAPI_AUDIO_MUTE_SET</code>	Mute the audio channel.
<code>IFX_TAPI_AUDIO_ICA_SET</code>	Enable and disable in-call announcement.
<code>IFX_TAPI_AUDIO_RING_START</code>	Start ringing on the audio channel.
<code>IFX_TAPI_AUDIO_RING_STOP</code>	Stop ringing on the audio channel.
<code>IFX_TAPI_AUDIO_RING_VOLUME_SET</code>	Volume for audio channel ringing.
<code>IFX_TAPI_AUDIO_ROOM_TYPE_SET</code>	Choose the room type.
<code>IFX_TAPI_AUDIO_TEST_SET</code>	Audio channel test modes.
<code>IFX_TAPI_AUDIO_VOLUME_SET</code>	Choose the volume level for the audio channel.

Table 81 Structure Overview of Tone Control Service

Name	Description
<code>IFX_TAPI_AUDIO_AFE_CFG_SET_t</code>	AFE Input/Output Selectors for Hands-free, Hand- and Headset.
<code>IFX_TAPI_AUDIO_TEST_MODE_t</code>	Audio channel test mode configuration (for loop and diagnostics).

Table 82 Enumerator Overview of Tone Control Service

Name	Description
<code>IFX_TAPI_AUDIO_AFE_PIN_MIC_t</code>	AFE Microphone Inputs.
<code>IFX_TAPI_AUDIO_AFE_PIN_OUT_t</code>	AFE Outputs.
<code>IFX_TAPI_AUDIO_ICA_t</code>	Selector for Auxiliary Channel based functionalities In Call Announcement / Off Hook Voice Announcement
<code>IFX_TAPI_AUDIO_MODE_t</code>	Audio mode.
<code>IFX_TAPI_AUDIO_ROOM_TYPE_t</code>	Room type.
<code>IFX_TAPI_AUDIO_TEST_MODES_t</code>	Lists the ports for the capability list.

4.1.15.1 IFX_TAPI_AUDIO_AFE_CFG_SET

Description

This service sets the Inputs and Outputs of the Analog Frontent (AFE) for Handset, Headset and Hands-free Mode.

Attention: For a description of the AFE and supported pins please refer to the Hardware User's Manual!

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_AFE_CFG_SET,
```

```
IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_AFE_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is a pointer to the IFX_TAPI_AUDIO_AFE_CFG_SET_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.15.2 IFX_TAPI_AUDIO_MODE_SET

Description

Selection of audio mode.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_MODE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_MODE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is the audio mode to be set.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.15.3 IFX_TAPI_AUDIO_MUTE_SET

Description

Mute the audio channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_MUTE_SET,
    IFX_operation_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_MUTE_SET	I/O control identifier for this operation.
IFX_operation_t	param	The parameter specifies whether to enable or disable mute.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.15.4 IFX_TAPI_AUDIO_ICA_SET

Description

Enable and disable in-call announcement.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_ICA_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_ICA_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter specifies whether to enable or disabling in-call announcement, parameter to be selected from IFX_TAPI_AUDIO_ICA_t .

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

4.1.15.5 IFX_TAPI_AUDIO_RING_START

Description

Start ringing on the audio channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_RING_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
<code>IFX_int32_t</code>	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
<code>IFX_int32_t</code>	IFX_TAPI_AUDIO_RING_START	I/O control identifier for this operation.
<code>IFX_int32_t</code>	param	Tone table index containing the ring cadence.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

4.1.15.6 IFX_TAPI_AUDIO_RING_STOP

Description

Stop ringing on the audio channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_RING_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_RING_STOP	I/O control identifier for this operation.
IFX_int32_t	param	Not required.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.15.7 IFX_TAPI_AUDIO_RING_VOLUME_SET

Description

This service sets volume for ringing on audio channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_RING_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_RING_VOLUME_SET	I/O control identifier for this operation.
IFX_int32_t	param	Ringing volume level (1...8).

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.15.8 IFX_TAPI_AUDIO_ROOM_TYPE_SET

Description

Choose the room type.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_ROOM_TYPE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_ROOM_TYPE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter specifies the room type, to be selected from IFX_TAPI_AUDIO_ROOM_TYPE_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.15.9 IFX_TAPI_AUDIO_TEST_SET

Description

Audio channel test modes.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_ROOM_TYPE_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_ROOM_TYPE_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is a pointer to a IFX_TAPI_AUDIO_TEST_MODE_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.15.10 IFX_TAPI_AUDIO_VOLUME_SET

Description

Choose the volume level for the audio channel.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_AUDIO_VOLUME_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to channel file descriptors containing the audio channel.
IFX_int32_t	IFX_TAPI_AUDIO_VOLUME_SET	I/O control identifier for this operation.
IFX_int32_t	param	Volume level (1..8).

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.16 Polling Services

All polling services apply to device file descriptors except otherwise stated.

Table 83 IO-control Overview of Polling Service

Name	Description
IFX_TAPI_POLL_CFG_SET	Used to perform global TAPI polling configuration.
IFX_TAPI_POLL_DEV_ADD	Used to register a TAPI device for events polling.
IFX_TAPI_POLL_DEV_Rem	Used to unregister a TAPI device for events polling.
IFX_TAPI_POLL_EVENT_UPDATE	Used to read interrupts from all polled devices, the interrupts will be queued inside TAPI.
IFX_TAPI_POLL_PKT_READ	Used for reading packets from TAPI devices registered for packets polling.
IFX_TAPI_POLL_PKT_WRITE	Used for writing packets to TAPI devices registered for packets polling.

Table 84 Structure Overview of Polling Service

Name	Description
IFX_TAPI_POLL_CFG_t	Structure for polling configuration.
IFX_TAPI_POLL_PKT_t	Structure for polling packet handling.
IFX_TAPI_PKT_EV_OOBPLAY_t	Defines the play out of received RFC2833 event packets.
IFX_TAPI_POLL_PKT_TYPE_t	Defines the packet types supported by polling.

Table 85 Enumerator Overview of Polling Service

Name	Description
IFX_TAPI_POLL_PKT_TYPE_t	Defines the packet types supported by polling.

4.1.16.1 IFX_TAPI_POLL_CFG_SET

Description

Used to perform global TAPI polling configuration.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_POLL_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_POLL_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to IFX_TAPI_POLL_CFG_t structure.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Remarks

No need to provide buffer information for Linux®. The buffer is already residing in kernel and this ioctl will just register this buffer for usage by the polling TAPI implementation.

Example

```
/* ..... */
IFX_TAPI_POLL_CFG_t pollCfg;
memset(&pollCfg, 0, sizeof(IFX_TAPI_POLL_CFG_t));
/* .....
```



```
ioctl(fd, IFX_TAPI_POLL_CFG_SET, &pollCfg);
```

4.1.16.2 IFX_TAPI_POLL_DEV_ADD

Description

Used to register a TAPI device for polling.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_POLL_DEV_ADD,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_POLL_DEV_ADD	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is not required.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.16.3 IFX_TAPI_POLL_DEV_Rem

Description

Used to unregister a TAPI device for polling.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_POLL_EVENT_Rem,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_POLL_EVENT_Rem	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is not required.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.16.4 IFX_TAPI_POLL_EVENT_UPDATE

Description

Used to read interrupts from all polled devices, the interrupts will be queued inside TAPI.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_POLL_EVENT_UPDATE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_POLL_EVENT_UPDATE	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is not required.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.16.5 IFX_TAPI_POLL_PKT_READ

Description

Used for reading packets to TAPI devices registered for packets polling.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_POLL_PKT_READ,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_POLL_PKT_READ	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to IFX_TAPI_POLL_PKT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.16.6 IFX_TAPI_POLL_PKT_WRITE

Description

Used for writing packets to TAPI devices registered for packets polling.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_POLL_PKT_WRITE,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to device file descriptors.
IFX_int32_t	IFX_TAPI_POLL_PKT_WRITE	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to IFX_TAPI_POLL_PKT_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.1.17 FXO Services

All FXO services apply to channel file descriptors except otherwise stated.

Table 86 IO-control Overview of FXO Service

Name	Description
IFX_TAPI_FXO_APOH_GET	Receives the APOH status from the fxo interface
IFX_TAPI_FXO_DIAL_CFG_SET	Configuration for fxo dialing
IFX_TAPI_FXO_DIAL_START	Dials digits on fxo interface
IFX_TAPI_FXO_DIAL_STOP	Stops dialing digits on fxo interface
IFX_TAPI_FXO_FLASH_CFG_SET	Configuration of the fxo hook
IFX_TAPI_FXO_FLASH_SET	Issues flash-hook in the fxo interface
IFX_TAPI_FXO_HOOK_SET	Issues on-/off-hook in the fxo interface
IFX_TAPI_FXO_OSI_CFG_SET	Configuration of OSI timing
IFX_TAPI_FXO_BATTERY_GET	Receives battery status from the fxo interface
IFX_TAPI_FXO_POLARITY_GET	Receives polarity status from the fxo interface
IFX_TAPI_FXO_RING_GET	Receives ring status from the fxo interface

Table 87 Structure Overview of FXO Service

Name	Description
IFX_TAPI_FXO_DIAL_t	Structure including the digits to be dialed
IFX_TAPI_FXO_DIAL_CFG_t	Structure for FXO dialing configuration
IFX_TAPI_FXO_FLASH_CFG_t	Hook configuration for FXO
IFX_TAPI_FXO_OSI_CFG_t	OSI configuration for FXO

Table 88 Enumerator Overview of FXO Service

Name	Description
IFX_TAPI_FXO_HOOK_t	Enumeration for FXO hook.

4.1.17.1 IFX_TAPI_FXO_APOH_GET

Description

Get APOH (another phone off-hook) status of the fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_APOH_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_APOH_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_boolean_t , indicating APOH status. <ul style="list-style-type: none"> • IFX_TRUE if APOH condition is verified. • IFX_FALSE otherwise.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.17.2 IFX_TAPI_FXO_DIAL_CFG_SET

Description

Configuration for fxo dialing.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_DIAL_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_DIAL_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_FXO_DIAL_CFG_t structure

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.1.17.3 IFX_TAPI_FXO_DIAL_START

Description

Dials digits on fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_DIAL_START,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_DIAL_START	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_RING_CADENCE_t structure

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.4 IFX_TAPI_FXO_DIAL_STOP

Description

Stop dialing digits on fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_DIAL_STOP,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_DIAL_STOP	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is not required.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.5 IFX_TAPI_FXO_FLASH_CFG_SET

Description

Configuration of the fxo hook.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_FLASH_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_FLASH_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_FXO_FLASH_CFG_t structure

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.6 IFX_TAPI_FXO_FLASH_SET

Description

Issues flash-hook in the fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_FLASH_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_FLASH_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter is not required.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.7 IFX_TAPI_FXO_HOOK_SET

Description

Issues on-/off-hook in the fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_HOOK_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_HOOK_SET	I/O control identifier for this operation.
IFX_int32_t	param	Select hook on-/off-hook from IFX_TAPI_FXO_HOOK_t .

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.8 IFX_TAPI_FXO_OSI_CFG_SET

Description

Configuration of OSI timing.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_OSI_CFG_SET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_OSI_CFG_SET	I/O control identifier for this operation.
IFX_int32_t	param	The parameter points to a IFX_TAPI_FXO_OSI_CFG_t structure

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.9 IFX_TAPI_FXO_BATTERY_GET

Description

Receives battery status from the fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_RING_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_RING_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_boolean_t, indicating the battery status <ul style="list-style-type: none">• IFX_TRUE if the FXO port is disconnected from the PSTN (battery absent).• IFX_FALSE if the FXO port is connected from the PSTN (battery present).

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

Example

4.1.17.10 IFX_TAPI_FXO_POLARITY_GET

Description

Receives polarity status from the fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_RING_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_RING_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_boolean_t , indicating the polarity status of the FXO line. <ul style="list-style-type: none"> • IFX_TRUE for normal polarity. • IFX_FALSE for reversed polarity.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

Example

4.1.17.11 IFX_TAPI_FXO_RING_GET

Description

Receives ring status from the fxo interface.

Prototype

```
IFX_int32_t ioctl (
    IFX_int32_t fd,
    IFX_TAPI_FXO_RING_GET,
    IFX_int32_t param );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd	File descriptor. It is applicable to data channel file descriptors.
IFX_int32_t	IFX_TAPI_FXO_RING_GET	I/O control identifier for this operation.
IFX_int32_t	param	Pointer to a IFX_boolean_t , indicating the ringing status of the FXO line. <ul style="list-style-type: none"> • IFX_TRUE the line is ringing. • IFX_FALSE the line is not ringing.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none">• <code>IFX_SUCCESS</code> 0• <code>IFX_ERROR</code> -1

Example

4.2 Function Reference

Table 89 TAPI Interface Overview

Name	Description
TAPI_Poll_Down	Polling function for downstream packets.
TAPI_Poll_Events	Polling function to fetch the events occurred in all devices.
TAPI_Poll_Up	Polling function for upstream packets.
IFX_TAPI_KPI_WaitForData	Sleep until data is available for reading with IFX_TAPI_KPI_ReadData().
IFX_TAPI_KPI_ReadData	Read packet from TAPI KPI.
IFX_TAPI_KPI_WriteData	Write packet to TAPI KPI.
bufferPoolInit	Initialize bufferpool.
bufferPoolGet	Request a buffer from the bufferpool.
bufferPoolPut	Return a buffer to the bufferpool.

4.2.1 TAPI_Poll_Down

Description

Polling downstream interface functions.

Prototype

```
IFX_void_t TAPI_Poll_Down (
    IFX_void_t ** ppPktsDown,
    IFX_int32_t * pPktsDownNum );
```

Parameters

Data Type	Name	Description
IFX_void_t **	ppPktsDown	Pointer to the first element in an array of packet pointers.
IFX_int32_t *	pPktsDownNum	On entry contains the number of packets to be written. On return contains the number of buffers actually written.

Return Values

Data Type	Description
IFX_void_t	No return values

4.2.2 TAPI_Poll_Events

Description

Polling function to fetch the events occurred in all devices.

Prototype

```
IFX_void_t TAPI_Poll_Events (
    IFX_void_t );
```

Parameters

Data Type	Name	Description
IFX_void_t		Parameter not required.

Return Values

Data Type	Description
IFX_void_t	No return values.

4.2.3 TAPI_Poll_Up

Description

Polling upstream interface functions.

Prototype

```
IFX_void_t TAPI_Poll_Up (
    IFX_void_t ** ppPktsUp,
    IFX_int32_t * pPktsUpNum );
```

Parameters

Data Type	Name	Description
IFX_void_t **	ppPktsUp	Pointer to the first element in an array of packet pointers.
IFX_int32_t *	pPktsUpNum	On entry contains the number of available buffers in ppPkts. On return contains the number of buffers actually read.

Return Values

Data Type	Description
IFX_void_t	No return values.

4.2.4 IFX_TAPI_KPI_WaitForData

Description

Sleep until data is available for reading with IFX_TAPI_KPI_ReadData().

Prototype

```
IFX_int32_t IFX_TAPI_KPI_WaitForData (
    IFX_TAPI_KPI_CH_t nKpiGroup );
```

Parameters

Data Type	Name	Description
IFX_TAPI_KPI_CH_t	nKpiGroup	Sleep until data is available for reading with IFX_TAPI_KPI_ReadData() .

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none"> • <code>IFX_SUCCESS</code> 0 • <code>IFX_ERROR</code> -1, returned if an invalid group is used.

4.2.5 IFX_TAPI_KPI_ReadData

Description

Read packet from TAPI KPI.

Attention: *The KPI client is responsible for the deallocation of the packet buffer using bufferPoolPut!*

Prototype

```
IFX_int32_t IFX_TAPI_KPI_ReadData (
    IFX_TAPI_KPI_CH_t nKpiGroup,
    IFX_TAPI_KPI_CH_t *nKpiChannel,
    IFX_void_t **pPacket,
    IFX_uint32_t *nPacketLength,
    IFX_uint8_t *nMore );
```

Parameters

Data Type	Name	Description
<code>IFX_TAPI_KPI_CH_t</code>	<code>nKpiGroup</code>	KPI group where to read the packet from.
<code>IFX_TAPI_KPI_CH_t</code>	<code>*nKpiChannel</code>	KPI channel for the read packet.
<code>IFX_void_t</code>	<code>**pPacket</code>	Pointer to the read packet.
<code>IFX_uint32_t</code>	<code>*nPacketLength</code>	Packet length.
<code>IFX_uint8_t</code>	<code>*nMore</code>	More packets are available for read from the same KPI group.

Return Values

Data Type	Description
<code>IFX_int32_t</code>	The return value can be either of the following: <ul style="list-style-type: none"> • The number of read bytes. • <code>IFX_ERROR</code> in case of error.

4.2.6 IFX_TAPI_KPI_WriteData

Description

Write packet from KPI client to TAPI KPI.

Attention: *The KPI client is responsible for the allocation of the packet buffer using bufferPoolGet!*

Prototype

```
IFX_int32_t IFX_TAPI_KPI_WriteData (
```

```
IFX_TAPI_KPI_CH_t nKpiChannel,  
IFX_void_t *pPacket,  
IFX_uint32_t nPacketLength );
```

Parameters

Data Type	Name	Description
IFX_TAPI_KPI_CH_t	nKpiChannel	KPI channel for the packet.
IFX_void_t	*pPacket	Pointer to the packet.
IFX_uint32_t	nPacketLength	Packet Length.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• The number of written bytes.• IFX_ERROR in case of error.

4.2.7 bufferPoolInit

Description

Initialize bufferpool.

Prototype

```
BUFFERPOOL* bufferPoolInit (  
    const unsigned int bufferSize,  
    const unsigned int initialElements,  
    const unsigned int extensionStep );
```

Parameters

Data Type	Name	Description
const unsigned int	bufferSize	Size of one buffer in bytes.
const unsigned int	initialElements	Number of empty buffers created at initialisation.
const unsigned int	extensionStep	Number of empty buffers to be added when the last buffer is taken out of the bufferpool.

Return Values

Data Type	Description
BUFFERPOOL*	Handle (pointer) to a bufferpool or a NULL pointer if the initialisation failed.

4.2.8 bufferPoolGet

Description

Request a buffer from the bufferpool.

Prototype

```
void* bufferPoolGet (
    void *pBufferpool );
```

Parameters

Data Type	Name	Description
void	*pBufferpool	Handle (pointer) to the bufferpool.

Return Values

Data Type	Description
void*	The return value is a void pointer to the provided buffer or a NULL pointer if no more buffers are available in the bufferpool.

4.2.9 bufferPoolPut

Description

Return a buffer to the bufferpool.

Prototype

```
int* bufferPoolPut (
    void *pBuf );
```

Parameters

Data Type	Name	Description
void	*pBuf	A pointer to the buffer to be returned.

Return Values

Data Type	Description
int*	BUFFERPOOL_SUCCESS or BUFFERPOOL_ERROR.

4.3 Type Definition Reference

This chapter contains the basic type definitions, reference of data types and structures of all modules.

4.3.1 Basic Type Definitions

This section describes the following basic type definitions:

- `IFX_return_t`
- `IFX_boolean_t`
- `IFX_uint8_t`
- `IFX_int8_t`
- `IFX_uint32_t`
- `IFX_int32_t`
- `IFX_uint16_t`
- `IFX_int16_t`
- `IFX_char_t`
- `IFX_void_t`
- `IFX_float_t`
- `IFX_operation_t`

4.3.1.1 IFX_return_t

Description

All the APIs return a Success or a Failure based on their execution Status. The return code is set to `IFX_ERROR` only if an error occurs, otherwise its value is `IFX_SUCCESS`.

Prototype

```
typedef enum
{
    IFX_ERROR = -1,
    IFX_SUCCESS = 0
} IFX_return_t;
```

Parameters

Name	Value	Description
<code>IFX_ERROR</code>	-1_D	Operation failed.
<code>IFX_SUCCESS</code>	0_D	Operation was successful.

4.3.1.2 IFX_boolean_t

Description

Definition of true and false.

Prototype

```
typedef enum
{
    IFX_FALSE = 0,
    IFX_TRUE = 1
} IFX_boolean_t;
```

Parameters

Name	Value	Description
IFX_FALSE	0 _D	False.
IFX_TRUE	1 _D	True.

4.3.1.3 IFX_uint8_t**Prototype**

```
typedef unsigned char IFX_uint8_t;
```

Parameters

Data Type	Name	Description
unsigned char	IFX_uint8_t	This is the unsigned char 8-bit datatype.

4.3.1.4 IFX_int8_t**Prototype**

```
typedef char IFX_int8_t;
```

Parameters

Data Type	Name	Description
char	IFX_int8_t	This is the char 8-bit datatype.

4.3.1.5 IFX_uint32_t**Prototype**

```
typedef unsigned int IFX_uint32_t;
```

Parameters

Data Type	Name	Description
unsigned int	IFX_uint32_t	This is the unsigned int 32-bit datatype.

4.3.1.6 IFX_int32_t**Prototype**

```
typedef int IFX_int32_t;
```

Parameters

Data Type	Name	Description
int	IFX_int32_t	This is the int 32-bit datatype.

4.3.1.7 IFX_uint16_t

Prototype

```
typedef unsigned short IFX_uint16_t;
```

Parameters

Data Type	Name	Description
unsigned short	IFX_uint16_t	This is the unsigned short int 16-bit datatype.

4.3.1.8 IFX_int16_t

Prototype

```
typedef short IFX_int16_t;
```

Parameters

Data Type	Name	Description
short	IFX_int16_t	This is the short int 16-bit datatype.

4.3.1.9 IFX_char_t

Prototype

```
typedef char IFX_char_t;
```

Parameters

Data Type	Name	Description
char	IFX_char_t	This is the char 8-bit datatype.

4.3.1.10 IFX_void_t

Prototype

```
typedef void IFX_void_t;
```

Parameters

Data Type	Name	Description
void	IFX_void_t	This is a void datatype.

4.3.1.11 IFX_float_t

Prototype

```
typedef float IFX_float_t;
```

Parameters

Data Type	Name	Description
float	IFX_float_t	This is a float datatype.

4.3.1.12 IFX_operation_t

Description

Definition of enable and disable operation.

Prototype

```
typedef enum
{
    IFX_DISABLE = 0,
    IFX_ENABLE = 1
} IFX_operation_t;
```

Parameters

Name	Value	Description
IFX_DISABLE	0 _D	Disable.
IFX_ENABLE	1 _D	Enable.

4.3.1.13 IFX_TAPI_KPI_CH_t

Prototype

```
typedef IFX_uint16_t IFX_TAPI_KPI_CH_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	IFX_TAPI_KPI_CH_t	Used for the KPI channel numbers. The KPI channel consists of the KPI group in the 4 MSB bits and the channel within this group in the LSB bits of this type. So channel 5 in group 2 is built as (IFX_TAPI_KPI_GROUP2 0x0005).

4.3.2 IO-control Reference

This chapter contains the IO-control reference.

Table 90 IO-control Overview of TAPI Interfaces

Name	Description
IFX_TAPI_AUDIO_ICA_SET	Enable and disable in-call announcement.
IFX_TAPI_AUDIO_MODE_SET	Selection of audio mode.
IFX_TAPI_AUDIO_MUTE_SET	Mute the audio channel.
IFX_TAPI_AUDIO_RING_START	Start ringing on the audio channel.
IFX_TAPI_AUDIO_RING_STOP	Stop ringing on the audio channel.
IFX_TAPI_AUDIO_RING_VOLUME_SET	Volume for audio channel ringing.
IFX_TAPI_AUDIO_ROOM_TYPE_SET	Choose the room type.
IFX_TAPI_AUDIO_VOLUME_SET	Choose the volume level for the audio channel.
IFX_TAPI_CAP_CHECK	This service checks if a specific capability is supported.
IFX_TAPI_CAP_LIST	This service returns the capability lists.
IFX_TAPI_CAP_NR	This service returns the number of capabilities.
IFX_TAPI_CH_INIT	This service sets the default initialization of device and hardware.
IFX_TAPI_CID_CFG_SET	Configures the CID transmitter.
IFX_TAPI_CID_RX_DATA_GET	Reads CID Data collected since Caller ID receiver was started.
IFX_TAPI_CID_RX_START	Setup the CID receiver to start receiving CID Data.
IFX_TAPI_CID_RX_STATUS_GET	Retrieves the current status information of the CID receiver.
IFX_TAPI_CID_RX_STOP	Stop the CID receiver.
IFX_TAPI_CID_TX_INFO_START	This interfaces transmits CID message.
IFX_TAPI_COD_DEC_HP_SET	Switches on/off the HP filter of the decoder path in the COD module.
IFX_TAPI_COD_VOLUME_SET	Volume settings for the COD module.
IFX_TAPI_DEBUG_REPORT_SET	Set the report levels if the driver is compiled with ENABLE_TRACE.
IFX_TAPI_DEC_START	Starts the playout of data.
IFX_TAPI_DEC_STOP	Stops the playout of data.
IFX_TAPI_DEC_VOLUME_SET	Sets the playout volume.
IFX_TAPI_DTMF_RX_CFG_SET	This service is used to set DTMF receiver coefficients.
IFX_TAPI_ENC_AGC_CFG_GET	Set the AGC coefficient for a coder module This implementation assumes that an index of a AGC resource is fix assigned to the related index of the coder module.
IFX_TAPI_ENC_AGC_ENABLE	Enable/Disable the AGC resource This implementation assumes that the AGC resources inside a VINETIC are fixed assigned to the related Coder-Module.
IFX_TAPI_ENC_FRAME_LEN_GET	This service gets the frame length for the audio packets.
IFX_TAPI_ENC_FRAME_LEN_SET	This service sets the frame length for the audio packets.
IFX_TAPI_ENC_HOLD	This service is used to control the encoder hold functionality.
IFX_TAPI_ENC_LEVEL_SET	This service returns the level of the most recently recorded signal.

Table 90 IO-control Overview of TAPI Interfaces (cont'd)

Name	Description
<code>IFX_TAPI_ENC_ROOM_NOISE_DETECT_START</code>	This service configures and starts room noise detection.
<code>IFX_TAPI_ENC_ROOM_NOISE_DETECT_STOP</code>	This service stops room noise detection.
<code>IFX_TAPI_ENC_START</code>	Start recording on the data channel.
<code>IFX_TAPI_ENC_STOP</code>	Stop recording (generating packets) on this channel.
<code>IFX_TAPI_ENC_TYPE_SET</code>	Select a codec for the data channel.
<code>IFX_TAPI_ENC_VAD_CFG_SET</code>	Configures the voice activity detection and silence handling Voice Activity Detection (VAD) is a feature that allows the codec to determine when to send voice data or silence data.
<code>IFX_TAPI_ENC_VOLUME_SET</code>	Sets the recording volume.
<code>IFX_TAPI_EVENT_DISABLE</code>	Disable event detection.
<code>IFX_TAPI_EVENT_ENABLE</code>	Enable event detection.
<code>IFX_TAPI_EVENT_EXT_DTMF</code>	Report DTMF event from application software.
<code>IFX_TAPI_EVENT_EXT_DTMF_CFG</code>	Configure reporting of DTMF event from application software.
<code>IFX_TAPI_EVENT_GET</code>	Get event.
<code>IFX_TAPI_FXO_APOH_GET</code>	Receives the APOH status from the fxo interface
<code>IFX_TAPI_FXO_BATTERY_GET</code>	Receives battery status from the fxo interface
<code>IFX_TAPI_FXO_DIAL_CFG_SET</code>	Configuration for fxo dialing
<code>IFX_TAPI_FXO_DIAL_START</code>	Dials digits on fxo interface
<code>IFX_TAPI_FXO_DIAL_STOP</code>	Stops dialing digits on fxo interface
<code>IFX_TAPI_FXO_FLASH_CFG_SET</code>	Configuration of the fxo hook
<code>IFX_TAPI_FXO_FLASH_SET</code>	Issues flash-hook in the fxo interface
<code>IFX_TAPI_FXO_HOOK_SET</code>	Issues on-/off-hook in the fxo interface
<code>IFX_TAPI_FXO_OSI_CFG_SET</code>	Configuration of OSI timing
<code>IFX_TAPI_FXO_POLARITY_GET</code>	Receives polarity status from the fxo interface
<code>IFX_TAPI_FXO_RING_GET</code>	Receives ring status from the fxo interface
<code>IFX_TAPI_JB_CFG_SET</code>	Configures the jitter buffer.
<code>IFX_TAPI_JB_STATISTICS_GET</code>	Reads out jitter buffer statistics.
<code>IFX_TAPI_JB_STATISTICS_RESET</code>	Resets the jitter buffer statistics.
<code>IFX_TAPI_LEC_PCM_CFG_GET</code>	Get the LEC configuration for PCM.
<code>IFX_TAPI_LEC_PCM_CFG_SET</code>	Set the line echo canceller (LEC) configuration for PCM.
<code>IFX_TAPI_LEC_PHONE_CFG_GET</code>	Get the LEC configuration.
<code>IFX_TAPI_LEC_PHONE_CFG_SET</code>	Set the line echo canceller (LEC) configuration.
<code>IFX_TAPI_LINE_FEED_SET</code>	This service sets the line feeding mode.
<code>IFX_TAPI_LINE_HOOK_STATUS_GET</code>	This service reads the hook status from the driver.
<code>IFX_TAPI_LINE_HOOK_VT_SET</code>	Specifies the time for hook, pulse digit and hook flash validation.
<code>IFX_TAPI_LINE_LEVEL_SET</code>	This service enables or disables a high level path of a phone channel.
<code>IFX_TAPI_LINE_TYPE_SET</code>	This service configures the line type.

Table 90 IO-control Overview of TAPI Interfaces (cont'd)

Name	Description
IFX_TAPI_MAP_DATA_ADD	This interface adds the data channel to an analog phone device.
IFX_TAPI_MAP_DATA_REMOVE	This interface removes a data channel from an analog phone device.
IFX_TAPI_MAP_PCM_ADD	This interface adds the PCM channel to an analog phone device.
IFX_TAPI_MAP_PCM_REMOVE	This interface removes the PCM channel to an analog phone device.
IFX_TAPI_MAP_PHONE_ADD	This interface adds the phone channel to another analog phone channel.
IFX_TAPI_MAP_PHONE_REMOVE	This interface removes a phone channel from an analog phone device.
IFX_TAPI_METER_CFG_SET	This service sets the characteristic for the metering service.
IFX_TAPI_METER_START	This service starts the metering.
IFX_TAPI_METER_STOP	This service stops the metering.
IFX_TAPI_PCM_ACTIVATION_GET	This service gets the activation status of the PCM time slots configured for this channel.
IFX_TAPI_PCM_ACTIVATION_SET	This service activate/deactivates the PCM time slots configured for this channel.
IFX_TAPI_PCM_CFG_GET	This service gets the configuration of the PCM interface.
IFX_TAPI_PCM_CFG_SET	This service sets the configuration of the PCM interface.
IFX_TAPI_PCM_DEC_HP_SET	This service switches on/off the HP filter of the decoder path in PCM module.
IFX_TAPI_PCM_VOLUME_SET	Sets the PCM interface volume settings.
IFX_TAPI_PHONE_ES_SET	Usage of the echo suppressor. <i>Note: Not supported yet, preliminary interface description.</i>
IFX_TAPI_PHONE_VOLUME_SET	Sets the speaker phone and microphone volume settings.
IFX_TAPI_PKT_AAL_CFG_SET	This interface configures AAL fields for a new connection.
IFX_TAPI_PKT_AAL_PROFILE_SET	AAL profile configuration.
IFX_TAPI_PKT_EV_OOB_SET	This service controls the DTMF sending mode.
IFX_TAPI_PKT_EV_GENERATE	This service is used to generate RFC2833 event from the application software.
IFX_TAPI_PKT_EV_GENERATE_CFG	This service is used to configure the generation of RFC2833 events from the application software.
IFX_TAPI_PKT_RTCP_STATISTICS_GET	Retrieves RTCP statistics.
IFX_TAPI_PKT_RTCP_STATISTICS_RESET	Resets the RTCP statistics.
IFX_TAPI_PKT_RTP_CFG_SET	This interface configures RTP and RTCP fields for a new connection.
IFX_TAPI_PKT_RTP_PT_CFG_SET	Change the payload type table.
IFX_TAPI_POLL_CFG_SET	Used to perform global TAPI polling configuration.
IFX_TAPI_POLL_DEV_ADD	Used to register a TAPI device for events polling.
IFX_TAPI_POLL_DEV_Rem	Used to unregister a TAPI device for events polling.

Table 90 IO-control Overview of TAPI Interfaces (cont'd)

Name	Description
IFX_TAPI_POLL_EVENT_UPDATE	Used to read interrupts from all polled devices, the interrupts will be queued inside TAPI.
IFX_TAPI_POLL_PKT_READ	Used for reading packets from TAPI devices registered for packets polling.
IFX_TAPI_POLL_PKT_WRITE	Used for writing packets to TAPI devices registered for packets polling.
IFX_TAPI_PULSE_ASCII_GET	This service reads the ASCII character representing the pulse digit out of the receive buffer.
IFX_TAPI_PULSE_GET	This service reads the dial pulse digit out of the receive buffer.
IFX_TAPI_PULSE_READY	This service checks if a pulse digit was received.
IFX_TAPI_RING_CADENCE_HR_SET	This service sets the high resolution ring cadence for the non-blocking ringing services.
IFX_TAPI_RING_CADENCE_SET	This service sets the ring cadence for the non-blocking ringing services.
IFX_TAPI_RING_CFG_GET	This service gets the ring configuration for the non-blocking ringing services.
IFX_TAPI_RING_CFG_SET	This service sets the ring configuration for the non-blocking ringing services.
IFX_TAPI_RING_START	This service starts the non-blocking ringing on the phone line using the preconfigured ring cadence.
IFX_TAPI_RING_STOP	This service stops non-blocking ringing on the phone line which was started before with the IFX_TAPI_RING_START service.
IFX_TAPI_SIG_DETECT_DISABLE	Disables the signal detection for Fax or modem signals.
IFX_TAPI_SIG_DETECT_ENABLE	Enables the signal detection for Fax or modem signals.
IFX_TAPI_T38_DEMOD_START	This service configures and enables the demodulator for a T.38 fax session.
IFX_TAPI_T38_MOD_START	This service configures and enables the modulator for a T.38 fax session.
IFX_TAPI_T38_STATUS_GET	This service provides the T.38 fax status on query.
IFX_TAPI_T38_STOP	This service disables the T.38 fax data pump and activates the voice path again.
IFX_TAPI_TONE_CPTD_START	Start the call progress tone detection based on a previously defined simple tone.
IFX_TAPI_TONE_CPTD_STOP	Stops the call progress tone detection.
IFX_TAPI_TONE_DTMF_ASCII_GET	This service reads the ASCII character representing the DTMF digit out of the receive buffer.
IFX_TAPI_TONE_DTMF_GET	This service reads the DTMF digit out of the internal receive buffer.
IFX_TAPI_TONE_DTMF_READY_GET	This service checks if a DTMF digit was received.
IFX_TAPI_TONE_LOCAL_PLAY	Plays a tone, which is defined before.
IFX_TAPI_TONE_NET_PLAY	Plays a tone to the network side, which is defined before.
IFX_TAPI_TONE_STATUS_GET	This service gets the tone playing state.

Table 90 IO-control Overview of TAPI Interfaces (cont'd)

Name	Description
IFX_TAPI_TONE_STOP	Stops playback of the current tone (call progress tone), or cadence.
IFX_TAPI_TONE_TABLE_CFG_SET	Configures a tone based on simple or composed tones.
IFX_TAPI_VERSION_CHECK	Check the supported TAPI interface version.
IFX_TAPI_VERSION_GET	Retrieves the TAPI version string.
IFX_TAPI_WLEC_PCM_CFG_GET	Get the LEC configuration for PCM.
IFX_TAPI_WLEC_PCM_CFG_SET	Set the line echo canceller (LEC) configuration for PCM.
IFX_TAPI_WLEC_PHONE_CFG_GET	Set the line echo canceller (LEC) configuration.
IFX_TAPI_WLEC_PHONE_CFG_SET	Get the LEC configuration.

4.3.3 Constant Reference

This chapter contains the constant reference.

Table 91 Constant Reference for TAPI Interfaces

Name and Description	Value
IFX_TAPI_CID_MSG_LEN_MAX Max number of octets for a CID message element.	50 _D
IFX_TAPI_CID_RX_FIFO_SIZE CID RX FIFO Size	10 _D
IFX_TAPI_CID_SIZE_MAX Max length for a CID message.	128 _D
IFX_TAPI_KPI_GROUP1 Definition of KPI group 1.	1000 _H
IFX_TAPI_KPI_GROUP2 Definition of KPI group 2.	2000 _H
IFX_TAPI_KPI_GROUP3 Definition of KPI group 3.	3000 _H
IFX_TAPI_KPI_GROUP4 Definition of KPI group 4.	4000 _H
IFX_TAPI_DTMF_FIFO_SIZE FIFO size for the detected DTMF digits	40 _D
IFX_TAPI_EVENT_ALL_CHANNELS Used to report events from any channel in the device. This constant is also used to report events that can not be associated to a particular channel.	FFFF _H
IFX_TAPI_FXO_DIAL_DIGITS Maximum number of digits to be dialed on FXO interface.	30 _D
IFX_TAPI_LEC_LEN_MAX Maximum length of LEC tail	16 _D
IFX_TAPI_LEC_LEN_MIN Minimum length of LEC tail	4 _D
IFX_TAPI_LINE_VOLUME_HIGH High volume gain, +24 dB	24 _D
IFX_TAPI_LINE_VOLUME_LOW Low volume gain, -24 dB	-24 _D

Table 91 Constant Reference for TAPI Interfaces (cont'd)

Name and Description	Value
IFX_TAPI_LINE_VOLUME_MEDIUM Medium line volume gain, 0 dB	0_D
IFX_TAPI_LINE_VOLUME_OFF Line volume mute	FF_H
IFX_TAPI_PULSE_FIFO_SIZE FIFO size for the detected pulse digits	20_D
IFX_TAPI_RING_CADENCE_MAX Max number of ring cadences.	40_D
IFX_TAPI_TONE_INDEX_MAX Maximum index value for user defined tones	255_D
IFX_TAPI_TONE_INDEX_MIN Minimum index value for user defined tones	32_D
IFX_TAPI_TONE_SIMPLE_MAX Max number of simple tones part of a composed tone.	7_D
IFX_TAPI_TONE_SRC_DEFAULT Tone is played out on default source.	0_D
IFX_TAPI_TONE_SRC_DSP Tone is played out on DSP, default, if available.	4000_H
IFX_TAPI_TONE_SRC_TG Tone is played out on local tone generator in the analog part of the device.	8000_H
IFX_TAPI_TONE_STEPS_MAX Maximum tone generation steps, also called cadences.	6_D

4.3.4 Union Reference

This chapter contains the Union reference.

Table 92 Union Overview of TAPI Interfaces

Name	Description
IFX_TAPI_CID_MSG_ELEMENT_t	CID Message Element
IFX_TAPI_CID_STD_TYPE_t	CID Message Element
IFX_TAPI_EVENT_DATA_t	Union for the possible events to be reported.
IFX_TAPI_TONE_t	Tone descriptor.

4.3.4.1 IFX_TAPI_CID_MSG_ELEMENT_t

Description

Union of element types

Prototype

```
typedef union
{
    IFX_TAPI_CID_MSG_DATE_t date;
    IFX_TAPI_CID_MSG_STRING_t string;
    IFX_TAPI_CID_MSG_VALUE_t value;
```

```
    IFX_TAPI_CID_MSG_TRANSPARENT_t transparent;
} IFX_TAPI_CID_MSG_ELEMENT_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_MSG_DATE_t	date	Message element including date and time information.
IFX_TAPI_CID_MSG_STRING_t	string	Message element formatted as string.
IFX_TAPI_CID_MSG_VALUE_t	value	Message element formatted as value.
IFX_TAPI_CID_MSG_TRANSPARENT_t	transparent	Message element to be sent with transparent transmission.

4.3.4.2 IFX_TAPI_CID_STD_TYPE_t

Description

Union of the CID configuration structures for different standards.

Prototype

```
typedef union
{
    IFX_TAPI_CID_STD_TELCORDIA_t telcordia;
    IFX_TAPI_CID_STD_ETSI_FSK_t etsiFSK;
    IFX_TAPI_CID_STD_ETSI_DTMF_t etsiDTMF;
    IFX_TAPI_CID_STD_SIN_t sin;
    IFX_TAPI_CID_STD_NTT_t ntt;
} IFX_TAPI_CID_STD_TYPE_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_STD_TELCORDIA_t	telcordia	Structure defining configuration parameters for Telcordia standard.
IFX_TAPI_CID_STD_ETSI_FSK_t	etsiFSK	Structure defining configuration parameters for ETSI standard, with FSK transmission.
IFX_TAPI_CID_STD_ETSI_DTMF_t	etsiDTMF	Structure defining configuration parameters for ETSI standard, with DTMF transmission.
IFX_TAPI_CID_STD_SIN_t	sin	Structure defining configuration parameters for BT SIN standard.
IFX_TAPI_CID_STD_NTT_t	ntt	Structure defining configuration parameters for NTT standard.

4.3.4.3 IFX_TAPI_EVENT_DATA_t

Description

Union for the possible events to be reported.

Prototype

```
typedef union
{
    IFX_TAPI_EVENT_DATA_PULSE_t pulse;
    IFX_TAPI_EVENT_DATA_DTMF_t dtmf;
    IFX_TAPI_EVENT_DATA_TONE_GEN_t tone_gen;
    IFX_TAPI_EVENT_DATA_FAX_SIG_t fax_sig;
    IFX_TAPI_EVENT_DATA_RFC2833_t rfc2833;
    IFX_TAPI_EVENT_DATA_DEC_CHG_t dec_chg;
    IFX_TAPI_EVENT_DATA_CERR_t cerr;
    IFX_uint16_t value;
    IFX_TAPI_EVENT_DATA_EXT_KEYPAD_t keyinfo;
} IFX_TAPI_EVENT_DATA_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_EVENT_DATA_PULSE_t	pulse	Pulse digit information.
IFX_TAPI_EVENT_DATA_DTMF_t	dtmf	DTMF digit information.
IFX_TAPI_EVENT_DATA_TONE_GEN_t	tone_gen	Tone generation index.
IFX_TAPI_EVENT_DATA_FAX_SIG_t	fax_sig	Fax/modem signal information.
IFX_TAPI_EVENT_DATA_RFC2833_t	rfc2833	RFC2833 event information.
IFX_TAPI_EVENT_DATA_DEC_CHG_t	dec_chg	Decoder change event details.
IFX_TAPI_EVENT_DATA_CERR_t	cerr	Command error event details.
IFX_uint16_t	value	Reserved.
IFX_TAPI_EVENT_DATA_EXT_KEYPAD_t	keyinfo	External keypad event information.

4.3.4.4 IFX_TAPI_TONE_t

Description

This chapter defines a union for the tone descriptor.

Prototype

```
typedef union
{
    IFX_TAPI_TONE_SIMPLE_t simple;
    IFX_TAPI_TONE_COMPOSED_t composed;
} IFX_TAPI_TONE_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_TONE_SIMPLE_t	simple	The parameter points to a IFX_TAPI_TONE_SIMPLE_t structure.
IFX_TAPI_TONE_COMPOSED_t	composed	The parameter points to a IFX_TAPI_TONE_COMPOSED_t structure.

4.3.5 Structure Reference

This chapter contains the Structure reference.

Table 93 Structure Overview of TAPI Interfaces

Name	Description
IFX_TAPI_AUDIO_AFE_CFG_SET_t	AFE Input/Output Selectors for Hands-free, Hand- and Headset.
IFX_TAPI_AUDIO_TEST_MODE_t	Audio channel test mode configuration (for loop and diagnostics).
IFX_TAPI_CAP_t	Capability structure.
IFX_TAPI_CH_INIT_t	TAPI initialization structure used for IFX_TAPI_CH_INIT .
IFX_TAPI_CID_ABS_REASON_t	Structure containing CID configuration for ETSI standard using DTMF transmission.
IFX_TAPI_CID_CFG_t	Structure containing CID configuration possibilities.
IFX_TAPI_CID_DTMF_CFG_t	Structure containing the configuration information for DTMF CID.
IFX_TAPI_CID_FSK_CFG_t	Structure containing the configuration information for FSK transmitter and receiver.
IFX_TAPI_CID_MSG_DATE_t	Structure for element types (IFX_TAPI_CID_SERVICE_TYPE_t) with date and time.
IFX_TAPI_CID_MSG_STRING_t	Structure for element types (IFX_TAPI_CID_SERVICE_TYPE_t) with dynamic length (line numbers or names).
IFX_TAPI_CID_MSG_t	Structure containing the CID message type and content.
IFX_TAPI_CID_MSG_TRANSPARENT_t	Structure for element types (IFX_TAPI_CID_SERVICE_TYPE_t) with dynamic length (line numbers or names).
IFX_TAPI_CID_MSG_VALUE_t	Structure for element types (IFX_TAPI_CID_SERVICE_TYPE_t) with one value (length 1).
IFX_TAPI_CID_RX_DATA_t	Structure for Caller ID receiver data
IFX_TAPI_CID_RX_STATUS_t	Structure for Caller ID receiver status.
IFX_TAPI_CID_STD_ETSI_DTMF_t	Structure containing CID configuration for ETSI standard using DTMF transmission.
IFX_TAPI_CID_STD_ETSI_FSK_t	Structure containing CID configuration for ETSI standard using FSK transmission.
IFX_TAPI_CID_STD_NTT_t	Structure containing CID configuration for NTT standard.
IFX_TAPI_CID_STD_SIN_t	Structure containing CID configuration for BT SIN227 standard.
IFX_TAPI_CID_STD_TELCORDIA_t	Structure containing CID configuration for Telcordia standard.
IFX_TAPI_CID_TIMING_t	Structure containing the timing for CID transmission.
IFX_TAPI_DTMF_RX_CFG_t	Struct used for setting DTMF Receiver efficiencies.
IFX_TAPI_ENC_ROOM_NOISE_DETECT_t	Structure for room noise detection.
IFX_TAPI_EVENT_DATA_CERR_t	This struct contains the data specific to the Command Error event.
IFX_TAPI_EVENT_DATA_CERR_t	Information about a DTMF event.
IFX_TAPI_EVENT_DATA_DEC_CHG_t	Decoder change event details.
IFX_TAPI_EVENT_DATA_EXT_KEYPAD_t	This structure is used to report a DTMF event to the TAPI from an external software module.
IFX_TAPI_EVENT_DATA_FAX_SIG_t	Information about a fax/modem signal event.
IFX_TAPI_EVENT_DATA_PULSE_t	Information about a pulse event.
IFX_TAPI_EVENT_DATA_RFC2833_t	Information about a tone generation/detection event.

Table 93 Structure Overview of TAPI Interfaces (cont'd)

Name	Description
IFX_TAPI_EVENT_DATA_TONE_GEN_t	Information about a tone generation/detection event.
IFX_TAPI_EVENT_EXT_DTMF_CFG_t	This structure is used to configure support for the reporting of external DTMF events.
IFX_TAPI_EVENT_EXT_DTMF_t	This structure is used to report a DTMF event to the TAPI from an external software module.
IFX_TAPI_EVENT_t	This structure is reported by an "EVENT_GET" ioctl. For event masking "EVENT_MASK" reusing IFX_TAPI_EVENT_t should be used.
IFX_TAPI_FXO_DIAL_CFG_t	Structure for FXO dialing configuration
IFX_TAPI_FXO_DIAL_t	Structure including the digits to be dialed
IFX_TAPI_FXO_FLASH_CFG_t	Hook configuration for FXO
IFX_TAPI_FXO_OSI_CFG_t	OSI configuration for FXO
IFX_TAPI_JB_CFG_t	Structure for jitter buffer configuration used by IFX_TAPI_JB_CFG_SET .
IFX_TAPI_JB_STATISTICS_t	Structure for Jitter Buffer statistics used by ioctl IFX_TAPI_JB_STATISTICS_GET .
IFX_TAPI_LEC_CFG_t	Line echo canceller (LEC) configuration.
IFX_TAPI_LINE_HOOK_VT_t	Structure used for validation times of hook, hook flash and pulse dialing.
IFX_TAPI_LINE_VOLUME_t	Phone speaker phone and microphone volume settings used for ioctl IFX_TAPI_PHONE_VOLUME_SET .
IFX_TAPI_MAP_DATA_t	Phone channel mapping structure used for IFX_TAPI_MAP_DATA_ADD and IFX_TAPI_MAP_DATA_REMOVE .
IFX_TAPI_MAP_PCM_t	Phone channel mapping structure used for IFX_TAPI_MAP_PCM_ADD and IFX_TAPI_MAP_PCM_REMOVE .
IFX_TAPI_MAP_PHONE_t	Phone channel mapping structure used for IFX_TAPI_MAP_PHONE_ADD and IFX_TAPI_MAP_PHONE_REMOVE .
IFX_TAPI_METER_CFG_t	Structure for metering configuration.
IFX_TAPI_PCK_AAL_CFG_t	Structure used for ioctl IFX_TAPI_PKT_AAL_CFG_SET
IFX_TAPI_PCK_AAL_PROFILE_t	AAL profile setup structure used for IFX_TAPI_PKT_AAL_PROFILE_SET .
IFX_TAPI_PCM_CFG_t	Structure for PCM channel configuration.
IFX_TAPI_PCM_IF_CFG_t	Structure for PCM interface configuration.
IFX_TAPI_PKT_EV_GENERATE_CFG_t	This structure is used to configure support for the reporting of external DTMF events.
IFX_TAPI_PKT_EV_GENERATE_t	This structure is used to report a DTMF event to the TAPI from an external software module
IFX_TAPI_PKT_RTCP_STATISTICS_t	Structure for RTCP Statistics.
IFX_TAPI_PKT_RTP_CFG_t	Structure for RTP Configuration.
IFX_TAPI_PKT_RTP_PT_CFG_t	Structure for RTP payload configuration.
IFX_TAPI_PKT_VOLUME_t	Packet path volume settings.

Table 93 Structure Overview of TAPI Interfaces (cont'd)

Name	Description
IFX_TAPI_POLL_CFG_t	Structure for polling configuration.
IFX_TAPI_POLL_PKT_t	Structure for polling packet handling.
IFX_TAPI_RING_CADENCE_t	Structure for ring cadence used in IFX_TAPI_RING_CADENCE_HR_SET .
IFX_TAPI_RING_CFG_t	Ringing configuration structure used for ioctl IFX_TAPI_RING_CFG_SET .
IFX_TAPI_SIG_DETECTION_t	Structure used for enable and disable signal detection.
IFX_TAPI_T38_DEMOD_DATA_t	Structure to setup the demodulator for T.38 fax and used for IFX_TAPI_T38_DEMOD_START .
IFX_TAPI_T38_MOD_DATA_t	Structure to setup the modulator for T.38 fax and used for IFX_TAPI_T38_MOD_START .
IFX_TAPI_T38_STATUS_t	Structure to read the T.38 fax status and used for IFX_TAPI_T38_STATUS_GET .
IFX_TAPI_TEST_LOOP_t	Structure for switching loops for testing.
IFX_TAPI_TONE_COMPOSED_t	Structure for definition of composed tones.
IFX_TAPI_TONE_CPTD_t	Structure used for IFX_TAPI_TONE_CPTD_START and IFX_TAPI_TONE_CPTD_STOP .
IFX_TAPI_TONE_SIMPLE_t	Structure for definition of simple tones.
IFX_TAPI_VERSION_t	Structure used for the TAPI version support check.
IFX_TAPI_WLEC_CFG_t	Line echo canceller (LEC) configuration.

4.3.5.1 IFX_TAPI_AUDIO_AFE_CFG_SET_t

Description

AFE Input/Output selectors for Hands-free, Hand- and Headset.

Prototype

```
typedef struct
{
    IFX_TAPI_AUDIO_AFE_PIN_MIC_t nHFMic;
    IFX_TAPI_AUDIO_AFE_PIN_OUT_t nHFOut;
    IFX_TAPI_AUDIO_AFE_PIN_MIC_t nHNMic;
    IFX_TAPI_AUDIO_AFE_PIN_OUT_t nHNOut;
    IFX_TAPI_AUDIO_AFE_PIN_MIC_t nHDMic;
    IFX_TAPI_AUDIO_AFE_PIN_OUT_t nHDOut;
} IFX_TAPI_AUDIO_AFE_CFG_SET_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_AUDIO_AFE_PIN_MIC_t	nHFMic	Hands-free Microphone.
IFX_TAPI_AUDIO_AFE_PIN_OUT_t	nHFOut	Hands-free Output.
IFX_TAPI_AUDIO_AFE_PIN_MIC_t	nHNMic	Handset Microphone.
IFX_TAPI_AUDIO_AFE_PIN_OUT_t	nHNOut	Handset Output.

Data Type	Name	Description
IFX_TAPI_AUDIO_AFE_PIN_MIC_t	nHDMic	Headset Microphone.
IFX_TAPI_AUDIO_AFE_PIN_OUT_t	nHDOut	Headset Output.

4.3.5.2 IFX_TAPI_AUDIO_TEST_MODE_t

Description

Audio channel test mode configuration (for loop and diagnostics).

Prototype

```
typedef struct
{
    IFX_TAPI_AUDIO_TEST_MODES_t nTestPort0;
    IFX_TAPI_AUDIO_TEST_MODES_t nTestPort1;
} IFX_TAPI_AUDIO_TEST_MODE_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_AUDIO_TEST_MODES_t	nTestPort0	Audio channel test port 0.
IFX_TAPI_AUDIO_TEST_MODES_t	nTestPort1	Audio channel test port 1.

4.3.5.3 IFX_TAPI_CAP_t

Description

Capability structure.

Prototype

```
typedef struct
{
    IFX_char_t desc[80];
    IFX_TAPI_CAP_TYPE_t captype;
    IFX_int32_t cap;
    IFX_int32_t handle;
} IFX_TAPI_CAP_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	desc[80]	Description of the capability.
IFX_TAPI_CAP_TYPE_t	captype	Defines the capability type.
IFX_int32_t	cap	Defines if, what or how many are available. The definition of cap depends on the type. See captype
IFX_int32_t	handle	The number of this capability.

4.3.5.4 IFX_TAPI_CH_INIT_t

Description

TAPI initialization structure used for [IFX_TAPI_CH_INIT](#).

Prototype

```
typedef struct
{
    IFX_uint8_t nMode;
    IFX_uint8_t nCountry;
    IFX_void_t pProc;
} IFX_TAPI_CH_INIT_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nMode	Channel initialization mode, to be selected from IFX_TAPI_CH_INIT_MODE_t . It should be always set to IFX_TAPI_INIT_MODE_VOICE_CODER .
IFX_uint8_t	nCountry	Reserved.
IFX_void_t	pProc	Pointer to the low-level device initialization structure (for example VMMC_IO_INIT for INCA-IP2). For details please refer to the device specific driver documentation.

4.3.5.5 IFX_TAPI_CID_ABS_REASON_t

Description

Structure containing CID configuration for ETSI standard using DTMF transmission.

Prototype

```
typedef struct
{
    IFX_char_t nLength;
    IFX_char_t unavailable[TAPI_CID_MAX_MSG_LEN];
    IFX_char_t private[TAPI_CID_MAX_MSG_LEN];
} IFX_TAPI_CID_ABS_REASON_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	nLength	Length of the coded strings.
IFX_char_t	unavailable[TAPI_CID_MAX_MSG_LEN]	String representing code for unavailable/unknown CLI. Default "00".
IFX_char_t	private[TAPI_CID_MAX_MSG_LEN]	String representing code for private/withheld CLI. Default "01".

4.3.5.6 IFX_TAPI_CID_CFG_t

Description

Structure containing CID configuration possibilities.

Prototype

```
typedef struct
{
    IFX_int32_t nStandard;
    IFX_TAPI_CID_STD_TYPE_t cfg;
} IFX_TAPI_CID_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	nStandard	Standard used (enumerated in IFX_TAPI_CID_STD_t). Default IFX_TAPI_CID_STD_TELCORDIA .
IFX_TAPI_CID_STD_TYPE_t	cfg	Union of the different standards. Default IFX_TAPI_CID_STD_TELCORDIA_t .

4.3.5.7 IFX_TAPI_CID_DTMF_CFG_t

Description

Structure containing the configuration information for DTMF CID.

Prototype

```
typedef struct
{
    IFX_char_t startTone;
    IFX_char_t stopTone;
    IFX_char_t infoStartTone;
    IFX_char_t startTone;
    IFX_int32_t digitTime;
    IFX_int32_t interDigitTime;
} IFX_TAPI_CID_DTMF_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	startTone	Tone id for starting tone. Default is DTMF 'A'.
IFX_char_t	stopTone	Tone id for stop tone. Default is DTMF 'C'.
IFX_char_t	infoStartTone	Tone id for starting information tone. Default is DTMF 'B'.
IFX_char_t	startTone	Tone id for starting redirection tone. Default is DTMF 'D'.
IFX_int32_t	digitTime	Time for DTMF digit duration. Default is 50 ms.
IFX_int32_t	interDigitTime	Time between DTMF digits in ms. Default is 50 ms.

4.3.5.8 IFX_TAPI_CID_FSK_CFG_t

Description

Structure containing the configuration information for FSK transmitter and receiver.

Prototype

```
typedef struct
{
    IFX_int32_t levelTX;
    IFX_int32_t levelRX;
    IFX_uint32_t seizureTX;
    IFX_uint32_t seizureRX;
    IFX_uint32_t markTXOnhook;
    IFX_uint32_t markTXOffhook;
    IFX_uint32_t markRXOnhook;
    IFX_uint32_t markRXOffhook;
} IFX_TAPI_CID_FSK_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	levelTX	Signal level for FSK transmission in 0.1 dB steps. Default -140 (-14 dB).
IFX_int32_t	levelRX	Minimum signal level for FSK reception in 0.1 dB steps. Default -150 (-15 dB).
IFX_uint32_t	seizureTX	Number of seizure bits for FSK transmission. This field is relevant only for on-hook transmission. Default value NTT standard: 0 bits. Other standards: 300 bits.
IFX_uint32_t	seizureRX	Minimum number of seizure bits for FSK reception. This field is relevant only for on-hook transmission. Default value NTT standard: 0 bits. Other standards: 200 bits.
IFX_uint32_t	markTXOnhook	Number of mark bits for on-hook FSK transmission. Default value NTT standard: 72 bits. Other standards: 180 bits.
IFX_uint32_t	markTXOffhook	Number of mark bits for off-hook FSK transmission. Default value NTT standard: 72 bits. Other standards: 80 bits.

Data Type	Name	Description
IFX_uint32_t	markRXOnhook	Minimum number of mark bits for on-hook FSK reception. Default value NTT standard: 50 bits. Other standards: 150 bits.
IFX_uint32_t	markRXOffhook	Minimum number of mark bits for off-hook FSK reception. Default value NTT standard: 50 bits. Other standards: 55 bits.

4.3.5.9 IFX_TAPI_CID_MSG_DATE_t

Description

Structure for element types ([IFX_TAPI_CID_SERVICE_TYPE_t](#)) containing date and time information.

Prototype

```
typedef struct
{
    IFX_int32_t elementType;
    IFX_int32_t day;
    IFX_int32_t month;
    IFX_int32_t hour;
    IFX_int32_t mn;
} IFX_TAPI_CID_MSG_DATE_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	elementType	Element type
IFX_int32_t	day	Day
IFX_int32_t	month	Month
IFX_int32_t	hour	Hour
IFX_int32_t	mn	Minute

4.3.5.10 IFX_TAPI_CID_MSG_STRING_t

Description

Structure for element types ([IFX_TAPI_CID_SERVICE_TYPE_t](#)) with dynamic length (line numbers or names).

Prototype

```
typedef struct
{
    IFX_TAPI_CID_SERVICE_TYPE_t elementType;
    IFX_int32_t len;
    IFX_char_t element[TAPI_CID_MAX_MSG_LEN];
} IFX_TAPI_CID_MSG_STRING_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_SERVICE_TYPE_t	elementType	Element type
IFX_int32_t	len	Length of the message array
IFX_char_t	element[TAPI_CID_MAX_MSG_LEN]	String containing the message element.

4.3.5.11 IFX_TAPI_CID_MSG_t

Description

Structure containing the CID message type and content as well as information about transmission mode. This structure contains all information required by [IFX_TAPI_CID_TX_INFO_START](#) to start CID generation.

Prototype

```
typedef struct
{
    IFX_int32_t txMode;
    IFX_int32_t messageType;
    IFX_int32_t nMsgElements;
    IFX_TAPI_CID_MSG_ELEMENT_t* message;
} IFX_TAPI_CID_MSG_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	txMode	Define the Transmission Mode (enumerated in IFX_TAPI_CID_HOOK_MODE_t). Default IFX_TAPI_CID_HM_ONHOOK .
IFX_int32_t	messageType	Define the Message Type to be displayed (enumerated in IFX_TAPI_CID_MSG_TYPE_t).
IFX_int32_t	nMsgElements	Number of elements of the message array.
IFX_TAPI_CID_MSG_ELEMENT_t*	message	Message array.

4.3.5.12 IFX_TAPI_CID_MSG_TRANSPARENT_t

Description

Structure for element types ([IFX_TAPI_CID_SERVICE_TYPE_t](#)) with dynamic length (line numbers or names).

Prototype

```
typedef struct
{
    IFX_TAPI_CID_SERVICE_TYPE_t elementType;
    IFX_int32_t len;
    IFX_char_t *data;
} IFX_TAPI_CID_MSG_TRANSPARENT_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_SERVICE_TYPE_t	elementType	Element type, this must be IFX_TAPI_CID_ST_TRANSPARENT
IFX_int32_t	len	Length of the message buffer.
IFX_char_t	*data	Pointer to the message buffer containing the message already coded in the appropriate format and ready to be transmitted.

4.3.5.13 IFX_TAPI_CID_MSG_VALUE_t

Description

Structure for element types ([IFX_TAPI_CID_SERVICE_TYPE_t](#)) with one value (length 1).

Prototype

```
typedef struct
{
    IFX_TAPI_CID_SERVICE_TYPE_t elementType;
    IFX_uint8_t element;
} IFX_TAPI_CID_MSG_VALUE_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_SERVICE_TYPE_t	elementType	Element type.
IFX_uint8_t	element	Value for the message element.

4.3.5.14 IFX_TAPI_CID_RX_DATA_t

Description

Structure for Caller ID receiver data

Prototype

```
typedef struct
{
    IFX_uint8_t data;
    IFX_int32_t nSize;
} IFX_TAPI_CID_RX_DATA_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	data	0_D IFX_TAPI_CID_RX_SIZE_MAX Caller Id receiver data.
IFX_int32_t	nSize	Caller Id receiver data size in bytes.

4.3.5.15 IFX_TAPI_CID_RX_STATUS_t

Description

Structure for Caller ID receiver status.

Prototype

```
typedef struct
{
    IFX_uint8_t nStatus;
    IFX_uint8_t nError;
} IFX_TAPI_CID_RX_STATUS_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nStatus	<p>Caller Id receiver actual status using IFX_TAPI_CID_RX_STATE_t. It can be any of the following values:</p> <ul style="list-style-type: none"> 0_D IFX_TAPI_CIDRX_STAT_INACTIVE CID receiver is not active. 1_D IFX_TAPI_CIDRX_STAT_ACTIVE CID receiver is active. 2_D IFX_TAPI_CIDRX_STAT_ONGOING CID receiver is just receiving data. 3_D IFX_TAPI_CIDRX_STAT_DATA_RDY CID receiver is completed.
IFX_uint8_t	nError	<p>Caller Id receiver actual error code using IFX_TAPI_CID_RX_ERROR_t. It can be any of the following values:</p> <ul style="list-style-type: none"> 0_D IFX_TAPI_CID_RX_ERROR_NONE No Error during CID receiver operation. 1_D IFX_TAPI_CID_RX_ERROR_READ Reading error during CID receiver operation.

4.3.5.16 IFX_TAPI_CID_STD_ETSİ_DTMF_t

Description

Structure containing CID configuration for ETSI standard using DTMF transmission.

Prototype

```
typedef struct
{
    IFX_TAPI_CID_TIMING_t* pCIDTiming;
    IFX_TAPI_CID_DTMF_CFG_t* pDTMFConf;
    IFX_int32_t nETSIAlertRing;
    IFX_int32_t nETSIAlertNoRing;
    IFX_int32_t nAlertToneOffhook;
    IFX_int32_t nAlertToneOnhook;
    IFX_int32_t ringPulseTime;
    IFX_char_t ackTone;
```

```

    IFX_TAPI_CID_ABS_REASON_t* pABSCLICode;
} IFX_TAPI_CID_STD_ETSİ_DTMF_t;

```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_TIMING_t*	pCIDTiming	Pointer to a structure containing timing information. If the parameter is not given, IFX_TAPI_CID_TIMING_t default values will be used.
IFX_TAPI_CID_DTMF_CFG_t*	pDTMFConf	Pointer to a structure containing DTMF configuration parameters. If the parameter is not given, IFX_TAPI_CID_DTMF_CFG_t default values will be used.
IFX_int32_t	nETSIAlertRing	Type of ETSI Alert of on-hook services associated to ringing (enumerated in IFX_TAPI_CID_ALERT_ETSİ_t). Default IFX_TAPI_CID_ALERT_ETSİ_FR .
IFX_int32_t	nETSIAlertNoRing	Type of ETSI Alert of on-hook services not associated to ringing (enumerated in IFX_TAPI_CID_ALERT_ETSİ_t). Default IFX_TAPI_CID_ALERT_ETSİ_RP .
IFX_int32_t	nAlertToneOffhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	nAlertToneOnhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	ringPulseTime	Duration of Ring Pulse, in ms, default 500 ms.
IFX_char_t	ackTone	DTMF ACK after CAS, used for offhook transmission. Default DTMF 'D'.
IFX_TAPI_CID_ABS_REASON_t*	pABSCLICode	Pointer to a structure containing the coding for absence reason of calling number.

4.3.5.17 IFX_TAPI_CID_STD_ETSİ_FSK_t

Description

Structure containing CID configuration for ETSI standard using FSK transmission.

Prototype

```

typedef struct
{
    IFX_TAPI_CID_TIMING_t* pCIDTiming;
    IFX_TAPI_CID_FSK_CFG_t* pFSKConf;
    IFX_int32_t nETSIAlertRing;
    IFX_int32_t nETSIAlertNoRing;
    IFX_int32_t nAlertToneOffhook;
    IFX_int32_t nAlertToneOnhook;
}

```

```

    IFX_int32_t ringPulseTime;
    IFX_char_t ackTone;
} IFX_TAPI_CID_STD_ETSIE_FSK_t;

```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_TIMING_t*	pCIDTiming	Pointer to a structure containing timing information. If the parameter is not given, IFX_TAPI_CID_TIMING_t default values will be used.
IFX_TAPI_CID_FSK_CFG_t*	pFSKConf	Pointer to a structure containing FSK configuration parameters. If the parameter is not given, IFX_TAPI_CID_FSK_CFG_t default values will be used.
IFX_int32_t	nETSIAlertRing	Type of ETSI Alert of on-hook services associated to ringing (enumerated in IFX_TAPI_CID_ALERT_ETSIE_t). Default IFX_TAPI_CID_ALERT_ETSIE_FR .
IFX_int32_t	nETSIAlertNoRing	Type of ETSI Alert of on-hook services not associated to ringing (enumerated in IFX_TAPI_CID_ALERT_ETSIE_t). Default IFX_TAPI_CID_ALERT_ETSIE_RP .
IFX_int32_t	nAlertToneOffhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	nAlertToneOnhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	ringPulseTime	Duration of Ring Pulse, in ms, default 500 ms.
IFX_char_t	ackTone	DTMF ACK after CAS, used for off-hook transmission. Default DTMF is 'D'.

4.3.5.18 IFX_TAPI_CID_STD_NTT_t

Description

Structure containing CID configuration for NTT standard.

Prototype

```

typedef struct
{
    IFX_TAPI_CID_TIMING_t* pCIDTiming;
    IFX_TAPI_CID_FSK_CFG_t* pFSKConf;
    IFX_int32_t nAlertToneOffhook;
    IFX_int32_t nAlertToneOnhook;
    IFX_int32_t ringPulseTime;
    IFX_int32_t ringPulseTimeLoop;
    IFX_int32_t ringPulseOffTime;
    IFX_int32_t dataOut2incomingSuccessfulTimeout;
} IFX_TAPI_CID_STD_NTT_t;

```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_TIMING_t*	pCIDTiming	Pointer to a structure containing timing information. If the parameter is not given, IFX_TAPI_CID_TIMING_t default values will be used.
IFX_TAPI_CID_FSK_CFG_t*	pFSKConf	Pointer to a structure containing FSK configuration parameters. If the parameter is not given, IFX_TAPI_CID_FSK_CFG_t default values will be used.
IFX_int32_t	nAlertToneOffhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	nAlertToneOnhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	ringPulseTime	Ring pulse on time (CAR signal), in ms, default 500 ms.
IFX_int32_t	ringPulseTimeLoop	Max number of ring pulses (CAR signals), default 5.
IFX_int32_t	ringPulseOffTime	Ring pulse off time (CAR signal), in ms, default 500 ms.
IFX_int32_t	dataOut2incomingSuccessfulTimeout	Timeout for incoming successful signal to arrive after CID data transmission is completed. Default 7000 ms.

4.3.5.19 IFX_TAPI_CID_STD_SIN_t

Description

Structure containing CID configuration for BT SIN227 standard.

Prototype

```
typedef struct
{
    IFX_TAPI_CID_TIMING_t* pCIDTiming;
    IFX_TAPI_CID_FSK_CFG_t* pFSKConf;
    IFX_int32_t nAlertToneOffhook;
    IFX_int32_t nAlertToneOnhook;
    IFX_char_t ackTone;
} IFX_TAPI_CID_STD_SIN_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_TIMING_t*	pCIDTiming	Pointer to a structure containing timing information. If the parameter is not given, IFX_TAPI_CID_TIMING_t default values will be used.
IFX_TAPI_CID_FSK_CFG_t*	pFSKConf	Pointer to a structure containing FSK configuration parameters. If the parameter is not given, IFX_TAPI_CID_FSK_CFG_t default values will be used.

Data Type	Name	Description
IFX_int32_t	nAlertToneOffhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_int32_t	nAlertToneOnhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_char_t	ackTone	DTMF ACK after CAS, used for offhook transmission. Default DTMF 'D'.

4.3.5.20 IFX_TAPI_CID_STD_TELCORDIA_t

Description

Structure containing CID configuration for Telcordia standard.

Prototype

```
typedef struct
{
    IFX_TAPI_CID_TIMING_t* pCIDTiming;
    IFX_TAPI_CID_FSK_CFG_t* pFSKConf;
    IFX_int32_t OSIoffhook;
    IFX_int32_t OSItime;
    IFX_int32_t nAlertToneOffhook;
    IFX_char_t ackTone;
} IFX_TAPI_CID_STD_TELCORDIA_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_CID_TIMING_t*	pCIDTiming	Pointer to a structure containing timing information. If the parameter is not given, IFX_TAPI_CID_TIMING_t default values will be used.
IFX_TAPI_CID_FSK_CFG_t*	pFSKConf	Pointer to a structure containing FSK configuration parameters. If the parameter is not given, IFX_TAPI_CID_FSK_CFG_t default values will be used.
IFX_int32_t	OSIoffhook	Usage of OSI for offhook transmission. Default IFX_FALSE .
IFX_int32_t	OSItime	Length of the OSI signal in ms. Default 200 ms.
IFX_int32_t	nAlertToneOffhook	Tone table index for the alert tone to be used. Required for automatic CID/MWI generation. By default TAPI uses an internal tone definition.
IFX_char_t	ackTone	DTMF ACK after CAS, used for offhook transmission. Default DTMF 'D'.

4.3.5.21 IFX_TAPI_CID_TIMING_t

Description

Structure containing the timing for CID transmission.

Prototype

```
typedef struct
{
    IFX_int32_t beforeData;
    IFX_int32_t dataOut2restoreTimeOnhook;
    IFX_int32_t dataOut2restoreTimeOffhook;
    IFX_int32_t ack2dataOutTime;
    IFX_int32_t cas2ackTime;
    IFX_int32_t afterAckTimeout;
    IFX_int32_t afterFirstRing;
    IFX_int32_t afterRingPulse;
    IFX_int32_t afterDTASOnhook;
    IFX_int32_t afterLineReversal;
    IFX_int32_t afterOSI;
} IFX_TAPI_CID_TIMING_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	beforeData	Time to wait after AS, in ms, before data transmission. Default 300 ms. Used only for NTT off-hook trasmission.
IFX_int32_t	dataOut2restoreTimeOnhook	Time to wait after data transmission, in ms, for on-hook services. Default 300 ms.
IFX_int32_t	dataOut2restoreTimeOffhook	Time to wait after data transmission, in ms, for off-hook services. Default 60 ms.
IFX_int32_t	ack2dataOutTime	Time to wait after ack detection, in ms, before data transmission. Default 55 ms.
IFX_int32_t	cas2ackTime	Time-out for ack detection, in ms. Default 160 ms.
IFX_int32_t	afterAckTimeout	Time to wait after ACK time-out, in ms. Default 50 ms.
IFX_int32_t	afterFirstRing	Time to wait after first ring, in ms, before starting data transmission. Default 600 ms.
IFX_int32_t	afterRingPulse	Time to wait after ring pulse, in ms, before starting data transmission. Default 600 ms.
IFX_int32_t	afterDTASOnhook	Time to wait after DTAS, in ms, before starting data transmission. Default 45 ms.
IFX_int32_t	afterLineReversal	Time to wait after line reversal, in ms, before successive operation ¹⁾ is performed. Default 100 ms.
IFX_int32_t	afterOSI	Time to wait after OSI signal, in ms, before data transmission. Default 300 ms.

1) Timing between line reversal and DTAS (ETSI standard) or CAR (NTT standard) signal.

4.3.5.22 IFX_TAPI_DWLD_t

Description

TAPI download structure.

Prototype

```
typedef struct
{
    IFX_TAPI_DWLD_TYPE_t nMode;
    IFX_uint8_t * pBuf;
    IFX_uint32_t nSize;
    IFX_uint16_t nCRC;
} IFX_TAPI_DWLD_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_DWLD_TYPE_t	nMode	Download type.
IFX_uint8_t *	pBuf	Pointer to the buffer to be downloaded.
IFX_uint32_t	nSize	Size, in bytes, of the buffer to be downloaded.
IFX_uint16_t	nCRC	Return value of the CRC. <i>Note: Not defined for all downloads.</i>

4.3.5.23 IFX_TAPI_DTMF_RX_CFG_t

Description

DTMF Receiver coefficients settings.

The following DTMF Receiver Coefficients are to be directly programmed in the underlying device. Therefore the passed values must be expressed in a format ready for programming, as no interpretation of these values is attempted.

Prototype

```
typedef struct
{
    IFX_int32_t nLevel;
    IFX_int32_t nTwist;
    IFX_int32_t nGain;
} IFX_TAPI_DTMF_RX_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	nLevel	Minimal signal level (dB)
IFX_int32_t	nTwist	Maximum allowed signal twist (dB)
IFX_int32_t	nGain	Gain adjustment of the input signal (dB)

4.3.5.24 IFX_TAPI_ENC_AGC_CFG_t

Description

Structure used for AGC configuration.

Prototype

```
typedef struct
{
    IFX_int32_t com;
    IFX_int32_t gain;
    IFX_int32_t att;
    IFX_int32_t lim;
} IFX_TAPI_ENC_AGC_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	com	“Compare Level”, this is the target level.
IFX_int32_t	gain	“Maximum Gain”, maximum gain that will be applied to the signal.
IFX_int32_t	att	“Maximum Attenuation for AGC”, maximum attenuation that will be applied to the signal
IFX_int32_t	lim	“Minimum Input Level”, signals below this threshold won't be processed by AGC.

4.3.5.25 IFX_TAPI_ENC_CFG_t

Description

Structure for encoding type and length.

Prototype

```
typedef struct
{
    IFX_TAPI_COD_TYPE_t nEncType;
    IFX_TAPI_COD_LENGTH_t nFrameLen;
} IFX_TAPI_ENC_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_COD_TYPE_t	nEncType	Encoder type.
IFX_TAPI_COD_LENGTH_t	nFrameLen	Frame length in milliseconds.

4.3.5.26 IFX_TAPI_ENC_ROOM_NOISE_DETECT_t

Description

Structure for room noise detection.

Prototype

```
typedef struct
{
    IFX_uint32_t nThreshold;
    IFX_uint8_t nVoicePktCnt;
    IFX_uint8_t nSilencePktCnt;
} IFX_TAPI_ENC_ROOM_NOISE_DETECT_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	nThreshold	Detection level in minus dB.
IFX_uint8_t	nVoicePktCnt	Count of consecutive voice packets required for event.
IFX_uint8_t	nSilencePktCnt	Count of consecutive silence packets required for event.

4.3.5.27 IFX_TAPI_EVENT_t**Description**

This structure is used by event reporting interfaces.

Prototype

```
typedef struct
{
    IFX_TAPI_EVENT_ID_t id;
    IFX_uint16_t ch;
    IFX_uint16_t more;
    IFX_TAPI_EVENT_DATA_t data;
} IFX_TAPI_EVENT_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_EVENT_ID_t	id	Event id.
IFX_uint16_t	ch	Channel where the event occurred.
IFX_uint16_t	more	This field is used to report whether new events are ready (IFX_TRUE) or not (IFX_FALSE).
IFX_TAPI_EVENT_DATA_t	data	Data about the individual event.

4.3.5.28 IFX_TAPI_EVENT_DATA_CERR_t**Description**

This struct contains the data specific to the Command Error event.

Prototype

```
typedef struct
{
    IFX_uint16_t fw_id;
```

```
    IFX_uint16_t reason;  
    IFX_uint32_t command;  
} IFX_TAPI_EVENT_DATA_CERR_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	fw_id	Firmware family identifier used to decode the reason field.
IFX_uint16_t	reason	Reason given by the firmware for the command error.
IFX_uint32_t	command	Header of error command.

4.3.5.29 IFX_TAPI_EVENT_DATA_DEC_CHG_t

Description

Decoder change event details.

Prototype

```
typedef struct  
{  
    IFX_uint32_t dec_type:8;  
    IFX_uint32_t dec_framelength:8;  
} IFX_TAPI_EVENT_DATA_DEC_CHG_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	dec_type:8	Type of the coder used. Please refer to coding of IFX_TAPI_COD_TYPE_t .
IFX_uint32_t	dec_framelength:8	Frame length. Please refer to coding of IFX_TAPI_COD_LENGTH_t .

4.3.5.30 IFX_TAPI_EVENT_DATA_DTMF_t

Description

Information about a DTMF event.

Prototype

```
typedef struct  
{  
    IFX_uint32_t local:1;  
    IFX_uint32_t network:1;  
    IFX_uint32_t reserved:6;  
    IFX_uint32_t digit:8;  
    IFX_uint32_t ascii:8;  
} IFX_TAPI_EVENT_DATA_DTMF_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	local:1	Detected from local side.
IFX_uint32_t	network:1	Detected from network side.
IFX_uint32_t	reserved:6	Reserved.
IFX_uint32_t	digit:8	DTMF digit information.
IFX_uint32_t	ascii:8	DTMF digit in ASCII representation.

4.3.5.31 IFX_TAPI_EVENT_DATA_EXT_KEYPAD_t

Description

This structure is used to report a DTMF event to the TAPI from an external software module.

Prototype

```
typedef struct
{
    IFX_int8_t key;
    IFX_char_t duration;
} IFX_TAPI_EVENT_DATA_EXT_KEYPAD_t;
```

Parameters

Data Type	Name	Description
IFX_int8_t	key	Key.
IFX_char_t	duration	Duration.

4.3.5.32 IFX_TAPI_EVENT_DATA_FAX_SIG_t

Description

Information about a fax/modem signal event.

Prototype

```
typedef struct
{
    IFX_uint16_t local:1;
    IFX_uint16_t network:1;
    IFX_uint16_t reserved:6;
} IFX_TAPI_EVENT_DATA_FAX_SIG_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	local:1	Detected from local side.
IFX_uint16_t	network:1	Detected from network side.
IFX_uint16_t	reserved:6	Reserved.

4.3.5.33 IFX_TAPI_EVENT_DATA_PULSE_t

Description

Information about a pulse event.

Prototype

```
typedef struct
{
    IFX_uint16_t reserved:8;
    IFX_uint16_t digit:8;
} IFX_TAPI_EVENT_DATA_PULSE_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	reserved:8	Reserved.
IFX_uint16_t	digit:8	Pulse digit information.

4.3.5.34 IFX_TAPI_EVENT_DATA_RFC2833_t

Description

Information about an RFC2833 event.

Prototype

```
typedef struct
{
    IFX_uint32_t event:16;
} IFX_TAPI_EVENT_DATA_RFC2833_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	event:16	Event code contained in the RFC2833 frame.

4.3.5.35 IFX_TAPI_EVENT_DATA_TONE_GEN_t

Description

Information about a tone generation/detection event.

Prototype

```
typedef struct
{
    IFX_uint16_t local:1;
    IFX_uint16_t network:1;
    IFX_uint16_t reserved:6;
    IFX_uint16_t index:8;
} IFX_TAPI_EVENT_DATA_TONE_GEN_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	local:1	Detected from local side.
IFX_uint16_t	network:1	Detected from network side.
IFX_uint16_t	reserved:6	Reserved.
IFX_uint16_t	index:8	Tone table index.

4.3.5.36 IFX_TAPI_EVENT_EXT_DTMF_t

Description

This structure is used to report a DTMF event to the TAPI from an external software module.

Prototype

```
typedef struct
{
    IFX_char_t event;
    IFX_TAPI_ACTION_t action;
    IFX_uint32_t duration;
} IFX_TAPI_EVENT_EXT_DTMF_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	event	Event code according to RFC2833.
IFX_TAPI_ACTION_t	action	Start/tone event generation.
IFX_uint32_t	duration	Duration of event in unit of 10 ms. 0 means forever.

4.3.5.37 IFX_TAPI_EVENT_EXT_DTMF_CFG_t

Description

This structure is used to configure support for the reporting of external DTMF events.

Prototype

```
typedef struct
{
    IFX_operation_t localPlay;
} IFX_TAPI_EVENT_EXT_DTMF_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_operation_t	localPlay	Enable or disable local play of the DTMF tone.

4.3.5.38 IFX_TAPI_FXO_DIAL_t

Description

Structure including the digits to be dialed.

Prototype

```
typedef struct
{
    IFX_uint8_t nDigits;
    IFX_char_t data[IFX_TAPI_FXO_DIAL_DIGITS];
} IFX_TAPI_FXO_DIAL_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nDigits	Number of digits to be dialed.
IFX_char_t	data[IFX_TAPI_FXO_DIAL_DIGITS]	String of digits to be dialed. <i>Note: Only 0-9 and A, B, C, D are supported.</i>

4.3.5.39 IFX_TAPI_FXO_DIAL_CFG_t

Description

Structure for FXO dialing configuration.

Prototype

```
typedef struct
{
    IFX_uint16_t nInterDigitTime;
    IFX_uint16_t nDigitPlayTime;
} IFX_TAPI_FXO_DIAL_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	nInterDigitTime	Time between two digits, in ms. Default 100 ms.
IFX_uint16_t	nDigitPlayTime	Play time for each digit, in ms. Default 100 ms.

4.3.5.40 IFX_TAPI_FXO_FLASH_CFG_t

Description

Hook configuration for FXO.

Prototype

```
typedef struct
{
    IFX_uint16_t nFlashTime;
} IFX_TAPI_FXO_FLASH_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	nFlashTime	Duration of a flash-hook. Default 100 ms.

4.3.5.41 IFX_TAPI_FXO_OSI_CFG_t

Description

OSI configuration for FXO.

Prototype

```
typedef struct
{
    FX_int32_t nOSIMax;
} IFX_TAPI_FXO_OSI_CFG_t;
```

Parameters

Data Type	Name	Description
FX_int32_t	nOSIMax	Duration of an OSI. Default 200 ms.

4.3.5.42 IFX_TAPI_JB_CFG_t

Description

Structure for jitter buffer configuration used by [IFX_TAPI_JB_CFG_SET](#).

Prototype

```
typedef struct
{
    IFX_uint8_t nJbType;
    IFX_char_t nPckAdpt;
    IFX_char_t nLocalAdpt;
    IFX_char_t nScaling;
    IFX_uint16_t nInitialSize;
    IFX_uint16_t nMaxSize;
    IFX_uint16_t nMinSize;
} IFX_TAPI_JB_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nJbType	Jitter buffer type, value of IFX_TAPI_JB_TYPE_t .
IFX_char_t	nPckAdpt	Packet adaptation, value of IFX_TAPI_JB_PKT_ADAPT_t .
IFX_char_t	nLocalAdpt	Local adaptation, value of IFX_TAPI_JB_LOCAL_ADAPT_t . Relevant only for adaptive jitter buffer.

Data Type	Name	Description
IFX_char_t	nScaling	This factor influences the play out delay. If nPckAdpt is 1, nScaling multiplied by the packet length determines the play out delay. If nPckAdpt is 0, the play out delay is calculated by the multiplication of the estimated network jitter and nScaling. nScaling can be chosen between 1 and 16. Default: 8
IFX_uint16_t	nInitialSize	Initial size of the jitter buffer in timestamps of 125 µs in case of an adaptive jitter buffer.
IFX_uint16_t	nMaxSize	Maximum size of the jitter buffer in timestamps of 125 µs in case of an adaptive jitter buffer.
IFX_uint16_t	nMinSize	Minimum size of the jitter buffer in timestamps of 125 µs in case of an adaptive jitter buffer.

Remarks

This structure may be changed in the future.

4.3.5.43 IFX_TAPI_JB_STATISTICS_t

Description

Structure for Jitter Buffer statistics used by ioctl **IFX_TAPI_JB_STATISTICS_GET**.

Prototype

```
typedef struct
{
    IFX_uint8_t nType;
    IFX_uint32_t nInTime;
    IFX_uint32_t nCNG;
    IFX_uint32_t nBFI;
    IFX_uint16_t nBufSize;
    IFX_uint16_t nMaxBufSize;
    IFX_uint16_t nMinBufSize;
    IFX_uint16_t nMaxDelay;
    IFX_uint16_t nMinDelay;
    IFX_uint16_t nNwJitter;
    IFX_uint16_t nPODelay;
    IFX_uint16_t nMaxPODelay;
    IFX_uint16_t nMinPODelay;
    IFX_uint32_t nPackets;
    IFX_uint16_t nLost;
    IFX_uint16_t nInvalid;
    IFX_uint16_t nDuplicate;
    IFX_uint16_t nLate;
    IFX_uint16_t nEarly;
    IFX_uint16_t nResync;
    IFX_uint32_t nIsUnderflow;
    IFX_uint32_t nIsNoUnderflow;
    IFX_uint32_t nIsIncrement;
    IFX_uint32_t nSkDecrement;
    IFX_uint32_t nDsDecrement;
```

```

    IFX_uint32_t nDsOverflow;
    IFX_uint32_t nSid;
} IFX_TAPI_JB_STATISTICS_t;

```

Parameters

Data Type	Name	Description
IFX_uint8_t	nType	Jitter buffer type <ul style="list-style-type: none"> • 1: fixed • 2: adaptive
IFX_uint32_t	nInTime	Incoming time high word total time in timestamp units for all packets since the start of the connection which could be played out correctly. Not supported anymore
IFX_uint32_t	nCNG	Comfort noise generation. Not supported anymore
IFX_uint32_t	nBFI	Bad frame interpolation. Not supported anymore
IFX_uint16_t	nBufSize	Current jitter buffer size.
IFX_uint16_t	nMaxBufSize	Maximum estimated jitter buffer size.
IFX_uint16_t	nMinBufSize	Minimum estimated jitter buffer size.
IFX_uint16_t	nMaxDelay	Maximum packet delay. Not supported anymore
IFX_uint16_t	nMinDelay	Minimum packet delay. Not supported anymore
IFX_uint16_t	nNwJitter	Network jitter value. Not supported anymore
IFX_uint16_t	nPODelay	Play out delay
IFX_uint16_t	nMaxPODelay	Maximum play out delay.
IFX_uint16_t	nMinPODelay	Minimum play out delay.
IFX_uint32_t	nPackets	Received packet number.
IFX_uint16_t	nLost	Lost packets number. Not supported anymore
IFX_uint16_t	nInvalid	Invalid packet number.
IFX_uint16_t	nDuplicate	Duplication packet number. Not supported anymore
IFX_uint16_t	nLate	Late packets number.
IFX_uint16_t	nEarly	Early packets number.
IFX_uint16_t	nResync	Resynchronizations number.
IFX_uint32_t	nlsUnderflow	Total number of injected samples since the beginning of the connection or since the last statistic reset due to jitter buffer underflows.
IFX_uint32_t	nlsNoUnderflow	Total number of injected samples since the beginning of the connection or since the last statistic reset in case of normal jitter buffer operation, which means when there is not a jitter buffer underflow.
IFX_uint32_t	nlsIncrement	Total number of injected samples since the beginning of the connection or since the last statistic reset in case of jitter buffer increments.

Data Type	Name	Description
IFX_uint32_t	nSkDecrement	Total number of skipped lost samples since the beginning of the connection or since the last statistic reset in case of jitter buffer decrements.
IFX_uint32_t	nDsDecrement	Total number of dropped samples since the beginning of the connection or since the last statistic reset in case of jitter buffer decrements.
IFX_uint32_t	nDsOverflow	Total number of dropped samples since the beginning of the connection or since the last statistic reset in case of jitter buffer overflows.
IFX_uint32_t	nSid	Total number of comfort noise samples since the beginning of the connection or since the last statistic reset.

4.3.5.44 IFX_TAPI_KPI_CH_CFG_t

Description

Struct to configure the redirection of packet streams to the KPI..

Prototype

```
typedef struct
{
    IFX_TAPI_KPI_STREAM_t nStream;
    IFX_uint16_t nKpiCh;
} IFX_TAPI_KPI_CH_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_KPI_STR_EAM_t	nStream	Packet stream that should be redirected.
IFX_uint16_t	nKpiCh	KPI group and channel where the stream should be sent to.

4.3.5.45 IFX_TAPI_LEC_CFG_t

Description

Line echo canceller (LEC) configuration.

Prototype

```
typedef struct
{
    IFX_TAPI_LEC_TYPE_t nType;
    IFX_char_t nGainIn;
    IFX_char_t nGainOut;
    IFX_char_t nLen;
    IFX_char_t bNlp;
} IFX_TAPI_LEC_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_LEC_TYPE_t	nType	LEC type selection.
IFX_char_t	nGainIn	Gain for input. 0 _D IFX_TAPI_LEC_GAIN_OFF LEC Off 0 _D IFX_TAPI_LEC_GAIN_OFF LEC Off 1 _D IFX_TAPI_LEC_GAIN_LOW Low Gain 2 _D IFX_TAPI_LEC_GAIN_MEDIUM Medium Gain (only supported for VINETIC®) 3 _D IFX_TAPI_LEC_GAIN_HIGH High Gain
IFX_char_t	nGainOut	Gain for output LEC. 0 _D IFX_TAPI_LEC_GAIN_OFF LEC Off 1 _D IFX_TAPI_LEC_GAIN_LOW Low Gain 2 _D IFX_TAPI_LEC_GAIN_MEDIUM Medium Gain (only supported for VINETIC®) 3 _D IFX_TAPI_LEC_GAIN_HIGH High Gain
IFX_char_t	nLen	LEC tail length in milli seconds. nLen is currently not supported and can be set to zero
IFX_char_t	bNlp	Switch the NLP on or off. 0 _D TAPI_LEC_NLPDEFAULT NLP is default 1 _D TAPI_LEC_NLP_ON NLP is on 2 _D TAPI_LEC_NLP_OFF NLP is off

4.3.5.46 IFX_TAPI_LINE_HOOK_VT_t

Description

Structure used for validation times of hook, hook flash and pulse dialing.

An example of typical timing

- 80 ms <= flash time <= 200 ms
- 30 ms <= digit low time <= 80 ms
- 30 ms <= digit high time <= 80 ms
- Interdigit time = 300 ms
- Off-hook time = 40 ms
- On-hook time = 400 ms!!! open: only min. time is validated and pre initialized

Prototype

```
typedef struct
{
    IFX_TAPI_LINE_HOOK_VALIDATION_TYPE_t nType;
    IFX_uint32_t nMinTime;
    IFX_uint32_t nMaxTime;
} IFX_TAPI_LINE_HOOK_VT_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_LINE_HOOK_VALIDATION_TYPE_t	nType	Type of validation time setting.
IFX_uint32_t	nMinTime	Minimum time for validation in ms.
IFX_uint32_t	nMaxTime	Maximum time for validation in ms

4.3.5.47 IFX_TAPI_LINE_TYPE_CFG_t

Description

Struct used to configure the line type (FXS or FXO).

Prototype

```
typedef struct
{
    IFX_TAPI_LINE_TYPE_t nType;
    IFX_uint8_t nDaaCh;
} IFX_TAPI_LINE_TYPE_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_LINE_TYPE_t	nType	Configure the line type of this analog channel .
IFX_uint8_t	nDaaCh	Corresponding index of the DAA channel defined in drv_daa (board specific).

4.3.5.48 IFX_TAPI_LINE_VOLUME_t

Description

Struct used to configure volume settings.

Prototype

```
typedef struct
{
    IFX_int32_t nGainRx;
    IFX_int32_t nGainTx;
} IFX_TAPI_LINE_VOLUME_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	nGainRx	Volume setting for the receiving path. The value is given in dB with the range (-24 dB to 24 dB), 1 dB step.
IFX_int32_t	nGainTx	Volume setting for the transmitting path. The value is given in dB with the range (-24 dB to 24 dB), 1 dB step.

4.3.5.49 IFX_TAPI_MAP_DATA_t

Description

Phone channel mapping structure used for [IFX_TAPI_MAP_DATA_ADD](#) and [IFX_TAPI_MAP_DATA_REMOVE](#).

Prototype

```
typedef struct
{
    IFX_char_t nDstCh;
    IFX_TAPI_MAP_TYPE_t nChType;
    IFX_TAPI_DATA_MAP_START_STOP_t nRecStart;
    IFX_TAPI_DATA_MAP_START_STOP_t nPlayStart;
} IFX_TAPI_MAP_DATA_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	nDstCh	Phone channel number to which this channel should be mapped. Phone channels numbers start from 0.
IFX_TAPI_MAP_TYPE_t	nChType	Type of the destination channel, defined in IFX_TAPI_MAP_TYPE_t .
IFX_TAPI_DATA_MAP_START_STOP_t	nRecStart	Enables or disables the recording service or leaves as it is. 0 _D IFX_TAPI_MAP_DATA_UNCHANGED Do not modify the status of the recorder 1 _D IFX_TAPI_MAP_DATA_START Recording is started, same as IFX_TAPI_ENC_START 2 _D IFX_TAPI_MAP_DATA_STOP Recording is stopped, same as IFX_TAPI_ENC_STOP
IFX_TAPI_DATA_MAP_START_STOP_t	nPlayStart	Enables or disables the play service or leaves as it is. 0 _D IFX_TAPI_MAP_DATA_UNCHANGED Do not modify the status of the recorder 1 _D IFX_TAPI_MAP_DATA_START Playing is started, same as IFX_TAPI_ENC_START 2 _D IFX_TAPI_MAP_DATA_STOP Playing is stopped, same as IFX_TAPI_ENC_STOP

4.3.5.50 IFX_TAPI_MAP_PCM_t

Description

Phone channel mapping structure used for [IFX_TAPI_MAP_PCM_ADD](#) and [IFX_TAPI_MAP_PCM_REMOVE](#).

Prototype

```
typedef struct
{
    IFX_uint8_t nDstCh;
    IFX_TAPI_MAP_TYPE_t nChType;
} IFX_TAPI_MAP_PCM_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nDstCh	Channel number to which this channel should be mapped. Channels numbers start from 0.
IFX_TAPI_MAP_TYPE_t	nChType	Type of the destination channel. 0 _D IFX_TAPI_MAP_TYPE_DEFAULT Default selected (analog phone channel) 1 _D IFX_TAPI_MAP_TYPE_CODER not supported 2 _D IFX_TAPI_MAP_TYPE_PCM type is PCM 3 _D IFX_TAPI_MAP_TYPE_PHONE type is analog phone channel

4.3.5.51 IFX_TAPI_MAP_PHONE_t

Description

Phone channel mapping structure used for [IFX_TAPI_MAP_PHONE_ADD](#) and [IFX_TAPI_MAP_PHONE_REMOVE](#).

Prototype

```
typedef struct
{
    IFX_uint8_t nPhoneCh;
    IFX_TAPI_MAP_TYPE_t nChType;
} IFX_TAPI_MAP_PHONE_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nPhoneCh	Phone channel number to which this channel should be mapped. Phone channels numbers start from 0.
IFX_TAPI_MAP_TYPE_t	nChType	Type of the destination channel. 0 _D IFX_TAPI_MAP_TYPE_DEFAULT Default selected (analog phone channel) 1 _D IFX_TAPI_MAP_TYPE_CODER not supported 2 _D IFX_TAPI_MAP_TYPE_PCM type is PCM 3 _D IFX_TAPI_MAP_TYPE_PHONE type is analog phone channel

4.3.5.52 IFX_TAPI_METER_CFG_t

Description

Structure for metering config.

Prototype

```
typedef struct
{
    IFX_uint8_t mode;
    IFX_uint8_t freq;
    IFX_uint32_t burst_len;
    IFX_uint32_t burst_dist;
    IFX_uint32_t burst_cnt;
} IFX_TAPI_METER_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	mode	Metering mode. 0_D TAPI_METER_MODE_TTX TTX mode 1_D TAPI_METER_MODE_REVPOL reverse polarity
IFX_uint8_t	freq	Reserved.
IFX_uint32_t	burst_len	Length of metering burst in ms. burst_len must be greater than zero.
IFX_uint32_t	burst_dist	Distance between the metering burst in sec.
IFX_uint32_t	burst_cnt	Defines the number of bursts.

4.3.5.53 IFX_TAPI_PCK_AAL_CFG_t

Description

Structure used for AAL configuration

Prototype

```
typedef struct
{
    IFX_uint16_t nCid;
    IFX_uint16_t nTimestamp;
    IFX_uint16_t nCpsCid;
} IFX_TAPI_PCK_AAL_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	nCid	Connection identifier.
IFX_uint16_t	nTimestamp	Start value for the timestamp (resolution of 125 µs).
IFX_uint16_t	nCpsCid	Connection Identifier for CPS events.

4.3.5.54 IFX_TAPI_PCK_AAL_PROFILE_t

Description

AAL profile setup structure.

Prototype

```
typedef struct
{
    IFX_char_t rows;
    IFX_char_t len[10];
    IFX_char_t nUUID[10];
    IFX_char_t codec[10];
} IFX_TAPI_PCK_AAL_PROFILE_t;
```

Parameters⁷

Data Type	Name	Description
IFX_char_t	rows	Amount of rows to program.
IFX_char_t	len[10]	Length of packet in bytes - 1.
IFX_char_t	nUUID[10]	UUID codepoint range indicator, see IFX_TAPI_PKT_AAL_PROFILE_RANGE_t .
IFX_char_t	codec[10]	Codec as listed for IFX_TAPI_COD_TYPE_t .

4.3.5.55 IFX_TAPI_PCM_CFG_t

Description

Structure for PCM channel configuration.

Prototype

```
typedef struct
{
    IFX_uint32_t nTimeslotRX;
    IFX_uint32_t nTimeslotTX;
    IFX_uint32_t nHighway;
    IFX_uint32_t nResolution;
} IFX_TAPI_PCM_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	nTimeslotRX	PCM time slot for the receive direction.
IFX_uint32_t	nTimeslotTX	PCM time slot for the transmit direction.

Data Type	Name	Description
IFX_uint32_t	nHighway	Defines the PCM highway number which is connected to the channel.
IFX_uint32_t	nResolution	Defines the PCM interface coding. 0 _D IFX_TAPI_PCM_RES_ALAW_8BIT 8-bit A-law 1 _D IFX_TAPI_PCM_RES_MLAW_8BIT 8bit μ-law 2 _D IFX_TAPI_PCM_RES_LINEAR_16BIT 16-bit linear

4.3.5.56 IFX_TAPI_PCM_IF_CFG_t

Description

Structure for PCM interface configuration.

Attention: Not all Infineon products support all features that can be configured using this struct (for example master mode or slave mode without automatic clock detection). Please refer to the product system release note to learn about the supported features.

Prototype

```
typedef struct
{
    IFX_TAPI_PCM_IF_MODE_t nOpMode;
    IFX_TAPI_PCM_IF_DCLFREQ_t nDCLFreq;
    IFX_operation_t nDoubleClk;
    IFX_TAPI_PCM_IF_SLOPE_t nSlopeTX;
    IFX_TAPI_PCM_IF_SLOPE_t nSlopeRX;
    IFX_TAPI_PCM_IF_OFFSET_t nOffsetTX;
    IFX_TAPI_PCM_IF_OFFSET_t nOffsetRX;
    IFX_TAPI_PCM_IF_DRIVE_t nDrive;
    IFX_operation_t nShift;
    IFX_uint8_t nMCTS;
} IFX_TAPI_PCM_IF_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_PCM_IF_MODE_t	nOpMode	Select operation mode: master or slave mode.
IFX_TAPI_PCM_IF_DCLFREQ_t	nDCLFreq	DCL frequency to be used in master and/or slave mode.
IFX_operation_t	nDoubleClk	Activation/deactivation of the double clock mode. <ul style="list-style-type: none"> • IFX_DISABLE, single clocking is used. • IFX_ENABLE, double clocking is used.
IFX_TAPI_PCM_IF_SLOPE_t	nSlopeTX	Slope to be considered for the PCM transmit direction.
IFX_TAPI_PCM_IF_SLOPE_t	nSlopeRX	Slope to be considered for the PCM receive direction.
IFX_TAPI_PCM_IF_OFFSET_t	nOffsetTX	Transmit bit offset.
IFX_TAPI_PCM_IF_OFFSET_t	nOffsetRX	Receive bit offset.
IFX_TAPI_PCM_IF_DRIVE_t	nDrive	Drive mode for bit 0.

Data Type	Name	Description
IFX_operation_t	nShift	Enable/disable shift access edge. Shift the access edges by one clock cycle. <ul style="list-style-type: none"> • IFX_DISABLE, no shift takes place. • IFX_ENABLE, shift takes place. <i>Note: This setting is defined only in double clock mode.</i>
IFX_uint8_t	nMCTS	Reserved. PCM chip specific setting, it should be set to 0x00 if not differently advised from Infineon support.

4.3.5.57 IFX_TAPI_PKT_VOLUME_t

Description

Packet path volume settings.

Prototype

```
typedef struct
{
    IFX_int32_t nEnc;
    IFX_int32_t nDec;
} IFX_TAPI_PKT_VOLUME_t;
```

Parameters

Data Type	Name	Description
IFX_int32_t	nEnc	Volume setting for the encoding path. The value is given in dB with the range (-24 dB to 24 dB), 1 dB step.
IFX_int32_t	nDec	Volume setting for the decoding path. The value is given in dB with the range (-24 dB to 24 dB), 1 dB step.

4.3.5.58 IFX_TAPI_PKT_EV_GENERATE_t

Description

This structure is used to report a DTMF event to the TAPI from an external software module.

Prototype

```
typedef struct
{
    IFX_char_t event;
    IFX_TAPI_PKT_EV_GEN_ACTION_t action;
    IFX_uint32_t duration;
} IFX_TAPI_PKT_EV_GENERATE_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	event	Event code according to RFC2833.

Data Type	Name	Description
IFX_TAPI_PKT_EV_GEN_ACTION_t	action	Start/tone event generation.
IFX_uint32_t	duration	Duration of event in unit of 10 ms. 0 means forever.

4.3.5.59 IFX_TAPI_PKT_EV_GENERATE_CFG_t

Description

This structure is used to configure support for the reporting of external DTMF events.

Prototype

```
typedef struct
{
    IFX_operation_t local;
} IFX_TAPI_PKT_EV_GENERATE_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_operation_t	local	Enable or disable local play of the DTMF tone.

4.3.5.60 IFX_TAPI_PKT_RTCP_STATISTICS_t

Description

Structure for RTCP Statistics. It refers to the RFC3550/3551.

Prototype

```
typedef struct
{
    IFX_uint32_t ssrc;
    IFX_uint32_t ntp_sec;
    IFX_uint32_t ntp_frac;
    IFX_uint32_t rtp_ts;
    IFX_uint32_t psent;
    IFX_uint32_t osent;
    IFX_uint32_t rssrc;
    IFX_uint32_t fraction;
    IFX_int32_t lost;
    IFX_uint32_t last_seq;
    IFX_uint32_t jitter;
    IFX_uint32_t lsr;
    IFX_uint32_t dlsr;
} IFX_TAPI_PKT_RTCP_STATISTICS_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	ssrc	Sender generating this report.
IFX_uint32_t	ntp_sec	NTP timestamp higher 32 bits. <i>Note: This field is not filled by TAPI.</i>
IFX_uint32_t	ntp_frac	NTP timestamp lower 32 bits. <i>Note: This field is not filled by TAPI.</i>
IFX_uint32_t	rtp_ts	RTP time stamp.
IFX_uint32_t	psent	Sent packet count.
IFX_uint32_t	osent	Sent octets count.
IFX_uint32_t	rssrc	Data source.
IFX_uint32_t	fraction	Receivers fraction loss.
IFX_int32_t	lost	Receivers packet lost.
IFX_uint32_t	last_seq	Extended last seq nr received.
IFX_uint32_t	jitter	Receives interarrival jitter.
IFX_uint32_t	lsr	Last sender report. <i>Note: This field is not filled by TAPI.</i>
IFX_uint32_t	dlsr	Delay since last sender report. <i>Note: This field is not filled by TAPI.</i>

4.3.5.61 IFX_TAPI_PKT_RTP_CFG_t

Description

Structure for RTP Configuration.

RFC2833 event payload types (ePT) for the encoder and decoder part are also configured. Parameter “nPlayEvents” and “nEventPlayPT” are used to configure the payload type for the decoder part.

Prototype

```
typedef struct
{
    IFX_uint16_t nSeqNr;
    IFX_uint32_t nSsrc;
    IFX_uint32_t nTimestamp;
    IFX_uint8_t nEvents;
    IFX_uint8_t nPlayEvents;
    IFX_uint8_t nEventPT;
    IFX_uint8_t nEventPlayPT;
} IFX_TAPI_PKT_RTP_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint16_t	nSeqNr	Start value for the sequence number.
IFX_uint32_t	nSsrc	Synchronization source value for the voice and SID packets.

Data Type	Name	Description
IFX_uint32_t	nTimestamp	Reserved.
IFX_uint8_t	nEvents	Defines how to handle RFC 2833 packets in upstream direction. Set parameter as defined in enum IFX_TAPI_PKT_EV_OOB_t .
IFX_uint8_t	nPlayEvents	Defines whether the received RFC 2833 packets have to be played out. Set parameter as defined in enum IFX_TAPI_PKT_EV_OOBPLAY_t .
IFX_uint8_t	nEventPT	Payload type to be used for RFC 2833 frames in encoder direction (upstream).
IFX_uint8_t	nEventPlayPT	Payload type to be used for RFC 2833 frames in decoder direction (downstream).

Remarks

The parameter 'nEventPlayPT' is ignored if the firmware does not support configuration of different payload types for the decoder and encoder.

4.3.5.62 IFX_TAPI_PKT_RTP_PT_CFG_t

Description

Structure for RTP payload type configuration.

Prototype

```
typedef struct
{
    IFX_uint8_t nPTup[MAX_CODECS];
    IFX_uint8_t nPTdown[MAX_CODECS];
} IFX_TAPI_PKT_RTP_PT_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nPTup[MAX_CODECS]	Table with all payload types, the coder type IFX_TAPI_COD_TYPE_t is used as index.
IFX_uint8_t	nPTdown[MAX_CODECS]	Table with all payload types, the coder type IFX_TAPI_COD_TYPE_t is used as index.

4.3.5.63 IFX_TAPI_POLL_CFG_t

Description

Structure for configuration of polling.

Attention: Please note that these buffer pool functions can be used inside a system interrupt routine!

Prototype

```
typedef struct
{
    IFX_void_t* pBufPoll;
    IFX_void_t* (*getBuf) (IFX_void_t *pBufPool);
    IFX_void_t* (*puBuf) (IFX_void_t *pBuf);
```

```
} IFX_TAPI_POLL_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_void_t*	pBufPoll	Pointer to the buffer pool control structure. The pointer is used together with the buffer get (* getBuf) routine to identify the buffer pool used.
IFX_void_t*	(*getBuf) (IFX_void_t *pBufPool)	Pointer to function used to get an empty buffer from the buffer pool. The buffer is protected and can be exclusively used by the user. The buffer size is predefined at buffer pool initialization time.
IFX_void_t*	(*puBuf) (IFX_void_t *pBuf)	Pointer to function pointer used to return a used buffer back to the buffer pool.

4.3.5.64 IFX_TAPI_POLL_PKT_t

Description

Structure for polling packet handling.

Prototype

```
typedef struct
{
    IFX_void_t** ppPkts;
    IFX_uint32_t* nPktsNum;
} IFX_TAPI_POLL_PKT_t;
```

Parameters

Data Type	Name	Description
IFX_void_t**	ppPkts	Pointer to the first element in an array of packet pointers.
IFX_uint32_t*	nPktsNum	Number of packet pointers in the array.

4.3.5.65 IFX_TAPI_RING_CADENCE_t

Description

Structure for ring cadence used in [IFX_TAPI_RING_CADENCE_HR_SET](#).

Prototype

```
typedef struct
{
    IFX_char_t data[IFX_TAPI_MAX_CADENCE_BYTES];
    IFX_int32_t nr;
    IFX_char_t initial[IFX_TAPI_MAX_CADENCE_BYTES];
    IFX_int32_t initialNr;
} IFX_TAPI_RING_CADENCE_t;
```

Parameters

Data Type	Name	Description
IFX_char_t	data[IFX_TAPI_MAX_CADENCE _BYTES]	Pointer to data bytes which contain the encoded cadence sequence. One bit represents ring cadence voltage for 50 ms. A maximum of 40 bytes (320 bits) are allowed.
IFX_int32_t	nr	Number of data bits of cadence sequence. A maximum number of 320 data bits is possible which corresponds to a maximum cadence duration of 16 seconds.
IFX_char_t	initial[IFX_TAPI_MAX_CADENCE _BYTES]	Obsolete field, please do not use!
IFX_int32_t	initialNr	Obsolete field, please do not use!

4.3.5.66 IFX_TAPI_RING_CFG_t

Description

Ringing configuration structure.

Prototype

```
typedef struct
{
    IFX_uint8_t nMode;
    IFX_uint8_t nSubmode;
} IFX_TAPI_RING_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nMode	Configures the ringing mode. 0 _D INTERNAL_BALANCED internal balanced 1 _D INTERNAL_UNBALANCED_ROT internal unbalanced ROT 2 _D INTERNAL_UNBALANCED_ROR internal unbalanced ROR 3 _D EXTERNAL_IT_CS external SLIC current sense 4 _D EXTERNAL_IO_CS external IO current sense
IFX_uint8_t	nSubmode	Configures the ringing submode. 0 _D DC_RNG_TRIP_STANDARD DC Ring Trip standard 1 _D DC_RNG_TRIP_FAST DC Ring Trip fast 2 _D AC_RNG_TRIP_STANDARD AC Ring Trip standard 3 _D AC_RNG_TRIP_FAST AC Ring Trip fast

4.3.5.67 IFX_TAPI_SIG_DETECTION_t

Description

Structure used for enabling and disabling signal detection.

Prototype

```
typedef struct
{
    IFX_uint32_t sig;
    IFX_uint32_t sig_ext;
} IFX_TAPI_SIG_DETECTION_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	sig	Signals to detect. Can be any combination of IFX_TAPI_SIG_t
IFX_uint32_t	sig_ext	Signals to detect. Can be any combination of IFX_TAPI_SIG_EXT_t

4.3.5.68 IFX_TAPI_T38_DEMOD_DATA_t

Description

Structure to setup the demodulator for T.38 fax and used for [IFX_TAPI_T38_DEMOD_START](#).

Prototype

```
typedef struct
{
    IFX_uint8_t nStandard1;
    IFX_uint8_t nStandard2;
    IFX_uint16_t nSigLen;
    IFX_uint16_t nGainRx;
    IFX_uint8_t nEqualizer;
    IFX_uint8_t nTraining;
    IFX_uint16_t nDmbsd;
} IFX_TAPI_T38_DEMOD_DATA_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nStandard1	Selects the standard used for Fax T.38 using IFX_TAPI_T38_STD_t. <ul style="list-style-type: none"> • 00_H: Silence • 01_H: V.21 • 02_H: V.27/2400 • 03_H: V.27/4800 • 04_H: V.29/7200 • 05_H: V.29/9600 • 06_H: V.17/7200 • 07_H: V.17/9600 • 08_H: V.17/12000
IFX_uint8_t	nStandard2	Selects the alternative standard used for Fax T.38 using IFX_TAPI_T38_STD_t. <ul style="list-style-type: none"> • 00_H: Silence • 01_H: V.21 • 02_H: V.27/2400 • 03_H: V.27/4800 • 04_H: V.29/7200 • 05_H: V.29/9600 • 06_H: V.17/7200 • 07_H: V.17/9600 • 08_H: V.17/12000 • 09_H: V.17/14400 • FF_H: Use only standard 1.
IFX_uint16_t	nSigLen	Signal duration in ms. Used for the tonal signals (CED, CNG) and silence only. 1 < nSigLen < 4000 [ms]
IFX_uint16_t	nGainRx	Sets the receive gain for the upstream direction.
IFX_uint8_t	nEqualizer	Equalizer configuration flag. <ul style="list-style-type: none"> • 0: Reset the equalizer • 1: Reuse the equalizer coefficients
IFX_uint8_t	nTraining	Training sequence flag, used by V.17 only, ignored in all other cases. <ul style="list-style-type: none"> • 0: Short training sequence • 1: Long training sequence
IFX_uint16_t	nDmbsd	Level required before the demodulator sends data.

4.3.5.69 IFX_TAPI_T38_MOD_DATA_t

Description

Structure to setup the modulator for T.38 fax and used for [IFX_TAPI_T38_MOD_START](#).

Prototype

```
typedef struct
{
    IFX_uint8_t nStandard;
    IFX_uint16_t nSigLen;
    IFX_uint16_t nGainTx;
```

```

IFX_uint8_t nDbm;
IFX_uint8_t nTEP;
IFX_uint8_t nTraining;
IFX_uint16_t nMobsrm;
IFX_uint16_t nMobrd;
} IFX_TAPI_T38_MOD_DATA_t;

```

Parameters

Data Type	Name	Description
IFX_uint8_t	nStandard	Selects the standard used for Fax T.38. IFX_TAPI_T38_STD_t <ul style="list-style-type: none"> • 00_H: Silence • 01_H: V.21 • 02_H: V.27/2400 • 03_H: V.27/4800 • 04_H: V.29/7200 • 05_H: V.29/9600 • 06_H: V.17/7200 • 07_H: V.17/9600 • 08_H: V.17/12000 • 09_H: V.17/14400 • 0A_H: CNG • 0B_H: CED
IFX_uint16_t	nSigLen	Signal duration in ms. Used for the ton signals (CED, CNG) and silence only. 1 < nSigLen < 4000 [ms]
IFX_uint16_t	nGainTx	Sets the transmit gain for the downstream direction.
IFX_uint8_t	nDbm	Desired output signal power in -dBm.
IFX_uint8_t	nTEP	TEP Generation flag, used by V.27, V.29 and V.17 only, ignored in all other cases. <ul style="list-style-type: none"> • 0: no TEP generation • 1: TEP generation
IFX_uint8_t	nTraining	Training sequence flag, used by V.17 only, ignored in all other cases. <ul style="list-style-type: none"> • 0: Short training sequence • 1: Long training sequence
IFX_uint16_t	nMobsrm	Level required before the modulation starts.
IFX_uint16_t	nMobrd	Level required before the modulation requests more data.

4.3.5.70 IFX_TAPI_T38_STATUS_t

Description

Structure to read the T.38 fax status and used for [IFX_TAPI_T38_STATUS_GET](#).

Prototype

```

typedef struct
{
    IFX_uint8_t nStatus;
    IFX_uint8_t nError;
}

```

```
} IFX_TAPI_T38_STATUS_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	nStatus	T.38 fax status, refer to IFX_TAPI_T38_STATUS_t . 0 _D IFX_TAPI_FAX_T38_DP_OFF Data pump is not active 1 _D IFX_TAPI_FAX_T38_DP_ON Data pump is active 2 _D IFX_TAPI_FAX_T38_TX_ON Transmission is active 3 _D IFX_TAPI_FAX_T38_TX_OFF Transmission is finished.
IFX_uint8_t	nError	T.38 fax error, refer to IFX_TAPI_T38_ERROR_t . 0 _D IFX_TAPI_FAX_T38_NO_ERR No error occurred 1 _D IFX_TAPI_FAX_T38_ERR Fax error occurred, the fax data pump should be deactivated 2 _D IFX_TAPI_FAX_T38_MIPS_OVLD MIPS overload 3 _D IFX_TAPI_FAX_T38_READ_ERR Error while reading data 4 _D IFX_TAPI_FAX_T38_WRITE_ERR Error while writing data 5 _D IFX_TAPI_FAX_T38_DATA_ERR Error while setting up the modulator or demodulator

4.3.5.71 IFX_TAPI_TEST_LOOP_t

Description

Structure for switching loops for testing

Prototype

```
typedef struct
{
    unsigned char bAnalog;
} IFX_TAPI_TEST_LOOP_t;
```

Parameters

Data Type	Name	Description
unsigned char	bAnalog	Switch an analog loop in the device. If switched on, signals that are played to the subscriber are looped back to the receiving side. <ul style="list-style-type: none"> • 0 IFX_FALSE, Analog loop off • 1 IFX_TRUE, Analog loop on

4.3.5.72 IFX_TAPI_TONE_COMPOSED_t

Description

Structure for definition of composed tones.

Prototype

```
typedef struct
{
```

```

IFX_uint8_t format;
IFX_uint8_t index;
IFX_uint8_t loop;
IFX_uint8_t alternateVoice;
IFX_uint8_t count;
IFX_uint8_t tones[TAPI_MAX_SIMPLE_TONES];
} IFX_TAPI_TONE_COMPOSED_t;

```

Parameters

Data Type	Name	Description
IFX_uint8_t	format	Indicate the type of the tone descriptor: 1_D IFX_TAPI_TONE_TYPE_SIMPLE the tone descriptor describe a simple tone. 2_D IFX_TAPI_TONE_TYPE_COMPOSED the tone descriptor describes a composed tone.
IFX_uint8_t	index	Tone code ID; 0< ID <255.
IFX_uint8_t	loop	Number of times to play the tone sequence, 0 for infinite. Maximum 7.
IFX_uint8_t	alternateVoice	Indicate if the voice path is active between the loops.
IFX_uint8_t	count	Number of simple tones used in the composed tone.
IFX_uint8_t	tones[TAPI_MAX_SIMPLE_TONES]	Simple tones to be used. The simple tones are played in the same order as they are stored in the array. <i>Note: In order to create composed tones only simple tones with a finite loop count can be used.</i>

4.3.5.73 IFX_TAPI_TONE_CPTD_t

Description

Structure used for **IFX_TAPI_TONE_CPTD_START**.

Prototype

```

typedef struct
{
    IFX_int32_t tone;
    IFX_int32_t signal;
} IFX_TAPI_TONE_CPTD_t;

```

Parameters

Data Type	Name	Description
IFX_int32_t	tone	The index of the tone to detect. The tone index must be preconfigured in the tone table, before starting tone detection.
IFX_int32_t	signal	The specification of the signal. 1 _H IFX_TAPI_TONE_CPTD_DIRECTION_RX receive direction of the programmed CPT tone 2 _H IFX_TAPI_TONE_CPTD_DIRECTION_TX transmit direction of the programmed CPT tone

4.3.5.74 IFX_TAPI_TONE_SIMPLE_t

Description

Structure used to define simple tone characteristics.

Prototype

```
typedef struct
{
    IFX_uint8_t format;
    IFX_uint8_t index;
    IFX_uint8_t loop;
    IFX_int32_t levelA;
    IFX_int32_t levelB;
    IFX_int32_t levelC;
    IFX_int32_t levelD;
    IFX_uint32_t freqA;
    IFX_uint32_t freqB;
    IFX_uint32_t freqC;
    IFX_uint32_t freqD;
    IFX_uint32_t cadence[IFX_TAPI_TONE_STEPS_MAX];
    IFX_uint32_t frequencies[IFX_TAPI_TONE_STEPS_MAX];
    IFX_uint32_t modulation[IFX_TAPI_TONE_STEPS_MAX];
    IFX_uint32_t pause;
} IFX_TAPI_TONE_SIMPLE_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	format	Indicate the type of the tone descriptor: 1 _D IFX_TAPI_TONE_TYPE_SIMPLE the tone descriptor describe a simple tone. 2 _D IFX_TAPI_TONE_TYPE_COMPOSED the tone descriptor describe a composed tone.
IFX_uint8_t	index	Tone code ID; 0 < ID < 255.
IFX_uint8_t	loop	Number of times to play the simple tone, 0 < loop < 8.
IFX_int32_t	levelA	Power level for frequency A in 0.1 dB steps; -300 < levelA < 0.

Data Type	Name	Description
IFX_int32_t	levelB	Power level for frequency B in 0.1 dB steps; -300 < levelB < 0.
IFX_int32_t	levelC	Power level for frequency C in 0.1 dB steps; -300 < levelC < 0.
IFX_int32_t	levelD	Power level for frequency D in 0.1 dB steps; -300 < levelD < 0.
IFX_uint32_t	freqA	Tone frequency A in Hz; 0 <= Hz < 4000.
IFX_uint32_t	freqB	Tone frequency B in Hz; 0 <= Hz < 4000.
IFX_uint32_t	freqC	Tone frequency C in Hz; 0 <= Hz < 4000.
IFX_uint32_t	freqD	Tone frequency D in Hz; 0 <= Hz < 4000.
IFX_uint32_t	cadence[IFX_TAPI_TONE_STEPS_MAX]	<p>D IFX_TAPI_TONE_STEPS_MAX Array defining time duration for each cadence steps, with 2 ms granularity. $0 \leq \text{cadence} \leq 32000$.</p> <p>The first cadence[X] = 0 (starting from X=1) in the array indicates that X-1 cadences must be played.</p> <p>A tone with cadence[0]=0 can not be processed!</p>
IFX_uint32_t	frequencies[IFX_TAPI_TONE_STEPS_MAX]	<p>Active frequencies for the cadence steps. More than one frequency can be active in the same cadence step. All active frequencies are summed together.</p> <p> 0_H IFX_TAPI_TONE_FREQNONE No frequencies. 1_H IFX_TAPI_TONE_FREQA Frequency A is enabled. 2_H IFX_TAPI_TONE_FREQB Frequency B is enabled. 4_H IFX_TAPI_TONE_FREQC Frequency C is enabled. 8_H IFX_TAPI_TONE_FREQD Frequency D is enabled. F_H IFX_TAPI_TONE_FREQALL All frequencies are enabled. </p>
IFX_uint32_t	modulation[IFX_TAPI_TONE_STEPS_MAX]	<p>Array containing selection for each cadence steps, whether to enable/disable modulation of frequency A with frequency B. Defined values for each array entry:</p> <p> 0_D IFX_TAPI_TONE_MODULATION_OFF Modulation of frequency A with frequency B is disabled. 1_D IFX_TAPI_TONE_MODULATION_ON Modulation of frequency A with frequency B is enabled. </p>
IFX_uint32_t	pause	<p>Some tones require an off time at the end of the tone. The offtime will be added to the last used cadence. Therefore the maximum value for offtime is 32000 - "last used cadence" and have the granularity of 2 ms;</p> <p>$0 < 32000 - \text{"last used cadence"} < 32000$.</p>

4.3.5.75 IFX_TAPI_WLEC_CFG_t

Description

Line echo canceller (LEC) configuration.

Prototype

```
typedef struct
{
    IFX_TAPI_WLEC_TYPE_t nType;
    IFX_char_t bNlp;
} IFX_TAPI_WLEC_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_TAPI_WLEC_TYPE_t	nType	LEC type selection.
IFX_char_t	bNlp	Switch the NLP on or off. 0_D TAPI_LEC_NLPDEFAULT NLP is default 1_D TAPI_LEC_NLP_ON NLP is on 2_D TAPI_LEC_NLP_OFF NLP is off

4.3.5.76 IFX_TAPI_VERSION_t

Description

Structure used for the TAPI version support check.

Prototype

```
typedef struct
{
    IFX_uint8_t major;
    IFX_uint8_t minor;
} IFX_TAPI_VERSION_t;
```

Parameters

Data Type	Name	Description
IFX_uint8_t	major	Major version number supported
IFX_uint8_t	minor	Minor version number supported

4.3.6 Enumerator Reference

This chapter contains the Enumerator reference.

Table 94 Enumerator Overview of TAPI Interfaces

Name	Description
DEV_ERR	Error codes
IFX_TAPI_AUDIO_AFE_PIN_MIC_t	AFE Microphone Inputs.
IFX_TAPI_AUDIO_AFE_PIN_OUT_t	AFE Outputs.
IFX_TAPI_AUDIO_ICA_t	Selector for Auxiliary Channel based functionalities In Call Announcement / Off Hook Voice Announcement.
IFX_TAPI_AUDIO_MODE_t	Audio loop and audio diagnostics modes.
IFX_TAPI_AUDIO_TEST_MODES_t	Lists the ports for the capability list.
IFX_TAPI_CAP_SIG_DETECT_t	Lists the signal detectors for the capability list.
IFX_TAPI_CAP_TYPE_t	Enumeration used for phone capabilities types.
IFX_TAPI_CH_INIT_COUNTRY_t	Country selection for IFX_TAPI_CH_INIT_t.
IFX_TAPI_CH_INIT_MODE_t	TAPI Initialization modes, selection for target system.
IFX_TAPI_CID_ABSREASON_t	ABSCLI/ABSNAME settings.
IFX_TAPI_CID_ALERT_ETSİ_t	List of ETSI Alerts.
IFX_TAPI_CID_HOOK_MODE_t	Caller ID transmission modes.
IFX_TAPI_CID_MSG_TYPE_t	Caller ID message types (defined in ETSI EN 300 659-3).
IFX_TAPI_CID_RX_ERROR_t	CID receiver Errors.
IFX_TAPI_CID_RX_STATE_t	CID receiver Status.
IFX_TAPI_CID_SERVICE_TYPE_t	Caller ID Services (defined in ETSI EN 300 659-3).
IFX_TAPI_CID_STD_t	List of CID standards.
IFX_TAPI_CID_VMWI_t	List of VMWI settings.
IFX_TAPI_COD_LENGTH_t	Packetization length.
IFX_TAPI_COD_LENGTH_t	Defines encoding length.
IFX_TAPI_COD_TYPE_t	Definition of codecs.
IFX_TAPI_COD_TYPE_t	Possible codecs.
IFX_TAPI_DATA_MAP_START_STOP_t	Start/Stop information for data channel mapping.
IFX_TAPI_DIALING_STATUS_t	Enumeration for dial status events.
IFX_TAPI_DWLD_TYPE_t	Definition of download type.
IFX_TAPI_ENC_AGC_MODE_t	Specifies the Enable/Disable mode of the AGC resource.
IFX_TAPI_ENC_TYPE_t	Obsolete. Possible codecs.
IFX_TAPI_ENC_VAD_t	Enumeration used for ioctl VAD interface.
IFX_TAPI_EVENT_ID_t	Event ID.
IFX_TAPI_EVENT_TYPE_t	Event type.
IFX_TAPI_FXO_HOOK_t	Enumeration for FXO hook.
IFX_TAPI_JB_LOCAL_ADAPT_t	Jitter buffer adoption.
IFX_TAPI_JB_PKT_ADAPT_t	Jitter buffer packet adaptation.
IFX_TAPI_JB_TYPE_t	Jitter buffer type.
IFX_TAPI_KPI_STREAM_t	Enum used to name the packet streams that can be redirected to KPI

Table 94 Enumerator Overview of TAPI Interfaces (cont'd)

Name	Description
<code>IFX_TAPI_LEC_GAIN_t</code>	LEC Gain Levels.
<code>IFX_TAPI_LEC_NLP_t</code>	LEC NLP (Non Linear Processor) Settings.
<code>IFX_TAPI_LEC_TYPE_t</code>	LEC type selection.
<code>IFX_TAPI_LINE_FEED_t</code>	Defines for linefeeding.
<code>IFX_TAPI_LINE_HOOK_STATUS_t</code>	Enumeration for hook status events.
<code>IFX_TAPI_LINE_HOOK_VALIDATION_TYPE_t</code>	Validation types used for structure <code>IFX_TAPI_LINE_HOOK_VT_t</code> .
<code>IFX_TAPI_LINE_LEVEL_t</code>	Specifies the Enable/Disable mode of the high level.
<code>IFX_TAPI_LINE_STATUS_t</code>	Enumeration for phone line status information.
<code>IFX_TAPI_LINE_TYPE_t</code>	Enumeration specifying the line type.
<code>IFX_TAPI_MAP_DATA_TYPE_t</code>	Data channel destination types (conferencing).
<code>IFX_TAPI_MAP_DEC_t</code>	Play out enabling and disabling information.
<code>IFX_TAPI_MAP_ENC_t</code>	Recording enabling and disabling information.
<code>IFX_TAPI_MAP_TYPE_t</code>	Type channel for mapping.
<code>IFX_TAPI_METER_MODE_t</code>	Metering Modes.
<code>IFX_TAPI_PCM_IF_DCLFREQ_t</code>	DCL frequency for the PCM interface.
<code>IFX_TAPI_PCM_IF_DRIVE_t</code>	Drive mode for bit 0, in single clocking mode.
<code>IFX_TAPI_PCM_IF_MCTS_t</code>	Source for the master mode clock tracking..
<code>IFX_TAPI_PCM_IF_MODE_t</code>	PCM interface mode (for example master, slave, etc).
<code>IFX_TAPI_PCM_IF_OFFSET_t</code>	PCM interface mode transmit/receive offset.
<code>IFX_TAPI_PCM_IF_SLOPE_t</code>	Slope for the PCM interface transmit/receive.
<code>IFX_TAPI_PCM_RES_t</code>	Coding for the PCM channel.
<code>IFX_TAPI_PKT_AAL_PROFILE_RANGE_t</code>	Used for <code>IFX_TAPI_PCK_AAL_PROFILE_t</code> in case one coder range.
<code>IFX_TAPI_PKT_EV_GEN_ACTION_t</code>	Start/stop event generation.
<code>IFX_TAPI_PKT_EV_NUM_t</code>	Out of band or in band definition.
<code>IFX_TAPI_PKT_EV_OOB_t</code>	Out of band or in band definition.
<code>IFX_TAPI_PKT_EV_OOBPLAY_t</code>	Defines the play out of received RFC2833 event packets.
<code>IFX_TAPI_POLL_PKT_TYPE_t</code>	Defines the packet types supported by polling.
<code>IFX_TAPI_RING_CFG_MODE_t</code>	Ring Configuration mode.
<code>IFX_TAPI_RING_CFG_SUBMODE_t</code>	Ring Configuration sub-mode.
<code>IFX_TAPI_RUNTIME_ERROR_t</code>	TAPI Runtime Errors.
<code>IFX_TAPI_SIG_EXT_t</code>	Additional list the tone detection options.
<code>IFX_TAPI_SIG_t</code>	List the tone detection options.
<code>IFX_TAPI_T38_ERROR_t</code>	T38 Fax errors.
<code>IFX_TAPI_T38_STATUS_t</code>	T38 Fax Datapump states.
<code>IFX_TAPI_T38_STD_t</code>	T38 Fax standards.
<code>IFX_TAPI_TDM_IF_TYPE_t</code>	TDM interface type.
<code>IFX_TAPI_TONE_CPTD_DIRECTION_t</code>	Specifies the CPT signal for CPT detection.
<code>IFX_TAPI_TONE_FREQ_t</code>	Frequency setting for a cadence step.
<code>IFX_TAPI_TONE_GROUP_t</code>	Tone grouping.

Table 94 Enumerator Overview of TAPI Interfaces (cont'd)

Name	Description
<code>IFX_TAPI_TONE_MODULATION_t</code>	Modulation setting for a cadence step.
<code>IFX_TAPI_TONE_TG_t</code>	Defines the tone generator usage.
<code>IFX_TAPI_TONE_TYPE_t</code>	Tone types.
<code>IFX_TAPI_WB_t</code>	Enum for wideband activation.
<code>IFX_TAPI_WLEC_NLP_t</code>	NLP configuration.
<code>IFX_TAPI_WLEC_TYPE_t</code>	WLEC type configuration.

4.3.6.1 DEV_ERR

Description

Low-level driver error codes.

Attention: The error codes listed in this enum are not defined for each Infineon product, for more details please refer to the product specific documentation.

Prototype

```
typedef enum
{
    ERR_OK = 0,
    ERR_CERR = 0x01,
    ERR_CIBX_OF = 0x2,
    ERR_HOST = 0x3,
    ERR_MIPS_OL = 0x4,
    ERR_NO_COBX = 0x5,
    ERR_NO_DATA = 0x6,
    ERR_NO_FIBXMS = 0x7,
    ERR_MORE_DATA = 0x8,
    ERR_NO_MBXEMPTY = 0x9,
    ERR_NO_DLRDY = 0xA,
    ERR_WRONGDATA = 0xB,
    ERR_OBXML_ZERO = 0xC,
    ERR_TEST_FAIL = 0xD,
    ERR_HW_ERR = 0xE,
    ERR_PIBX_OF = 0xF,
    ERR_FUNC_PARM = 0x10,
    ERR_TO_CHSTATE = 0x11,
    ERR_BUF_UN = 0x12,
    ERR_NO_MEM = 0x13,
    ERR_NOINIT = 0x14,
    ERR_INTSTUCK = 0x15,
    ERR_LT_ON = 0x16,
    ERR_NOPHI = 0x17,
    ERR_EDSP_FAIL = 0x18,
    ERR_FW_CRC_FAIL = 0x19,
    ERR_NO_TAPI = 0x1A,
    ERR_SPI = 0x1B,
    ERR_INVALID = 0x1C,
    ERR_GR909 = 0x1D,
```

```
ERR_ACCRC_FAIL = 0x1E,
ERR_NO_VERSION = 0x1F,
ERR_DCCRC_FAIL = 0x20,
ERR_UNKNOWN_VERSION = 0x21,
ERR_LT_LINE_IS_PDNH = 0x22,
ERR_LT_UNKNOWN_PARAM = 0x23,
ERR_CID_TRANSMIT = 0x24,
ERR_LT_TIMEOUT_LM_OK = 0x25,
ERR_LT_TIMEOUT_LM_RAMP_RDY = 0x26,
ERR_PRAM_FW = 0x27,
ERR_NOFW = 0x28,
ERR_PHICRC0 = 0x29,
ERR_ARCDWLD_FAIL = 0x2A,
ERR_ARCDWLD_BOOT = 0x2B,
ERR_FWINVALID = 0x2C,
ERR_NOFWVERS = 0x2D,
ERR_NOMAXCBX = 0x2E,
ERR_SIGMOD_NOTEN = 0x2F,
ERR_SIGCH_NOTEN = 0x30,
ERR_CODCONF_NOTVALID = 0x31,
ERR_LT_OPTRES_FAILED = 0x32,
ERR_NO_FREE_INPUT_SLOT = 0x33,
ERR_NOTSUPPORTED = 0x34,
ERR_NORESOURCE = 0x35,
ERR_WRONG_EVPT = 0x36,
ERR_CON_INVALID = 0x37,
ERR_HOSTREG_ACCESS = 0x38,
ERR_NOPKT_BUFF = 0x39,
ERR_COD_RUNNING = 0x3A,
ERR_TONE_PLAYING = 0x3B,
ERR_INVALID_TONERES = 0x3C,
ERR_INVALID_SIGSTATE = 0x3D,
ERR_INVALID_UTGSTATE = 0x3E,
ERR_CID_RUNNING = 0x3F,
ERR_UNKNOWN = 0x40,
ERR_WRONG_CHANNEL_MODE = 0x41,
ERR_DRVINIT_FAIL = 0x80,
ERR_DEV_ERR = 0x81
} DEV_ERR_t;
```

Parameters

Name	Value	Description
ERR_OK	0	0x0: no error.
ERR_CERR	01 _H	Command error, see last command.
ERR_CIBX_OF	2 _H	Command inbox overflow.
ERR_HOST	3 _H	Host error.
ERR_MIPS_OL	4 _H	MIPS overload.

Name	Value	Description
ERR_NO_COBX	5 _H	No command data received event within time-out. This error is obsolete, since the driver used a polling mode.
ERR_NO_DATA	6 _H	No command data received within time-out.
ERR_NO_FIBXMS	7 _H	Not enough inbox space for writing command.
ERR_MORE_DATA	8 _H	More data then expected in outbox.
ERR_NO_MBXEMPTY	9 _H	Mailbox was not empty after time-out. This error occurs while the driver tries to switch the mailbox sizes before and after the firmware download. The time-out is given in the constant WAIT_MBX_EMPTY.
ERR_NO_DLRDY	A _H	Download ready event has not occurred.
ERR_WRONGDATA	B _H	Register read: expected values do not match.
ERR_OBXML_ZERO	C _H	OBXML is zero after COBX-DATA event. This error is obsolete, since the driver is polling the OBXML register, i.e. the COBX-DATA event is not handled anymore in the interrupt routine.
ERR_TEST_FAIL	D _H	Test chip access failed.
ERR_HW_ERR	E _H	Internal EDSP hardware error reported in HWSR1:HW-ERR.
ERR_PIBX_OF	F _H	Mailbox Overflow Error.
ERR_FUNC_PARM	10 _H	Invalid parameter in function call.
ERR_TO_CHSTATE	11 _H	Time-out while waiting on channel status change.
ERR_BUF_UN	12 _H	Buffer under run in evaluation down streaming.
ERR_NO_MEM	13 _H	No memory by memory allocation.
ERR_NOINIT	14 _H	Board previously not initialized.
ERR_INTSTUCK	15 _H	Interrupts can not be cleared.
ERR_LT_ON	16 _H	Line testing measurement is running.
ERR_NOPHI	17 _H	PHI patch was not successfully downloaded. There was a chip access problem.
ERR_EDSP_FAIL	18 _H	EDSP Failures.
ERR_FW_CRC_FAIL	19 _H	CRC Fail while FW download.
ERR_NO_TAPI	1A _H	TAPI not initialized.
ERR_SPI	1B _H	Error while using SPI Interface.
ERR_INVALID	1C _H	Inconsistent or invalid parameters were provided.
ERR_GR909	1D _H	No Data to copy to user space for GR909 measurement.
ERR_ACCCRC_FAIL	1E _H	CRC Fail while ALM-DSP download for V1.4.
ERR_NO_VERSION	1F _H	Couldn't read out chip version.
ERR_DCCRC_FAIL	20 _H	CRC Fail in DCCTRL download.
ERR_UNKNOWN_VERSION	21 _H	Unknown chip version.
ERR_LT_LINE_IS_PDNH	22 _H	Linetesting, line is in Power Down High Impedance, measurement not possible.
ERR_LT_UNKNOWN_PARAM	23 _H	Linetesting, unknown Parameter.
ERR_CID_TRANSMIT	24 _H	Error while sending CID.
ERR_LT_TIMEOUT_LM_OK	25 _H	Linetesting, time-out waiting for LM_OK.

Name	Value	Description
ERR_LT_TIMEOUT_LM_RAMP_RDY	26 _H	Linetesting, time-out waiting for RAMP_RDY.
ERR_PRAM_FW	27 _H	Invalid pram fw length.
ERR_NOFW	28 _H	No firmware specified and not included in driver.
ERR_PHICRC0	29 _H	PHI CRC is zero.
ERR_ARCDWLD_FAIL	2A _H	Embedded Controller download failed.
ERR_ARCDWLD_BOOT	2B _H	Embedded Controller boot failed after download.
ERR_FWINVALID	2C _H	Firmware binary is invalid.
ERR_NOFWVERS	2D _H	Firmware version could not be read, no answer to command.
ERR_NOMAXCBX	2E _H	Maximize mailbox failed.
ERR_SIGMOD_NOTEN	2F _H	Signaling module not enabled.
ERR_SIGCH_NOTEN	30 _H	Signaling channel not enabled.
ERR_CODCONF_NOTVALID	31 _H	Coder configuration not valid.
ERR_LT_OPTRES_FAILED	32 _H	Linetesting, optimum result routine failed.
ERR_NO_FREE_INPUT_SLOT	33 _H	No free input found while connecting cod, sig and alm modules.
ERR_NOTSUPPORTED	34 _H	Feature or combination not supported.
ERR_NORESOURCE	35 _H	Resource not available.
ERR_WRONG_EVPT	36 _H	Event payload type mismatch.
ERR_CON_INVALID	37 _H	Connection not valid on remove.
ERR_HOSTREG_ACCESS	38 _H	Host register access failure.
ERR_NOPKT_BUFF	39 _H	No packet buffers available.
ERR_COD_RUNNING	3A _H	At least one parameter is not possible to apply when the coder is running. Event payload types cannot be changed on the fly.
ERR_TONE_PLAYING	3B _H	Tone is already played out on this channel.
ERR_INVALID_TONERES	3C _H	Tone resource is not capable playing out a certain tone. This error should not occur -> internal mismatch.
ERR_INVALID_SIGSTATE	3D _H	Invalid state for switching off signaling modules. Internal error.
ERR_INVALID_UTGSTATE	3E _H	Invalid state for switching off signaling modules. Internal error.
ERR_CID_RUNNING	3F _H	Cid sending is ongoing in this channel.
ERR_UNKNOWN	40 _H	Some internal state occurred, that could not be handled. This error should never occur.
ERR_WRONG_CHANNEL_MODE	41 _H	Action not supported with this TAPI initialisation mode.
ERR_DRVINIT_FAIL	80 _H	Driver initialization failed.
ERR_DEV_ERR	81 _H	General access error, RDQ bit is always 1.

4.3.6.2 IFX_TAPI_ACTION_t

Description

Start/stop event generation.

Prototype

```
typedef enum
{
    IFX_TAPI_STOP = 0,
    IFX_TAPI_START = 1
} IFX_TAPI_ACTION_t;
```

Parameters

Name	Value	Description
IFX_TAPI_STOP	0 _D	Stop event generation.
IFX_TAPI_START	1 _D	Start event generation.

4.3.6.3 IFX_TAPI_AUDIO_AFE_PIN_MIC_t**Description**

AFE Microphone Inputs.

Prototype

```
typedef enum
{
    IFX_TAPI_AUDIO_AFE_PIN_MIC1 = 0,
    IFX_TAPI_AUDIO_AFE_PIN_MIC2 = 1,
    IFX_TAPI_AUDIO_AFE_PIN_MIC3 = 2,
    IFX_TAPI_AUDIO_AFE_PIN_MIC4 = 3
} IFX_TAPI_AUDIO_AFE_PIN_MIC_t;
```

Parameters

Name	Value	Description
IFX_TAPI_AUDIO_AFE_PIN_MIC1	0 _D	Use AFE microphone input 1. Not possible for Hands-free. <i>Note: INCA-IP2: pins MIP1/MIN1.</i>
IFX_TAPI_AUDIO_AFE_PIN_MIC2	1 _D	Use AFE microphone input 2. Not possible for Hands-free. <i>Note: INCA-IP2: pins MIP2/MIN2.</i>
IFX_TAPI_AUDIO_AFE_PIN_MIC3	2 _D	Use AFE microphone input 3. Default for hands-free. <i>Note: INCA-IP2: pins MIP3/MIN3.</i>
IFX_TAPI_AUDIO_AFE_PIN_MIC4	3 _D	Use AFE microphone input 4. Not possible for Handset/Headset. To be used for OHVA. <i>Note: INCA-IP2: pins MIP4/MIN4.</i>

4.3.6.4 IFX_TAPI_AUDIO_AFE_PIN_OUT_t**Description**

AFE Outputs.

Prototype

```
typedef enum
{
    IFX_TAPI_AUDIO_AFE_PIN_OUT1 = 0,
    IFX_TAPI_AUDIO_AFE_PIN_OUT2 = 1,
    IFX_TAPI_AUDIO_AFE_PIN_OUT3 = 2,
    IFX_TAPI_AUDIO_AFE_PIN_OUT4 = 3
} IFX_TAPI_AUDIO_AFE_PIN_OUT_t _t;
```

Parameters

Name	Value	Description
IFX_TAPI_AUDIO_AFE_PIN_OUT1	0 _D	INCA-IP2: pins HOP1/HON1.
IFX_TAPI_AUDIO_AFE_PIN_OUT2	1 _D	INCA-IP2: pins HOP2/HON2.
IFX_TAPI_AUDIO_AFE_PIN_OUT3	2 _D	INCA-IP2: pins LSP1/LSN1.
IFX_TAPI_AUDIO_AFE_PIN_OUT4	3 _D	INCA-IP2: pins LSP2/LSN2.

4.3.6.5 IFX_TAPI_AUDIO_ICA_t**Description**

Selector for Auxiliary Channel based functionalities In Call Announcement / Off Hook Voice Announcement.

Prototype

```
typedef enum
{
    IFX_TAPI_AUDIO_ICA_DISABLED = 0,
    IFX_TAPI_AUDIO_ICA_OUT = 1,
    IFX_TAPI_AUDIO_ICA_INOUT = 2
} IFX_TAPI_AUDIO_ICA_t;
```

Parameters

Name	Value	Description
IFX_TAPI_AUDIO_ICA_DISABLED	0 _D	Disable In-call annoucement/OHVA.
IFX_TAPI_AUDIO_ICA_OUT	1 _D	In-call annoucement, using the audio aux port as output.
IFX_TAPI_AUDIO_ICA_INOUT	2 _D	In-call Annoucement, using the audio aux port as input/output (OHVA).

4.3.6.6 IFX_TAPI_AUDIO_MODE_t**Description**

Audio modes for the audio channel.

Prototype

```
typedef enum
{
    IFX_TAPI_AUDIO_MODE_DISABLED = 0,
```

```

IFX_TAPI_AUDIO_MODE_HANDSET = 1,
IFX_TAPI_AUDIO_MODE_HANDSET_OPENL = 2,
IFX_TAPI_AUDIO_MODE_HEADSET = 3,
IFX_TAPI_AUDIO_MODE_HEADSET_OPENL = 4,
IFX_TAPI_AUDIO_MODE_HANDSFREE = 5
} IFX_TAPI_AUDIO_MODE_t;

```

Parameters

Name	Value	Description
IFX_TAPI_AUDIO_MODE_DISABLED	0 _D	Audio channel is disabled.
IFX_TAPI_AUDIO_MODE_HANDSET	1 _D	Handset mode.
IFX_TAPI_AUDIO_MODE_HANDSET_OPENL	2 _D	Handset mode with open listening.
IFX_TAPI_AUDIO_MODE_HEADSET	3 _D	Headset mode.
IFX_TAPI_AUDIO_MODE_HEADSET_OPENL	4 _D	Headset mode with open listening.
IFX_TAPI_AUDIO_MODE_HANDSFREE	5 _D	Hands-free mode.

4.3.6.7 IFX_TAPI_AUDIO_TEST_MODES_t

Description

Audio loop and audio diagnostics modes.

Prototype

```

typedef enum
{
    IFX_TAPI_AUDIO_TEST_DISABLED = 0,
    IFX_TAPI_AUDIO_TEST_DIAGNOSTIC = 1,
    IFX_TAPI_AUDIO_TEST_LOOP = 2
} IFX_TAPI_AUDIO_TEST_MODES_t;

```

Parameters

Name	Value	Description
IFX_TAPI_AUDIO_TEST_DISABLED	0 _D	The test mode is disabled: the audio channel can be used as usual.
IFX_TAPI_AUDIO_TEST_DIAGNOSTIC	1 _D	Diagnostic test mode.
IFX_TAPI_AUDIO_TEST_LOOP	2 _D	Loop test mode.

4.3.6.8 IFX_TAPI_AUDIO_ROOM_TYPE_t

Description

Audio modes.

Prototype

```

typedef enum
{
    IFX_TAPI_AUDIO_ROOM_TYPE_MUFFLED = 1,

```

```

IFX_TAPI_AUDIO_ROOM_TYPE_MEDIUM = 2,
IFX_TAPI_AUDIO_ROOM_TYPE_ECHOIC = 3
} IFX_TAPI_AUDIO_ROOM_TYPE_t;

```

Parameters

Name	Value	Description
IFX_TAPI_AUDIO_ROOM_TYPE_MUFFLED	1 _D	Muffled room, low echo level.
IFX_TAPI_AUDIO_ROOM_TYPE_MEDIUM	2 _D	Medium echo level.
IFX_TAPI_AUDIO_ROOM_TYPE_ECHOIC	3 _D	Echoic room, high echo level.

4.3.6.9 IFX_TAPI_CAP_PORT_t

Description

Lists the ports for the capability list.

Prototype

```

typedef enum
{
    IFX_TAPI_CAP_PORT_POTS = 0,
    IFX_TAPI_CAP_PORT_PSTN = 1,
    IFX_TAPI_CAP_PORT_HANDSET = 2,
    IFX_TAPI_CAP_PORT_SPEAKER = 3
} IFX_TAPI_CAP_PORT_t;

```

Parameters

Name	Value	Description
IFX_TAPI_CAP_PORT_POTS	0 _D	POTS port available
IFX_TAPI_CAP_PORT_PSTN	1 _D	PSTN port available
IFX_TAPI_CAP_PORT_HANDSET	2 _D	Handset port available
IFX_TAPI_CAP_PORT_SPEAKER	3 _D	Speaker port available

4.3.6.10 IFX_TAPI_CAP_SIG_DETECT_t

Description

Lists the signal detectors for the capability list.

Prototype

```

typedef enum
{
    IFX_TAPI_CAP_SIG_DETECT_CNG = 0,
    IFX_TAPI_CAP_SIG_DETECT_CED = 1,
    IFX_TAPI_CAP_SIG_DETECT_DIS = 2,
    IFX_TAPI_CAP_SIG_DETECT_POWER = 3,
    IFX_TAPI_CAP_SIG_DETECT_CPTD = 4,
    IFX_TAPI_CAP_SIG_DETECT_V8BIS = 5
}

```

```
} IFX_TAPI_CAP_SIG_DETECT_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CAP_SIG_DETECT_CNG	0 _D	Signal detection for CNG is available.
IFX_TAPI_CAP_SIG_DETECT_CED	1 _D	Signal detection for CED is available.
IFX_TAPI_CAP_SIG_DETECT_DIS	2 _D	Signal detection for DIS is available.
IFX_TAPI_CAP_SIG_DETECT_POWER	3 _D	Signal detection for line power is available.
IFX_TAPI_CAP_SIG_DETECT_CPTD	4 _D	Signal detection for CPT is available.
IFX_TAPI_CAP_SIG_DETECT_V8BIS	5 _D	Signal detection for V8.bis is available.

4.3.6.11 IFX_TAPI_CAP_TYPE_t

Description

Enumeration used for phone capabilities types.

Prototype

```
typedef enum
{
    IFX_TAPI_CAP_TYPE_VENDOR = 0,
    IFX_TAPI_CAP_TYPE_DEVICE = 1,
    IFX_TAPI_CAP_TYPE_PORT = 2,
    IFX_TAPI_CAP_TYPE_CODEC = 3,
    IFX_TAPI_CAP_TYPE_DSP = 4,
    IFX_TAPI_CAP_TYPE_PCM = 5,
    IFX_TAPI_CAP_TYPE_CODECS = 6,
    IFX_TAPI_CAP_TYPE_PHONES = 7,
    IFX_TAPI_CAP_TYPE_SIG = 8,
    IFX_TAPI_CAP_TYPE_T38 = 9
} IFX_TAPI_CAP_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CAP_TYPE_VENDOR	0 _D	Capability type: representation of the vendor.
IFX_TAPI_CAP_TYPE_DEVICE	1 _D	Capability type: representation of the Underlying device.
IFX_TAPI_CAP_TYPE_PORT	2 _D	Capability type: information about available ports.
IFX_TAPI_CAP_TYPE_CODEC	3 _D	Capability type: vocoder type.
IFX_TAPI_CAP_TYPE_DSP	4 _D	Capability type: DSP functionality available.
IFX_TAPI_CAP_TYPE_PCM	5 _D	Capability type: number of PCM modules.
IFX_TAPI_CAP_TYPE_CODECS	6 _D	Capability type: number of coder modules.
IFX_TAPI_CAP_TYPE_PHONES	7 _D	Capability type: number of analog interfaces.
IFX_TAPI_CAP_TYPE_SIG	8 _D	Capability type: number of signaling modules.
IFX_TAPI_CAP_TYPE_T38	9 _D	Capability type: T.38 support.

4.3.6.12 IFX_TAPI_CH_INIT_COUNTRY_t

Description

Country selection for [IFX_TAPI_CH_INIT_t](#).

For future purposes, not yet used. If different countries are supported by the implementation, this parameter specifies which one.

Prototype

```
typedef enum
{
    IFX_TAPI_CH_INIT_COUNTRY_DEFAULT = 0,
    IFX_TAPI_CH_INIT_COUNTRY_DE = 1,
    IFX_TAPI_CH_INIT_COUNTRY_US = 2,
    IFX_TAPI_CH_INIT_COUNTRY_UK = 3
} IFX_TAPI_CH_INIT_COUNTRY_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CH_INIT_COUNTRY_DEFAULT	0 _D	Default country.
IFX_TAPI_CH_INIT_COUNTRY_DE	1 _D	Germany.
IFX_TAPI_CH_INIT_COUNTRY_US	2 _D	USA.
IFX_TAPI_CH_INIT_COUNTRY_UK	3 _D	United Kingdom.

4.3.6.13 IFX_TAPI_CH_INIT_MODE_t

Description

TAPI Initialization modes, selection for target system.

If different modes are supported by the implementation, this parameter specifies which mode should be set up. The meaning of the mode is dependent on the implementation.

Prototype

```
typedef enum
{
    IFX_TAPI_INIT_MODE_DEFAULT = 0,
    IFX_TAPI_INIT_MODE_VOICE_CODER = 1,
    IFX_TAPI_INIT_MODE_PCM_DSP = 2,
    IFX_TAPI_INIT_MODE_PCM_PHONE = 3,
    IFX_TAPI_INIT_MODE_NONE = 0xFF
} IFX_TAPI_CH_INIT_MODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_INIT_MODE_DEFAULT	0 _D	Default initialization.
IFX_TAPI_INIT_MODE_VOICE_CODE R	1 _D	Typical VoIP solution. Phone connected to a packet coder (data channel) with DSP features for signal detection
IFX_TAPI_INIT_MODE_PCM_DSP	2 _D	Phone to PCM using DSP features for signal detection.
IFX_TAPI_INIT_MODE_PCM_PHONE	3 _D	Phone to PCM not using DSP features for signal detection.
IFX_TAPI_INIT_MODE_NONE	FF _H	Phone to PCM connection without DSP features.

4.3.6.14 IFX_TAPI_CID_ABSREASON_t

Description

List of ABSCLI/ABSNAME settings.

Prototype

```
typedef enum
{
    IFX_TAPI_CID_ABSREASON_UNAV = 0x4F,
    IFX_TAPI_CID_ABSREASON_PRIV = 0x50
} IFX_TAPI_CID_ABSREASON_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_ABSREASON_UNAV	4F _H	Unavailable/Unknown.
IFX_TAPI_CID_ABSREASON_PRIV	50 _H	Private.

4.3.6.15 IFX_TAPI_CID_ALERT_ETSIt

Description

List of ETSI Alerts.

Prototype

```
typedef enum
{
    IFX_TAPI_CID_ALERT_ETSIt_FR = 0x0,
    IFX_TAPI_CID_ALERT_ETSIt_DTAS = 0x1,
    IFX_TAPI_CID_ALERT_ETSIt_RP = 0x2,
    IFX_TAPI_CID_ALERT_ETSIt_LRDTAS = 0x3
} IFX_TAPI_CID_ALERT_ETSIt;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_ALERT_ETSI_FR	0 _H	First Ring Burst. <i>Note: Defined only CID transmission associated with ringing.</i>
IFX_TAPI_CID_ALERT_ETSI_DTAS	1 _H	DTAS.
IFX_TAPI_CID_ALERT_ETSI_RP	2 _H	Ring Pulse.
IFX_TAPI_CID_ALERT_ETSI_LRDTAS	3 _H	Line Reversal (alias Polarity Reversal) followed by DTAS.

4.3.6.16 IFX_TAPI_CID_HOOK_MODE_t

Description

Caller ID transmission modes.

Prototype

```
typedef enum
{
    IFX_TAPI_CID_HM_ONHOOK = 0x0,
    IFX_TAPI_CID_HM_OFFHOOK = 0x1
} IFX_TAPI_CID_HOOK_MODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_HM_ONHOOK	0 _H	On-hook transmission. Applicable to CID type 1 and MWI
IFX_TAPI_CID_HM_OFFHOOK	1 _H	Off-hook transmission. Applicable to CID type 2 and MWI

Remarks

Information required especially for FSK framing.

4.3.6.17 IFX_TAPI_CID_MSG_TYPE_t

Description

Caller ID Message Type defined in ETSI EN 300 659-3.

Prototype

```
typedef enum
{
    IFX_TAPI_CID_MT_CSUP = 0x80,
    IFX_TAPI_CID_MT_MWI = 0x82,
    IFX_TAPI_CID_MT_AOC = 0x86,
    IFX_TAPI_CID_MT_SMS = 0x89,
    IFX_TAPI_CID_MT_RES01 = 0xF1,
    IFX_TAPI_CID_MT_RES02 = 0xF2,
```

```

IFX_TAPI_CID_MT_RES03 = 0xF3,
IFX_TAPI_CID_MT_RES04 = 0xF4,
IFX_TAPI_CID_MT_RES05 = 0xF5,
IFX_TAPI_CID_MT_RES06 = 0xF6,
IFX_TAPI_CID_MT_RES07 = 0xF7,
IFX_TAPI_CID_MT_RES08 = 0xF8,
IFX_TAPI_CID_MT_RES09 = 0xF9,
IFX_TAPI_CID_MT_RES0A = 0xFA,
IFX_TAPI_CID_MT_RES0B = 0xFB,
IFX_TAPI_CID_MT_RES0C = 0xFC,
IFX_TAPI_CID_MT_RES0D = 0xFD,
IFX_TAPI_CID_MT_RES0E = 0xFE,
IFX_TAPI_CID_MT_RES0F = 0xFF
} IFX_TAPI_CID_MSG_TYPE_t;

```

Parameters

Name	Value	Description
IFX_TAPI_CID_MT_CSUP	80 _H	Call Set-up. Corresponds to Caller ID type 1 and type 2.
IFX_TAPI_CID_MT_MWI	82 _H	Message Waiting Indicator
IFX_TAPI_CID_MT_AOC	86 _H	Advice of Charge
IFX_TAPI_CID_MT_SMS	89 _H	Short Message Service
IFX_TAPI_CID_MT_RES01	F1 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES02	F2 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES03	F3 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES04	F4 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES05	F5 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES06	F6 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES07	F7 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES08	F8 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES09	F9 _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES0A	FA _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES0B	FB _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES0C	FC _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES0D	FD _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES0E	FE _H	Reserved for Network Operator Use
IFX_TAPI_CID_MT_RES0F	FF _H	Reserved for Network Operator Use

Remarks

Implemented only [IFX_TAPI_CID_MT_CSUP](#) (for Caller ID type 1 and type 2) and [IFX_TAPI_CID_MT_MWI](#) (for Message Waiting).

4.3.6.18 IFX_TAPI_CID_RX_ERROR_t

Description

CID receiver Errors.

Prototype

```
typedef enum
{
    IFX_TAPI_CID_RX_ERROR_NONE = 0,
    IFX_TAPI_CID_RX_ERROR_READ = 1
} IFX_TAPI_CID_RX_ERROR_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_RX_ERROR_NONE	0 _D	No Error during CID receiver operation.
IFX_TAPI_CID_RX_ERROR_READ	1 _D	Reading error during CID receiver operation.

4.3.6.19 IFX_TAPI_CID_RX_STATE_t**Description**

CID receiver Status.

Prototype

```
typedef enum
{
    IFX_TAPI_CIDRX_STAT_INACTIVE = 0,
    IFX_TAPI_CIDRX_STAT_ACTIVE = 1,
    IFX_TAPI_CIDRX_STAT_ONGOING = 2,
    IFX_TAPI_CIDRX_STAT_DATA_RDY = 3
} IFX_TAPI_CID_RX_STATE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CIDRX_STAT_INACTIVE	0 _D	CID receiver is not active.
IFX_TAPI_CIDRX_STAT_ACTIVE	1 _D	CID receiver is active.
IFX_TAPI_CIDRX_STAT_ONGOING	2 _D	CID receiver is just receiving data.
IFX_TAPI_CIDRX_STAT_DATA_RDY	3 _D	CID receiver is completed.

4.3.6.20 IFX_TAPI_CID_SERVICE_TYPE_t**Description**

Caller ID Services (defined in ETSI EN 300 659-3).

Prototype

```
typedef enum
{
    IFX_TAPI_CID_ST_DATE = 0x01,
    IFX_TAPI_CID_ST_CLI = 0x02,
    IFX_TAPI_CID_ST_CDLI = 0x03,
    IFX_TAPI_CID_ST_ABSCLI = 0x04,
```

```
IFX_TAPI_CID_ST_NAME = 0x07,
IFX_TAPI_CID_ST_ABSNAME = 0x08,
IFX_TAPI_CID_ST_VISINDIC = 0x0B,
IFX_TAPI_CID_ST_MSGIDENT = 0x0D,
IFX_TAPI_CID_ST_LMSGCLI = 0x0E,
IFX_TAPI_CID_ST_CDATE = 0x0F,
IFX_TAPI_CID_ST_CCLI = 0x10,
IFX_TAPI_CID_ST_CT = 0x11,
IFX_TAPI_CID_ST_FIRSTCLI = 0x12,
IFX_TAPI_CID_ST_MSGNR = 0x13,
IFX_TAPI_CID_ST_FWCT = 0x15,
IFX_TAPI_CID_ST_USRT = 0x16,
IFX_TAPI_CID_ST_REDIR = 0x1A,
IFX_TAPI_CID_ST_CHARGE = 0x20,
IFX_TAPI_CID_ST_ACHARGE = 0x21,
IFX_TAPI_CID_ST_DURATION = 0x23,
IFX_TAPI_CID_ST_NTID = 0x30,
IFX_TAPI_CID_ST_CARID = 0x31,
IFX_TAPI_CID_ST_TERMSEL = 0x40,
IFX_TAPI_CID_ST_DISP = 0x50,
IFX_TAPI_CID_ST_SINFO = 0x55,
IFX_TAPI_CID_ST_XOPUSE = 0xE0,
IFX_TAPI_CID_ST_TRANSPARENT = 0xFF
} IFX_TAPI_CID_SERVICE_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_ST_DATE	01 _H	Date and time presentation
IFX_TAPI_CID_ST_CLI	02 _H	Calling line identity (mandatory)
IFX_TAPI_CID_ST_CDLI	03 _H	Called line identity
IFX_TAPI_CID_ST_ABSCLI	04 _H	Reason for absence of CLI
IFX_TAPI_CID_ST_NAME	07 _H	Calling line name
IFX_TAPI_CID_ST_ABSNAME	08 _H	Reason for absence of name
IFX_TAPI_CID_ST_VISINDIC	0B _H	Visual indicator
IFX_TAPI_CID_ST_MSGIDENT	0D _H	Reserved
IFX_TAPI_CID_ST_LMSGCLI	0E _H	Reserved
IFX_TAPI_CID_ST_CDATE	0F _H	Reserved
IFX_TAPI_CID_ST_CCLI	10 _H	Complementary calling line identity
IFX_TAPI_CID_ST_CT	11 _H	Call type
IFX_TAPI_CID_ST_FIRSTCLI	12 _H	First called line identity
IFX_TAPI_CID_ST_MSGNR	13 _H	Number of messages
IFX_TAPI_CID_ST_FWCT	15 _H	Type of forwarded call
IFX_TAPI_CID_ST_USRT	16 _H	Type of calling user
IFX_TAPI_CID_ST_REDIR	1A _H	Number redirection
IFX_TAPI_CID_ST_CHARGE	20 _H	Charge
IFX_TAPI_CID_ST_ACHARGE	21 _H	Additional charge

Name	Value	Description
IFX_TAPI_CID_ST_DURATION	23 _H	Duration of the call
IFX_TAPI_CID_ST_NTID	30 _H	Network provider id
IFX_TAPI_CID_ST_CARID	31 _H	Carrier identity
IFX_TAPI_CID_ST_TERMSEL	40 _H	Selection of terminal function
IFX_TAPI_CID_ST_DISP	50 _H	Display information, used as INFO for DTMF
IFX_TAPI_CID_ST_SINFO	55 _H	Reserved
IFX_TAPI_CID_ST_XOPUSE	E0 _H	Extension for operator use
IFX_TAPI_CID_ST_TRANSPARENT	FF _H	Transparent mode

4.3.6.21 IFX_TAPI_CID_STD_t

Description

List of CID standards.

Prototype

```
typedef enum
{
    IFX_TAPI_CID_STD_TELCORDIA = 0x0,
    IFX_TAPI_CID_STD_ETS1_FSK = 0x1,
    IFX_TAPI_CID_STD_ETS1_DTMF = 0x2,
    IFX_TAPI_CID_STD_SIN = 0x3,
    IFX_TAPI_CID_STD_NTT = 0x4
} IFX_TAPI_CID_STD_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_STD_TELCORDIA	0 _H	Bellcore/Telcordia GR-30-CORE. Using Bell202 FSK coding of CID information.
IFX_TAPI_CID_STD_ETS1_FSK	1 _H	ETSI 300-659-1/2/3 V1.3.1. Using V.23 FSK coding to transmit CID information.
IFX_TAPI_CID_STD_ETS1_DTMF	2 _H	ETSI 300-659-1/2/3 V1.3.1. Using DTMF transmission of CID information.
IFX_TAPI_CID_STD_SIN	3 _H	SIN 227 Issue 3.4. Using V.23 FSK coding of CID information.
IFX_TAPI_CID_STD_NTT	4 _H	NTT standard: TELEPHONE SERVICE INTERFACES, Edition 5. Using a modified V.23 FSK coding of CID information.

4.3.6.22 IFX_TAPI_CID_VMWI_t

Description

List of VMWI settings.

Prototype

```
typedef enum
{
```

```
IFX_TAPI_CID_VMWI_DIS = 0x00,  
IFX_TAPI_CID_VMWI_EN = 0xFF  
} IFX_TAPI_CID_VMWI_t;
```

Parameters

Name	Value	Description
IFX_TAPI_CID_VMWI_DIS	00 _H	Disable VMWI on CPE
IFX_TAPI_CID_VMWI_EN	FF _H	Enable VMWI on CPE

4.3.6.23 IFX_TAPI_COD_LENGTH_t

Description

Packetization length.

Prototype

```
typedef enum  
{  
    IFX_TAPI_COD_LENGTH_ZERO = 0,  
    IFX_TAPI_COD_LENGTH_2_5 = 1,  
    IFX_TAPI_COD_LENGTH_5 = 2,  
    IFX_TAPI_COD_LENGTH_5_5 = 3,  
    IFX_TAPI_COD_LENGTH_10 = 4,  
    IFX_TAPI_COD_LENGTH_11 = 5,  
    IFX_TAPI_COD_LENGTH_20 = 6,  
    IFX_TAPI_COD_LENGTH_30 = 7,  
    IFX_TAPI_COD_LENGTH_40 = 8,  
    IFX_TAPI_COD_LENGTH_50 = 9,  
    IFX_TAPI_COD_LENGTH_60 = 10  
} IFX_TAPI_COD_LENGTH_t;
```

Parameters

Name	Value	Description
IFX_TAPI_COD_LENGTH_ZERO	0 _D	Zero packetization length. Not supported.
IFX_TAPI_COD_LENGTH_2_5	1 _D	2.5 ms packetization length.
IFX_TAPI_COD_LENGTH_5	2 _D	5 ms packetization length.
IFX_TAPI_COD_LENGTH_5_5	3 _D	5.5 ms packetization length.
IFX_TAPI_COD_LENGTH_10	4 _D	10 ms packetization length.
IFX_TAPI_COD_LENGTH_11	5 _D	11 ms packetization length.
IFX_TAPI_COD_LENGTH_20	6 _D	20 ms packetization length.
IFX_TAPI_COD_LENGTH_30	7 _D	30 ms packetization length.
IFX_TAPI_COD_LENGTH_40	8 _D	40 ms packetization length.
IFX_TAPI_COD_LENGTH_50	9 _D	50 ms packetization length.
IFX_TAPI_COD_LENGTH_60	10 _D	60 ms packetization length.

4.3.6.24 IFX_TAPI_COD_TYPE_t

Description

Definition of codecs.

Prototype

```
typedef enum
{
    IFX_TAPI_COD_TYPE_UNKNOWN = 0,
    IFX_TAPI_COD_TYPE_G723_63 = 1,
    IFX_TAPI_COD_TYPE_G723_53 = 2,
    IFX_TAPI_COD_TYPE_G728 = 6,
    IFX_TAPI_COD_TYPE_G729_AB = 7,
    IFX_TAPI_COD_TYPE_MLAW = 8,
    IFX_TAPI_COD_TYPE_ALAW = 9,
    IFX_TAPI_COD_TYPE_MLAW_VBD = 10,
    IFX_TAPI_COD_TYPE_ALAW_VBD = 11,
    IFX_TAPI_COD_TYPE_G726_16 = 12,
    IFX_TAPI_COD_TYPE_G726_24 = 13,
    IFX_TAPI_COD_TYPE_G726_32 = 14,
    IFX_TAPI_COD_TYPE_G726_40 = 15,
    IFX_TAPI_COD_TYPE_G729_E = 16,
    IFX_TAPI_COD_TYPE_ILBC_133 = 17,
    IFX_TAPI_COD_TYPE_ILBC_152 = 18,
    IFX_TAPI_COD_TYPE_AMR_4_75 = 21,
    IFX_TAPI_COD_TYPE_AMR_5_15 = 22,
    IFX_TAPI_COD_TYPE_AMR_5_9 = 23,
    IFX_TAPI_COD_TYPE_AMR_6_7 = 24,
    IFX_TAPI_COD_TYPE_AMR_7_4 = 25,
    IFX_TAPI_COD_TYPE_AMR_7_95 = 26,
    IFX_TAPI_COD_TYPE_AMR_10_2 = 27,
    IFX_TAPI_COD_TYPE_AMR_12_2 = 28,
    IFX_TAPI_COD_TYPE_G722_64 = 31,
    IFX_TAPI_COD_TYPE_G7221_24 = 32,
    IFX_TAPI_COD_TYPE_G7221_32 = 33,
    IFX_TAPI_COD_TYPE_MAX = 34
} IFX_TAPI_COD_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_COD_TYPE_UNKNOWN	0 _D	Reserved.
IFX_TAPI_COD_TYPE_G723_63	1 _D	G.723, 6.3 kBit/s.
IFX_TAPI_COD_TYPE_G723_53	2 _D	G.723, 5.3 kBit/s.
IFX_TAPI_COD_TYPE_G728	6 _D	G.728, 16 kBit/s. Not available!
IFX_TAPI_COD_TYPE_G729_AB	7 _D	G.729 A and B (silence compression), 8 kBit/s.
IFX_TAPI_COD_TYPE_MLAW	8 _D	G.711 µ-law, 64 kBit/s.
IFX_TAPI_COD_TYPE_ALAW	9 _D	G.711 A-law, 64 kBit/s.

Name	Value	Description
IFX_TAPI_COD_TYPE_MLAW_VBD	10 _D	G.711 μ-law, 64 kBit/s. Voice Band Data encoding as defined by V.152.
IFX_TAPI_COD_TYPE_ALAW_VBD	11 _D	G.711 A-law, 64 kBit/s. Voice Band Data encoding as defined by V.152.
IFX_TAPI_COD_TYPE_G726_16	12 _D	G.726, 16 kBit/s.
IFX_TAPI_COD_TYPE_G726_24	13 _D	G.726, 24 kBit/s.
IFX_TAPI_COD_TYPE_G726_32	14 _D	G.726, 32 kBit/s.
IFX_TAPI_COD_TYPE_G726_40	15 _D	G.726, 40 kBit/s.
IFX_TAPI_COD_TYPE_G729_E	16 _D	G.729 E, 11.8 kBit/s.
IFX_TAPI_COD_TYPE_iLBC_133	17 _D	iLBC, 13.3 kBit/s.
IFX_TAPI_COD_TYPE_iLBC_152	18 _D	iLBC, 15.2 kBit/s.
IFX_TAPI_COD_TYPE_AMR_4_75	21 _D	AMR, 4.75 kBit/s.
IFX_TAPI_COD_TYPE_AMR_5_15	22 _D	AMR, 5.15 kBit/s.
IFX_TAPI_COD_TYPE_AMR_5_9	23 _D	AMR, 5.9 kBit/s.
IFX_TAPI_COD_TYPE_AMR_6_7	24 _D	AMR, 6.7 kBit/s.
IFX_TAPI_COD_TYPE_AMR_7_4	25 _D	AMR, 7.4 kBit/s.
IFX_TAPI_COD_TYPE_AMR_7_95	26 _D	AMR, 7.95 kBit/s.
IFX_TAPI_COD_TYPE_AMR_10_2	27 _D	AMR, 10.2 kBit/s.
IFX_TAPI_COD_TYPE_AMR_12_2	28 _D	AMR, 12.2 kBit/s.
IFX_TAPI_COD_TYPE_G722_64	31 _D	G.722 (wideband), 64 kBit/s.
IFX_TAPI_COD_TYPE_G7221_24	32 _D	G.722.1 (wideband), 24 kBit/s.
IFX_TAPI_COD_TYPE_G7221_32	33 _D	G.722.1 (wideband), 32 kBit/s.
IFX_TAPI_COD_TYPE_MAX	34 _D	Maximum number of Codecs.

4.3.6.25 IFX_TAPI_DATA_MAP_START_STOP_t

Description

Start/Stop information for data channel mapping.

Prototype

```
typedef enum
{
    IFX_TAPI_MAP_DATA_UNCHANGED = 0,
    IFX_TAPI_MAP_DATA_START = 1,
    IFX_TAPI_MAP_DATA_STOP = 2
} IFX_TAPI_DATA_MAP_START_STOP_t;
```

Parameters

Name	Value	Description
IFX_TAPI_MAP_DATA_UNCHANGED	0 _D	Do not modify the status of the recorder.
IFX_TAPI_MAP_DATA_START	1 _D	Recording is started.
IFX_TAPI_MAP_DATA_STOP	2 _D	Recording is stopped.

4.3.6.26 IFX_TAPI_DEBUG_REPORT_SET_t

Description

Debug report set.

Prototype

```
typedef enum
{
    IFX_TAPI_DEBUG_REPORT_SET_OFF = 0,
    IFX_TAPI_DEBUG_REPORT_SET_LOW = 1,
    IFX_TAPI_DEBUG_REPORT_SET_NORMAL = 2,
    IFX_TAPI_DEBUG_REPORT_SET_HIGH = 3
} IFX_TAPI_DEBUG_REPORT_SET_t;
```

Parameters

Name	Value	Description
IFX_TAPI_DEBUG_REPORT_SET_OFF	0 _D	Debug report off.
IFX_TAPI_DEBUG_REPORT_SET_LOW	1 _D	Low-level debug report.
IFX_TAPI_DEBUG_REPORT_SET_NORMAL	2 _D	Normal level debug report, general information and warnings.
IFX_TAPI_DEBUG_REPORT_SET_HIGH	3 _D	High level debug report, only errors.

4.3.6.27 IFX_TAPI_DIALING_STATUS_t

Description

Enumeration for dial status events.

Prototype

```
typedef enum
{
    IFX_TAPI_DIALING_STATUS_DTMF = 0x01,
    IFX_TAPI_DIALING_STATUS_PULSE = 0x02
} IFX_TAPI_DIALING_STATUS_t;
```

Parameters

Name	Value	Description
IFX_TAPI_DIALING_STATUS_DTMF	01 _H	DTMF sign detected.
IFX_TAPI_DIALING_STATUS_PULSE	02 _H	Pulse digit detected

4.3.6.28 IFX_TAPI_ENC_AGC_MODE_t

Description

Specifies the Enable/Disable mode of the AGC resource.

Prototype

```
typedef enum
{
    IFX_TAPI_ENC_AGC_MODE_DISABLE = 0x0,
    IFX_TAPI_ENC_AGC_MODE_ENABLE = 0x1
} IFX_TAPI_ENC_AGC_MODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_ENC_AGC_MODE_DISABLE	0 _H	Disable AGC
IFX_TAPI_ENC_AGC_MODE_ENABLE	1 _H	Enable AGC

4.3.6.29 IFX_TAPI_DWLD_TYPE_t**Description**

Definition of download type.

Prototype

```
typedef enum
{
    IFX_TAPI_DWLD_TYPE_NONE = 0x0,
    IFX_TAPI_DWLD_TYPE_BBD = 0x1,
    IFX_TAPI_DWLD_TYPE_FW = 0x2
} IFX_TAPI_DWLD_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_DWLD_TYPE_NONE	0x0	No download.
IFX_TAPI_DWLD_TYPE_BBD	0x1	BBD download type.
IFX_TAPI_DWLD_TYPE_FW	0x2	FW download type.

4.3.6.30 IFX_TAPI_ENC_TYPE_t**Description**

Definition of codecs.

Attention: This enum is obsolete, [IFX_TAPI_COD_TYPE_t](#) should be used!

Prototype

```
typedef enum
{
    IFX_TAPI_ENC_TYPE_UNKNOWN = 0,
    IFX_TAPI_ENC_TYPE_G723_63 = 1,
    IFX_TAPI_ENC_TYPE_G723_53 = 2,
    IFX_TAPI_ENC_TYPE_G728 = 6,
    IFX_TAPI_ENC_TYPE_G729_AB = 7,
```

```
IFX_TAPI_ENC_TYPE_MLAW = 8,  
IFX_TAPI_ENC_TYPE_ALAW = 9,  
IFX_TAPI_ENC_TYPE_MLAW_VBD = 10,  
IFX_TAPI_ENC_TYPE_ALAW_VBD = 11,  
IFX_TAPI_ENC_TYPE_G726_16 = 12,  
IFX_TAPI_ENC_TYPE_G726_24 = 13,  
IFX_TAPI_ENC_TYPE_G726_32 = 14,  
IFX_TAPI_ENC_TYPE_G726_40 = 15,  
IFX_TAPI_ENC_TYPE_G729_E = 16,  
IFX_TAPI_ENC_TYPE_ILBC_133 = 17,  
IFX_TAPI_ENC_TYPE_ILBC_152 = 18,  
IFX_TAPI_ENC_TYPE_AMR_4_75 = 21,  
IFX_TAPI_ENC_TYPE_AMR_5_15 = 22,  
IFX_TAPI_ENC_TYPE_AMR_5_9 = 23,  
IFX_TAPI_ENC_TYPE_AMR_6_7 = 24,  
IFX_TAPI_ENC_TYPE_AMR_7_4 = 25,  
IFX_TAPI_ENC_TYPE_AMR_7_95 = 26,  
IFX_TAPI_ENC_TYPE_AMR_10_2 = 27,  
IFX_TAPI_ENC_TYPE_AMR_12_2 = 28,  
IFX_TAPI_ENC_TYPE_G722_64 = 31,  
IFX_TAPI_ENC_TYPE_G7221_24 = 32,  
IFX_TAPI_ENC_TYPE_G7221_32 = 33,  
IFX_TAPI_ENC_TYPE_MAX = 34  
} IFX_TAPI_ENC_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_ENC_TYPE_UNKNOWN	0 _D	Reserved.
IFX_TAPI_ENC_TYPE_G723_63	1 _D	G723, 6.3 kBit/s.
IFX_TAPI_ENC_TYPE_G723_53	2 _D	G723, 5.3 kBit/s.
IFX_TAPI_ENC_TYPE_G728	6 _D	G728, 16 kBit/s. Not available!
IFX_TAPI_ENC_TYPE_G729_AB	7 _D	G729 A and B (silence compression), 8 kBit/s.
IFX_TAPI_ENC_TYPE_MLAW	8 _D	G711 µ-law, 64 kBit/s.
IFX_TAPI_ENC_TYPE_ALAW	9 _D	G711 A-law, 64 kBit/s.
IFX_TAPI_ENC_TYPE_MLAW_VBD	10 _D	G711 µ-law, 64 kBit/s. Voice Band Data encoding as defined by V.152.
IFX_TAPI_ENC_TYPE_ALAW_VBD	11 _D	G711 A-law, 64 kBit/s. Voice Band Data encoding as defined by V.152.
IFX_TAPI_ENC_TYPE_G726_16	12 _D	G726, 16 kBit/s.
IFX_TAPI_ENC_TYPE_G726_24	13 _D	G726, 24 kBit/s.
IFX_TAPI_ENC_TYPE_G726_32	14 _D	G726, 32 kBit/s.
IFX_TAPI_ENC_TYPE_G726_40	15 _D	G726, 40 kBit/s.
IFX_TAPI_ENC_TYPE_G729_E	16 _D	G729 E, 11.8 kBit/s.
IFX_TAPI_ENC_TYPE_ILBC_133	17 _D	iLBC, 13.3 kBit/s.
IFX_TAPI_ENC_TYPE_ILBC_152	18 _D	iLBC, 15.2 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_4_75	21 _D	AMR, 4.75 kBit/s.

Name	Value	Description
IFX_TAPI_ENC_TYPE_AMR_5_15	22 _D	AMR, 5.15 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_5_9	23 _D	AMR, 5.9 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_6_7	24 _D	AMR, 6.7 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_7_4	25 _D	AMR, 7.4 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_7_95	26 _D	AMR, 7.95 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_10_2	27 _D	AMR, 10.2 kBit/s.
IFX_TAPI_ENC_TYPE_AMR_12_2	28 _D	AMR, 12.2 kBit/s.
IFX_TAPI_ENC_TYPE_G722_64	31 _D	G.722 (wideband), 64 kBit/s.
IFX_TAPI_ENC_TYPE_G7221_24	32 _D	G.722.1 (wideband), 24 kBit/s.
IFX_TAPI_ENC_TYPE_G7221_32	33 _D	G.722.1 (wideband), 32 kBit/s.
IFX_TAPI_ENC_TYPE_MAX	34 _D	Maximum number of Codecs.

4.3.6.31 IFX_TAPI_ENC_VAD_t

Description

Enumeration used for ioctl [IFX_TAPI_ENC_VAD_CFG_SET](#).

Prototype

```
typedef enum
{
    IFX_TAPI_ENC_VAD_NOVAD = 0,
    IFX_TAPI_ENC_VAD_ON = 1,
    IFX_TAPI_ENC_VAD_G711 = 2
} IFX_TAPI_ENC_VAD_t;
```

Parameters

Name	Value	Description
IFX_TAPI_ENC_VAD_NOVAD	0 _D	No voice activity detection.
IFX_TAPI_ENC_VAD_ON	1 _D	Voice activity detection on, in this case also comfort noise and spectral information (nicer noise) is switched on.
IFX_TAPI_ENC_VAD_G711	2 _D	Voice activity detection on with comfort noise generation without spectral information.

4.3.6.32 IFX_TAPI_EVENT_ID_t

Description

Event id.

Prototype

```
typedef enum
{
    IFX_TAPI_EVENT_NONE = ,
    IFX_TAPI_EVENT_FXS_RING = ,
    IFX_TAPI_EVENT_FXS_RINGBURST_END = ,
}
```

```
IFX_TAPI_EVENT_FXS_RINGING_END = ,  
IFX_TAPI_EVENT_FXS_ONHOOK = ,  
IFX_TAPI_EVENT_FXS_OFFHOOK = ,  
IFX_TAPI_EVENT_FXS_FLASH = ,  
IFX_TAPI_EVENT_FXS_ONHOOK_INT = ,  
IFX_TAPI_EVENT_FXS_OFFHOOK_INT = ,  
IFX_TAPI_EVENT_FXO_NONE = ,  
IFX_TAPI_EVENT_FXO_BAT_FEEDED = ,  
IFX_TAPI_EVENT_FXO_BAT_DROPPED = ,  
IFX_TAPI_EVENT_FXO_POLARITY = ,  
IFX_TAPI_EVENT_FXO_RING_START = ,  
IFX_TAPI_EVENT_FXO_RING_STOP = ,  
IFX_TAPI_EVENT_FXO_OSI = ,  
IFX_TAPI_EVENT_FXO_APOH = ,  
IFX_TAPI_EVENT_FXO_NOPOH = ,  
IFX_TAPI_EVENT_LT_GR909_RDY = ,  
IFX_TAPI_EVENT_PULSE_DIGIT = ,  
IFX_TAPI_EVENT_DTMF_DIGIT = ,  
IFX_TAPI_EVENT_CID_TX_SEQ_START = ,  
IFX_TAPI_EVENT_CID_TX_SEQ_END = ,  
IFX_TAPI_EVENT_CID_TX_INFO_START = ,  
IFX_TAPI_EVENT_CID_TX_INFO_END = ,  
IFX_TAPI_EVENT_CID_TX_NOACK_ERR = ,  
IFX_TAPI_EVENT_CID_TX_RINGCAD_ERR = ,  
IFX_TAPI_EVENT_CID_TX_UNDERRUN_ERR = ,  
IFX_TAPI_EVENT_CID_TX_NOACK2_ERR = ,  
IFX_TAPI_EVENT_CID_RX_CAS = ,  
IFX_TAPI_EVENT_CID_RX_FSK_END = ,  
IFX_TAPI_EVENT_CID_RX_CD = ,  
IFX_TAPI_EVENT_CID_RX_ERROR_READ = ,  
IFX_TAPI_EVENT_CID_RX_ERROR1 = ,  
IFX_TAPI_EVENT_CID_RX_ERROR2 = ,  
IFX_TAPI_EVENT_TONE_GEN_END = ,  
IFX_TAPI_EVENT_TONE_DET_CPT = ,  
IFX_TAPI_EVENT_FAXMODEM_DIS = ,  
IFX_TAPI_EVENT_FAXMODEM_CED = ,  
IFX_TAPI_EVENT_FAXMODEM_PR = ,  
IFX_TAPI_EVENT_FAXMODEM_AM = ,  
IFX_TAPI_EVENT_FAXMODEM_CNGFAX = ,  
IFX_TAPI_EVENT_FAXMODEM_CNGMOD = ,  
IFX_TAPI_EVENT_FAXMODEM_V21L = ,  
IFX_TAPI_EVENT_FAXMODEM_V18A = ,  
IFX_TAPI_EVENT_FAXMODEM_V27 = ,  
IFX_TAPI_EVENT_FAXMODEM_BELL = ,  
IFX_TAPI_EVENT_FAXMODEM_V22 = ,  
IFX_TAPI_EVENT_FAXMODEM_V22ORBELL = ,  
IFX_TAPI_EVENT_FAXMODEM_V32AC = ,  
IFX_TAPI_EVENT_FAXMODEM_V8BIS = ,  
IFX_TAPI_EVENT_FAXMODEM_HOLDEND = ,  
IFX_TAPI_EVENT_FAXMODEM_CEDEND = ,  
IFX_TAPI_EVENT_FAXMODEM_CAS_BELL = ,
```

```

IFX_TAPI_EVENT_COD_DEC_CHG = ,
IFX_TAPI_EVENT_COD_ROOM_NOISE = ,
IFX_TAPI_EVENT_COD_ROOM_SILENCE = ,
IFX_TAPI_EVENT_RFC2833_EVENT = ,
IFX_TAPI_EVENT_T38_ERROR_GEN = ,
IFX_TAPI_EVENT_T38_ERROR_OVLD = ,
IFX_TAPI_EVENT_T38_ERROR_READ = ,
IFX_TAPI_EVENT_T38_ERROR_WRITE = ,
IFX_TAPI_EVENT_T38_ERROR_DATA = ,
IFX_TAPI_EVENT_T38_ERROR_SETUP = ,
IFX_TAPI_EVENT_INFO_MBX_CONGESTION = ,
IFX_TAPI_EVENT_DEBUG_NONE = ,
IFX_TAPI_EVENT_DEBUG_CERR = ,
IFX_TAPI_EVENT_LL_DRIVER_NONE = ,
IFX_TAPI_EVENT_FAULT_GENERAL_NONE = ,
IFX_TAPI_EVENT_FAULT_GENERAL = ,
IFX_TAPI_EVENT_FAULT_LINE_NONE = ,
IFX_TAPI_EVENT_FAULT_LINE_GK_POS = ,
IFX_TAPI_EVENT_FAULT_LINE_GK_NEG = ,
IFX_TAPI_EVENT_FAULT_LINE_GK_LOW = ,
IFX_TAPI_EVENT_FAULT_LINE_GK_HIGH = ,
IFX_TAPI_EVENT_FAULT_LINE_OVERTEMP =
} IFX_TAPI_EVENT_ID_t;

```

Parameters

Name	Value	Description
IFX_TAPI_EVENT_NONE		Reserved
IFX_TAPI_EVENT_FXS_RING		FXS line is ringing
IFX_TAPI_EVENT_FXS_RINGBURST_END		FXS end of a single ring burst
IFX_TAPI_EVENT_FXS_RINGING_END		FXS end of ringing
IFX_TAPI_EVENT_FXS_ONHOOK		Hook event: on-hook
IFX_TAPI_EVENT_FXS_OFFHOOK		Hook event: off-hook
IFX_TAPI_EVENT_FXS_FLASH		Hook event: flash-hook
IFX_TAPI_EVENT_FXS_ONHOOK_INT		Hook event: on-hook detected by interrupt
IFX_TAPI_EVENT_FXS_OFFHOOK_INT		Hook event: off-hook detected by interrupt
IFX_TAPI_EVENT_FXO_NONE		No event
IFX_TAPI_EVENT_FXO_BAT_FEEDED		Battery - FXO line is feeded
IFX_TAPI_EVENT_FXO_BAT_DROPPED		Battery - FXO line is not feeded
IFX_TAPI_EVENT_FXO_POLARITY		FXO line polarity changed
IFX_TAPI_EVENT_FXO_RING_START		FXO line is ringing
IFX_TAPI_EVENT_FXO_RING_STOP		FXO line stopped ringing
IFX_TAPI_EVENT_FXO_OSI		OSI signal (short drop of DC voltage, typically less than 300 ms), indicating the start of a CID transmission
IFX_TAPI_EVENT_FXO_APOH		Another Phone Off-Hook
IFX_TAPI_EVENT_FXO_NOPOH		No Other Phone Off-Hook
IFX_TAPI_EVENT_LT_GR909_RDY		GR909 ready

Name	Value	Description
IFX_TAPI_EVENT_PULSE_DIGIT		Pulse Digit detected
IFX_TAPI_EVENT_DTMF_DIGIT		DTMF tone detected
IFX_TAPI_EVENT_CID_TX_SEQ_START		Reserved. Start of CID TX Sequence
IFX_TAPI_EVENT_CID_TX_SEQ_END		End of CID TX Sequence
IFX_TAPI_EVENT_CID_TX_INFO_START		Reserved. Start of CID TX Information
IFX_TAPI_EVENT_CID_TX_INFO_END		End of CID TX Information
IFX_TAPI_EVENT_CID_TX_NOACK_ERR		No acknowledge during CID sequence
IFX_TAPI_EVENT_CID_TX_RINGCAD_ERR		Ring cadence settings error in CID tx
IFX_TAPI_EVENT_CID_TX_UNDERRUN_ER R		CID data buffer underrun
IFX_TAPI_EVENT_CID_RX_NOACK2_ERR		No 2nd acknowledge during CID sequence (NTT mode)
IFX_TAPI_EVENT_CID_RX_CAS		CID CAS detected (CPE Alert Signal, for CID type 2)
IFX_TAPI_EVENT_CID_RX_FSK_END		CID RX, FSK detection ended
IFX_TAPI_EVENT_CID_RX_CD		Reserved. FSK Carrier Detected
IFX_TAPI_EVENT_CID_RX_ERROR_READ		Error during CID reception
IFX_TAPI_EVENT_CID_RX_ERROR1		Reserved. Error during CID reception
IFX_TAPI_EVENT_CID_RX_ERROR2		Reserved. Error during CID reception
IFX_TAPI_EVENT_TONE_GEN_END		Tone generator ended
IFX_TAPI_EVENT_TONE_DET_CPT		Call progress tone detected
IFX_TAPI_EVENT_FAXMODEM_DIS		DIS preamble signal
IFX_TAPI_EVENT_FAXMODEM_CED		2100 Hz (CED) answering tone (ANS)
IFX_TAPI_EVENT_FAXMODEM_PR		Phase reversal
IFX_TAPI_EVENT_FAXMODEM_AM		Amplitude modulation
IFX_TAPI_EVENT_FAXMODEM_CNGFAX		1100 Hz single tone (CNG Fax)
IFX_TAPI_EVENT_FAXMODEM_CNGMOD		1300 Hz single tone (CNG Modem). It can indicate CT, V.18 XCI mark sequence
IFX_TAPI_EVENT_FAXMODEM_V21L		980 Hz single tone (V.21L mark sequence)
IFX_TAPI_EVENT_FAXMODEM_V18A		1400 Hz single tone (V.18A mark sequence)
IFX_TAPI_EVENT_FAXMODEM_V27		1800 Hz single tone (V.27, V.32 carrier)
IFX_TAPI_EVENT_FAXMODEM_BELL		2225 Hz single tone (Bell answering tone)
IFX_TAPI_EVENT_FAXMODEM_V22		2250 Hz single tone (V.22 unscrambled binary ones)
IFX_TAPI_EVENT_FAXMODEM_V22ORBELL		2225 Hz or 2250 Hz single tone, not possible to distinguish
IFX_TAPI_EVENT_FAXMODEM_V32AC		600 Hz + 300 Hz dual tone (V.32 AC)
IFX_TAPI_EVENT_FAXMODEM_V8BIS		1375 Hz + 2002 Hz dual tone (V.8bis initiating segment 1)
IFX_TAPI_EVENT_FAXMODEM_HOLDEND		Hold characteristic
IFX_TAPI_EVENT_FAXMODEM_CEDEND		End of CED signal
IFX_TAPI_EVENT_FAXMODEM_CAS_BELL		2130 + 2750 Hz dual tone (Bell Caller ID Type 2 Alert Tone)
IFX_TAPI_EVENT_COD_DEC_CHG		Decoder change event
IFX_TAPI_EVENT_COD_ROOM_NOISE		Room noise detection: noise detected

Name	Value	Description
IFX_TAPI_EVENT_COD_ROOM_SILENCE		Room noise detection: silence detected
IFX_TAPI_EVENT_RFC2833_EVENT		RFC 2833 event
IFX_TAPI_EVENT_T38_ERROR_GEN		Generic error
IFX_TAPI_EVENT_T38_ERROR_OVLD		Overload
IFX_TAPI_EVENT_T38_ERROR_READ		Read error
IFX_TAPI_EVENT_T38_ERROR_WRITE		Write error
IFX_TAPI_EVENT_T38_ERROR_DATA		Data error
IFX_TAPI_EVENT_T38_ERROR_SETUP		Setup error
IFX_TAPI_EVENT_INFO_MBX_CONGESTION		Information mailbox congestion in downstream direction, packet was dropped.
IFX_TAPI_EVENT_DEBUG_NONE		Reserved. Debug event
IFX_TAPI_EVENT_DEBUG_CERR		Reserved. Debug command error event
IFX_TAPI_EVENT_LL_DRIVER_NONE		Reserved. Device specific events, no event
IFX_TAPI_EVENT_FAULT_GENERAL_NONE		General System Fault, no event
IFX_TAPI_EVENT_FAULT_GENERAL		General System Fault
IFX_TAPI_EVENT_FAULT_LINE_NONE		Reserved. Line fault, no event
IFX_TAPI_EVENT_FAULT_LINE_GK_POS		Ground Key, Positive Polarity
IFX_TAPI_EVENT_FAULT_LINE_GK_NEG		Ground Key, Negative Polarity
IFX_TAPI_EVENT_FAULT_LINE_GK_LOW		Ground Key Low
IFX_TAPI_EVENT_FAULT_LINE_GK_HIGH		Ground Key High
IFX_TAPI_EVENT_FAULT_LINE_OVERTEMP		Overtemperature

4.3.6.33 IFX_TAPI_EVENT_GET_RET_t

Description

Return value for event reporting interface.

Prototype

```
typedef enum
{
    IFX_TAPI_EVENT_RET_ERROR = -1,
    IFX_TAPI_EVENT_RET_SUCCESS = 0,
    IFX_TAPI_EVENT_RET_READY = 1
} IFX_TAPI_EVENT_GET_RET_t;
```

Parameters

Name	Value	Description
IFX_TAPI_EVENT_RET_ERROR	-1 _D	Error.
IFX_TAPI_EVENT_RET_SUCCESS	0 _D	Success.
IFX_TAPI_EVENT_RET_READY	1 _D	A new event is ready.

4.3.6.34 IFX_TAPI_EVENT_TYPE_t

Description

Event types.

Prototype

```
typedef enum
{
    IFX_TAPI_EVENT_TYPE_NONE = 0x00000000,
    IFX_TAPI_EVENT_TYPE_FXS = 0x20000000,
    IFX_TAPI_EVENT_TYPE_FXO = 0x21000000,
    IFX_TAPI_EVENT_TYPE_LT = 0x29000000,
    IFX_TAPI_EVENT_TYPE_PULSE = 0x30000000,
    IFX_TAPI_EVENT_TYPE_DTMF = 0x31000000,
    IFX_TAPI_EVENT_TYPE_CID = 0x32000000,
    IFX_TAPI_EVENT_TYPE_TONE_GEN = 0x33000000,
    IFX_TAPI_EVENT_TYPE_TONE_DET = 0x34000000,
    IFX_TAPI_EVENT_TYPE_FAXMODEM_SIGNAL = 0x35000000,
    IFX_TAPI_EVENT_TYPE_COD = 0x40000000,
    IFX_TAPI_EVENT_TYPE_RFC2833 = 0x43000000,
    IFX_TAPI_EVENT_TYPE_T38 = 0x50000000,
    IFX_TAPI_EVENT_TYPE_LL_DRIVER = 0xE0000000,
    IFX_TAPI_EVENT_TYPE_FAULT_GENERAL = 0xF1000000,
    IFX_TAPI_EVENT_TYPE_FAULT_LINE = 0xF2000000
} IFX_TAPI_EVENT_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_EVENT_TYPE_NONE	00000000 _H	Reserved.
IFX_TAPI_EVENT_TYPE_FXS	20000000 _H	Ringing, Hook events.
IFX_TAPI_EVENT_TYPE_FXO	21000000 _H	Reserved, not implemented yet. Ringing, polarity reversal, ...
IFX_TAPI_EVENT_TYPE_LT	29000000 _H	Reserved, not implemented yet. Linetesting events.
IFX_TAPI_EVENT_TYPE_PULSE	30000000 _H	Pulse Digit detected.
IFX_TAPI_EVENT_TYPE_DTMF	31000000 _H	DTMF Digit detected.
IFX_TAPI_EVENT_TYPE_CID	32000000 _H	Caller ID events.
IFX_TAPI_EVENT_TYPE_TONE_GEN	33000000 _H	Tone generation event, for example. Tone generation ended.
IFX_TAPI_EVENT_TYPE_TONE_DET	34000000 _H	Tone detection event, for example Call Progress Tones
IFX_TAPI_EVENT_TYPE_FAXMODEM_SIGNAL	35000000 _H	Detection of Fax/Modem and V.18 signals.
IFX_TAPI_EVENT_TYPE_COD	40000000 _H	For example vocoder changed
IFX_TAPI_EVENT_TYPE_RFC2833	43000000 _H	Reserved, not implemented yet. RFC2833 Frame detected.

Name	Value	Description
IFX_TAPI_EVENT_TYPE_T38	50000000 _H	Reserved, not implemented yet. T.38 events.
IFX_TAPI_EVENT_TYPE_LL_DRIVER	E0000000 _H	Reserved. Events of the low-level driver
IFX_TAPI_EVENT_TYPE_FAULT_GENERAL	F1000000 _H	General fault.
IFX_TAPI_EVENT_TYPE_FAULT_LINE	F2000000 _H	For example: Overtemperature, Ground key detected

4.3.6.35 IFX_TAPI_FXO_HOOK_t

Description

Hook status for fxo.

Prototype

```
typedef enum
{
    IFX_TAPI_FXO_HOOK_ONHOOK = 0,
    IFX_TAPI_FXO_HOOK_OFFHOOK = 1
} IFX_TAPI_FXO_HOOK_t;
```

Parameters

Name	Value	Description
IFX_TAPI_FXO_HOOK_ONHOOK	0 _D	On-hook.
IFX_TAPI_FXO_HOOK_OFFHOOK	1 _D	Off-hook.

4.3.6.36 IFX_TAPI_JB_LOCAL_ADAPT_t

Description

Jitter buffer adaptation.

Prototype

```
typedef enum
{
    IFX_TAPI_JB_LOCAL_ADAPT_OFF = 0,
    IFX_TAPI_JB_LOCAL_ADAPT_ON = 1,
    IFX_TAPI_JB_LOCAL_ADAPT_SI_ON = 2
} IFX_TAPI_JB_LOCAL_ADAPT_t;
```

Parameters

Name	Value	Description
IFX_TAPI_JB_LOCAL_ADAPT_OFF	0 _D	Local Adaptation OFF. Speech gaps which are detected by the far end side are used for the jitter buffer adaptations.
IFX_TAPI_JB_LOCAL_ADAPT_ON	1 _D	Local adaptation ON. Local adaptation on. Jitter buffer adaptation via local and far end speech detection. This means that the jitter buffer adaptation does not need the far end silence compression feature but will use it if the far end side has detected a silence period. Thus a jitter buffer adaptation can occur when the far end side has detected silence or when a speech gap was detected in the downstream direction.
IFX_TAPI_JB_LOCAL_ADAPT_SI_ON	2 _D	Local Adaptation ON with Sample interpolation. A jitter buffer adaptation can be done via sample interpolation. The advantage is that not a whole frame has to be interpolated or discarded. Thus no major distortion should be heard.

4.3.6.37 IFX_TAPI_JB_PKT_ADAPT_t

Description

Jitter buffer packet adaptation.

Prototype

```
typedef enum
{
    IFX_TAPI_JB_PKT_ADAPT_RES1 = 0,
    IFX_TAPI_JB_PKT_ADAPT_RES2 = 1,
    IFX_TAPI_JB_PKT_ADAPT_VOICE = 2,
    IFX_TAPI_JB_PKT_ADAPT_DATA = 3
} IFX_TAPI_JB_PKT_ADAPT_t;
```

Parameters

Name	Value	Description
IFX_TAPI_JB_PKT_ADAPT_RES1	0 _D	Reserved.
IFX_TAPI_JB_PKT_ADAPT_RES2	1 _D	Reserved.
IFX_TAPI_JB_PKT_ADAPT_VOICE	2 _D	JB adapted for voice, reduced adjustment speed and packet repetition is off.
IFX_TAPI_JB_PKT_ADAPT_DATA	3 _D	JB adapted for data (fax/modem). Reduced adjustment speed and packet repetition is on

4.3.6.38 IFX_TAPI_JB_TYPE_t

Description

Jitter buffer type.

Prototype

```
typedef enum
{
    IFX_TAPI_JB_TYPE_FIXED = 0,
    IFX_TAPI_JB_TYPE_ADAPTIVE = 1
} IFX_TAPI_JB_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_JB_TYPE_FIXED	0 _D	Fixed Jitter Buffer.
IFX_TAPI_JB_TYPE_ADAPTIVE	1 _D	Adaptive Jitter Buffer.

4.3.6.39 IFX_TAPI_KPI_STREAM_t**Description**

Enum used to name the packet streams that can be redirected to KPI.

Prototype

```
typedef enum
{
    IFX_TAPI_KPI_STREAM_COD = 0,
    IFX_TAPI_KPI_STREAM_DECT = 1,
    IFX_TAPI_KPI_STREAM_MAX = 2
} IFX_TAPI_KPI_STREAM_t;
```

Parameters

Name	Value	Description
IFX_TAPI_KPI_STREAM_COD	0 _D	Source stream generated by CODer.
IFX_TAPI_KPI_STREAM_DECT	1 _D	Source stream generated by DECT.
IFX_TAPI_KPI_STREAM_MAX	2 _D	Reserved.

4.3.6.40 IFX_TAPI_LEC_GAIN_t**Description**

LEC gain levels.

Prototype

```
typedef enum
{
    IFX_TAPI_LEC_GAIN_OFF = 0,
    IFX_TAPI_LEC_GAIN_LOW = 1,
    IFX_TAPI_LEC_GAIN_MEDIUM = 2,
    IFX_TAPI_LEC_GAIN_HIGH = 3
} IFX_TAPI_LEC_GAIN_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LEC_GAIN_OFF	0 _D	Turn LEC off.
IFX_TAPI_LEC_GAIN_LOW	1 _D	Turn LEC on to low-level.
IFX_TAPI_LEC_GAIN_MEDIUM	2 _D	Turn LEC on to medium level.
IFX_TAPI_LEC_GAIN_HIGH	3 _D	Turn LEC on to high level.

4.3.6.41 IFX_TAPI_LEC_NLP_t

Description

LEC NLP (Non Linear Processor) settings.

Prototype

```
typedef enum
{
    IFX_TAPI_LEC_NLP_DEFAULT = 0,
    IFX_TAPI_LEC_NLP_ON = 1,
    IFX_TAPI_LEC_NLP_OFF = 2
} IFX_TAPI_LEC_NLP_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LEC_NLP_DEFAULT	0 _D	Default NLP on.
IFX_TAPI_LEC_NLP_ON	1 _D	NLP on.
IFX_TAPI_LEC_NLP_OFF	2 _D	NLP off.

4.3.6.42 IFX_TAPI_LEC_TYPE_t

Description

LEC type selection.

Prototype

```
typedef enum
{
    IFX_TAPI_LEC_TYPE_OFF = 0,
    IFX_TAPI_LEC_TYPE_NE = 1,
    IFX_TAPI_LEC_TYPE_NFE = 2
} IFX_TAPI_LEC_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LEC_TYPE_OFF	0 _D	LEC OFF.

Name	Value	Description
IFX_TAPI_LEC_TYPE_NE	1 _D	Near-end LEC.
IFX_TAPI_LEC_TYPE_NFE	2 _D	Window based LEC (near-end and far-end at the same time).

4.3.6.43 IFX_TAPI_LINE_FEED_t

Description

Defines for line feeding modes.

Prototype

```
typedef enum
{
    IFX_TAPI_LINE_FEED_ACTIVE = 0,
    IFX_TAPI_LINE_FEED_ACTIVE_REV = 1,
    IFX_TAPI_LINE_FEED_STANDBY = 2,
    IFX_TAPI_LINE_FEED_HIGH_IMPEDANCE = 3,
    IFX_TAPI_LINE_FEED_DISABLED = 4,
    IFX_TAPI_LINE_FEED_GROUND_START = 5,
    IFX_TAPI_LINE_FEED_RING_BURST = 8,
    IFX_TAPI_LINE_FEED_RING_PAUSE = 9,
    IFX_TAPI_LINE_FEED_METER = 10
} IFX_TAPI_LINE_FEED_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LINE_FEED_ACTIVE	0 _D	Feeding mode for phone used for on-hook or off-hook transmission, with normal polarity.
IFX_TAPI_LINE_FEED_ACTIVE_REV	1 _D	Feeding mode for phone used for on-hook or off-hook transmission, with reversed polarity.
IFX_TAPI_LINE_FEED_STANDBY	2 _D	Feeding mode to be used if the phone is in standby (on-hook without any transmission active). Off-hook detection is possible in this mode.
IFX_TAPI_LINE_FEED_HIGH_IMPEDANCE	3 _D	Switch off the line, the device is only able to test the line.
IFX_TAPI_LINE_FEED_DISABLED	4 _D	Switch off the line, no operations possible on the line.
IFX_TAPI_LINE_FEED_GROUND_START	5 _D	Use ground start, also known as open tip.
IFX_TAPI_LINE_FEED_RING_BURST	8 _D	Reserved, needed for ring internal function.
IFX_TAPI_LINE_FEED_RING_PAUSE	9 _D	Reserved, needed for ring internal function.
IFX_TAPI_LINE_FEED_METER	10 _D	Reserved, needed for internal function.

4.3.6.44 IFX_TAPI_LINE_HOOK_STATUS_t

Description

Enumeration for hook status events.

Prototype

```
typedef enum
{
    IFX_TAPI_LINE_HOOK_STATUS_HOOK = 0x01,
    IFX_TAPI_LINE_HOOK_STATUS_FLASH = 0x02,
    IFX_TAPI_LINE_HOOK_STATUS_OFFHOOK = 0x04
} IFX_TAPI_LINE_HOOK_STATUS_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LINE_HOOK_STATUS_HOOK	01 _H	Hook detected.
IFX_TAPI_LINE_HOOK_STATUS_FLASH	02 _H	Hook flash detected.
IFX_TAPI_LINE_HOOK_STATUS_OFFHOOK	04 _H	Detected hook event is an off-hook.

4.3.6.45 IFX_TAPI_LINE_HOOK_VALIDATION_TYPE_t**Description**

Validation types used for structure [IFX_TAPI_LINE_HOOK_VT_t](#).

Prototype

```
typedef enum
{
    IFX_TAPI_LINE_HOOK_VT_OFFHOOK_TIME = 0x0,
    IFX_TAPI_LINE_HOOK_VT_ONHOOK_TIME = 0x1,
    IFX_TAPI_LINE_HOOK_VT_FLASHHOOK_TIME = 0x2,
    IFX_TAPI_LINE_HOOK_VT_DIGITLOW_TIME = 0x4,
    IFX_TAPI_LINE_HOOK_VT_DIGITHIGH_TIME = 0x8,
    IFX_TAPI_LINE_HOOK_VT_INTERDIGIT_TIME = 0x10
} IFX_TAPI_LINE_HOOK_VALIDATION_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LINE_HOOK_VT_OFFHOOK_TIME	0 _H	Off-hook time validation.
IFX_TAPI_LINE_HOOK_VT_ONHOOK_TIME	1 _H	On-hook time validation.
IFX_TAPI_LINE_HOOK_VT_FLASHHOOK_TIME	2 _H	Hook flash (alias register recall) validation timing.
IFX_TAPI_LINE_HOOK_VT_DIGITLOW_TIME	4 _H	Pulse digit low (open loop/break) validation timing.
IFX_TAPI_LINE_HOOK_VT_DIGITHIGH_TIME	8 _H	Pulse digit high (close loop/make) validation timing.
IFX_TAPI_LINE_HOOK_VT_INTERDIGIT_TIME	10 _H	Inter-digit pause validation timing.

4.3.6.46 IFX_TAPI_LINE_LEVEL_t

Description

Specifies the whether the “high level” line output mode should be used. Enabling the “high level” mode, it will be possible to have a extremely high output signal level, above +3 dBm. This mode is required for some special howler tones.

Attention: The “high level” mode allow signal levels potentially dangerous for the human ear!

Prototype

```
typedef enum
{
    IFX_TAPI_LINE_LEVEL_NORMAL = 0x0,
    IFX_TAPI_LINE_LEVEL_HIGH = 0x1
} IFX_TAPI_LINE_LEVEL_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LINE_LEVEL_NORMAL	0 _H	Line output level for typical operations.
IFX_TAPI_LINE_LEVEL_HIGH	1 _H	High level line, suitable for playing howler tones requiring output levels above 3 dBm. This is not suitable for voice calls

4.3.6.47 IFX_TAPI_LINE_STATUS_t

Description

Enumeration for phone line status information.

Prototype

```
typedef enum
{
    IFX_TAPI_LINE_STATUS_RINGING = 0x1,
    IFX_TAPI_LINE_STATUS_RINGFINISHED = 0x02,
    IFX_TAPI_LINE_STATUS_FAX = 0x04,
    IFX_TAPI_LINE_STATUS_GNDKEY = 0x10,
    IFX_TAPI_LINE_STATUS_GNDKEYHIGH = 0x20,
    IFX_TAPI_LINE_STATUS_OTEMP = 0x40,
    IFX_TAPI_LINE_STATUS_GNDKEYPOL = 0x80,
    IFX_TAPI_LINE_STATUS_GR909RES = 0x100,
    IFX_TAPI_LINE_STATUS_CIDRX = 0x200
} IFX_TAPI_LINE_STATUS_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LINE_STATUS_RINGING	1 _H	Line is ringing
IFX_TAPI_LINE_STATUS_RINGFINISHED	02 _H	Ringing finished
IFX_TAPI_LINE_STATUS_FAX	04 _H	Fax detected -> is replaced by signal

Name	Value	Description
IFX_TAPI_LINE_STATUS_GNDKEY	10 _H	Ground key detected
IFX_TAPI_LINE_STATUS_GNDKEYHIGH	20 _H	Ground key high detected
IFX_TAPI_LINE_STATUS_OTEMP	40 _H	Over temperature detected
IFX_TAPI_LINE_STATUS_GNDKEYPOL	80 _H	Ground key polarity detected
IFX_TAPI_LINE_STATUS_GR909RES	100 _H	
IFX_TAPI_LINE_STATUS_CIDRX	200 _H	Caller id received

4.3.6.48 IFX_TAPI_LINE_TYPE_t

Description

Enumeration specifying the line type.

Prototype

```
typedef enum
{
    IFX_TAPI_LINE_TYPE_UNKNOWN = -1,
    IFX_TAPI_LINE_TYPE_FXS = 0,
    IFX_TAPI_LINE_TYPE_FXO = 1
} IFX_TAPI_LINE_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_LINE_TYPE_UNKNOWN	-1 _D	Wrong line mode type for analog channel.
IFX_TAPI_LINE_TYPE_FXS	0 _D	Line mode type FXS for analog channel.
IFX_TAPI_LINE_TYPE_FXO	1 _D	Line mode type FXO for analog channel.

4.3.6.49 IFX_TAPI_MAP_DATA_TYPE_t

Description

Data channel destination types (conferencing).

Attention: This enum is maintained only for backwards compatibility reasons, it is recommended to use enum [IFX_TAPI_MAP_TYPE_t](#).

Prototype

```
typedef enum
{
    IFX_TAPI_MAP_DATA_TYPE_DEFAULT = 0,
    IFX_TAPI_MAP_DATA_TYPE_CODER = 1,
    IFX_TAPI_MAP_DATA_TYPE_PCM = 2,
    IFX_TAPI_MAP_DATA_TYPE_PHONE = 3,
    IFX_TAPI_MAP_DATA_TYPE_AUDIO = 4,
    IFX_TAPI_MAP_DATA_TYPE_AUDIO_AUX = 5
} IFX_TAPI_MAP_DATA_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_MAP_DATA_TYPE_DEFAULT	0 _D	Reserved.
IFX_TAPI_MAP_DATA_TYPE_CODER	1 _D	Type is a Coder channel.
IFX_TAPI_MAP_DATA_TYPE_PCM	2 _D	Type is a PCM channel.
IFX_TAPI_MAP_DATA_TYPE_PHONE	3	Type is a Analog Phone channel.
IFX_TAPI_MAP_DATA_TYPE_AUDIO	4 _D	Type is an Audio channel.
IFX_TAPI_MAP_DATA_TYPE_AUDIO_AUX	5 _D	Type is the auxiliary output of the audio channel.

Remarks

This enum is used to choose the resource type for a mapping ioctl, the applicability on a certain strictly depends on the resource availability on the selected channel. In particular

- **IFX_TAPI_MAP_DATA_TYPE_PHONE** can be used only in IP Phone applications.
- **IFX_TAPI_MAP_DATA_TYPE_AUDIO** and **IFX_TAPI_MAP_DATA_TYPE_AUDIO_AUX** can be used only in IP Phone applications.

4.3.6.50 IFX_TAPI_MAP_DEC_t

Description

Play out enabling and disabling information.

Prototype

```
typedef enum
{
    IFX_TAPI_MAP_DEC_NONE = 0,
    IFX_TAPI_MAP_DEC_START = 1,
    IFX_TAPI_MAP_DEC_STOP = 2
} IFX_TAPI_MAP_DEC_t;
```

Parameters

Name	Value	Description
IFX_TAPI_MAP_DEC_NONE	0 _D	Do not modify playing status.
IFX_TAPI_MAP_DEC_START	1 _D	Start playing after mapping.
IFX_TAPI_MAP_DEC_STOP	2 _D	Stop playing after mapping.

4.3.6.51 IFX_TAPI_MAP_ENC_t

Description

Recording enabling and disabling information.

Prototype

```
typedef enum
{
    IFX_TAPI_MAP_ENC_NONE = 0,
```

```

IFX_TAPI_MAP_ENC_START = 1,
IFX_TAPI_MAP_ENC_STOP = 2
} IFX_TAPI_MAP_ENC_t;

```

Parameters

Name	Value	Description
IFX_TAPI_MAP_ENC_NONE	0 _D	Do not modify recording status.
IFX_TAPI_MAP_ENC_START	1 _D	Start recording after mapping.
IFX_TAPI_MAP_ENC_STOP	2 _D	Stop recording after mapping.

4.3.6.52 IFX_TAPI_MAP_TYPE_t

Description

Type channel for mapping.

Prototype

```

typedef enum
{
    IFX_TAPI_MAP_TYPE_DEFAULT = 0,
    IFX_TAPI_MAP_TYPE_CODER = 1,
    IFX_TAPI_MAP_TYPE_PCM = 2,
    IFX_TAPI_MAP_TYPE_PHONE = 3,
    IFX_TAPI_MAP_TYPE_AUDIO = 4,
    IFX_TAPI_MAP_TYPE_AUDIO_AUX = 5,
    IFX_TAPI_MAP_TYPE_AUDIO_DIAG0_IN = 6,
    IFX_TAPI_MAP_TYPE_AUDIO_DIAG0_OUT = 7,
    IFX_TAPI_MAP_TYPE_AUDIO_DIAG1_IN = 8,
    IFX_TAPI_MAP_TYPE_AUDIO_DIAG1_OUT = 9,
    IFX_TAPI_MAP_TYPE_AUDIO_LOOP0 = 10,
    IFX_TAPI_MAP_TYPE_AUDIO_LOOP1 = 11,
    IFX_TAPI_MAP_TYPE_DECT = 12
} IFX_TAPI_MAP_TYPE_t;

```

Parameters

Name	Value	Description
IFX_TAPI_MAP_TYPE_DEFAULT	0 _D	Reserved.
IFX_TAPI_MAP_TYPE_CODER	1 _D	Type is a Coder channel.
IFX_TAPI_MAP_TYPE_PCM	2 _D	Type is a PCM channel.
IFX_TAPI_MAP_TYPE_PHONE	3	Type is a Analog Phone channel.
IFX_TAPI_MAP_TYPE_AUDIO	4 _D	Type is an Audio channel.
IFX_TAPI_MAP_TYPE_AUDIO_AUX	5 _D	Type is the auxiliary output of the audio channel.
IFX_TAPI_MAP_TYPE_AUDIO_DIAG0_IN	6 _D	Type is a diagnostic output 'behind' ADC0.
IFX_TAPI_MAP_TYPE_AUDIO_DIAG0_O	7 _D	Type is a diagnostic output 'before' DAC0.
UT		
IFX_TAPI_MAP_TYPE_AUDIO_DIAG1_IN	8 _D	Type is a diagnostic output 'behind' ADC1.

Name	Value	Description
IFX_TAPI_MAP_TYPE_AUDIO_DIAG1_O_UT	9 _D	Type is a diagnostic output 'before' DAC1.
IFX_TAPI_MAP_TYPE_AUDIO_LOOP0	10 _D	Type is audio channel loop 0.
IFX_TAPI_MAP_TYPE_AUDIO_LOOP1	11 _D	Type is the auxiliary output of the audio channel.
IFX_TAPI_MAP_TYPE_DECT	12 _D	Type is a DECT channel.

Remarks

This enum is used to choose the resource type for a mapping ioctl, the applicability strictly depends on the resource availability on the selected channel. In particular:

- **IFX_TAPI_MAP_TYPE_PHONE** can be used only in ATA/GW applications.
- **IFX_TAPI_MAP_TYPE_AUDIO** and **IFX_TAPI_MAP_TYPE_AUDIO_AUX** can be used only in IP Phone applications.

4.3.6.53 IFX_TAPI_PCM_IF_DCLFREQ_t

Description

DCL frequency for the PCM interface.

Prototype

```
typedef enum
{
    IFX_TAPI_PCM_IF_DCLFREQ_512 = 0,
    IFX_TAPI_PCM_IF_DCLFREQ_1024 = 1,
    IFX_TAPI_PCM_IF_DCLFREQ_1536 = 2,
    IFX_TAPI_PCM_IF_DCLFREQ_2048 = 3,
    IFX_TAPI_PCM_IF_DCLFREQ_4096 = 4,
    IFX_TAPI_PCM_IF_DCLFREQ_8192 = 5,
    IFX_TAPI_PCM_IF_DCLFREQ_16384 = 6
} IFX_TAPI_PCM_IF_DCLFREQ_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PCM_IF_DCLFREQ_512	0 _D	512 kHz.
IFX_TAPI_PCM_IF_DCLFREQ_1024	1 _D	1024 kHz.
IFX_TAPI_PCM_IF_DCLFREQ_1536	2 _D	1536 kHz.
IFX_TAPI_PCM_IF_DCLFREQ_2048	3 _D	2048 kHz.
IFX_TAPI_PCM_IF_DCLFREQ_4096	4 _D	4096 kHz.
IFX_TAPI_PCM_IF_DCLFREQ_8192	5 _D	8192 kHz.
IFX_TAPI_PCM_IF_DCLFREQ_16384	6 _D	16384 kHz.

4.3.6.54 IFX_TAPI_PCM_IF_DRIVE_t

Description

Drive mode for bit 0, in single clocking mode.

Prototype

```
typedef enum
{
    IFX_TAPI_PCM_IF_DRIVE_ENTIRE = 0,
    IFX_TAPI_PCM_IF_DRIVE_HALF = 1
} IFX_TAPI_PCM_IF_DRIVE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PCM_IF_DRIVE_ENTIRE	0 _D	Bit 0 is driven for the entire clock period.
IFX_TAPI_PCM_IF_DRIVE_HALF	1 _D	Bit 0 is driven for the first half of the clock period.

4.3.6.55 IFX_TAPI_PCM_IF_MODE_t**Description**

PCM interface mode (master/slave).

Prototype

```
typedef enum
{
    IFX_TAPI_PCM_IF_MODE_SLAVE_AUTOFREQ = 0,
    IFX_TAPI_PCM_IF_MODE_SLAVE = 1,
    IFX_TAPI_PCM_IF_MODE_MASTER = 2
} IFX_TAPI_PCM_IF_MODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PCM_IF_MODE_SLAVE_AUTOFREQ	0 _D	Reseved.
IFX_TAPI_PCM_IF_MODE_SLAVE	1 _D	Slave mode. The DCL frequency is explicitly programmed.
IFX_TAPI_PCM_IF_MODE_MASTER	2 _D	Master mode. The DCL frequency is explicitly programmed.

4.3.6.56 IFX_TAPI_PCM_IF_OFFSET_t**Description**

PCM interface mode transmit/receive offset.

Prototype

```
typedef enum
{
    IFX_TAPI_PCM_IF_OFFSET_NONE = 0,
    IFX_TAPI_PCM_IF_OFFSET_1 = 1,
    IFX_TAPI_PCM_IF_OFFSET_2 = 2,
```

```

IFX_TAPI_PCM_IF_OFFSET_3 = 3,
IFX_TAPI_PCM_IF_OFFSET_4 = 4,
IFX_TAPI_PCM_IF_OFFSET_5 = 5,
IFX_TAPI_PCM_IF_OFFSET_6 = 6,
IFX_TAPI_PCM_IF_OFFSET_7 = 7
} IFX_TAPI_PCM_IF_OFFSET_t;

```

Parameters

Name	Value	Description
IFX_TAPI_PCM_IF_OFFSET_NONE	0 _D	No offset.
IFX_TAPI_PCM_IF_OFFSET_1	1 _D	Offset: one data period is added.
IFX_TAPI_PCM_IF_OFFSET_2	2 _D	Offset: two data periods are added.
IFX_TAPI_PCM_IF_OFFSET_3	3 _D	Offset: three data periods are added.
IFX_TAPI_PCM_IF_OFFSET_4	4 _D	Offset: four data periods are added.
IFX_TAPI_PCM_IF_OFFSET_5	5 _D	Offset: five data periods are added.
IFX_TAPI_PCM_IF_OFFSET_6	6 _D	Offset: sixt data periods are added.
IFX_TAPI_PCM_IF_OFFSET_7	7 _D	Offset: seven data periods are added.

4.3.6.57 IFX_TAPI_PCM_IF_SLOPE_t

Description

Slope for the PCM interface transmit/receive.

Prototype

```

typedef enum
{
    IFX_TAPI_PCM_IF_SLOPE_RISE = 0,
    IFX_TAPI_PCM_IF_SLOPE_FALL = 1
} IFX_TAPI_PCM_IF_SLOPE_t;

```

Parameters

Name	Value	Description
IFX_TAPI_PCM_IF_SLOPE_RISE	0 _D	Rising edge.
IFX_TAPI_PCM_IF_SLOPE_FALL	1 _D	Falling edge.

4.3.6.58 IFX_TAPI_PCM_RES_t

Description

Coding for the PCM channel.

Prototype

```

typedef enum
{
    IFX_TAPI_PCM_RES_ALAW_8BIT = 0,
    IFX_TAPI_PCM_RES_MLAW_8BIT = 1,
}

```

```
IFX_TAPI_PCM_RES_LINEAR_16BIT = 2
} IFX_TAPI_PCM_RES_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PCM_RES_ALAW_8BIT	0 _D	A-law 8-bit.
IFX_TAPI_PCM_RES_MLAW_8BIT	1 _D	μ-law 8-bit
IFX_TAPI_PCM_RES_LINEAR_16BIT	2 _D	Linear 16-bit.

4.3.6.59 IFX_TAPI_TDM_IF_TYPE_t

Description

Type of TDM interface used.

Prototype

```
typedef enum
{
    IFX_TAPI_TDM_IF_TYPE_PCM = 0,
    IFX_TAPI_TDM_IF_TYPE_IOM2 = 1,
    IFX_TAPI_TDM_IF_TYPE_AC97 = 2
} IFX_TAPI_TDM_IF_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TDM_IF_TYPE_PCM	0 _D	PCM interface.
IFX_TAPI_TDM_IF_TYPE_IOM2	1 _D	IOM2 interface.
IFX_TAPI_TDM_IF_TYPE_AC97	2 _D	AC97 interface.

4.3.6.60 IFX_TAPI_METER_MODE_t

Description

Metering modes.

Prototype

```
typedef enum
{
    IFX_TAPI_METER_MODE_TTX = 0,
    IFX_TAPI_METER_MODE_REVPOL = 1
} IFX_TAPI_METER_MODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_METER_MODE_TTX	0 _D	Normal TTX mode.
IFX_TAPI_METER_MODE_REVPOL	1 _D	Reverse polarity mode.

4.3.6.61 IFX_TAPI_PKT_AAL_PROFILE_RANGE_t

Description

Used for [IFX_TAPI_PCK_AAL_PROFILE_t](#) in case one coder range.

The range information is specified as “UUI Codepoint Range” in the specification The ATM Forum, AF-VMOA-0145.000 or ITU-T I.366.2

Prototype

```
typedef enum
{
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_15 = 0,
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_7 = 1,
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_8_15 = 2,
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_3 = 3,
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_4_7 = 4,
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_8_11 = 5,
    IFX_TAPI_PKT_AAL_PROFILE_RANGE_12_15 = 6
} IFX_TAPI_PKT_AAL_PROFILE_RANGE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_15	0 _D	One range from 0 to 15.
IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_7	1 _D	Range from 0 to 7 for a two range profile entry.
IFX_TAPI_PKT_AAL_PROFILE_RANGE_8_15	2 _D	Range from 8 to 15 for a two range profile entry.
IFX_TAPI_PKT_AAL_PROFILE_RANGE_0_3	3 _D	Range from 0 to 3 for a four range profile entry.
IFX_TAPI_PKT_AAL_PROFILE_RANGE_4_7	4 _D	Range from 4 to 7 for a four range profile entry.
IFX_TAPI_PKT_AAL_PROFILE_RANGE_8_11	5 _D	Range from 8 to 11 for a four range profile entry.
IFX_TAPI_PKT_AAL_PROFILE_RANGE_12_15	6 _D	Range from 12 to 15 for a four range profile entry.

4.3.6.62 IFX_TAPI_PKT_EV_GEN_ACTION_t

Description

Start/stop event generation.

Prototype

```
typedef enum
{
    IFX_TAPI_EV_GEN_ACTION_STOP = 0,
    IFX_TAPI_EV_GEN_ACTION_START = 1
} IFX_TAPI_PKT_EV_GEN_ACTION_t;
```

Parameters

Name	Value	Description
IFX_TAPI_EV_GEN_ACTION_STOP	0 _D	Stop event generation.
IFX_TAPI_EV_GEN_ACTION_START	1 _D	Start event generation.

4.3.6.63 IFX_TAPI_PKT_EV_NUM_t

Description

Out of band or in band definition.

Prototype

```
typedef enum
{
    IFX_TAPI_PKT_EV_NUM_DTMF_0 = 0,
    IFX_TAPI_PKT_EV_NUM_DTMF_1 = 1,
    IFX_TAPI_PKT_EV_NUM_DTMF_2 = 2,
    IFX_TAPI_PKT_EV_NUM_DTMF_3 = 3,
    IFX_TAPI_PKT_EV_NUM_DTMF_4 = 4,
    IFX_TAPI_PKT_EV_NUM_DTMF_5 = 5,
    IFX_TAPI_PKT_EV_NUM_DTMF_6 = 6,
    IFX_TAPI_PKT_EV_NUM_DTMF_7 = 7,
    IFX_TAPI_PKT_EV_NUM_DTMF_8 = 8,
    IFX_TAPI_PKT_EV_NUM_DTMF_9 = 9,
    IFX_TAPI_PKT_EV_NUM_DTMF_STAR = 10,
    IFX_TAPI_PKT_EV_NUM_DTMF_HASH = 11,
    IFX_TAPI_PKT_EV_NUM_ANS = 32,
    IFX_TAPI_PKT_EV_NUM_NANS = 33,
    IFX_TAPI_PKT_EV_NUM_ANSAM = 34,
    IFX_TAPI_PKT_EV_NUM_NANSAM = 35,
    IFX_TAPI_PKT_EV_NUM_CNG = 36,
    IFX_TAPI_PKT_EV_NUM_DIS = 54,
    IFX_TAPI_PKT_EV_NUM_NO_EVENT = 0xFFFFFFFF
} IFX_TAPI_PKT_EV_NUM_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PKT_EV_NUM_DTMF_0	0 _D	RFC2833 Event number for DTMF tone 0.
IFX_TAPI_PKT_EV_NUM_DTMF_1	1 _D	RFC2833 Event number for DTMF tone 1.
IFX_TAPI_PKT_EV_NUM_DTMF_2	2 _D	RFC2833 Event number for DTMF tone 2.
IFX_TAPI_PKT_EV_NUM_DTMF_3	3 _D	RFC2833 Event number for DTMF tone 3.
IFX_TAPI_PKT_EV_NUM_DTMF_4	4 _D	RFC2833 Event number for DTMF tone 4.
IFX_TAPI_PKT_EV_NUM_DTMF_5	5 _D	RFC2833 Event number for DTMF tone 5.
IFX_TAPI_PKT_EV_NUM_DTMF_6	6 _D	RFC2833 Event number for DTMF tone 6.
IFX_TAPI_PKT_EV_NUM_DTMF_7	7 _D	RFC2833 Event number for DTMF tone 7.
IFX_TAPI_PKT_EV_NUM_DTMF_8	8 _D	RFC2833 Event number for DTMF tone 8.
IFX_TAPI_PKT_EV_NUM_DTMF_9	9 _D	RFC2833 Event number for DTMF tone 9.
IFX_TAPI_PKT_EV_NUM_DTMF_STAR	10 _D	RFC2833 Event number for DTMF tone *.
IFX_TAPI_PKT_EV_NUM_DTMF_HASH	11 _D	RFC2833 Event number for DTMF tone #.
IFX_TAPI_PKT_EV_NUM_ANS	32 _D	RFC2833 Event number for ANS tone.
IFX_TAPI_PKT_EV_NUM_NANS	33 _D	RFC2833 Event number for /ANS tone.
IFX_TAPI_PKT_EV_NUM_ANSAM	34 _D	RFC2833 Event number for ANSam tone.

Name	Value	Description
IFX_TAPI_PKT_EV_NUM_NANSAM	35 _D	RFC2833 Event number for /ANSam tone.
IFX_TAPI_PKT_EV_NUM_CNG	36 _D	RFC2833 Event number for CNG tone.
IFX_TAPI_PKT_EV_NUM_DIS	54 _D	RFC2833 Event number for DIS signal.
IFX_TAPI_PKT_EV_NUM_NO_EVENT	FFFFFFF _H	No support RFC event received or no event received.

4.3.6.64 IFX_TAPI_PKT_EV_OOB_t

Description

Out of band or in band definition.

Prototype

```
typedef enum
{
    IFX_TAPI_PKT_EV_OOB_DEFAULT = 0,
    IFX_TAPI_PKT_EV_OOB_NO = 1,
    IFX_TAPI_PKT_EV_OOB_ONLY = 2,
    IFX_TAPI_PKT_EV_OOB_ALL = 3,
    IFX_TAPI_PKT_EV_OOB_BLOCK = 4
} IFX_TAPI_PKT_EV_OOB_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PKT_EV_OOB_DEFAULT	0 _D	Reserved.
IFX_TAPI_PKT_EV_OOB_NO	1 _D	Transmit only in-band.
IFX_TAPI_PKT_EV_OOB_ONLY	2 _D	Transmit only out-of-band.
IFX_TAPI_PKT_EV_OOB_ALL	3 _D	Transmit in-band and out-of-band.
IFX_TAPI_PKT_EV_OOB_BLOCK	4 _D	Block event transmission: neither in-band nor out-of-band.

4.3.6.65 IFX_TAPI_PKT_EV_OOBPLAY_t

Description

Defines the play out of received RFC2833 event packets.

Prototype

```
typedef enum
{
    IFX_TAPI_PKT_EV_OOBPLAY_DEFAULT = 0,
    IFX_TAPI_PKT_EV_OOBPLAY_PLAY = 1,
    IFX_TAPI_PKT_EV_OOBPLAY_MUTE = 2,
    IFX_TAPI_PKT_EV_OOBPLAY_APT_PLAY = 3
} IFX_TAPI_PKT_EV_OOBPLAY_t;
```

Parameters

Name	Value	Description
IFX_TAPI_PKT_EV_OOBPLAY_DEFAULT	0 _D	Device default setting. Not recommended.
IFX_TAPI_PKT_EV_OOBPLAY_PLAY	1 _D	All RFC 2833 packets coming from the net are played out. Upstream and downstream RFC 2833 packets have the same payload type.
IFX_TAPI_PKT_EV_OOBPLAY_MUTE	2 _D	All RFC 2833 packets coming from the net are muted.
IFX_TAPI_PKT_EV_OOBPLAY_APT_PLAY	3 _D	All RFC 2833 packets coming from the net are played out. Upstream and downstream RFC 2833 packets have different payload types.

4.3.6.66 IFX_TAPI_POLL_PKT_TYPE_t

Description

Defines the packet types supported by polling.

Prototype

```
typedef enum
{
    IFX_TAPI_POLL_PKT_TYPE_VOICE = 0,
    IFX_TAPI_POLL_PKT_TYPE_FRD = 1
} IFX_TAPI_POLL_PKT_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_POLL_PKT_TYPE_VOICE	0 _D	Packetized voice.
IFX_TAPI_POLL_PKT_TYPE_FRD	1 _D	Fax relay data pump packets used if the T.38 data pump functionality is integrated in the device.

4.3.6.67 IFX_TAPI_RING_CFG_MODE_t

Description

Ring Configuration Mode.

Prototype

```
typedef enum
{
    IFX_TAPI_RING_CFG_MODE_INT_BALANCED = 0,
    IFX_TAPI_RING_CFG_MODE_INT_UNBALANCED_ROT = 1,
    IFX_TAPI_RING_CFG_MODE_INT_UNBALANCED_ROR = 2,
    IFX_TAPI_RING_CFG_MODE_EXT_IT_CS = 3,
    IFX_TAPI_RING_CFG_MODE_EXT_IO_CS = 4
} IFX_TAPI_RING_CFG_MODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_RING_CFG_MODE_INT_BALANCED	0 _D	Internal balanced.
IFX_TAPI_RING_CFG_MODE_INT_UNBALANCED_ROT	1 _D	Internal unbalanced ROT.
IFX_TAPI_RING_CFG_MODE_INT_UNBALANCED_ROR	2 _D	Internal unbalanced ROR.
IFX_TAPI_RING_CFG_MODE_EXT_IT_CS	3 _D	External SLIC current sense.
IFX_TAPI_RING_CFG_MODE_EXT_IO_CS	4 _D	External IO current sense.

4.3.6.68 IFX_TAPI_RING_CFG_SUBMODE_t

Description

Ring Configuration SubMode.

Prototype

```
typedef enum
{
    IFX_TAPI_RING_CFG_SUBMODE_DC RNG TRIP STANDARD = 0,
    IFX_TAPI_RING_CFG_SUBMODE_DC RNG TRIP FAST = 1,
    IFX_TAPI_RING_CFG_SUBMODE_AC RNG TRIP STANDARD = 2,
    IFX_TAPI_RING_CFG_SUBMODE_AC RNG TRIP FAST = 3
} IFX_TAPI_RING_CFG_SUBMODE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_RING_CFG_SUBMODE_DC RNG TRIP STANDARD	0 _D	DC Ring Trip standard.
IFX_TAPI_RING_CFG_SUBMODE_DC RNG TRIP FAST	1 _D	DC Ring Trip fast.
IFX_TAPI_RING_CFG_SUBMODE_AC RNG TRIP STANDARD	2 _D	AC Ring Trip standard.
IFX_TAPI_RING_CFG_SUBMODE_AC RNG TRIP FAST	3 _D	AC Ring Trip fast.

4.3.6.69 IFX_TAPI_RUNTIME_ERROR_t

Description

TAPI Runtime Errors.

Prototype

```
typedef enum
{
    IFX_TAPI_RT_ERROR_NONE = 0,
    IFX_TAPI_RT_ERROR_RINGCADENCE_CIDTX = 1,
    IFX_TAPI_RT_ERROR_CIDTX_NOACK = 2,
    IFX_TAPI_RT_ERROR_CIDTX_NOACK2 = 4
} IFX_TAPI_RUNTIME_ERROR_t;
```

Parameters

Name	Value	Description
IFX_TAPI_RT_ERROR_NONE	0 _D	No error.
IFX_TAPI_RT_ERROR_RINGCADENCE_CIDTX	1 _D	Ring cadence settings error in cid tx.
IFX_TAPI_RT_ERROR_CIDTX_NOACK	2 _D	No acknowledge during CID sequence.
IFX_TAPI_RT_ERROR_CIDTX_NOACK2	4 _D	No 2nd acknowledge during NTT CID onhook tx sequence. This indicates a missing incoming successful signal.

4.3.6.70 IFX_TAPI_SIG_t

Description

List the tone detection options.

Some application maybe not interested whether the signal came from the receive or transmit path. Therefore for each signal a mask exists, that includes receive and transmit path.

Prototype

```
typedef enum
{
    IFX_TAPI_SIG_NONE = 0x0,
    IFX_TAPI_SIG_DISRX = 0x1,
    IFX_TAPI_SIG_DISTX = 0x2,
    IFX_TAPI_SIG_DIS = 0x4,
    IFX_TAPI_SIG_CEDRX = 0x8,
    IFX_TAPI_SIG_CEDTX = 0x10,
    IFX_TAPI_SIG_CED = 0x20,
    IFX_TAPI_SIG_CNGFAXRX = 0x40,
    IFX_TAPI_SIG_CNGFAXTX = 0x80,
    IFX_TAPI_SIG_CNGFAX = 0x100,
    IFX_TAPI_SIG_CNGMODRX = 0x200,
    IFX_TAPI_SIG_CNGMODTX = 0x400,
    IFX_TAPI_SIG_CNGMOD = 0x800,
    IFX_TAPI_SIG_PHASEREV_RX = 0x1000,
    IFX_TAPI_SIG_PHASEREV_TX = 0x2000,
    IFX_TAPI_SIG_PHASEREV = 0x4000,
    IFX_TAPI_SIG_AMRX = 0x8000,
    IFX_TAPI_SIG_AMTX = 0x10000,
    IFX_TAPI_SIG_AM = 0x20000,
    IFX_TAPI_SIG_TONEHOLDING_ENDRX = 0x40000,
    IFX_TAPI_SIG_TONEHOLDING_ENDTX = 0x80000,
    IFX_TAPI_SIG_TONEHOLDING_END = 0x100000,
    IFX_TAPI_SIG_CEDENDRX = 0x200000,
    IFX_TAPI_SIG_CEDENDTX = 0x400000,
    IFX_TAPI_SIG_CEDEND = 0x800000,
    IFX_TAPI_SIG_CPTD = 0x1000000,
    IFX_TAPI_SIG_V8BISRX = 0x2000000,
    IFX_TAPI_SIG_V8BISTX = 0x4000000
}
```

```
} IFX_TAPI_SIG_t;
```

Parameters

Name	Value	Description
IFX_TAPI_SIG_NONE	0 _H	No signal detected
IFX_TAPI_SIG_DISRX	1 _H	V.21 Preamble Fax Tone, Digital identification signal (DIS), receive path.
IFX_TAPI_SIG_DISTX	2 _H	V.21 Preamble Fax Tone, Digital identification signal (DIS), transmit path.
IFX_TAPI_SIG_DIS	4 _H	V.21 Preamble Fax Tone in all path, Digital identification signal (DIS).
IFX_TAPI_SIG_CEDRX	8 _H	V.25 2100 Hz (CED) Modem/Fax Tone, receive path.
IFX_TAPI_SIG_CEDTX	10 _H	V.25 2100 Hz (CED) Modem/Fax Tone, transmit path.
IFX_TAPI_SIG_CED	20 _H	V.25 2100 Hz (CED) Modem/Fax Tone in all paths.
IFX_TAPI_SIG_CNGFAXRX	40 _H	CNG Fax Calling Tone (1100 Hz) receive path.
IFX_TAPI_SIG_CNGFAXTX	80 _H	CNG Fax Calling Tone (1100 Hz) transmit path.
IFX_TAPI_SIG_CNGFAX	100 _H	CNG Fax Calling Tone (1100 Hz) in all paths.
IFX_TAPI_SIG_CNGMODRX	200 _H	CNG Modem Calling Tone (1300 Hz) receive path.
IFX_TAPI_SIG_CNGMODTX	400 _H	CNG Modem Calling Tone (1300 Hz) transmit path.
IFX_TAPI_SIG_CNGMOD	800 _H	CNG Modem Calling Tone (1300 Hz) in all paths.
IFX_TAPI_SIG_PHASEREV_RX	1000 _H	Phase reversal detection receive path.
IFX_TAPI_SIG_PHASEREV_TX	2000 _H	Phase reversal detection transmit path.
IFX_TAPI_SIG_PHASEREV	4000 _H	Phase reversal detection in all paths.
IFX_TAPI_SIG_AM_RX	8000 _H	Amplitude modulation receive path.
IFX_TAPI_SIG_AM_TX	10000 _H	Amplitude modulation transmit path.
IFX_TAPI_SIG_AM	20000 _H	Amplitude modulation.
IFX_TAPI_SIG_TONEHOLDING_END_RX	40000 _H	Modem tone holding signal stopped receive path.
IFX_TAPI_SIG_TONEHOLDING_END_TX	80000 _H	Modem tone holding signal stopped transmit path.
IFX_TAPI_SIG_TONEHOLDING_END	100000 _H	Modem tone holding signal stopped all paths.
IFX_TAPI_SIG_CEDEND_RX	200000 _H	End of signal CED detection receive path.
IFX_TAPI_SIG_CEDEND_TX	400000 _H	End of signal CED detection transmit path.
IFX_TAPI_SIG_CEDEND	800000 _H	End of signal CED detection. This signal also includes information about phase reversals and amplitude modulation, if enabled
IFX_TAPI_SIG_CPTD	1000000 _H	Signals a call progress tone detection. This signal is enabled with the interface IFX_TAPI_TONE_CPTD_START and stopped with IFX_TAPI_TONE_CPTD_STOP . It can not be activated with IFX_TAPI_SIG_DETECT_ENABLE
IFX_TAPI_SIG_V8BISRX	2000000 _H	Signals the V8bis detection on the receive path.
IFX_TAPI_SIG_V8BISTX	4000000 _H	Signals the V8bis detection on the transmit path.

4.3.6.71 IFX_TAPI_SIG_EXT_t

Description

This service offers extended tone detection options.

Prototype

```
typedef enum
{
    IFX_TAPI_SIG_EXT_NONE = 0x0,
    IFX_TAPI_SIG_EXT_V21LRX = 0x1,
    IFX_TAPI_SIG_EXT_V21LTX = 0x2,
    IFX_TAPI_SIG_EXT_V21L = 0x4,
    IFX_TAPI_SIG_EXT_V18ARX = 0x8,
    IFX_TAPI_SIG_EXT_V18ATX = 0x10,
    IFX_TAPI_SIG_EXT_V18A = 0x20,
    IFX_TAPI_SIG_EXT_V27RX = 0x40,
    IFX_TAPI_SIG_EXT_V27RX = 0x80,
    IFX_TAPI_SIG_EXT_V27 = 0x100,
    IFX_TAPI_SIG_EXT_BELLRX = 0x200,
    IFX_TAPI_SIG_EXT_BELLTX = 0x400,
    IFX_TAPI_SIG_EXT_BELL = 0x800,
    IFX_TAPI_SIG_EXT_V22RX = 0x1000,
    IFX_TAPI_SIG_EXT_V22TX = 0x2000,
    IFX_TAPI_SIG_EXT_V22 = 0x4000,
    IFX_TAPI_SIG_EXT_V22ORBELLRX = 0x8000,
    IFX_TAPI_SIG_EXT_V22ORBELLTX = 0x10000,
    IFX_TAPI_SIG_EXT_V22ORBELL = 0x20000,
    IFX_TAPI_SIG_TONEHOLDING_ENDRX = 0x40000,
    IFX_TAPI_SIG_TONEHOLDING_ENDTX = 0x80000,
    IFX_TAPI_SIG_TONEHOLDING_END = 0x100000,
    IFX_TAPI_SIG_CEDENDRX = 0x200000,
    IFX_TAPI_SIG_EXT_V32ACRX = 0x400000,
    IFX_TAPI_SIG_EXT_V32ACTX = 0x800000,
    IFX_TAPI_SIG_EXT_V21HTX = 0x1000000,
    IFX_TAPI_SIG_EXT_CASBELLRX = 0x2000000,
    IFX_TAPI_SIG_EXT_CASBELLTX = 0x4000000,
    IFX_TAPI_SIG_EXT_CASBELL = 0x6000000,
    IFX_TAPI_SIG_EXT_V21HRX = 0x8000000,
    IFX_TAPI_SIG_EXT_V21HTX = 0x10000000,
    IFX_TAPI_SIG_EXT_V21H = 0x18000000
} IFX_TAPI_SIG_EXT_t;
```

Parameters

Name	Value	Description
IFX_TAPI_SIG_EXT_NONE	0 _H	No signal detected
IFX_TAPI_SIG_EXT_V21LRX	1 _H	980 Hz single tone (V.21L mark sequence) receive path.
IFX_TAPI_SIG_EXT_V21LTX	2 _H	980 Hz single tone (V.21L mark sequence) transmit path.

Name	Value	Description
IFX_TAPI_SIG_EXT_V21L	4 _H	980 Hz single tone (V.21L mark sequence) all paths.
IFX_TAPI_SIG_EXT_V18ARX	8 _H	1400 Hz single tone (V.18A mark sequence) receive path
IFX_TAPI_SIG_EXT_V18ATX	10 _H	1400 Hz single tone (V.18A mark sequence) transmit path.
IFX_TAPI_SIG_EXT_V18A	20 _H	1400 Hz single tone (V.18A mark sequence) all paths.
IFX_TAPI_SIG_EXT_V27RX	40 _H	1800 Hz single tone (V.27, V.32 carrier) receive path.
IFX_TAPI_SIG_EXT_V27RX	80 _H	1800 Hz single tone (V.27, V.32 carrier) transmit path.
IFX_TAPI_SIG_EXT_V27	100 _H	1800 Hz single tone (V.27, V.32 carrier) all paths.
IFX_TAPI_SIG_EXT_BELLRX	200 _H	2225 Hz single tone (Bell answering tone) receive path.
IFX_TAPI_SIG_EXT_BELLTX	400 _H	2225 Hz single tone (Bell answering tone) transmit path.
IFX_TAPI_SIG_EXT_BELL	800 _H	2225 Hz single tone (Bell answering tone) all paths.
IFX_TAPI_SIG_EXT_V22RX	1000 _H	2250 Hz single tone (V.22 unscrambled binary ones) receive path.
IFX_TAPI_SIG_EXT_V22TX	2000 _H	2250 Hz single tone (V.22 unscrambled binary ones) transmit path.
IFX_TAPI_SIG_EXT_V22	4000 _H	2250 Hz single tone (V.22 unscrambled binary ones) all paths.
IFX_TAPI_SIG_EXT_V22ORBELLRX	8000 _H	2225 Hz or 2250 Hz single tone, not possible to distinguish receive path.
IFX_TAPI_SIG_EXT_V22ORBELLTX	10000 _H	2225 Hz or 2250 Hz single tone, not possible to distinguish receive path
IFX_TAPI_SIG_EXT_V22ORBELL	20000 _H	2225 Hz or 2250 Hz single tone, not possible to distinguish all paths.
IFX_TAPI_SIG_TONEHOLDING_ENDRX	40000 _H	600 Hz + 300 Hz dual tone (V.32 AC) receive path.
IFX_TAPI_SIG_TONEHOLDING_ENDTX	80000 _H	Modem tone holding signal stopped transmit path.
IFX_TAPI_SIG_TONEHOLDING_END	100000 _H	Modem tone holding signal stopped all paths.
IFX_TAPI_SIG_CEDENDRX	200000 _H	End of signal CED detection receive path.
IFX_TAPI_SIG_EXT_V32ACRX	400000 _H	End of signal CED detection transmit path.
IFX_TAPI_SIG_EXT_V32ACTX	800000 _H	600 Hz + 300 Hz dual tone (V.32 AC) transmit path.
IFX_TAPI_SIG_EXT_V21HTX	1000000 _H	600 Hz + 300 Hz dual tone (V.32 AC) all paths.
IFX_TAPI_SIG_EXT_CASBELLRX	2000000 _H	130 + 2750 Hz dual tone (Bell Caller ID Type 2 Alert Tone) receive path.
IFX_TAPI_SIG_EXT_CASBELLTX	4000000 _H	2130 + 2750 Hz dual tone (Bell Caller ID Type 2 Alert Tone) transmit path.
IFX_TAPI_SIG_EXT_CASBELL	6000000 _H	2130 + 2750 Hz dual tone (Bell Caller ID Type 2 Alert Tone) all paths
IFX_TAPI_SIG_EXT_V21HRX	8000000 _H	1650 Hz single tone (V.21H mark sequence) receive path.
IFX_TAPI_SIG_EXT_V21HTX	10000000 _H	1650 Hz single tone (V.21H mark sequence) transmit path.
IFX_TAPI_SIG_EXT_V21H	18000000 _H	1650 Hz single tone (V.21H mark sequence) all paths.

4.3.6.72 IFX_TAPI_T38_ERROR_t

Description

T.38 Fax errors.

Prototype

```
typedef enum
{
    IFX_TAPI_T38_NO_ERR = 0,
    IFX_TAPI_T38_ERR = 1,
    IFX_TAPI_T38_MIPS_OVLD = 2,
    IFX_TAPI_T38_READ_ERR = 3,
    IFX_TAPI_T38_WRITE_ERR = 4,
    IFX_TAPI_T38_DATA_ERR = 5
} IFX_TAPI_T38_ERROR_t;
```

Parameters

Name	Value	Description
IFX_TAPI_T38_NO_ERR	0 _D	No Error.
IFX_TAPI_T38_ERR	1 _D	Error occurred: Deactivate Datapump.
IFX_TAPI_T38_MIPS_OVLD	2 _D	MIPS Overload.
IFX_TAPI_T38_READ_ERR	3 _D	Error while reading data.
IFX_TAPI_T38_WRITE_ERR	4 _D	Error while writing data.
IFX_TAPI_T38_DATA_ERR	5 _D	Error while setting up modulator or demodulator.

4.3.6.73 IFX_TAPI_T38_STATUS_t

Description

T.38 Fax Datapump states.

Prototype

```
typedef enum
{
    IFX_TAPI_T38_DP_OFF = 0x1,
    IFX_TAPI_T38_DP_ON = 0x2,
    IFX_TAPI_T38_TX_ON = 0x4,
    IFX_TAPI_T38_TX_OFF = 0x8
} IFX_TAPI_T38_STATUS_t;
```

Parameters

Name	Value	Description
IFX_TAPI_T38_DP_OFF	1 _H	Fax Datapump not active.
IFX_TAPI_T38_DP_ON	2 _H	Fax Datapump active.
IFX_TAPI_T38_TX_ON	4 _H	Fax transmission is active.
IFX_TAPI_T38_TX_OFF	8 _H	Fax transmission is not active.

4.3.6.74 IFX_TAPI_T38_STD_t

Description

T.38 Fax standard and rate.

Prototype

```
typedef enum
{
    IFX_TAPI_T38_STD_V21_STD = 0x1,
    IFX_TAPI_T38_STD_V27_2400_STD = 0x2,
    IFX_TAPI_T38_STD_V27_4800_STD = 0x3,
    IFX_TAPI_T38_STD_V29_7200_STD = 0x4,
    IFX_TAPI_T38_STD_V29_9600_STD = 0x5,
    IFX_TAPI_T38_STD_V17_7200_STD = 0x6,
    IFX_TAPI_T38_STD_V17_9600_STD = 0x7,
    IFX_TAPI_T38_STD_V17_12000_STD = 0x8,
    IFX_TAPI_T38_STD_V17_14400_STD = 0x9
} IFX_TAPI_T38_STD_t;
```

Parameters

Name	Value	Description
IFX_TAPI_T38_STD_V21_STD	1 _H	V.21.
IFX_TAPI_T38_STD_V27_2400_STD	2 _H	V.27/2400.
IFX_TAPI_T38_STD_V27_4800_STD	3 _H	V.27/4800.
IFX_TAPI_T38_STD_V29_7200_STD	4 _H	V.29/7200.
IFX_TAPI_T38_STD_V29_9600_STD	5 _H	V.29/9600.
IFX_TAPI_T38_STD_V17_7200_STD	6 _H	V.17/7200.
IFX_TAPI_T38_STD_V17_9600_STD	7 _H	V.17/9600.
IFX_TAPI_T38_STD_V17_12000_STD	8 _H	V.17/12000.
IFX_TAPI_T38_STD_V17_14400_STD	9 _H	V.17/14400.

4.3.6.75 IFX_TAPI_TONE_CPTD_DIRECTION_t

Description

Specifies the CPT signal for CPT detection.

Prototype

```
typedef enum
{
    IFX_TAPI_TONE_CPTD_DIRECTION_RX = 0x1,
    IFX_TAPI_TONE_CPTD_DIRECTION_TX = 0x2
} IFX_TAPI_TONE_CPTD_DIRECTION_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TONE_CPTD_DIRECTION_RX	1 _H	
IFX_TAPI_TONE_CPTD_DIRECTION_TX	2 _H	

4.3.6.76 IFX_TAPI_TONE_FREQ_t

Description

Used for selection of one or more frequencies belonging to a tone cadence.

Prototype

```
typedef enum
{
    IFX_TAPI_TONE_FREQNONE = 0x0,
    IFX_TAPI_TONE_FREQA = 0x1,
    IFX_TAPI_TONE_FREQB = 0x2,
    IFX_TAPI_TONE_FREQC = 0x4,
    IFX_TAPI_TONE_FREQD = 0x8,
    IFX_ALL = 0xF
} IFX_TAPI_TONE_FREQ_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TONE_FREQNONE	0 _H	All frequencies are inactive
IFX_TAPI_TONE_FREQA	1 _H	Play frequency A
IFX_TAPI_TONE_FREQB	2 _H	Play frequency B
IFX_TAPI_TONE_FREQC	4 _H	Play frequency C
IFX_TAPI_TONE_FREQD	8 _H	Play frequency D
IFX_ALL	F _H	Play all frequencies

4.3.6.77 IFX_TAPI_TONE_GROUP_t

Description

Tone grouping.

Prototype

```
typedef enum
{
    IFX_TAPI_TONE_GROUP_NONE = 0,
    IFX_TAPI_TONE_GROUP_AB = 1,
    IFX_TAPI_TONE_GROUP_BC = 2,
    IFX_TAPI_TONE_GROUP_AB_BC = 3
} IFX_TAPI_TONE_GROUP_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TONE_GROUP_NONE	0 _D	All tones are sent as single tones
IFX_TAPI_TONE_GROUP_AB	1 _D	The frequencies of A and B are sent as dual tone followed by frequency C sent as single tone.
IFX_TAPI_TONE_GROUP_BC	2 _D	For group two the frequency A is sent as a single tone followed by frequencies B and C as dual tone.
IFX_TAPI_TONE_GROUP_AB_BC	3 _D	The frequencies of A and B are sent as dual tone followed by frequency B and C as dual tone, not yet supported.

4.3.6.78 IFX_TAPI_TONE_MODULATION_t

Description

Modulation setting for a cadence step.

Prototype

```
typedef enum
{
    IFX_TAPI_TONE_MODULATION_OFF = 0,
    IFX_TAPI_TONE_MODULATION_ON = 1
} IFX_TAPI_TONE_MODULATION_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TONE_MODULATION_OFF	0 _D	Modulation off for the cadence step
IFX_TAPI_TONE_MODULATION_ON	1 _D	Modulation on for the cadence step

4.3.6.79 IFX_TAPI_TONE_TG_t

Description

Defines the tone generator usage.

Prototype

```
typedef enum
{
    IFX_TAPI_TONE_TG1 = 1,
    IFX_TAPI_TONE_TG2 = 2,
    IFX_TAPI_TONE_TGALL = 0xFF
} IFX_TAPI_TONE_TG_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TONE_TG1	1 _D	Use tone generator 1.
IFX_TAPI_TONE_TG2	2 _D	Use tone generator 2.
IFX_TAPI_TONE_TGALL	FF _H	Use all tone generators.

4.3.6.80 IFX_TAPI_TONE_TYPE_t

Description

Tone types.

Prototype

```
typedef enum
{
    IFX_TAPI_TONE_TYPE_SIMPLE = 1,
    IFX_TAPI_TONE_TYPE_COMPOSED = 2
} IFX_TAPI_TONE_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_TONE_TYPE_SIMPLE	1 _D	Simple tone
IFX_TAPI_TONE_TYPE_COMPOSED	2 _D	Composed tone

4.3.6.81 IFX_TAPI_WLEC_NLP_t

Description

NLP configuration.

Prototype

```
typedef enum
{
    IFX_TAPI_WLEC_NLP_DEFAULT = 0,
    IFX_TAPI_WLEC_NLP_ON = 1,
    IFX_TAPI_WLEC_NLP_OFF = 2
} IFX_TAPI_WLEC_NLP_t;
```

Parameters

Name	Value	Description
IFX_TAPI_WLEC_NLP_DEFAULT	0 _D	Reserved.
IFX_TAPI_WLEC_NLP_ON	1 _D	Enable NLP.
IFX_TAPI_WLEC_NLP_OFF	2 _D	Disable NLP.

4.3.6.82 IFX_TAPI_WLEC_TYPE_t

Description

LEC type definition.

Prototype

```
typedef enum
{
    IFX_TAPI_WLEC_TYPE_OFF = 0,
    IFX_TAPI_WLEC_TYPE_NE = 1,
    IFX_TAPI_WLEC_TYPE_NFE = 2
} IFX_TAPI_WLEC_TYPE_t;
```

Parameters

Name	Value	Description
IFX_TAPI_WLEC_TYPE_OFF	0 _D	Line echo cancellation disabled..
IFX_TAPI_WLEC_TYPE_NE	1 _D	Near-end echo cancellation enabled. .
IFX_TAPI_WLEC_TYPE_NFE	2 _D	Near-end and far-end echo cancellation enabled.

4.4 Line Testing Interfaces

This section describes line testing interfaces.

- [Chapter 4.4.1](#) provides a reference for the line testing functions.
- [Chapter 4.4.2](#) provides the reference for all types defined for line testing, including
 - [Chapter 4.4.2.1](#), structure reference
 - [Chapter 4.4.2.2](#), enum reference

4.4.1 Line Testing

This chapter contains the function reference for line testing.

Table 95 Function Overview of Line Testing Interfaces

Name	Description
Ifxphone_LT_GR909_Config	Configure system parameters (SLIC) to use for values calculation, e.g Voltage divider resistors.
Ifxphone_LT_GR909_Start	Start a GR-909 test or test sequence according to measurement mask, IFX_LT_GR909_MASK_t .
Ifxphone_LT_GR909_GetResults	Gets GR-909 measurement results.

4.4.1.1 [Ifxphone_LT_GR909_Config](#)

Description

Configure system parameters (SLIC) to use for values calculation, e.g Voltage divider resistors.

Prototype

```
IFX_int32_t Ifxphone_LT_GR909_Config (
    IFX_LT_GR909_CFG_t *p_cfg );
```

Parameters

Data Type	Name	Description
IFX_LT_GR909_CFG_t	*p_cfg	Handle to IFX_LT_GR909_CFG_t struct.

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none"> • IFX_SUCCESS 0 • IFX_ERROR -1

4.4.1.2 [Ifxphone_LT_GR909_Start](#)

Description

Start a GR909 test or test sequence according to measurement mask [IFX_LT_GR909_MASK_t](#).

Prototype

```
IFX_int32_t Ifxphone_LT_GR909_Start (
```

```
IFX_int32_t fd_line,
IFX_boolean_t b_euLike,
IFX_int32_t meas_mask );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd_line	Line file descriptor.
IFX_boolean_t	b_euLike	IFX_TRUE: EU like powerline frequency (50 Hz). IFX_FALSE: US like power line frequency (60 Hz).
IFX_int32_t	meas_mask	Measurement mask set with values out of \ref IFX_LT_GR909_MASK_t

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.4.1.3 Ifxphone_LT_GR909_GetResults

Description

Gets Gr909 measurement results.

Prototype

```
IFX_int32_t Ifxphone_LT_GR909_GetResults (
    IFX_int32_t fd_line,
    IFX_LT_GR909_RESULT_t *p_res );
```

Parameters

Data Type	Name	Description
IFX_int32_t	fd_line	Line file descriptor
IFX_LT_GR909_RESULT_t	*p_res	Handle to result structure

Return Values

Data Type	Description
IFX_int32_t	The return value can be either of the following: <ul style="list-style-type: none">• IFX_SUCCESS 0• IFX_ERROR -1

4.4.2 Type Definition Reference

This chapter contains the reference of data types and structures of all modules.

4.4.2.1 Structure Reference

This chapter contains the Structure reference.

Table 96 Structure Overview of Line Testing Interfaces

Name	Description
IFX_LT_GR909_HPT_t	Hazardous potential test results.
IFX_LT_GR909_FEMF_t	Foreign electromotive forces test results.
IFX_LT_GR909_RESULT_t	GR909 results structure.
IFX_LT_GR909_RFT_t	Resistive faults test results.
IFX_LT_GR909_ROH_t	Receiver off-hook test results.
IFX_LT_GR909_RIT_t	Ringer impedance test results.

4.4.2.1.1 [IFX_LT_GR909_HPT_t](#)

Description

Hazardous potential test results.

Prototype

```
typedef struct
{
    IFX_boolean_t b_result;
    IFX_float_t f_hpt_ac_r2g;
    IFX_float_t f_hpt_ac_t2g;
    IFX_float_t f_hpt_ac_t2r;
    IFX_float_t f_hpt_dc_r2g;
    IFX_float_t f_hpt_dc_t2g;
    IFX_float_t f_hpt_dc_t2r;
} IFX_LT_GR909_HPT_t;
```

Parameters

Data Type	Name	Description
IFX_boolean_t	b_result	Hpt result, passed or failed.
IFX_float_t	f_hpt_ac_r2g	Hpt ac ring wire to gnd value, [Vrms].
IFX_float_t	f_hpt_ac_t2g	Hpt ac tip wire to gnd value, [Vrms].
IFX_float_t	f_hpt_ac_t2r	Hpt ac tip wire to ring value, [Vrms].
IFX_float_t	f_hpt_dc_r2g	Hpt dc ring wire to gnd value, [V].
IFX_float_t	f_hpt_dc_t2g	Hpt dc tip wire to gnd value, [V].
IFX_float_t	f_hpt_dc_t2r	Hpt dc tip wire to ring value, [V].

4.4.2.1.2 IFX_LT_GR909_FEMF_t

Description

Foreign electromotive forces test results.

Prototype

```
typedef struct
{
    IFX_boolean_t b_result;
    IFX_float_t f_femf_ac_r2g;
    IFX_float_t f_femf_ac_t2g;
    IFX_float_t f_femf_ac_t2r;
    IFX_float_t f_femf_dc_r2g;
    IFX_float_t f_femf_dc_t2g;
    IFX_float_t f_femf_dc_t2r;
} IFX_LT_GR909_FEMF_t;
```

Parameters

Data Type	Name	Description
IFX_boolean_t	b_result	Femf result, passed or failed.
IFX_float_t	f_femf_ac_r2g	Femf ac ring wire to gnd value, [Vrms].
IFX_float_t	f_femf_ac_t2g	Femf ac tip wire to gnd value, [Vrms].
IFX_float_t	f_femf_ac_t2r	Femf ac tip wire to ring value, [Vrms].
IFX_float_t	f_femf_dc_r2g	Femf dc ring wire to gnd value, [V].
IFX_float_t	f_femf_dc_t2g	Femf dc tip wire to gnd value, [V].
IFX_float_t	f_femf_dc_t2r	Femf dc tip wire to ring value, [V].

4.4.2.1.3 IFX_LT_GR909_RFT_t

Description

Resistive faults test results.

Prototype

```
typedef struct
{
    IFX_boolean_t b_result;
    IFX_float_t f_rft_ac_r2g;
    IFX_float_t f_rft_ac_t2g;
    IFX_float_t f_rft_ac_t2r;
} IFX_LT_GR909_RFT_t;
```

Parameters

Data Type	Name	Description
IFX_boolean_t	b_result	Rft result, passed or failed.
IFX_float_t	f_rft_ac_r2g	Rft ac ring wire to gnd value, [Ohm].

Data Type	Name	Description
IFX_float_t	f_rft_ac_t2g	Rft ac tip wire to gnd value, [Ohm].
IFX_float_t	f_rft_ac_t2r	Rft ac tip wire to ring value, [Ohm].

4.4.2.1.4 [IFX_LT_GR909_ROH_t](#)

Description

Receiver off-hook test results.

Prototype

```
typedef struct
{
    IFX_boolean_t b_result;
    IFX_float_t f_rft_t2r_l;
    IFX_float_t f_rft_t2r_h;
} IFX_LT_GR909_ROH_t;
```

Parameters

Data Type	Name	Description
IFX_boolean_t	b_result	Roh result, passed or failed.
IFX_float_t	f_rft_t2r_l	Roh tip wire to ring wire value for low voltage, [Ohm].
IFX_float_t	f_rft_t2r_h	Roh tip wire to ring wire value for high voltage, [Ohm].

4.4.2.1.5 [IFX_LT_GR909_RIT_t](#)

Description

Ringer impedance test results.

Prototype

```
typedef struct
{
    IFX_boolean_t b_result;
    IFX_float_t f_rit_value;
} IFX_LT_GR909_RIT_t;
```

Parameters

Data Type	Name	Description
IFX_boolean_t	b_result	Rit result, passed or failed.
IFX_float_t	f_rit_value	Rit value, [Ohm].

4.4.2.1.6 [IFX_LT_GR909_RESULT_t](#)

Description

GR909 results structure.

Prototype

```
typedef struct
{
    IFX_uint32_t valid_mask;
    IFX_LT_GR909_HPT_t hpt;
    IFX_LT_GR909_FEMF_t femf;
    IFX_LT_GR909_RFT_t rft;
    IFX_LT_GR909_ROH_t roh;
    IFX_LT_GR909_RIT_t rit;
} IFX_LT_GR909_RESULT_t;
```

Parameters

Data Type	Name	Description
IFX_uint32_t	valid_mask	Valid results mask, set with IFX_LT_GR909_MASK_t .
IFX_LT_GR909_HPT_t	hpt	Hazardous potential test results.
IFX_LT_GR909_FEMF_t	femf	Foreign electromotive forces test results.
IFX_LT_GR909_RFT_t	rft	Resistive faults test results.
IFX_LT_GR909_ROH_t	roh	Receiver offhook test results.
IFX_LT_GR909_RIT_t	rit	Ringer impedance test results.

4.4.2.1.7 IFX_LT_GR909_CFG_t**Description**

GR909 parameter configuration structure e.g to set parameters suitable to the slic used.

Prototype

```
typedef struct
{
    IFX_float_t f_R1;
    IFX_float_t f_R2;
    IFX_float_t f_R3;
} IFX_LT_GR909_CFG_t;
```

Parameters

Data Type	Name	Description
IFX_float_t	f_R1	High resistor of the voltage divider connected to the line.
IFX_float_t	f_R2	Low resistor of the voltage divider in parallel to the internal resistor of 1 MOhm.
IFX_float_t	f_R3	Low resistor of the voltage divider in parallel to the internal resistor of 750 Ohm.

4.4.2.2 Enumerator Reference

This chapter contains the Enumerator reference.

Table 97 Enumerator Overview of Non TAPI Interfaces

Name	Description
IFX_LT_GR909_MASK_t	GR909 tests masks.

4.4.2.2.1 IFX_LT_GR909_MASK_t

Description

GR909 tests masks.

Prototype

```
typedef enum
{
    IFX_LT_GR909_HPT_MASK = (1 << 0),
    IFX_LT_GR909_FEMF_MASK = (1 << 1),
    IFX_LT_GR909_RTF_MASK = (1 << 2),
    IFX_LT_GR909_ROH_MASK = (1 << 3),
    IFX_LT_GR909_RIT_MASK = (1 << 4)
} IFX_LT_GR909_MASK_t;
```

Parameters

Name	Value	Description
IFX_LT_GR909_HPT_MASK	(1 << 0)	Mask to select HPT.
IFX_LT_GR909_FEMF_MASK	(1 << 1)	Mask to select FEMF.
IFX_LT_GR909_RTF_MASK	(1 << 2)	Mask to select RFT.
IFX_LT_GR909_ROH_MASK	(1 << 3)	Mask to select ROH.
IFX_LT_GR909_RIT_MASK	(1 << 4)	Mask to select RIT.

5 Operating System Porting

This chapter addresses porting issues related to the operating system porting.

5.1 Operating-System Macros

A set of operating-system macros is defined and used throughout the TAPI driver, making it operating-system independent. [Table 98](#) lists the abstractions of the operating-system macros and gives a rough overview. For more details, refer to appropriate header file, which is part of the source code (see [Chapter 5.2](#)).

Table 98 Operating-System Macros

Name	Description
Hardware Macros, defined in Board Support Package (BSP)	
IFXOS_UC_BASE	Returns the microprocessor base address.
__BYTE_ORDER	Defines the microprocessor endianess which will be considered in the VINETIC® Driver: __LITTLE_ENDIAN for a little-endian and __BIG_ENDIAN for a big-endian system.
Memory Management Macros	
IFXOS_MALLOC(...)	Allocates memory.
IFXOS_FREE(...)	Frees memory.
IFXOS_CPY_USR2KERN(...)	Copies data from user to kernel space.
IFXOS_CPY_KERN2USR(...)	Copies data from kernel to user space.
Interrupt Management Macros	
IFXOS_INTSTAT	Interrupt status data type.
IFXOS_LOCKINT(...)	Locks interrupt handling, disables global interrupt.
IFXOS_UNLOCKINT(...)	Unlocks interrupt handling, enables global interrupt.
IFXOS_IRQ_DISABLE(...)	Disables interrupt.
IFXOS_IRQ_ENABLE(...)	Enables interrupt.
Time Management Macros	
IFXOS_Wait(...)	Delays execution with task rescheduling.
IFXOS_DELAYMS(...)	Short active delay in milliseconds without rescheduling.
IFXOS_DELAYUS(...)	Short active delay in microseconds without rescheduling.
Event Type and Event Handling Macros	
Events are used for the communication between high priority tasks or interrupt and other tasks (for example: to signalize a task sleeping on an event that the event has occurred).	
IFXOS_event_t	Event data type.
IFXOS_WAIT_FOREVER	Waits forever.
IFXOS_NOWAIT	Never waits.
IFXOS_InitEvent(...)	Initializes an event.
IFXOS_WakeUpEvent(...)	Signals an event.
IFXOS_ClearEvent(...)	Resets an event to the initial state.
IFXOS_WaitEvent_timeout(...)	Waits for a specified event with a specified time-out to occur or timed out.
IFXOS_WaitEvent(...)	Waits for a specified event with a specified condition to occur.

Table 98 Operating-System Macros (cont'd)

Name	Description
Mutex Type and Mutex Macros	
IFXOS_Mutex_t	Mutex data type.
IFXOS_MutexInit(...)	Initializes mutex.
IFXOS_MutexLock(...)	Locks/takes the mutex.
IFXOS_MutexUnlock(...)	Unlocks/Gives the mutex.
IFXOS_MutexDelete (...)	Deletes a mutex element.

Selecting and Polling

The poll/select mechanism is used for user application synchronization after occurrence of particular events (for example: signaling to application, that data is ready for reading)

IFXOS_wakelist_t	Wakeup data type for select wait queues.
IFXOS_Init_WakeList(...)	Initializes a queue.
IFXOS_SleepQueue(...)	Initializes the sleep on a given queue.
IFXOS_WakeUp(...)	Wakes up a waiting queue in poll/select.
IFXOS_WRITEQ	Defines a write queue.
IFXOS_READQ	Defines the read queue.
IFXOS_SYSWRITE	Flag that signal that the system event for write is ready.
IFXOS_SYSREAD	Flag that signal that the system event for read is ready.

Nevertheless, some operating system files must be ported or implemented for the TAPI driver to be fully operational with the target operating system. This is the topic of [Chapter 5.2](#).

5.2 Operating-System Files

This chapter addresses the operating-system files that must be adapted or implemented for full operating system compatibility.

5.2.1 Macros Adaptation File

The operating system macros listed in [Chapter 5.1](#) are all implemented in a central header file called `<sys_drv_ifxos.h>`, where they are mapped to the appropriate operating system calls to insure the functionality behind them. This header file is part of the released source code and must be adapted for any new, yet unsupported operating system.

Under **Linux®** and **VxWorks®**, these macros are fully integrated and supported. They essentially map operating system specific types or functions.

Therefore, wrappers must be implemented in this file in case the operating system used does not support any of the functionalities behind the macros and types defined in [Chapter 5.1](#) (for example: wrapper for events, mutexes, poll/select).

5.2.2 TAPI Driver Operating-System File

The operating-system interface must be implemented in a file called `drv_tapi_<os>.c`¹⁾. This file represents the operating system abstraction layer of the TAPI Driver. Under **Linux®** and **VxWorks®** operating systems (which are currently supported), this file implements the commonly known UNIX-like interface open/close/ioctl/read/write and a select mechanism, as well as an entry and an exit function for the registration and de-registration of the TAPI Driver.

Attention: The select mechanism is used to support non-blocking I/O operations (for example: read/write) between an application and the underlying TAPI Driver. This mechanism is fully supported under Linux® (poll method) and VxWorks® (select method) operating systems. In case the operating system used does not support this mechanism, an emulation must be implemented.

1) <os> is the placeholder for the name of the operating system (for example `drv_tapi_linux.c`, `drv_tapi_vxworks.c`)

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Literature References

- [1] T.38 Fax Agent Release 1.3 User's Manual Programmer's Reference Rev. 1.0, 2007-01-30
- [2] T.38 Protocol Stack Release 1.24 User's Manual Programmer's Reference Rev. 1.0, 2007-01-30
- [3] T.38 Test Application Release 1.5 User's Manual Programmer's Reference Rev. 1.0, 2007-01-30
- [4] T.38 Fax Relay Package Release Notes

Attention: Please refer to the latest revision of the documents.

Standard References

- [5] Telcordia Technologies Generic Requirements GR-30-CORE, Issue 2, December 1998, LSSGR: Voiceband Data Transmission Interface (FSD 05-01-0100)
- [6] ETSI EN 300 659-1, V1.3.1 (2001-01), European Standard (Telecommunications series), Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On-hook data transmission
- [7] ETSI EN 300 659-2, V1.3.1 (2001-01), European Standard (Telecommunications series), Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 2: Off-hook data transmission
- [8] BT SIN 227, Issue 3.4 June 2004, Suppliers' Information Note: CALLING LINE IDENTIFICATION SERVICE, SERVICE DESCRIPTION
- [9] NTT Technical Reference, TELEPHONE SERVICE INTERFACES Edition 5
- [10] Telcordia Technologies GR-909-CORE, Issue 2, December 2004, Generic Criteria for Fiber in the Loop Systems

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Terminology

A

ACK	Acknowledge
AGC	Automatic Gain Control
ALM	Analog Line Module
APOH	Another Phone Off-Hook
API	Application Program Interface
ATA	Analog-Telefon-Adapter

B

BBD	Block Based Download
BSP	Board Support Package
BT	British Telecom

C

CAP	Capability
CFG	Configuration
CH	Channel
CID	Caller ID
CNG	Comfort Noise Generation
COD	Coder module
CPE	Customer Premises Equipment
CPT	Call Progress Tone
CTPD	Call Progress Tone Detector

D

DEC	Decoding
DET	Detection
DEV	Device
DTMF	Dual Tone Multiple Frequency

E

ENC	Encoding
ES	Echo Suppressor
ETSI	European Telecommunications Standards Institute

F

Fd	File descriptor
FSK	Frequency Shift Keying
FXO	Foreign eXchange Office
FXS	Foreign eXchange Station
FW	Firmware

G

GEN	Generation
GPIO	General Purpose Input Output

H

HL	High Level
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HW	Hardware
I	
ICA	In-call announcement
IETF	Internet Engineering Task Force
IF and i/f	Interface
IFX	Infineon
IO	Input/Output
IP	Internet Protocol
J	
JB	Jitter Buffer
K	
KPI	Kernel Packet Interface
L	
LEC	Line Echo Canceller
LL	Low Level
LR	Line Reversal
LT	Line Testing
M	
MAP	Mapping
MSG	Message
MWI	Message Waiting Indication
N	
NB	Narrowband, 16 kHz sampling rate.
NLP	Non Linear Processing
NTT	Nippon Telegraph and Telephone Company
O	
OOB	Out of band
OS	Operating System
OSI	Open Switching Interval
P	
PCM	Pulse Code Modulation
PKT	Packet
POSIX	Portable Operating System Interface
POTS	Plain Old Telephone System
PSTN	Public Switched Telephone Network
Q	
QoS	Quality of Service
R	
RFC	Internet Engineering Task Force Request for Comment
RTCP	Real Time Control Protocol
RTP	Real Time Protocol
RX	Receive
S	

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SID	Silence Insertion Descriptor
SIG	Signaling module
SIN	British Telecom Supplier's Information Note
SLIC	Subscriber Line Interface Circuit
SoC	System on a Chip
SSRC	Synchronization source
SW	Software
T	
TAPI	Telephone API
TX	Transmit
U	
UTG	Universal Tone Generator
V	
VAD	Voice Activity Detector
VMWI	Visual Message Waiting Indication
VoIP	Voice over IP
W	
WB	Wideband, 16 kHz sampling rate.
WLEC	Window-based Line Echo Canceller

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