



# **Intel(R) IXP400 Software OSAL API Reference Manual**

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# Operating System Abstraction Layer (IxOsal) API

This service provides a thin layer of OS dependency services.

## Defines

```
#define IX_OSAL_MMU_PHYS_TO_VIRT(physAddr)  
    physical to virtual address translation  
  
#define IX_OSAL_MMU_VIRT_TO_PHYS(virtAddr)  
    virtual to physical address translation  
  
#define IX_OSAL_CACHE_FLUSH(addr, size)  
    cache to memory flush  
  
#define IX_OSAL_CACHE_INVALIDATE(addr, size)  
    cache line invalidate  
  
#define IX_OSAL_TIMEVAL_TO_TICKS(tv)  
    Converts ixOsalTimeVal into ticks.  
  
#define IX_OSAL_TICKS_TO_TIMEVAL(ticks, pTv)  
    Converts ticks into ixOsalTimeVal.  
  
#define IX_OSAL_TIMEVAL_TO_MS(tv)  
    Converts ixOsalTimeVal to milliseconds.  
  
#define IX_OSAL_MS_TO_TIMEVAL(milliseconds, pTv)  
    Converts milliseconds to IxOsalTimeval.  
  
#define IX_OSAL_TIME_EQ(tvA, tvB)  
    "equal" comparison for IxOsalTimeval  
  
#define IX_OSAL_TIME_LT(tvA, tvB)  
    "less than" comparison for IxOsalTimeval  
  
#define IX_OSAL_TIME_GT(tvA, tvB)  
    "greater than" comparison for IxOsalTimeval  
  
#define IX_OSAL_TIME_ADD(tvA, tvB)  
    "add" operator for IxOsalTimeval  
  
#define IX_OSAL_TIME_SUB(tvA, tvB)  
    "subtract" operator for IxOsalTimeval
```

# Functions

PUBLIC

**IX\_STATUS ixOsaiIrqBind** (UINT32 irqLevel, **IxOsaiVoidFnVoidPtr** irqHandler, void \*parameter)  
*Binds an interrupt handler to an interrupt level.*

PUBLIC

**IX\_STATUS ixOsaiIrqUnbind** (UINT32 irqLevel)  
*Unbinds an interrupt handler from an interrupt level.*

PUBLIC UINT32 **ixOsaiIrqLock** (void)  
*Disables all interrupts.*

PUBLIC void **ixOsaiIrqUnlock** (UINT32 irqEnable)  
*Enables all interrupts.*

PUBLIC UINT32 **ixOsaiIrqLevelSet** (UINT32 irqLevel)  
*Selectively disables interrupts.*

PUBLIC void **ixOsaiIrqEnable** (UINT32 irqLevel)  
*Enables an interrupt level.*

PUBLIC void **ixOsaiIrqDisable** (UINT32 irqLevel)  
*Disables an interrupt level.*

PUBLIC void \* **ixOsaiMemAlloc** (UINT32 size)  
*Allocates memory.*

PUBLIC void **ixOsaiMemFree** (void \*ptr)  
*Frees memory.*

PUBLIC void \* **ixOsaiMemCopy** (void \*dest, void \*src, UINT32 count)  
*Copies memory zones.*

PUBLIC void \* **ixOsaiMemSet** (void \*ptr, UINT8 filler, UINT32 count)  
*Fills a memory zone.*

PUBLIC void \* **ixOsaiCacheDmaMalloc** (UINT32 size)  
*Allocates cache-safe memory.*

PUBLIC void **ixOsaiCacheDmaFree** (void \*ptr)  
*Frees cache-safe memory.*

PUBLIC **ixOsaiThreadCreate** (**IxOsaiThread** \*thread, **IxOsaiThreadAttr** \*threadAttr,  
**IX\_STATUS IxOsaiVoidFnVoidPtr** startRoutine, void \*arg)  
*Creates a new thread.*

PUBLIC

**IX\_STATUS ixOsaiThreadStart** (**IxOsaiThread** \*thread)  
*Starts a newly created thread.*

**PUBLIC**  
**IX\_STATUS ixOsalThreadKill (IxOsalThread \*thread)**  
*Kills an existing thread.*

**PUBLIC void ixOsalThreadExit (void)**  
*Exits a running thread.*

**PUBLIC**  
**IX\_STATUS ixOsalThreadPrioritySet (IxOsalThread \*thread, UINT32 priority)**  
*Sets the priority of an existing thread.*

**PUBLIC**  
**IX\_STATUS ixOsalThreadSuspend (IxOsalThread \*thread)**  
*Suspends thread execution.*

**PUBLIC**  
**IX\_STATUS ixOsalThreadResume (IxOsalThread \*thread)**  
*Resumes thread execution.*

**PUBLIC ixOsalMessageQueueCreate (IxOsalMessageQueue \*queue, UINT32 msgCount, IX\_STATUS UINT32 msgLen)**  
*Creates a message queue.*

**PUBLIC**  
**IX\_STATUS ixOsalMessageQueueDelete (IxOsalMessageQueue \*queue)**  
*Deletes a message queue.*

**PUBLIC**  
**IX\_STATUS ixOsalMessageQueueSend (IxOsalMessageQueue \*queue, UINT8 \*message)**  
*Sends a message to a message queue.*

**PUBLIC**  
**IX\_STATUS ixOsalMessageQueueReceive (IxOsalMessageQueue \*queue, UINT8 \*message)**  
*Receives a message from a message queue.*

**PUBLIC**  
**IX\_STATUS ixOsalMutexInit (IxOsalMutex \*mutex)**  
*initializes a mutex*

**PUBLIC**  
**IX\_STATUS ixOsalMutexLock (IxOsalMutex \*mutex, INT32 timeout)**  
*locks a mutex*

**PUBLIC**  
**IX\_STATUS ixOsalMutexUnlock (IxOsalMutex \*mutex)**  
*Unlocks a mutex.*

**PUBLIC**  
**IX\_STATUS ixOsalMutexTryLock (IxOsalMutex \*mutex)**  
*Non-blocking attempt to lock a mutex.*

**PUBLIC**  
**IX\_STATUS ixOsalMutexDestroy (IxOsalMutex \*mutex)**  
*Destroys a mutex object.*

**PUBLIC**  
**IX\_STATUS ixOsalFastMutexInit (IxOsalFastMutex \*mutex)**  
*Initializes a fast mutex.*

**PUBLIC**  
**IX\_STATUS ixOsalFastMutexTryLock (IxOsalFastMutex \*mutex)**  
*Non-blocking attempt to lock a fast mutex.*

**PUBLIC**  
**IX\_STATUS ixOsalFastMutexUnlock (IxOsalFastMutex \*mutex)**  
*Unlocks a fast mutex.*

**PUBLIC**  
**IX\_STATUS ixOsalFastMutexDestroy (IxOsalFastMutex \*mutex)**  
*Destroys a fast mutex object.*

**PUBLIC**  
**IX\_STATUS ixOsalSemaphoreInit (IxOsalSemaphore \*semaphore, UINT32 value)**  
*Initializes a semaphore.*

**PUBLIC**  
**IX\_STATUS ixOsalSemaphorePost (IxOsalSemaphore \*semaphore)**  
*Posts to (increments) a semaphore.*

**PUBLIC**  
**IX\_STATUS ixOsalSemaphoreWait (IxOsalSemaphore \*semaphore, INT32 timeout)**  
*Waits on (decrements) a semaphore.*

**PUBLIC**  
**IX\_STATUS ixOsalSemaphoreTryWait (IxOsalSemaphore \*semaphore)**  
*Non-blocking wait on semaphore.*

**PUBLIC**  
**IX\_STATUS ixOsalSemaphoreGetValue (IxOsalSemaphore \*semaphore, UINT32 \*value)**  
*Gets semaphore value.*

**PUBLIC**  
**IX\_STATUS ixOsalSemaphoreDestroy (IxOsalSemaphore \*semaphore)**  
*Destroys a semaphore object.*

**PUBLIC void ixOsalYield (void)**  
*Yields execution of current thread.*

**PUBLIC void ixOsalSleep (UINT32 milliseconds)**  
*Yielding sleep for a number of milliseconds.*

**PUBLIC void ixOsalBusySleep (UINT32 microseconds)**



*Busy sleep for a number of microseconds.*

PUBLIC UINT32 **ixOsalTimestampGet** (void)  
*XXX.*

PUBLIC UINT32 **ixOsalTimestampResolutionGet** (void)  
*Resolution of the timestamp counter.*

PUBLIC UINT32 **ixOsalSysClockRateGet** (void)  
*System clock rate, in ticks.*

PUBLIC void **ixOsalTimeGet** (**IxOsalTimeval** \*tv)  
*Current system time.*

PUBLIC INT32 **ixOsalLog** (**IxOsalLogLevel** level, **IxOsalLogDevice** device, char \*format, int arg1, int arg2, int arg3, int arg4, int arg5, int arg6)  
*Interrupt-safe logging function.*

PUBLIC UINT32 **ixOsalLogLevelSet** (UINT32 level)  
*sets the current logging verbosity level*

PUBLIC **ixOsalRepeatingTimerSchedule** (**IxOsalTimer** \*timer, UINT32 period, UINT32 **IX\_STATUS** priority, **IxOsalVoidFnVoidPtr** callback, void \*param)  
*Schedules a repeating timer.*

PUBLIC **ixOsalSingleShotTimerSchedule** (**IxOsalTimer** \*timer, UINT32 period, UINT32 **IX\_STATUS** priority, **IxOsalVoidFnVoidPtr** callback, void \*param)  
*Schedules a single-shot timer.*

PUBLIC  
**IX\_STATUS ixOsalTimerCancel** (**IxOsalTimer** \*timer)  
*Cancels a running timer.*

PUBLIC void **ixOsalTimersShow** (void)  
*displays all the running timers*

PUBLIC  
**IX\_STATUS ixOsalOsNameGet** (INT8 \*osName, INT32 maxSize)  
*provides the name of the Operating System running*

PUBLIC  
**IX\_STATUS ixOsalOsVersionGet** (INT8 \*osVersion, INT32 maxSize)  
*provides the version of the Operating System running*

---

## Detailed Description

This service provides a thin layer of OS dependency services.

This file contains the API to the functions which are some what OS dependant and would require porting to a particular OS. A primary focus of the component development is to make them as OS independent as possible. All other components should abstract their OS dependency to this module. Services overview

1. Data types, constants, defines
2. Interrupts
  - ◆ bind interrupts to handlers
  - ◆ unbind interrupts from handlers
  - ◆ disables all interrupts
  - ◆ enables all interrupts
  - ◆ selectively disables interrupts
  - ◆ enables an interrupt level
  - ◆ disables an interrupt level

## Memory

- allocates memory
- frees memory
- copies memory zones
- fills a memory zone
- allocates cache-safe memory
- frees cache-safe memory
- physical to virtual address translation
- virtual to physical address translation
- cache to memory flush
- cache line invalidate

## Threads

- creates a new thread
- starts a newly created thread
- kills an existing thread
- exits a running thread
- sets the priority of an existing thread
- suspends thread execution
- resumes thread execution

## IPC

- creates a message queue
- deletes a message queue
- sends a message to a message queue
- receives a message from a message queue

## Thread Synchronisation

- initializes a mutex
- locks a mutex
- unlocks a mutex
- non-blocking attempt to lock a mutex
- destroys a mutex object

## Detailed Description

- initializes a fast mutex
- non–blocking attempt to lock a fast mutex
- unlocks a fast mutex
- destroys a fast mutex object
- initializes a semaphore
- posts to (increments) a semaphore
- waits on (decrements) a semaphore
- non–blocking wait on semaphore
- gets semaphore value
- destroys a semaphore object
- yields execution of current thread

#### Time functions

- yielding sleep for a number of milliseconds
- busy sleep for a number of microseconds
- value of the timestamp counter
- resolution of the timestamp counter
- system clock rate, in ticks
- current system time
- converts ixOsaiTimeVal into ticks
- converts ticks into ixOsaiTimeVal
- converts ixOsaiTimeVal to milliseconds
- converts milliseconds to **IxOsaiTimeval**
- "equal" comparison for **IxOsaiTimeval**
- "less than" comparison for **IxOsaiTimeval**
- "greater than" comparison for **IxOsaiTimeval**
- "add" operator for **IxOsaiTimeval**
- "subtract" operator for **IxOsaiTimeval**

#### Logging

- sets the current logging verbosity level
- interrupt–safe logging function

#### Timer services

- schedules a repeating timer
- schedules a single–shot timer
- cancels a running timer
- displays all the running timers

#### Optional Modules

- Buffer management module
  - I/O memory and endianness support module
-

# Define Documentation

```
#define IX_OSAL_CACHE_FLUSH ( addr,  
                             size )
```

cache to memory flush

**Parameters:**

- addr* – memory address to flush from cache
- size* – number of bytes to flush (rounded up to a cache line)

Flushes the cached value of the memory zone pointed by "addr" into memory, rounding up to a cache line. Use before the zone is to be read by a processing unit which is not cache coherent with the main CPU.

- Reentrant: no
- IRQ safe: yes

**Returns:**

- none

Definition at line **438** of file **IxOsal.h**.

```
#define IX_OSAL_CACHE_INVALIDATE ( addr,  
                                   size )
```

cache line invalidate

**Parameters:**

- addr* – memory address to invalidate in cache
- size* – number of bytes to invalidate (rounded up to a cache line)

Invalidates the cached value of the memory zone pointed by "addr", rounding up to a cache line. Use before reading the zone from the main CPU, if the zone has been updated by a processing unit which is not cache coherent with the main CPU.

- Reentrant: no
- IRQ safe: yes

**Returns:**

- none

Definition at line **460** of file **IxOsal.h**.

```
#define IX_OSAL_MMU_PHYS_TO_VIRT ( physAddr )
```

physical to virtual address translation

**Parameters:**

*physAddr* – physical address

Converts a physical address into its equivalent MMU–mapped virtual address

- Reentrant: no
- IRQ safe: yes

**Returns:**

Corresponding virtual address, as UINT32

Definition at line **398** of file **IxOsal.h**.

```
#define IX_OSAL_MMU_VIRT_TO_PHYS ( virtAddr )
```

virtual to physical address translation

**Parameters:**

*virtAddr* – virtual address

Converts a virtual address into its equivalent MMU–mapped physical address

- Reentrant: no
- IRQ safe: yes

**Returns:**

Corresponding physical address, as UINT32

Definition at line **416** of file **IxOsal.h**.

```
#define IX_OSAL_MS_TO_TIMEVAL ( milliseconds,  
                                pTv          )
```

Converts milliseconds to **IxOsalTimeval**.

**Parameters:**

*milliseconds* – number of milliseconds to convert  
*pTv* – pointer to the destination structure

Converts a millisecond value into an **IxOsalTimeval** structure

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– Corresponding **IxOsalTimeval** structure Note: This function is OS–independent. Implemented by core.

Definition at line **1156** of file **IxOsal.h**.

```
#define IX_OSAL_TICKS_TO_TIMEVAL ( ticks,  
                                pTv )
```

Converts ticks into ixOsalTimeVal.

**Parameters:**

- ticks* – number of ticks
- pTv* – pointer to the destination structure

Converts the specified number of ticks into an **IxOsalTimeval** structure

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- Corresponding **IxOsalTimeval** structure Note: This function is OS-independent. Implemented by core.

Definition at line **1116** of file **IxOsal.h**.

```
#define IX_OSAL_TIME_ADD ( tvA,  
                           tvB )
```

"add" operator for **IxOsalTimeval**

**Parameters:**

- tvA, tvB* – **IxOsalTimeval** structures to add

Adds the second IxOsalTimevalStruct to the first one (equivalent to tvA += tvB)

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- none Note: This function is OS-independent.

Definition at line **1241** of file **IxOsal.h**.

```
#define IX_OSAL_TIME_EQ ( tvA,  
                           tvB )
```

"equal" comparison for **IxOsalTimeval**

**Parameters:**

*tvA, tvB* – **IxOsaiTimeval** structures to compare

Compares two **IxOsaiTimeval** structures for equality

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- TRUE if the structures are equal  
◊ FALSE otherwise Note: This function is OS-independent

Definition at line **1177** of file **IxOsai.h**.

```
#define IX_OSAL_TIME_GT ( tvA,  
                          tvB )
```

"greater than" comparison for **IxOsaiTimeval**

**Parameters:**

*tvA, tvB* – **IxOsaiTimeval** structures to compare

Compares two **IxOsaiTimeval** structures to determine if the first one is greater than the second one

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- TRUE if *tvA* > *tvB*  
◊ FALSE otherwise Note: This function is OS-independent.

Definition at line **1220** of file **IxOsai.h**.

```
#define IX_OSAL_TIME_LT ( tvA,  
                          tvB )
```

"less than" comparison for **IxOsaiTimeval**

**Parameters:**

*tvA, tvB* – **IxOsaiTimeval** structures to compare

Compares two **IxOsaiTimeval** structures to determine if the first one is less than the second one

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- TRUE if tvA < tvB  
◊ FALSE otherwise Note: This function is OS-independent.  
Implemented by core.

Definition at line **1198** of file **IxOsal.h**.

```
#define IX_OSAL_TIME_SUB ( tvA,  
                           tvB )
```

"subtract" operator for **IxOsalTimeval**

**Parameters:**

tvA, tvB – **IxOsalTimeval** structures to subtract

Subtracts the second IxOsalTimevalStruct from the first one (equivalent to tvA -= tvB)

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- none Note: This function is OS-independent. Implemented by core.

Definition at line **1266** of file **IxOsal.h**.

```
#define IX_OSAL_TIMEVAL_TO_MS ( tv )
```

Converts ixOsalTimeVal to milliseconds.

**Parameters:**

tv – **IxOsalTimeval** structure to convert

Converts an **IxOsalTimeval** structure into milliseconds

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- Corresponding number of milliseconds Note: This function is OS-independent. Implemented by core.

Definition at line **1137** of file **IxOsal.h**.

```
#define IX_OSAL_TIMEVAL_TO_TICKS ( tv )
```

Converts ixOsalTimeVal into ticks.



**Parameters:**

*tv* – an **IxOsaiTimeval** structure

Converts an **IxOsaiTimeval** structure into OS ticks

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– Corresponding number of ticks

Note: This function is OS-independent. Implemented by core.

Definition at line **1088** of file **IxOsai.h**.

---

## Function Documentation

```
PUBLIC void ixOsaiBusySleep ( UINT32 microseconds )
```

Busy sleep for a number of microseconds.

**Parameters:**

*microseconds* – number of microseconds to sleep

Sleeps for the specified number of microseconds, without explicitly yielding thread execution to the OS scheduler

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– none

```
PUBLIC void ixOsaiCacheDmaFree ( void * ptr )
```

Frees cache-safe memory.

**Parameters:**

*ptr* – pointer to the memory zone

Frees a memory zone previously allocated with **ixOsaiCacheDmaMalloc()**

- Reentrant: no
- IRQ safe: no

**Returns:**

– none

```
PUBLIC void* ixOsalCacheDmaMalloc ( UINT32 size )
```

Allocates cache-safe memory.

**Parameters:**

*size* – size, in bytes, of the allocated zone

Allocates a cache-safe memory zone of at least "size" bytes and returns the pointer to the memory zone. This memory zone, depending on the platform, is either uncached or aligned on a cache line boundary to make the CACHE\_FLUSH and CACHE\_INVALIDATE macros safe to use. The memory allocated with this function MUST be freed with **ixOsalCacheDmaFree()**, otherwise memory corruption can occur.

- Reentrant: no
- IRQ safe: no

**Returns:**

Pointer to the memory zone or NULL if allocation failed

**Note:**

It is important to note that cache coherence is maintained in software by using the IX\_OSAL\_CACHE\_FLUSH and IX\_OSAL\_CACHE\_INVALIDATE macros to maintain consistency between cache and external memory.

```
PUBLIC IX_STATUS ixOsalFastMutexDestroy ( IxOsalFastMutex * mutex )
```

Destroys a fast mutex object.

**Parameters:**

*mutex* – fast mutex  
handle

Destroys a fast mutex object

- Reentrant: yes
- IRQ safe: yes

**Returns:**

–  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalFastMutexInit ( IxOsalFastMutex * mutex )
```

Initializes a fast mutex.

**Parameters:**

*mutex* – fast mutex  
handle

Initializes a fast mutex object

- Reentrant: yes
- IRQ safe: yes

**Returns:**

–  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalFastMutexTryLock ( IxOsalFastMutex * mutex )
```

Non-blocking attempt to lock a fast mutex.

**Parameters:**

*mutex* – fast mutex handle

Attempts to lock a fast mutex object, returning immediately with IX\_SUCCESS if the lock was successful or IX\_FAIL if the lock failed

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalFastMutexUnlock ( IxOsalFastMutex * mutex )
```

Unlocks a fast mutex.

**Parameters:**

*mutex* – fast mutex  
handle

Unlocks a fast mutex object

- Reentrant: yes
- IRQ safe: yes

**Returns:**

–  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalIrqBind ( UINT32 irqLevel,  
                             IxOsalVoidFnVoidPtr irqHandler,  
                             void * parameter  
                             )
```

Binds an interrupt handler to an interrupt level.

**Parameters:**

*irqLevel* (in) – interrupt level  
*irqHandler* (in) – interrupt handler  
*parameter* (in) – custom parameter to be passed to the interrupt handler

Binds an interrupt handler to an interrupt level. The operation will fail if the wrong level is selected, if the handler is NULL, or if the interrupt is already bound. This function binds the specified C routine to an interrupt level. When called, the "parameter" value will be passed to the routine.

Reentrant: no IRQ safe: no

**Returns:**

IX\_SUCCESS if the operation succeeded or IX\_FAIL otherwise

```
PUBLIC void ixOsallIrqDisable ( UINT32 irqLevel )
```

Disables an interrupt level.

**Parameters:**

*irqLevel* - interrupt level to  
disable

Disables the specified interrupt level

- Reentrant: no
- IRQ safe: yes

**Returns:**

– none

```
PUBLIC void ixOsallIrqEnable ( UINT32 irqLevel )
```

Enables an interrupt level.

**Parameters:**

*irqLevel* - interrupt level to  
enable

Enables the specified interrupt level

- Reentrant: no
- IRQ safe: yes

**Returns:**

– none

```
PUBLIC UINT32 ixOsalIrqLevelSet ( UINT32 irqLevel )
```

Selectively disables interrupts.

**Parameters:**

*irqLevel* - new interrupt level

Disables the interrupts below the specified interrupt level

- Reentrant: no
- IRQ safe: yes

**Note:**

Depending on the implementation this function can disable all the interrupts

**Returns:**

previous interrupt level

```
PUBLIC UINT32 ixOsalIrqLock ( void )
```

Disables all interrupts.

**Parameters:**

– none

Disables all the interrupts and prevents tasks scheduling

- Reentrant: no
- IRQ safe: yes

**Returns:**

interrupt enable status prior to locking

```
PUBLIC IX_STATUS ixOsalIrqUnbind ( UINT32 irqLevel )
```

Unbinds an interrupt handler from an interrupt level.

**Parameters:**

*irqLevel* (in) – interrupt level

Unbinds the selected interrupt level from any previously registered handler

- Reentrant: no
- IRQ safe: no

**Returns:**

IX\_SUCCESS if the operation succeeded or IX\_FAIL otherwise

```
PUBLIC void ixOsalIrqUnlock ( UINT32 irqEnable )
```

Enables all interrupts.

**Parameters:**

*irqEnable* (in) – interrupt enable status, prior to interrupt locking

Enables the interrupts and task scheduling, cancelling the effect of **ixOsalIrqLock()**

- Reentrant: no
- IRQ safe: yes

**Returns:**

IX\_SUCCESS if the operation succeeded or IX\_FAIL otherwise

```
PUBLIC INT32 ixOsalLog ( IxOsalLogLevel level,  
                      IxOsalLogDevice device,  
                      char *          format,  
                      int             arg1,  
                      int             arg2,  
                      int             arg3,  
                      int             arg4,  
                      int             arg5,  
                      int             arg6  
                      )
```

Interrupt-safe logging function.

**Parameters:**

*level* – identifier prefix for the message  
*device* – output device  
*format* – message format, in a printf format  
... – up to 6 arguments to be printed

IRQ-safe logging function, similar to printf. Accepts up to 6 arguments to print (excluding the level, device and the format). This function will actually display the message only if the level is lower than the current verbosity level or if the IX\_OSAL\_LOG\_USER level is used. An output device must be specified (see **IxOsalTypes.h**).

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– Beside the exceptions documented in the note below, the returned value is the number of printed characters, or –1 if the parameters are incorrect (NULL format, unknown output device)

**Note:**

The exceptions to the return value are: VxWorks: The return value is 32 if the specified level is 1 and 64 if the specified level is greater than 1 and less or equal than 9. WinCE: If compiled for

EBOOT then the return value is always 0.

The given print format should take into account the specified output device. IX\_OSAL\_STDOUT supports all the usual print formats, however a custom hex display specified by IX\_OSAL\_HEX would support only a fixed number of hexadecimal digits.

```
PUBLIC UINT32 ixOsalLogLevelSet ( UINT32 level )
```

sets the current logging verbosity level

**Parameters:**

*level* – new log verbosity level

Sets the log verbosity level. The default value is IX\_OSAL\_LOG\_ERROR.

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– Old log verbosity level

```
PUBLIC void* ixOsalMemAlloc ( UINT32 size )
```

Allocates memory.

**Parameters:**

*size* – memory size to allocate, in bytes

Allocates a memory zone of a given size

- Reentrant: no
- IRQ safe: no

**Returns:**

Pointer to the allocated zone or NULL if the allocation failed

```
PUBLIC void* ixOsalMemCopy ( void * dest,  
                           void * src,  
                           UINT32 count  
                           )
```

Copies memory zones.

**Parameters:**

*dest* – destination memory zone  
*src* – source memory zone

*count* – number of bytes to copy

Copies *count* bytes from the source memory zone pointed by *src* into the memory zone pointed by *dest*.

- Reentrant: no
- IRQ safe: yes

**Returns:**

Pointer to the destination memory zone

```
PUBLIC void ixOsalMemFree ( void * ptr )
```

Frees memory.

**Parameters:**

*ptr* – pointer to the memory zone

Frees a previously allocated memory zone

- Reentrant: no
- IRQ safe: no

**Returns:**

– none

```
PUBLIC void* ixOsalMemSet ( void * ptr,  
                           UINT8 filler,  
                           UINT32 count  
                           )
```

Fills a memory zone.

**Parameters:**

*ptr* – pointer to the memory zone

*filler* – byte to fill the memory zone  
with

*count* – number of bytes to fill

Fills a memory zone with a given constant byte

- Reentrant: no
- IRQ safe: yes

**Returns:**

Pointer to the memory zone



```

PUBLIC IX_STATUS ixOsalMessageQueueCreate ( IxOsalMessageQueue * queue,
                                             UINT32             msgCount,
                                             UINT32             msgLen
                                             )

```

Creates a message queue.

**Parameters:**

- queue* – queue handle
- msgCount* – maximum number of messages to hold in the queue
- msgLen* – maximum length of each message, in bytes

Creates a message queue of msgCount messages, each containing msgLen bytes

- Reentrant: no
- IRQ safe: no

**Returns:**

- IX\_SUCCESS/IX\_FAIL

```

PUBLIC IX_STATUS ixOsalMessageQueueDelete ( IxOsalMessageQueue * queue )

```

Deletes a message queue.

**Parameters:**

- queue* – queue handle

Deletes a message queue

- Reentrant: no
- IRQ safe: no

**Returns:**

- IX\_SUCCESS/IX\_FAIL

```

PUBLIC IX_STATUS ixOsalMessageQueueReceive ( IxOsalMessageQueue * queue,
                                              UINT8 *             message
                                              )

```

Receives a message from a message queue.

**Parameters:**

- queue* – queue handle
- message* – pointer to where the message should be copied to

Retrieves the first message from the message queue

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalMessageQueueSend ( IxOsalMessageQueue * queue,
                                           UINT8 * message
                                           )
```

Sends a message to a message queue.

**Parameters:**

*queue* – queue handle  
*message* – message to send

Sends a message to the message queue. The message will be copied (at the configured size of the message) into the queue.

- Reentrant: yes
- IRQ safe: yes

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalMutexDestroy ( IxOsalMutex * mutex )
```

Destroys a mutex object.

**Parameters:**

*mutex* – mutex handle  
Destroys a mutex object; the caller should ensure that no thread is blocked on this mutex

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalMutexInit ( IxOsalMutex * mutex )
```

initializes a mutex

**Parameters:**

*mutex* – mutex  
handle

Initializes a mutex object

- Reentrant: no
- IRQ safe: no

**Returns:**

–  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalMutexLock ( IxOsalMutex * mutex,  
                                INT32      timeout  
                                )
```

locks a mutex

**Parameters:**

*mutex* – mutex handle  
*timeout* – timeout in ms; IX\_OSAL\_WAIT\_FOREVER (–1) to wait forever or  
IX\_OSAL\_WAIT\_NONE to return immediately

Locks a mutex object

- Reentrant: yes
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalMutexTryLock ( IxOsalMutex * mutex )
```

Non-blocking attempt to lock a mutex.

**Parameters:**

*mutex* – mutex handle

Attempts to lock a mutex object, returning immediately with IX\_SUCCESS if the lock was successful or IX\_FAIL if the lock failed

- Reentrant: yes
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalMutexUnlock ( IxOsalMutex * mutex )
```

Unlocks a mutex.

**Parameters:**

*mutex* – mutex  
handle

Unlocks a mutex object

- Reentrant: yes
- IRQ safe: yes

**Returns:**

–  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalOsNameGet ( INT8 * osName,  
                                INT32 maxSize  
                                )
```

provides the name of the Operating System running

**Parameters:**

*osName* – Pointer to a NULL–terminated string of characters that holds the name of the OS running. This is both an input and an output parameter  
*maxSize* – Input parameter that defines the maximum number of bytes that can be stored in *osName*

Returns a string of characters that describe the Operating System name

- Reentrant: yes
- IRQ safe: yes

return – IX\_SUCCESS for successful retrieval

- IX\_FAIL if (*osType* == NULL | *maxSize* ==< 0)

```
PUBLIC IX_STATUS ixOsalOsVersionGet ( INT8 * osVersion,  
                                    INT32 maxSize  
                                    )
```

provides the version of the Operating System running

**Parameters:**

*osVersion* – Pointer to a NULL terminated string of characters that holds the version of the OS running. This is both an input and an output parameter  
*maxSize* – Input parameter that defines the maximum number of bytes that can be stored in *osVersion*

Returns a string of characters that describe the Operating System's version

- Reentrant: yes
- IRQ safe: yes

return – IX\_SUCCESS for successful retrieval

- IX\_FAIL if (osVersion == NULL | maxSize =< 0)

```
PUBLIC IX_STATUS ixOsalRepeatingTimerSchedule ( IxOsalTimer *      timer,
                                              UINT32              period,
                                              UINT32              priority,
                                              IxOsalVoidFnVoidPtr callback,
                                              void *              param
                                              )
```

Schedules a repeating timer.

**Parameters:**

- timer* – handle of the timer object
- period* – timer trigger period, in milliseconds
- priority* – timer priority (0 being the highest)
- callback* – user callback to invoke when the timer triggers
- param* – custom parameter passed to the callback

Schedules a timer to be called every period milliseconds. The timer will invoke the specified callback function possibly in interrupt context, passing the given parameter. If several timers trigger at the same time contention issues are dealt according to the specified timer priorities.

- Reentrant: no
- IRQ safe: no

**Returns:**

- IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalSemaphoreDestroy ( IxOsalSemaphore * semaphore )
```

Destroys a semaphore object.

**Parameters:**

- semaphore* – semaphore handle

Destroys a semaphore object; the caller should ensure that no thread is blocked on this semaphore

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalSemaphoreGetValue ( IxOsalSemaphore * semaphore,  
                                         UINT32 * value  
                                         )
```

Gets semaphore value.

**Parameters:**

*semaphore* – semaphore handle  
*value* – location to store the  
semaphore value

Retrieves the current value of a semaphore object

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalSemaphoreInit ( IxOsalSemaphore * semaphore,  
                                     UINT32 value  
                                     )
```

Initializes a semaphore.

**Parameters:**

*semaphore* – semaphore  
handle  
*value* – initial  
semaphore  
value

Initializes a semaphore object

- Reentrant: no
- IRQ safe: no

**Returns:**

–  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalSemaphorePost ( IxOsalSemaphore * semaphore )
```

Posts to (increments) a semaphore.

**Parameters:**

*semaphore* – semaphore handle

Increments a semaphore object

- Reentrant: no
- IRQ safe: yes

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalSemaphoreTryWait ( IxOsalSemaphore * semaphore )
```

Non-blocking wait on semaphore.

**Parameters:**

*semaphore* – semaphore handle

Decrements a semaphore, not blocking the calling thread if the semaphore is unavailable

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalSemaphoreWait ( IxOsalSemaphore * semaphore,  
                                     INT32 timeout  
                                     )
```

Waits on (decrements) a semaphore.

**Parameters:**

*semaphore* – semaphore handle

*timeout* – timeout, in ms; IX\_OSAL\_WAIT\_FOREVER (–1) if the thread is to block indefinitely or IX\_OSAL\_WAIT\_NONE (0) if the thread is to return immediately even if the call fails

Decrements a semaphore, blocking if the semaphore is unavailable (value is 0).

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```

PUBLIC IX_STATUS ixOsalSingleShotTimerSchedule ( IxOsalTimer *      timer,
                                                UINT32              period,
                                                UINT32              priority,
                                                IxOsalVoidFnVoidPtr callback,
                                                void *              param
                                                )

```

Schedules a single-shot timer.

**Parameters:**

- timer* – handle of the timer object
- period* – timer trigger period, in milliseconds
- priority* – timer priority (0 being the highest)
- callback* – user callback to invoke when the timer triggers
- param* – custom parameter passed to the callback

Schedules a timer to be called after period milliseconds. The timer will cease to function past its first trigger. The timer will invoke the specified callback function, possibly in interrupt context, passing the given parameter. If several timers trigger at the same time contention issues are dealt according to the specified timer priorities.

- Reentrant: no
- IRQ safe: no

**Returns:**

- IX\_SUCCESS/IX\_FAIL

```

PUBLIC void ixOsalSleep ( UINT32 milliseconds )

```

Yielding sleep for a number of milliseconds.

**Parameters:**

- milliseconds* – number of milliseconds to sleep

The calling thread will sleep for the specified number of milliseconds. This sleep is yielding, hence other tasks will be scheduled by the operating system during the sleep period. Calling this function with an argument of 0 will place the thread at the end of the current scheduling loop.

- Reentrant: no
- IRQ safe: no

**Returns:**

- none

```

PUBLIC UINT32 ixOsalSysClockRateGet ( void )

```

System clock rate, in ticks.



Retrieves the resolution (number of ticks per second) of the system clock

- Reentrant: no
- IRQ safe: no

**Returns:**

- The system clock rate

**Note:**

The implementation of this function is platform and OS-specific. The system clock rate is not always available – e.g. Linux does not provide this information in user mode

```
PUBLIC IX_STATUS ixOsalThreadCreate ( IxOsalThread *      thread,  
                                     IxOsalThreadAttr * threadAttr,  
                                     IxOsalVoidFnVoidPtr startRoutine,  
                                     void *              arg  
                                     )
```

Creates a new thread.

**Parameters:**

- thread* – handle of the thread to be created
- threadAttr* – pointer to a thread attribute object
- startRoutine* – thread entry point
- arg* – argument given to the thread

Creates a thread given a thread handle and a thread attribute object. The same thread attribute object can be used to create separate threads. "NULL" can be specified as the attribute, in which case the default values will be used. The thread needs to be explicitly started using **ixOsalThreadStart()**.

- Reentrant: no
- IRQ safe: no

**Returns:**

- IX\_SUCCESS/IX\_FAIL

```
PUBLIC void ixOsalThreadExit ( void )
```

Exits a running thread.

Terminates the calling thread

- Reentrant: no
- IRQ safe: no

**Returns:**

- This function never returns

```
PUBLIC IX_STATUS ixOsalThreadKill ( IxOsalThread * thread )
```

Kills an existing thread.

**Parameters:**

*thread* – handle of the thread to be killed

Kills a thread given its thread handle.

- Reentrant: no
- IRQ safe: no

**Note:**

It is not possible to kill threads in Linux kernel mode. This function will only send a SIGTERM signal, and it is the responsibility of the thread to check for the presence of this signal with signal\_pending().

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalThreadPrioritySet ( IxOsalThread * thread,  
                                         UINT32      priority  
                                         )
```

Sets the priority of an existing thread.

**Parameters:**

*thread* – handle of the thread

*priority* – new priority, between 0 and 255 (0 being the highest)

Sets the thread priority

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalThreadResume ( IxOsalThread * thread )
```

Resumes thread execution.

**Parameters:**

*thread* – handle of the thread

Resumes the thread execution

- Reentrant: no
- IRQ safe: no

**Returns:**

—  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalThreadStart ( IxOsalThread * thread )
```

Starts a newly created thread.

**Parameters:**

*thread* – handle of the thread to be started

Starts a thread given its thread handle. This function is to be called only once, following the thread initialization.

- Reentrant: no
- IRQ safe: no

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC IX_STATUS ixOsalThreadSuspend ( IxOsalThread * thread )
```

Suspends thread execution.

**Parameters:**

*thread* – handle of the  
thread

Suspends the thread execution

- Reentrant: no
- IRQ safe: no

**Returns:**

—  
IX\_SUCCESS/IX\_FAIL

```
PUBLIC void ixOsalTimeGet ( IxOsalTimeval * tv )
```

Current system time.

**Parameters:**

*tv* – pointer to an **IxOsalTimeval** structure to store the current time in

Retrieves the current system time (real-time)

- Reentrant: no
- IRQ safe: no

**Returns:**

– none

**Note:**

The implementation of this function is platform-specific. Not all platforms have a real-time clock.

```
PUBLIC IX_STATUS ixOsalTimerCancel ( IxOsalTimer * timer )
```

Cancels a running timer.

**Parameters:**

*timer* – handle of the timer object

Cancels a single-shot or repeating timer.

- Reentrant: no
- IRQ safe: yes

**Returns:**

– IX\_SUCCESS/IX\_FAIL

```
PUBLIC void ixOsalTimersShow ( void )
```

displays all the running timers

Displays a list with all the running timers and their parameters (handle, period, type, priority, callback and user parameter)

- Reentrant: no
- IRQ safe: no

**Returns:**

– none

```
PUBLIC UINT32 ixOsalTimestampGet ( void )
```

XXX.

Retrieves the current timestamp

- Reentrant: yes

- IRQ safe: yes

**Returns:**

- The current timestamp

**Note:**

The implementation of this function is platform-specific. Not all the platforms provide a high-resolution timestamp counter.

```
PUBLIC UINT32 ixOsalTimestampResolutionGet ( void )
```

Resolution of the timestamp counter.

Retrieves the resolution (frequency) of the timestamp counter.

- Reentrant: yes
- IRQ safe: yes

**Returns:**

- The resolution of the timestamp counter

**Note:**

The implementation of this function is platform-specific. Not all the platforms provide a high-resolution timestamp counter.

```
PUBLIC void ixOsalYield ( void )
```

Yields execution of current thread.

Yields the execution of the current thread

- Reentrant: no
- IRQ safe: no

**Returns:**

- none

# OSAL Buffer Management Module.

Buffer management module for IxOsal.

## Defines

**#define IX\_OSAL\_MBUF\_MAX\_POOLS**

*The maximum number of pools that can be allocated, must be a multiple of 32 as required by implementation logic.*

**#define IX\_OSAL\_MBUF\_POOL\_NAME\_LEN**

*The maximum string length of the pool name.*

**#define IX\_OSAL\_MBUF\_NEXT\_PKT\_IN\_CHAIN\_PTR(m\_blk\_ptr)**

*Return pointer to the next packet in the chain.*

**#define IX\_OSAL\_MBUF\_MDATA(m\_blk\_ptr)**

*Return pointer to the data in the mbuf.*

**#define IX\_OSAL\_MBUF\_MLEN(m\_blk\_ptr)**

*Return the data length.*

**#define IX\_OSAL\_MBUF\_MTYPE(m\_blk\_ptr)**

*Return the data type in the mbuf.*

**#define IX\_OSAL\_MBUF\_FLAGS(m\_blk\_ptr)**

*Return the buffer flags.*

**#define IX\_OSAL\_MBUF\_NET\_POOL(m\_blk\_ptr)**

*Return pointer to a network pool.*

**#define IX\_OSAL\_MBUF\_PKT\_LEN(m\_blk\_ptr)**

*Return the total length of all the data in the mbuf chain for this packet.*

**#define IX\_OSAL\_MBUF\_PRIV(m\_blk\_ptr)**

*Return the private field.*

**#define IX\_OSAL\_MBUF\_SIGNATURE(m\_blk\_ptr)**

*Return the signature field of IX\_OSAL\_MBUF.*

**#define IX\_OSAL\_MBUF\_OSBUF\_PTR(m\_blk\_ptr)**

*Return ix\_osbuf\_ptr field of IX\_OSAL\_MBUF, which is used to store OS-specific buffer pointer during a buffer conversion.*

**#define IX\_OSAL\_MBUF\_ALLOCATED\_BUFF\_LEN(m\_blk\_ptr)**

*Return the allocated buffer size.*

**#define IX\_OSAL\_MBUF\_ALLOCATED\_BUFF\_DATA(m\_blk\_ptr)**

*Return the allocated buffer pointer.*

**#define IX\_OSAL\_MBUF\_POOL\_SIZE\_ALIGN(size)**

*This macro takes an integer as an argument and rounds it up to be a multiple of the memory cache-line size.*

**#define IX\_OSAL\_MBUF\_POOL\_MBUF\_AREA\_SIZE\_ALIGNED(count)**

*This macro calculates, from the number of mbufs required, the size of the memory area required to contain the mbuf headers for the buffers in the pool. The size to be used for each mbuf header is rounded up to a multiple of the cache-line size, to ensure each mbuf header aligns on a cache-line boundary. This macro is used by **IX\_OSAL\_MBUF\_POOL\_MBUF\_AREA\_ALLOC()**.*

**#define IX\_OSAL\_MBUF\_POOL\_DATA\_AREA\_SIZE\_ALIGNED(count, size)**

*This macro calculates, from the number of mbufs required and the size of the data portion for each mbuf, the size of the data memory area required. The size is adjusted to ensure alignment on cache line boundaries. This macro is used by **IX\_OSAL\_MBUF\_POOL\_DATA\_AREA\_ALLOC()**.*

**#define IX\_OSAL\_MBUF\_POOL\_MBUF\_AREA\_ALLOC(count, memAreaSize)**

*Allocates the memory area needed for the number of mbuf headers specified by count. This macro ensures the mbuf headers align on cache line boundaries. This macro evaluates to a pointer to the memory allocated.*

**#define IX\_OSAL\_MBUF\_POOL\_DATA\_AREA\_ALLOC(count, size, memAreaSize)**

*Allocates the memory pool for the data portion of the pool mbufs. The number of mbufs is specified by count. The size of the data portion of each mbuf is specified by size. This macro ensures the mbufs are aligned on cache line boundaries. This macro evaluates to a pointer to the memory allocated.*

**#define IX\_OSAL\_MBUF\_POOL\_INIT(count, size, name)**

*Wrapper macro for **ixOsalPoolInit()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_NO\_ALLOC\_POOL\_INIT(bufPtr, dataPtr, count, size, name)**

*Wrapper macro for **ixOsalNoAllocPoolInit()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_POOL\_GET(poolPtr)**

*Wrapper macro for **ixOsalMbufAlloc()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_POOL\_PUT(bufPtr)**

*Wrapper macro for **ixOsalMbufFree()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_POOL\_PUT\_CHAIN(bufPtr)**

*Wrapper macro for **ixOsalMbufChainFree()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_POOL\_SHOW(poolPtr)**

*Wrapper macro for **ixOsalMbufPoolShow()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_POOL\_MDATA\_RESET(bufPtr)**

*Wrapper macro for **ixOsalMbufDataPtrReset()** See function description below for details.*

**#define IX\_OSAL\_MBUF\_POOL\_UNINIT(m\_pool\_ptr)**

*Wrapper macro for **ixOsalBuffPoolUninit()** See function description below for details.*

```
#define IX_OSAL_CONVERT_OSBUF_TO_IXPBUF(osBufPtr, ixpBufPtr)
    Convert pre-allocated os-specific buffer format to OSAL IXP_BUF (IX_OSAL_MBUF) format. It is
    users' responsibility to provide pre-allocated and valid buffer pointers.

#define IX_OSAL_CONVERT_IXPBUF_TO_OSBUF(ixpBufPtr, osBufPtr)
    Convert pre-allocated OSAL IXP_BUF (IX_OSAL_MBUF) format to os-specific buffer pointers.
```

---

## Detailed Description

Buffer management module for IxOsal.

---

## Define Documentation

```
#define IX_OSAL_CONVERT_IXPBUF_TO_OSBUF ( ixpBufPtr,
                                         osBufPtr )
```

Convert pre-allocated OSAL IXP\_BUF (IX\_OSAL\_MBUF) format to os-specific buffer pointers.

### **Parameters:**

*ixpBufPtr* (in) – OSAL IXP\_BUF pointer  
*osBufPtr* (out) – os-specific buffer pointer.

### **Returns:**

None

Definition at line **560** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_CONVERT_OSBUF_TO_IXPBUF ( osBufPtr,
                                         ixpBufPtr )
```

Convert pre-allocated os-specific buffer format to OSAL IXP\_BUF (IX\_OSAL\_MBUF) format. It is users' responsibility to provide pre-allocated and valid buffer pointers.

### **Parameters:**

*osBufPtr* (in) – a pre-allocated os-specific buffer pointer.  
*ixpBufPtr* (in) – a pre-allocated OSAL IXP\_BUF pointer

### **Returns:**

None

Definition at line **545** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_ALLOCATED_BUFF_DATA ( m_blk_ptr )
```



Return the allocated buffer pointer.

Definition at line **299** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_ALLOCATED_BUFF_LEN ( m_blk_ptr )
```

Return the allocated buffer size.

Definition at line **289** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_FLAGS ( m_blk_ptr )
```

Return the buffer flags.

Definition at line **218** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_MAX_POOLS
```

The maximum number of pools that can be allocated, must be a multiple of 32 as required by implementation logic.

***Note:***

This can safely be increased if more pools are required.

Definition at line **69** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_MDATA ( m_blk_ptr )
```

Return pointer to the data in the mbuf.

Definition at line **188** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_MLEN ( m_blk_ptr )
```

Return the data length.

Definition at line **197** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_MTYPE ( m_blk_ptr )
```

Return the data type in the mbuf.

Definition at line **207** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_NET_POOL ( m_blk_ptr )
```

Return pointer to a network pool.

Definition at line **229** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_NEXT_PKT_IN_CHAIN_PTR ( m_blk_ptr )
```

Return pointer to the next packet in the chain.

Definition at line **177** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_NO_ALLOC_POOL_INIT ( bufPtr,  
                                         dataPtr,  
                                         count,  
                                         size,  
                                         name    )
```

Wrapper macro for **ixOsalNoAllocPoolInit()** See function description below for details.

**Returns:**

Pointer to the new pool or NULL if the initialization failed.

Definition at line **459** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_OSBUF_PTR ( m_blk_ptr )
```

Return ix\_osbuf\_ptr field of IX\_OSAL\_MBUF, which is used to store OS-specific buffer pointer during a buffer conversion.

Definition at line **278** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_PKT_LEN ( m_blk_ptr )
```

Return the total length of all the data in the mbuf chain for this packet.

Definition at line **242** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_DATA_AREA_ALLOC ( count,  
                                           size,  
                                           memAreaSize )
```

Allocates the memory pool for the data portion of the pool mbufs. The number of mbufs is specified by *count*. The size of the data portion of each mbuf is specified by *size*. This macro ensures the mbufs are aligned on cache line boundaries. This macro evaluates to a pointer to the memory allocated.

**Parameters:**

*int* [in] *count* – the number of mbufs the pool will contain

*int* [in] *size* – the desired size (in bytes) required for the data portion of each mbuf. Note that this size may be rounded up to ensure alignment on cache–line boundaries.

*int* [out] *memAreaSize* – the total amount of memory allocated

**Returns:**

*void \** – a pointer to the allocated memory area

Definition at line **431** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_DATA_AREA_SIZE_ALIGNED ( count,  
                                                    size )
```

This macro calculates, from the number of mbufs required and the size of the data portion for each mbuf, the size of the data memory area required. The size is adjusted to ensure alignment on cache line boundaries. This macro is used by **IX\_OSAL\_MBUF\_POOL\_DATA\_AREA\_ALLOC()**.

**Parameters:**

*int* [in] *count* – The number of mbufs in the pool.

*int* [in] *size* – The desired size for each mbuf data portion. This size will be rounded up to a multiple of the cache–line size to ensure alignment on cache–line boundaries for each data block.

**Returns:**

*int* – the total size required for the pool data area (aligned)

Definition at line **388** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_GET ( poolPtr )
```

Wrapper macro for **ixOsalMbufAlloc()** See function description below for details.

Definition at line **470** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_INIT ( count,  
                                size,  
                                name )
```

Wrapper macro for **ixOsalPoolInit()** See function description below for details.

Definition at line **445** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_MBUF_AREA_ALLOC ( count,  
                                             memAreaSize )
```

Allocates the memory area needed for the number of mbuf headers specified by *count*. This macro ensures the mbuf headers align on cache line boundaries. This macro evaluates to a pointer to the memory allocated.

**Parameters:**

*int* [in] count – the number of mbufs the pool will contain  
*int* [out] memAreaSize – the total amount of memory allocated

**Returns:**

void \* – a pointer to the allocated memory area

Definition at line **407** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_MBUF_AREA_SIZE_ALIGNED ( count )
```

This macro calculates, from the number of mbufs required, the size of the memory area required to contain the mbuf headers for the buffers in the pool. The size to be used for each mbuf header is rounded up to a multiple of the cache-line size, to ensure each mbuf header aligns on a cache-line boundary. This macro is used by **IX\_OSAL\_MBUF\_POOL\_MBUF\_AREA\_ALLOC()**.

**Parameters:**

*int* [in] count – the number of buffers the pool will contain

**Returns:**

int – the total size required for the pool mbuf area (aligned)

Definition at line **361** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_MDATA_RESET ( bufPtr )
```

Wrapper macro for **ixOsalMbufDataPtrReset()** See function description below for details.

Definition at line **514** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_NAME_LEN
```

The maximum string length of the pool name.

Definition at line **305** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_PUT ( bufPtr )
```

Wrapper macro for **ixOsalmBufFree()** See function description below for details.

Definition at line **481** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_PUT_CHAIN ( bufPtr )
```

Wrapper macro for **ixOsalmBufChainFree()** See function description below for details.

Definition at line **492** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_SHOW ( poolPtr )
```

Wrapper macro for **ixOsalmBufPoolShow()** See function description below for details.

Definition at line **503** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_SIZE_ALIGN ( size )
```

This macro takes an integer as an argument and rounds it up to be a multiple of the memory cache-line size.

***Parameters:***

*int* [in] size – the size integer to be rounded up

***Returns:***

int – the size, rounded up to a multiple of the cache-line size

Definition at line **336** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_POOL_UNINIT ( m_pool_ptr )
```

Wrapper macro for **ixOsalmBufPoolUninit()** See function description below for details.

Definition at line **525** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_PRIV ( m_blk_ptr )
```

Return the private field.

Definition at line **255** of file **IxOsalBufferMgt.h**.

```
#define IX_OSAL_MBUF_SIGNATURE ( m_blk_ptr )
```

Return the signature field of IX\_OSAL\_MBUF.

Definition at line **267** of file **IxOsalBufferMgt.h**.

# Osai IoMem module

I/O memory and endianness support.

## Data Structures

struct **IxOsaiMemoryMap**  
*IxOsaiMemoryMap structure.*

## Defines

#define **IX\_OSAL\_MEM\_MAP**(physAddr, size)  
*Map an I/O mapped physical memory zone to virtual zone and return virtual pointer.*

#define **IX\_OSAL\_MEM\_UNMAP**(virtAddr)  
*Unmap a previously mapped I/O memory zone using virtual pointer obtained during the mapping operation. pointer.*

#define **IX\_OSAL\_MMAP\_VIRT\_TO\_PHYS**(virtAddr)  
*This function Converts a virtual address into a physical address, including the dynamically mapped memory.*

#define **IX\_OSAL\_MMAP\_PHYS\_TO\_VIRT**(physAddr)  
*This function Converts a virtual address into a physical address, including the dynamically mapped memory.*

## Enumerations

enum **IxOsaiMapEntryType** {  
    **IX\_OSAL\_STATIC\_MAP**,  
    **IX\_OSAL\_DYNAMIC\_MAP**  
}  
*This is an enum for OSAL I/O mem map type.*

enum **IxOsaiMapEndiannessType** {  
    **IX\_OSAL\_BE**,  
    **IX\_OSAL\_LE\_AC**,  
    **IX\_OSAL\_LE\_DC**,  
    **IX\_OSAL\_LE**  
}  
*This is an enum for OSAL I/O mem Endianness and Coherency mode.*

---

## Detailed Description

I/O memory and endianness support.

---

## Define Documentation

```
#define IX_OSAL_MEM_MAP ( physAddr,  
                          size      )
```

Map an I/O mapped physical memory zone to virtual zone and return virtual pointer.

**Parameters:**

*physAddr* – the physical address  
*size* – the size

**Returns:**

start address of the virtual memory zone.

**Note:**

This function maps an I/O mapped physical memory zone of the given size into a virtual memory zone accessible by the caller and returns a cookie – the start address of the virtual memory zone. IX\_OSAL\_MMAP\_PHYS\_TO\_VIRT should NOT therefore be used on the returned virtual address. The memory zone is to be unmapped using IX\_OSAL\_MEM\_UNMAP once the caller has finished using this zone (e.g. on driver unload) using the cookie as parameter. The IX\_OSAL\_READ/WRITE\_LONG/SHORT macros should be used to read and write the mapped memory, adding the necessary offsets to the address cookie.

Definition at line **242** of file **IxOsaliMem.h**.

```
#define IX_OSAL_MEM_UNMAP ( virtAddr )
```

Unmap a previously mapped I/O memory zone using virtual pointer obtained during the mapping operation. pointer.

**Parameters:**

*virtAddr* – the virtual pointer to the zone to be unmapped.

**Returns:**

none

**Note:**

This function unmaps a previously mapped I/O memory zone using the cookie obtained in the mapping operation. The memory zone in question becomes unavailable to the caller once unmapped and the cookie should be discarded.

This function cannot fail if the given parameter is correct and does not return a value.



Definition at line **265** of file **IxOsallIoMem.h**.

```
#define IX_OSAL_MMAP_PHYS_TO_VIRT ( physAddr )
```

This function Converts a virtual address into a physical address, including the dynamically mapped memory.

**Parameters:**

*physAddr* – physical address to convert Return value: corresponding virtual address, or NULL

Definition at line **295** of file **IxOsallIoMem.h**.

```
#define IX_OSAL_MMAP_VIRT_TO_PHYS ( virtAddr )
```

This function Converts a virtual address into a physical address, including the dynamically mapped memory.

**Parameters:**

*virtAddr* – virtual address to convert Return value: corresponding physical address, or NULL

Definition at line **279** of file **IxOsallIoMem.h**.

---

## Enumeration Type Documentation

```
enum IxOsalMapEndiannessType
```

This is an enum for OSAL I/O mem Endianness and Coherency mode.

**Enumeration values:**

*IX\_OSAL\_BE* Set map endian mode to Big Endian.  
*IX\_OSAL\_LE\_AC* Set map endian mode to Little Endian, Address Coherent.  
*IX\_OSAL\_LE\_DC* Set map endian mode to Little Endian, Data Coherent.  
*IX\_OSAL\_LE* Set map endian mode to Little Endian without specifying coherency mode.

Definition at line **131** of file **IxOsallIoMem.h**.

```
enum IxOsalMapEntryType
```

This is an enum for OSAL I/O mem map type.

**Enumeration values:**

*IX\_OSAL\_STATIC\_MAP* Set map entry type to static

map.  
*IX\_OSAL\_DYNAMIC\_MAP* Set map entry type to  
dynamic map.

Definition at line **119** of file **IxOsallMem.h**.

# Osai basic data types.

Basic data types for Osai.

## Data Structures

struct **IxOsaiThreadAttr**  
*Thread Attribute.*

struct **IxOsaiTimeval**  
*Timeval structure.*

## Defines

#define **IX\_OSAL\_BILLION**  
*Alias for 1,000,000,000.*

#define **IX\_SUCCESS**  
*Success status.*

#define **IX\_FAIL**  
*Failure status.*

#define **PRIVATE**  
*#defined as static, except for debug builds*

#define **IX\_OSAL\_INLINE**  
*Alias for \_\_inline.*

#define **IX\_OSAL\_INLINE\_EXTERN**  
*Alias for \_\_inline extern.*

#define **IX\_OSAL\_LOG\_ERROR**  
*Alias for -1, used as log function error status.*

#define **IX\_OSAL\_WAIT\_FOREVER**  
*Definition for timeout forever, OS-specific.*

#define **IX\_OSAL\_WAIT\_NONE**  
*Definition for timeout 0, OS-specific.*

#define **IX\_OSAL\_THREAD\_DEFAULT\_STACK\_SIZE**  
*Default thread stack size, OS-specific.*

#define **IX\_OSAL\_THREAD\_MAX\_STACK\_SIZE**  
*Max stack size, OS-specific.*

```
#define IX_OSAL_DEFAULT_THREAD_PRIORITY
    Default thread priority, OS-specific.

#define IX_OSAL_MAX_THREAD_PRIORITY
    Max thread priority, OS-specific.
```

## Typedefs

```
typedef UINT32 IX_STATUS
    OSAL status.

typedef volatile UINT32 VUINT32
    VUINT32.

typedef volatile INT32 VINT32
    VINT32.

typedef void(* IxOsalVoidFnVoidPtr )(void *)
    Void function pointer prototype.

typedef UINT32 IxOsalTimer
    IxOsalTimer.

typedef IxOsalOsMutex IxOsalMutex
    IxOsalMutex.

typedef IxOsalOsFastMutex IxOsalFastMutex
    IxOsalFastMutex.

typedef IxOsalOsThread IxOsalThread
    IxOsalThread.

typedef IxOsalOsSemaphore IxOsalSemaphore
    IxOsalSemaphore.

typedef IxOsalOsMessageQueue IxOsalMessageQueue
    IxOsalMessageQueue.
```

## Enumerations

```
enum IxOsalLogDevice {
    IX_OSAL_LOG_DEV_STDOUT,
    IX_OSAL_LOG_DEV_STDERR,
    IX_OSAL_LOG_DEV_HEX_DISPLAY,
    IX_OSAL_LOG_DEV_ASCII_DISPLAY
}
    This is an enum for OSAL log devices.
```

```
enum IxOsalLogLevel {  
    IX_OSAL_LOG_LVL_NONE,  
    IX_OSAL_LOG_LVL_USER,  
    IX_OSAL_LOG_LVL_FATAL,  
    IX_OSAL_LOG_LVL_ERROR,  
    IX_OSAL_LOG_LVL_WARNING,  
    IX_OSAL_LOG_LVL_MESSAGE,  
    IX_OSAL_LOG_LVL_DEBUG1,  
    IX_OSAL_LOG_LVL_DEBUG2,  
    IX_OSAL_LOG_LVL_DEBUG3,  
    IX_OSAL_LOG_LVL_ALL  
}  
This is an enum for OSAL log trace level.
```

---

## Detailed Description

Basic data types for Osal.

---

## Define Documentation

```
#define IX_FAIL
```

Failure status.

Definition at line **107** of file **IxOsalTypes.h**.

```
#define IX_OSAL_BILLION
```

Alias for 1,000,000,000.

Definition at line **64** of file **IxOsalTypes.h**.

```
#define IX_OSAL_DEFAULT_THREAD_PRIORITY
```

Default thread priority, OS-specific.

Definition at line **349** of file **IxOsalTypes.h**.

```
#define IX_OSAL_INLINE
```

Alias for `__inline`.

Definition at line **131** of file **IxOsalTypes.h**.

```
#define IX_OSAL_INLINE_EXTERN
```

Alias for \_\_inline extern.

Definition at line **162** of file **IxOsalTypes.h**.

```
#define IX_OSAL_LOG_ERROR
```

Alias for -1, used as log function error status.

Definition at line **187** of file **IxOsalTypes.h**.

```
#define IX_OSAL_MAX_THREAD_PRIORITY
```

Max thread priority, OS-specific.

Definition at line **359** of file **IxOsalTypes.h**.

```
#define IX_OSAL_THREAD_DEFAULT_STACK_SIZE
```

Default thread stack size, OS-specific.

Definition at line **329** of file **IxOsalTypes.h**.

```
#define IX_OSAL_THREAD_MAX_STACK_SIZE
```

Max stack size, OS-specific.

Definition at line **339** of file **IxOsalTypes.h**.

```
#define IX_OSAL_WAIT_FOREVER
```

Definition for timeout forever, OS-specific.

Definition at line **251** of file **IxOsalTypes.h**.

```
#define IX_OSAL_WAIT_NONE
```

Definition for timeout 0, OS-specific.

Definition at line **261** of file **IxOsalTypes.h**.

```
#define IX_SUCCESS
```

Success status.

Definition at line **95** of file **IxOsalTypes.h**.

```
#define PRIVATE
```

#defined as static, except for debug builds

Definition at line **115** of file **IxOsalTypes.h**.

---

## Typedef Documentation

```
typedef UINT32 IX_STATUS
```

OSAL status.

**Note:**

Possible OSAL return status include IX\_SUCCESS and IX\_FAIL.

Definition at line **34** of file **IxOsalTypes.h**.

```
typedef IxOsalOsFastMutex IxOsalFastMutex
```

IxOsalFastMutex.

**Note:**

FastMutex handle, OS-specific

Definition at line **280** of file **IxOsalTypes.h**.

```
typedef IxOsalOsMessageQueue IxOsalMessageQueue
```

IxOsalMessageQueue.

**Note:**

Message Queue handle, OS-specific

Definition at line **307** of file **IxOsalTypes.h**.

```
typedef IxOsOsMutex IxOsMutex
```

IxOsMutex.

**Note:**

Mutex handle, OS-specific

Definition at line **271** of file **IxOsTypes.h**.

```
typedef IxOsOsSemaphore IxOsSemaphore
```

IxOsSemaphore.

**Note:**

Semaphore handle, OS-specific

Definition at line **298** of file **IxOsTypes.h**.

```
typedef IxOsOsThread IxOsThread
```

IxOsThread.

**Note:**

Thread handle, OS-specific

Definition at line **289** of file **IxOsTypes.h**.

```
typedef UINT32 IxOsTimer
```

IxOsTimer.

**Note:**

OSAL timer handle

Definition at line **240** of file **IxOsTypes.h**.

```
typedef void(* IxOsVoidFnVoidPtr)(void *)
```

Void function pointer prototype.

**Note:**

accepts a void pointer parameter and does not return a value.

Definition at line **216** of file **IxOsTypes.h**.



```
typedef volatile INT32 VINT32
```

VINT32.

**Note:**

volatile INT32

Definition at line **48** of file **IxOsalTypes.h**.

```
typedef volatile UINT32 VUINT32
```

VUINT32.

**Note:**

volatile UINT32

Definition at line **41** of file **IxOsalTypes.h**.

---

## Enumeration Type Documentation

```
enum IxOsalLogDevice
```

This is an enum for OSAL log devices.

**Enumeration values:**

<i>IX_OSAL_LOG_DEV_STDOUT</i>	standard output (implemented by default)
<i>IX_OSAL_LOG_DEV_STDERR</i>	standard error (implemented)
<i>IX_OSAL_LOG_DEV_HEX_DISPLAY</i>	hexadecimal display (not implemented)
<i>IX_OSAL_LOG_DEV_ASCII_DISPLAY</i>	ASCII-capable display (not implemented).

Definition at line **170** of file **IxOsalTypes.h**.

```
enum IxOsalLogLevel
```

This is an enum for OSAL log trace level.

**Enumeration values:**

<i>IX_OSAL_LOG_LVL_NONE</i>	No trace level.
<i>IX_OSAL_LOG_LVL_USER</i>	Set trace level to user.
<i>IX_OSAL_LOG_LVL_FATAL</i>	Set trace level to fatal.

<i>IX_OSAL_LOG_LVL_ERROR</i>	Set trace level to error.
<i>IX_OSAL_LOG_LVL_WARNING</i>	Set trace level to warning.
<i>IX_OSAL_LOG_LVL_MESSAGE</i>	Set trace level to message.
<i>IX_OSAL_LOG_LVL_DEBUG1</i>	Set trace level to debug1.
<i>IX_OSAL_LOG_LVL_DEBUG2</i>	Set trace level to debug2.
<i>IX_OSAL_LOG_LVL_DEBUG3</i>	Set trace level to debug3.
<i>IX_OSAL_LOG_LVL_ALL</i>	Set trace level to all.

Definition at line **194** of file **IxOsalTypes.h**.

# **IxOsaiMemoryMap Struct Reference**

## **[Osai IoMem module]**

IxOsaiMemoryMap structure.

---

## **Detailed Description**

IxOsaiMemoryMap structure.

---

The documentation for this struct was generated from the following file:

- **IxOsaiIoMem.h**

# IxOsalThreadAttr Struct Reference

[Osal basic data types.]

Thread Attribute.

## Data Fields

char \* **name**  
*name*

UINT32 **stackSize**  
*stack size*

UINT32 **priority**  
*priority*

---

## Detailed Description

Thread Attribute.

### *Note:*

Default thread attribute

Definition at line **314** of file **IxOsalTypes.h**.

---

## Field Documentation

char\* IxOsalThreadAttr::name

name

Definition at line **316** of file **IxOsalTypes.h**.

UINT32 IxOsalThreadAttr::priority

priority

Definition at line **318** of file **IxOsalTypes.h**.

UINT32 IxOsalThreadAttr::stackSize

stack size

Definition at line **317** of file **IxOsalTypes.h**.

---

The documentation for this struct was generated from the following file:

- **IxOsalTypes.h**

# IxOsalTimeval Struct Reference

## [Osal basic data types.]

Timeval structure.

## Data Fields

UINT32 **secs**  
*seconds*

UINT32 **nsecs**  
*nanoseconds*

---

## Detailed Description

Timeval structure.

### *Note:*

Contain subfields of seconds and nanoseconds..

Definition at line **226** of file **IxOsalTypes.h**.

---

## Field Documentation

UINT32 IxOsalTimeval::nsecs

nanoseconds

Definition at line **229** of file **IxOsalTypes.h**.

UINT32 IxOsalTimeval::secs

seconds

Definition at line **228** of file **IxOsalTypes.h**.

---

The documentation for this struct was generated from the following file:

- **IxOsalTypes.h**