

TCNOpen TRDP
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Chapter 1

The TRDP Light Library API Specification



1.1 General Information

1.1.1 Purpose

The TRDP protocol has been defined as the standard communication protocol in IP-enabled trains. It allows communication via process data (periodically transmitted data using UDP/IP) and message data (client - server messaging using UDP/IP or TCP/IP) This document describes the light API of the TRDP Library.

1.1.2 Scope

The intended audience of this document is the developers and project members of the TRDP project. TRDP Client Applications are programs using the TRDP protocol library to access the services of TRDP. Programmers developing such applications are the main target audience for this documentation.

1.1.3 Related documents

TCN-TRDP2-D-BOM-004-01 IEC61375-2-3_CD_ANNEXA Protocol definition of the TRDP standard

1.1.4 Abbreviations and Definitions

- API* Application Programming Interface
- ECN* Ethernet Consist Network
- TRDP* Train Real-time Data Protocol
- TCMS* Train Control Management System

1.2 Terminology

The API documented here is mainly concerned with three bodies of code:

- *TRDP Client Applications* (or 'client applications' for short): These are programs using the API to access the services of TRDP. Programmers developing such applications are the main target audience for this documentation.
- *TRDP Light Implementations* (or just 'TRDP implementation'): These are libraries realising the API as documented here. Programmers developing such implementations will find useful definitions about syntax and semantics of the API within this documentation.
- *VOS Subsystem* (Virtual Operating System): An OS and hardware abstraction layer which offers memory, networking, threading, queues and debug functions. The VOS API is documented here.

The following diagram shows how these pieces of software are interrelated.

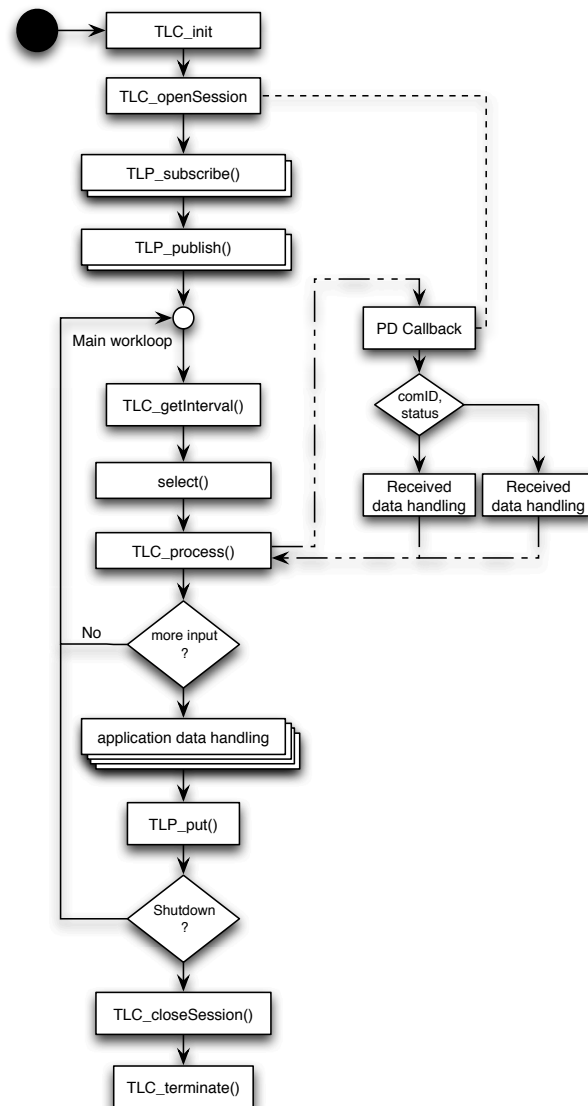


Figure 1.1: Sample client workflow

1.3 Conventions of the API

The API comprises a set of C header files that can also be used from client applications written in C++. These header files are contained in a directory named `trdp/api` and a subdirectory called `trdp/vos/api` with declarations not topical to TRDP but needed by the stack. Client applications shall include these header files like:

```
#include "trdp_if_light.h"
```

and, if VOS functions are needed, also the corresponding headers:

```
#include "vos_thread.h"
```

for example.

The subdirectory `trdp/doc` contains files needed for the API documentation.

Generally client application source code including API headers will only compile if the parent directory of the `trdp` directory is part of the include path of the used compiler. No other subdirectories of the API should be added to the compiler's include path.

The client API doesn't support a "catch-all" header file that includes all declarations in one step; rather the client application has to include individual headers for each feature set it wants to use.

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Chapter 4

Data Structure Documentation

4.1 GNU_PACKED Struct Reference

Types for ETB control.

```
#include <trdp_private.h>
```

Data Fields

- **UINT8** [trnVehNo](#)
vehicle sequence number within the train with vehicle 01 being the first vehicle in ETB reference direction 1 as defined in IEC61375-2-5 value range: 0.
- **ANTIVALENT8** [isLead](#)
vehicle is leading
- **UINT8** [leadDir](#)
vehicle leading direction 0 = not relevant 1 = leading direction 1 2 = leading direction 2
- **UINT8** [vehOrient](#)
vehicle orientation 0 = not known (corrected vehicle) 1 = same as operational train direction 2 = inverse to operational train direction
- **TRDP_SHORT_VERSION_T** [version](#)
telegram version information, main_version = 1, sub_version = 0
- **UINT16** [reserved01](#)
reserved (=0)
- **UINT8** [trnCstNo](#)
own TCN consist number (= 1.
- **UINT8** [reserved02](#)
reserved (=0)
- **UINT8** [ownOpCstNo](#)

own operational address (= 1.

- UINT8 [reserved03](#)
reserved (=0)
- UINT32 [cstTopoCount](#)
Consist topology counter.
- UINT32 [trnTopoCount](#)
Train directory topology counter.
- UINT32 [opTrnTopoCount](#)
Operational Train topology counter.
- ANTIVALENT8 [wasLead](#)
consist was leading, '01'B = false, '10'B = true
- ANTIVALENT8 [reqLead](#)
leading request, '01'B = false, '10'B = true
- UINT8 [reqLeadDir](#)
(request) leading direction, '01'B = consist direction 1, '10'B = consist direction 2
- ANTIVALENT8 [accLead](#)
accept remote leading request, '01'B = false/not accepted, '10'B = true/accepted
- ANTIVALENT8 [clearConfComp](#)
clear confirmed composition, '01'B = false, '10'B = true
- ANTIVALENT8 [corrRequest](#)
request confirmation, '01'B = false, '10'B = true
- ANTIVALENT8 [corrInfoSet](#)
correction info set, '01'B = false, '10'B = true
- ANTIVALENT8 [compStored](#)
corrected composition stored, '01'B = false, '10'B = true
- ANTIVALENT8 [sleepRequest](#)
request sleep mode, '01'B = false, '10'B = true
- UINT8 [leadVehOfCst](#)
position of leading vehicle in consist, 0.
- UINT8 [reserved04](#)
reserved (=0)
- UINT16 [reserved05](#)
reserved (=0)

- **UINT8 reserved06**
reserved (=0)
- **UINT8 confVehCnt**
number of confirmed vehicles in train (1.
- **TRDP_CONF_VEHICLE_T confVehList** [TRDP_MAX_VEH_CNT]
dynamic ordered list of confirmed vehicles in train, starting with vehicle at train head, see sub-clause 5.3.3.2.6
- **TRDP_ETB_CTRL_VDP_T safetyTrail**
ETBCTRL-VDP trailer, completely set to 0 == not used.
- **TRDP_LABEL_T deviceName**
function device of ECSC which sends the telegram
- **UINT8 inhibit**
inauguration inhibit 0 = no inhibit request 1 = inhibit request
- **UINT8 leadingReq**
leading request 0 = no leading request 1 = leading request
- **UINT8 leadingDir**
leading direction 0 = no leading request 1 = leading request direction 1 2 = leading request direction 2
- **UINT8 sleepReq**
sleep request 0 = no sleep request 1 = sleep request
- **UINT16 lifesign**
wrap-around counter, incremented with each produced datagram.
- **UINT8 ecspState**
ECSP state indication 0 = ECSP not operational(initial value) 1 = ECSP in operation.
- **UINT8 etbInhibit**
inauguration inhibit indication 0 = n/a (default) 1 = inhibit not requested on ETB 2 = inhibit set on local ETBN 3 = inhibit set on remote ETBN 4 = inhibit set on local and remote ETBN
- **UINT8 etbLength**
indicates train lengthening in case train inauguration is inhibit 0 = no lengthening (default) 1 = lengthening detected
- **UINT8 etbShort**
indicates train shortening in case train inauguration is inhibit 0 = no shortening (default) 1 = shortening detected
- **UINT16 reserved02**
reserved (=0)
- **UINT8 etbLeadState**

indication of local consist leadership 5 = consist not leading (initial value) 6 = consist is leading requesting 9 = consist is leading 10 = leading conflict other values are not allowed

- **UINT8** [etbLeadDir](#)

direction of the leading end car in the local consist 0 = unknown (default) 1 = TCN direction 1 2 = TCN direction 2 other values are not allowed

- **UINT8** [ttdbSrvState](#)

TTDB server state indication 0 = n/a (initial value) 1 = Leader (default) 2 = Follower 3 = Error.

- **UINT8** [dnsSrvState](#)

DNS server state indication 0 = n/a (initial value) 1 = Leader (default) 2 = Follower 3 = Error.

- **UINT8** [trnDirState](#)

train directory state 1 = UNCONFIRMED 2 = CONFIRMED other values are not allowed

- **UINT8** [opTrnDirState](#)

train directory state 1 = INVALID 2 = VALID 4 = SHARED other values are not allowed

- **UINT8** [sleepCtrlState](#)

sleep control state (option) 0 = option not available 1 = RegularOperation 2 = WaitForSleepMode 3 = PrepareForSleepMode

- **UINT8** [sleepReqCnt](#)

number of sleep requests (option) value range: 0.

- **UINT32** [opTrnTopoCnt](#)

operational train topology counter

- **UINT8** [command](#)

confirmation order 1 = confirmation/correction request 2 = un-confirmation request

- **UINT8** [reserved01](#)

reserved (=0)

- **UINT16** [confVehCnt](#)

number of confirmed vehicles in the train (1.

- **TRDP_OP_VEHICLE_T** [confVehList](#) [TRDP_MAX_VEH_CNT]

ordered list of confirmed vehicles in the train, starting with vehicle at train head, see chapter 5.3.3.2.10.

- **UINT8** [status](#)

status of storing correction info 0 = correctly stored 1 = not stored

- **UINT32** [reqSafetyCode](#)

SC-32 value of the request message.

- **UINT8** [byPassCtrl](#)

ETBN bypass control 0 = no action (keep old state) 1 = no bypass 2 = activate bypass.

- [UINT8 txCtrl](#)
ETBN transmission control 0 = no action (keep old state) 1 = activate sending on ETB (default) 2 = stop sending on ETB.
- [UINT8 slCtrl](#)
sleep mode control (option) 0 = no action (keep old state) 1 = deactivate sleep mode 2 = activate sleep mode (line activity sensing)
- [UINT8 etbnState](#)
state indication of the (active) ETBN 0 = ETBN not operational(initial value) 1 = ETBN in operation
- [UINT8 etbnInaugState](#)
ETBN inauguration state as defined in IEC61375-2-5 0 = init 1 = not inaugurated 2 = inaugurated 3 = ready for inauguration.
- [UINT8 etbnPosition](#)
position of the ETBN 0 = unknown (default) 1 = single node 2 = middle node 3 = end node TCN direction 1 4 = end node TCN direction 2
- [UINT8 etbnRole](#)
ETBN node role as defined in IEC61375-2-5 0 = undefined 1 = master (redundancy leader) 2 = backup (redundancy follower) 3 = not redundant.
- [BITSET8 etbLineState](#)
indication of ETB line status (FALSE == not trusted, TRUE == trusted) bit0 = line A ETBN direction 1 bit1 = line B ETBN direction 1 bit2 = line C ETBN direction 1 bit3 = line D ETBN direction 1 bit4 = line A ETBN direction 2 bit5 = line B ETBN direction 2 bit6 = line C ETBN direction 2 bit7 = line D ETBN direction 2
- [UINT8 byPassState](#)
state of bypass function 0 = bypass disabled 1 = bypass enabled
- [UINT8 slState](#)
sleep mode state (option) 0 = no sleep mode 1 = sleep mode active (line activity sensing)
- [UINT32 etbTopoCnt](#)
ETB topography counter.
- [TRDP_TRAIN_NET_DIR_T trnNetDir](#)
dynamic train info
- [UINT8 ver](#)
Version - incremented for incompatible changes.
- [UINT8 rel](#)
Release - incremented for compatible changes.
- [UINT32 reserved01](#)
reserved (=0)
- [TRDP_SHORT_VERSION_T userDataVersion](#)

version of the vital ETBCTRL telegram `mainVersion = 1`, `subVersion = 0`

- UINT32 [safeSeqCount](#)
safe sequence counter, as defined in B.9
- UINT32 [safetyCode](#)
checksum, as defined in B.9
- TRDP_UUID_T [cstUUID](#)
UUID of the consist, provided by ETBN (TrainNetworkDirectory) Reference to static consist attributes 0 if not available (e.g.
- UINT32 [cstTopoCnt](#)
consist topology counter provided with the CSTINFO 0 if no CSTINFO available
- UINT8 [cstOrient](#)
consist orientation '01'B = same as train direction '10'B = inverse to train direction
- UINT8 [cstCnt](#)
number of consists in train; range: 1.
- TRDP_CONSIST_T [cstList](#) [TRDP_MAX_CST_CNT]
consist list.
- UINT32 [trnTopoCnt](#)
trnTopoCnt value ctrlType == 0: actual value ctrlType == 1: set to 0
- BITSET8 [etbId](#)
identification of the ETB the TTDB is computed for bit0: ETB0 (operational network) bit1: ETB1 (multimedia network) bit2: ETB2 (other network) bit3: ETB3 (other network)
- TRDP_LABEL_T [vehId](#)
Unique vehicle identifier, application defined (e.g.
- UINT8 [opVehNo](#)
operational vehicle sequence number in train value range 1.
- UINT8 [opCstNo](#)
operational consist number in train (1.
- UINT8 [opCstOrient](#)
consist orientation '00'B = not known (corrected vehicle) '01'B = same as operational train direction '10'B = inverse to operational train direction
- TRDP_LABEL_T [trnId](#)
train identifier, application defined (e.g.
- TRDP_LABEL_T [trnOperator](#)
train operator, e.g.

- [UINT32 crc](#)
sc-32 computed over record (seed value: 'FFFFFFFF'H)
- [UINT8 opTrnOrient](#)
operational train orientation '00'B = unknown '01'B = same as train direction '10'B = inverse to train direction
- [UINT8 opCstCnt](#)
number of consists in train (1).
- [TRDP_OP_CONSIST_T opCstList](#) [TRDP_MAX_CST_CNT]
operational consist list starting with op.
- [UINT8 reserved05](#)
reserved for future use (= 0)
- [UINT8 opVehCnt](#)
number of vehicles in train (1).
- [TRDP_OP_VEHICLE_T opVehList](#) [TRDP_MAX_CST_CNT]
operational vehicle list starting with op.
- [UINT32 cstNetProp](#)
consist network properties bit0.
- [UINT16 entryCnt](#)
number of entries in train network directory
- [TRDP_TRAIN_NET_DIR_ENTRY_T trnNetDir](#) [TRDP_MAX_CST_CNT]
train network directory
- [UINT32 sequenceCounter](#)
Unique counter (autom incremented).
- [UINT16 protocolVersion](#)
fix value for compatibility (set by the API)
- [UINT16 msgType](#)
of datagram: PD Request (0x5072) or PD_MSG (0x5064)
- [UINT32 comId](#)
set by user: unique id
- [UINT32 datasetLength](#)
length of the data to transmit 0.
- [UINT32 reserved](#)
before used for ladder support
- [UINT32 replyComId](#)

used in PD request

- UINT32 [replyIpAddress](#)
used for PD request
- UINT32 [frameChecksum](#)
CRC32 of header.
- INT32 [replyStatus](#)
0 = OK
- UINT8 [sessionID](#) [16]
UUID as a byte stream.
- UINT32 [replyTimeout](#)
in us
- UINT8 [sourceURI](#) [32]
User part of URI.
- UINT8 [destinationURI](#) [32]
User part of URI.
- PD_HEADER_T [frameHead](#)
Packet header in network byte order.
- UINT8 [data](#) [TRDP_MAX_PD_DATA_SIZE]
data ready to be sent or received (with CRCs)

4.1.1 Detailed Description

Types for ETB control.

TRDP PD packet.

TRDP message data header - network order and alignment.

TRDP process data header - network order and alignment.

Train network directory structure.

Train network directory entry structure acc.

Operational Train directory status info structure.

Operational train structure.

Operational train directory state.

Operational consist structure.

Operational vehicle structure.

TCN train directory.

CSTINFO Control telegram.

TCN consist structure.

Version information for communication buffers.

to IEC61375-2-5

4.1.2 Field Documentation

4.1.2.1 UINT8 GNU_PACKED::trnVehNo

vehicle sequence number within the train with vehicle 01 being the first vehicle in ETB reference direction 1 as defined in IEC61375-2-5 value range: 0.

vehicle sequence number within the train with vehicle 01 being the first vehicle in ETB reference direction 1 as defined in IEC61375-2-5, value range: 1.

.63 a value of 0 indicates that this vehicle has been inserted by correction

.63, a value of 0 indicates that this vehicle has been inserted by correction

4.1.2.2 ANTIVALENT8 GNU_PACKED::isLead

vehicle is leading

consist contains leading vehicle, '01'B = false, '10'B = true

4.1.2.3 UINT8 GNU_PACKED::leadDir

vehicle leading direction 0 = not relevant 1 = leading direction 1 2 = leading direction 2

'vehicle leading direction 0 = not relevant 1 = leading direction 1 2 = leading direction 2

4.1.2.4 UINT8 GNU_PACKED::vehOrient

vehicle orientation 0 = not known (corrected vehicle) 1 = same as operational train direction 2 = inverse to operational train direction

vehicle orientation, '00'B = not known (corrected vehicle) '01'B = same as operational train direction '10'B = inverse to operational train direction

4.1.2.5 TRDP_SHORT_VERSION_T GNU_PACKED::version

telegram version information, main_version = 1, sub_version = 0

Train info structure version.

TrainDirectoryState data structure version parameter 'mainVersion' shall be set to 1.

TrainDirectory data structure version parameter 'mainVersion' shall be set to 1.

Consist Info Control structure version parameter 'mainVersion' shall be set to 1.

4.1.2.6 UINT16 GNU_PACKED::reserved01

reserved (=0)

reserved for future use (= 0)

4.1.2.7 UINT8 GNU_PACKED::trnCstNo

own TCN consist number (= 1.

train consist number telegram control type 0 = with trnTopoCnt tracking 1 = without trnTopoCnt tracking

Sequence number of consist in train (1.

.32)

.63)

4.1.2.8 UINT8 GNU_PACKED::reserved02

reserved (=0)

reserved (= 0)

reserved for future use (= 0)

4.1.2.9 UINT8 GNU_PACKED::ownOpCstNo

own operational address (= 1.

operational consist number the vehicle belongs to

.32) = 0 if unknown (e.g. after Inauguration)

4.1.2.10 UINT8 GNU_PACKED::reserved03

reserved (=0)

reserved for future use (= 0)

4.1.2.11 UINT8 GNU_PACKED::leadVehOfCst

position of leading vehicle in consist, 0.

.31 (1: first vehicle in consist in Direction 1, 2: second vehicle, etc.)

4.1.2.12 UINT8 GNU_PACKED::reserved04

reserved (=0)

reserved for future use (= 0)

4.1.2.13 UINT8 GNU_PACKED::reserved06

reserved (=0)

reserved for future use (= 0)

4.1.2.14 UINT8 GNU_PACKED::confVehCnt

number of confirmed vehicles in train (1.
.63)

4.1.2.15 TRDP_ETB_CTRL_VDP_T GNU_PACKED::safetyTrail

ETBCTRL-VDP trailer, completely set to 0 == not used.

ETBCTRL-VDP trailer, parameter 'safeSequCount' == 0 completely set to 0 == not used.

ETBCTRL-VDP trailer, parameter 'safeSequCount' == 0 completely set to 0 == not used.

ETBCTRL-VDP trailer, parameter 'safeSequCount' == 0 completely set to 0 == SDTv2 not used.

ETBCTRL-VDP trailer, completely set to 0 == SDTv2 not used.

4.1.2.16 TRDP_LABEL_T GNU_PACKED::deviceName

function device of ECSC which sends the telegram

function device of ED which sends the telegram

4.1.2.17 UINT8 GNU_PACKED::inhibit

inauguration inhibit 0 = no inhibit request 1 = inhibit request

ETBN inhibit 0 = no action (keep old state) 1 = no inhibit request 2 = inhibit request.

4.1.2.18 UINT16 GNU_PACKED::lifesign

wrap-around counter, incremented with each produced datagram.

4.1.2.19 UINT8 GNU_PACKED::etbInhibit

inauguration inhibit indication 0 = n/a (default) 1 = inhibit not requested on ETB 2 = inhibit set on local ETBN 3 = inhibit set on remote ETBN 4 = inhibit set on local and remote ETBN

inauguration inhibit indication 0 = n/a (default) 1 = inhibit not requested on ETB 2 = inhibit set on local ETBN 3 = inhibit set on remote ETBN 4 = inhibit set on local and remote ETBN

4.1.2.20 UINT8 GNU_PACKED::etbLength

indicates train lengthening in case train inauguration is inhibit 0 = no lengthening (default) 1 = lengthening detected

indicates train lengthening in case train inauguration is inhibit 0 = no lengthening (default) 1 = lengthening detected

4.1.2.21 UINT8 GNU_PACKED::etbShort

indicates train shortening in case train inauguration is inhibit 0 = no shortening (default) 1 = shortening detected

indicates train shortening in case train inauguration is inhibit 0 = no shortening (default) 1 = shortening detected

4.1.2.22 UINT16 GNU_PACKED::reserved02

reserved (=0)

reserved (= 0)

4.1.2.23 UINT8 GNU_PACKED::trnDirState

train directory state 1 = UNCONFIRMED 2 = CONFIRMED other values are not allowed

TTDB status: '01'B == unconfirmed, '10'B == confirmed.

4.1.2.24 UINT8 GNU_PACKED::opTrnDirState

train directory state 1 = INVALID 2 = VALID 4 = SHARED other values are not allowed

Operatiobal train directory status: '01'B == inalid, '10'B == valid.

4.1.2.25 UINT8 GNU_PACKED::sleepReqCnt

number of sleep requests (option) value range: 0.

.63, not used = 0

4.1.2.26 UINT32 GNU_PACKED::opTrnTopoCnt

operational train topology counter

set by user: direction/side critical, '0' if ignored

operational train topology counter computed as defined in 5.3.3.2.16 (seed value : trnTopoCnt)

operational train topology counter set to 0 if opTrnDirState == invalid

operational train topocounter value of the operational train directory the correction is based on

4.1.2.27 UINT8 GNU_PACKED::reserved01

reserved (=0)

reserved for future use (= 0)

4.1.2.28 UINT16 GNU_PACKED::confVehCnt

number of confirmed vehicles in the train (1.

.63).

4.1.2.29 TRDP_OP_VEHICLE_T GNU_PACKED::confVehList[TRDP_MAX_VEH_CNT]

ordered list of confirmed vehicles in the train, starting with vehicle at train head, see chapter 5.3.3.2.10.

Parameters 'isLead' and 'leadDir' to be set to 0

4.1.2.30 UINT32 GNU_PACKED::etbTopoCnt

ETB topography counter.

set by user: ETB to use, '0' for consist local traffic

train network directory CRC

4.1.2.31 TRDP_UUID_T GNU_PACKED::cstUUID

UUID of the consist, provided by ETBN (TrainNetworkDirectory) Reference to static consist attributes 0 if not available (e.g.

unique consist identifier

Reference to static consist attributes, 0 if not available (e.g.

correction)

correction)

4.1.2.32 UINT8 GNU_PACKED::cstCnt

number of consists in train; range: 1.

.63

.63

4.1.2.33 TRDP_CONSIST_T GNU_PACKED::cstList

consist list.

consist list ordered list starting with trnCstNo == 1 Note: This is a variable size array, only opCstCnt array elements are present on the network and for crc computation

If trnCstNo > 0 this shall be an ordered list starting with trnCstNo == 1 (exactly the same as in structure TRAIN_DIRECTORY). If trnCstNo == 0 it is not mandatory to list all consists (only consists which should send CSTINFO telegram). The parameters 'trnCstNo' and 'cstOrient' are optional and can be set to 0.

4.1.2.34 UINT32 GNU_PACKED::trnTopoCnt

trnTopoCnt value ctrlType == 0: actual value ctrlType == 1: set to 0

computed as defined in 5.3.3.2.16 (seed value: etbTopoCnt)

4.1.2.35 TRDP_LABEL_T GNU_PACKED::vehId

Unique vehicle identifier, application defined (e.g.

UIC Identifier)

4.1.2.36 UINT8 GNU_PACKED::opVehNo

operational vehicle sequence number in train value range 1.

.63

4.1.2.37 UINT8 GNU_PACKED::opCstNo

operational consist number in train (1.

.63)

4.1.2.38 TRDP_LABEL_T GNU_PACKED::trnId

train identifier, application defined (e.g.

'ICE75', 'IC346'), informal

4.1.2.39 TRDP_LABEL_T GNU_PACKED::trnOperator

train operator, e.g.

'trenitalia.it', informal

4.1.2.40 UINT8 GNU_PACKED::opCstCnt

number of consists in train (1.

.63)

4.1.2.41 TRDP_OP_CONSIST_T GNU_PACKED::opCstList[TRDP_MAX_CST_CNT]

operational consist list starting with op.

consist #1 Note: This is a variable size array, only opCstCnt array elements are present

4.1.2.42 UINT8 GNU_PACKED::opVehCnt

number of vehicles in train (1.

.63)

4.1.2.43 TRDP_OP_VEHICLE_T GNU_PACKED::opVehList[TRDP_MAX_CST_CNT]

operational vehicle list starting with op.

vehicle #1 Note: This is a variable size array, only opCstCnt array elements are present

4.1.2.44 UINT32 GNU_PACKED::cstNetProp

consist network properties bit0.

.1: consist orientation bit2..7: 0 bit8..13: ETBN Id bit14..15: 0 bit16..21: subnet Id bit24..29: CN Id bit30..31: 0

4.1.2.45 UINT16 GNU_PACKED::protocolVersion

fix value for compatibility (set by the API)

fix value for compatibility

4.1.2.46 UINT16 GNU_PACKED::msgType

of datagram: PD Request (0x5072) or PD_MSG (0x5064)

of datagram: Mn, Mr, Mp, Mq, Mc or Me

4.1.2.47 UINT32 GNU_PACKED::datasetLength

length of the data to transmit 0.

defined by user: length of data to transmit

..1436

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

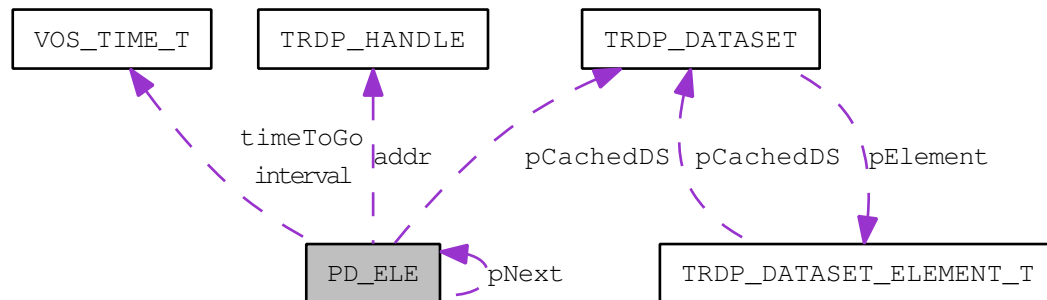
- [tau_ctrl_types.h](#)
- [tau_tti_types.h](#)
- [trdp_proto.h](#)
- [trdp_private.h](#)

4.2 PD_ELE Struct Reference

Queue element for PD packets to send or receive.

```
#include <trdp_private.h>
```

Collaboration diagram for PD_ELE:



Data Fields

- struct [PD_ELE](#) * `pNext`
pointer to next element or NULL
- UINT32 `magic`
prevent acces through dangeling pointer
- [TRDP_ADDRESSES_T](#) `addr`
handle of publisher/subscriber
- [TRDP_IP_ADDR_T](#) `lastSrcIP`
last source IP a subscribed packet was received from
- [TRDP_IP_ADDR_T](#) `pullIpAddress`
In case of pulling a PD this is the requested Ip.
- UINT32 `redId`
Redundancy group ID or zero.
- UINT32 `curSeqCnt`
the last sent or received sequence counter
- UINT32 `curSeqCnt4Pull`
the last sent sequence counter for PULL
- [TRDP_SEQ_CNT_LIST_T](#) * `pSeqCntList`
pointer to list of received sequence numbers per comId
- UINT32 `numRxTx`
Counter for received packets (statistics).

- [UINT32 updPkts](#)
Counter for updated packets (statistics).
- [UINT32 getPkts](#)
Counter for read packets (statistics).
- [TRDP_ERR_T lastErr](#)
Last error (timeout).
- [TRDP_PRIV_FLAGS_T privFlags](#)
private flags
- [TRDP_FLAGS_T pktFlags](#)
flags
- [TRDP_TIME_T interval](#)
time out value for received packets or interval for packets to send (set from ms)
- [TRDP_TIME_T timeToGo](#)
next time this packet must be sent/rcv
- [TRDP_TO_BEHAVIOR_T toBehavior](#)
timeout behavior for packets
- [UINT32 dataSize](#)
net data size
- [UINT32 grossSize](#)
complete packet size (header, data)
- [UINT32 sendSize](#)
data size sent out
- [TRDP_DATASET_T * pCachedDS](#)
Pointer to dataset element if known.
- [INT32 socketIdx](#)
index into the socket list
- [const void * pUserRef](#)
from subscribe()
- [TRDP_PD_CALLBACK_T pfCbFunction](#)
Pointer to PD callback function.
- [PD_PACKET_T * pFrame](#)
header .

4.2.1 Detailed Description

Queue element for PD packets to send or receive.

4.2.2 Field Documentation

4.2.2.1 PD_PACKET_T* PD_ELE::pFrame

header .

.. data + FCS...

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

- [trdp_private.h](#)

4.3 TAU_MARSHALL_INFO_T Struct Reference

Marshalling info, used to and from wire.

Data Fields

- INT32 [level](#)
track recursive level
- UINT8 * [pSrc](#)
source pointer
- UINT8 * [pDst](#)
destination pointer
- UINT8 * [pDstEnd](#)
last destination

4.3.1 Detailed Description

Marshalling info, used to and from wire.

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

- [tau_marshall.c](#)

4.4 TRDP_CLTR_CST_INFO_T Struct Reference

Closed train consists information.

```
#include <tau_tti_types.h>
```

Data Fields

- [TRDP_UUID_T cltrCstUUID](#)
closed train consist UUID
- [UINT8 cltrCstOrient](#)
closed train consist orientation '01'B = same as closed train direction '10'B = inverse to closed train direction
- [UINT8 cltrCstNo](#)
sequence number of the consist within the closed train, value range 1.
- [UINT16 reserved01](#)
reserved for future use (= 0)

4.4.1 Detailed Description

Closed train consists information.

4.4.2 Field Documentation

4.4.2.1 [UINT8 TRDP_CLTR_CST_INFO_T::cltrCstNo](#)

sequence number of the consist within the closed train, value range 1.

.32

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

- [tau_tti_types.h](#)

4.5 TRDP_COMID_DSID_MAP_T Struct Reference

ComId - data set mapping element definition.

```
#include <trdp_types.h>
```

Data Fields

- UINT32 [comId](#)
comId
- UINT32 [datasetId](#)
corresponding dataset Id

4.5.1 Detailed Description

ComId - data set mapping element definition.

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

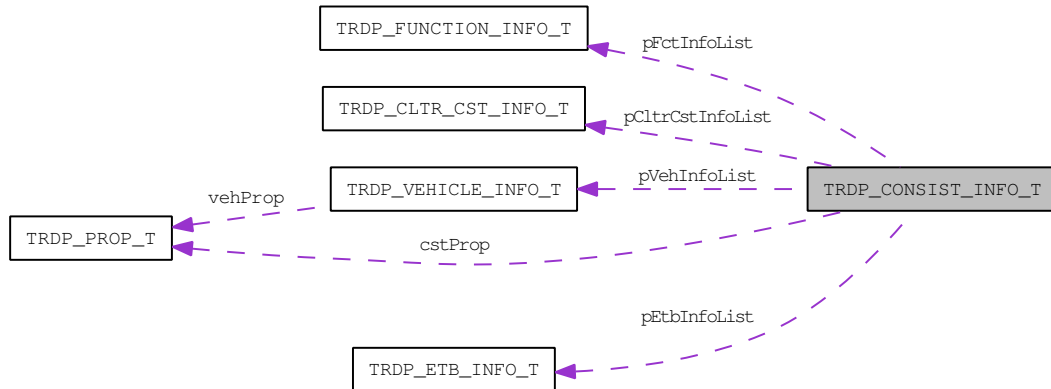
- [trdp_types.h](#)

4.6 TRDP_CONSIST_INFO_T Struct Reference

consist information structure

```
#include <tau_tti_types.h>
```

Collaboration diagram for TRDP_CONSIST_INFO_T:



Data Fields

- **TRDP_SHORT_VERSION_T** [version](#)
ConsistInfo data structure version, application defined mainVersion = 1, subVersion = 0.
- **UINT8** [cstClass](#)
consist info classification 0 = (single) consist 1 = closed train 2 = closed train consist
- **UINT8** [reserved01](#)
reserved for future use (= 0)
- **TRDP_LABEL_T** [cstId](#)
application defined consist identifier, e.g.
- **TRDP_LABEL_T** [cstType](#)
consist type, application defined
- **TRDP_LABEL_T** [cstOwner](#)
consist owner, e.g.
- **TRDP_UUID_T** [cstUUID](#)
consist UUID
- **UINT32** [reserved02](#)
reserved for future use (= 0)
- **TRDP_PROP_T** [cstProp](#)
static consist properties

- **UINT16 reserved03**
reserved for future use (= 0)
- **UINT16 etbCnt**
number of ETB's, range: 1.
- **TRDP_ETB_INFO_T * pEtbInfoList**
ETB information list for the consist Ordered list starting with lowest etbId.
- **UINT16 reserved04**
reserved for future use (= 0)
- **UINT16 vehCnt**
number of vehicles in consist 1.
- **TRDP_VEHICLE_INFO_T * pVehInfoList**
vehicle info list for the vehicles in the consist Ordered list starting with cstVehNo==1
- **UINT16 reserved05**
reserved for future use (= 0)
- **UINT16 fctCnt**
number of consist functions value range 0.
- **TRDP_FUNCTION_INFO_T * pFctInfoList**
function info list for the functions in consist lexicographical ordered by fctName
- **UINT16 reserved06**
reserved for future use (= 0)
- **UINT16 cltrCstCnt**
number of original consists in closed train value range: 0.
- **TRDP_CLTR_CST_INFO_T * pCltrCstInfoList**
info on closed train composition Ordered list starting with cltrCstNo == 1
- **UINT32 cstTopoCnt**
consist topology counter computed as defined in 5.3.3.2.16, seed value: 'FFFFFFFF'H

4.6.1 Detailed Description

consist information structure

4.6.2 Field Documentation

4.6.2.1 TRDP_LABEL_T TRDP_CONSIST_INFO_T::cstId

application defined consist identifier, e.g.

UIC identifier

4.6.2.2 TRDP_LABEL_T TRDP_CONSIST_INFO_T::cstOwner

consist owner, e.g.

"trenitalia.it", "snecf.fr", "db.de"

4.6.2.3 UINT16 TRDP_CONSIST_INFO_T::etbCnt

number of ETB's, range: 1.

.4

4.6.2.4 UINT16 TRDP_CONSIST_INFO_T::vehCnt

number of vehicles in consist 1.

.32

4.6.2.5 UINT16 TRDP_CONSIST_INFO_T::fctCnt

number of consist functions value range 0.

.1024

4.6.2.6 UINT16 TRDP_CONSIST_INFO_T::cltrCstCnt

number of original consists in closed train value range: 0.

.32, 0 = consist is no closed train

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

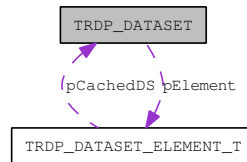
- [tau_tti_types.h](#)

4.7 TRDP_DATASET Struct Reference

Dataset definition.

```
#include <trdp_types.h>
```

Collaboration diagram for TRDP_DATASET:



Data Fields

- **UINT32** `id`
dataset identifier > 1000
- **UINT16** `reserved1`
Reserved for future use, must be zero.
- **UINT16** `numElement`
Number of elements.
- **TRDP_DATASET_ELEMENT_T** `pElement` []
Pointer to a dataset element, used as array.

4.7.1 Detailed Description

Dataset definition.

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

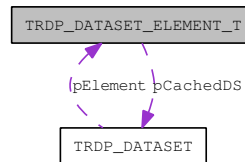
- [trdp_types.h](#)

4.8 TRDP_DATASET_ELEMENT_T Struct Reference

Dataset element definition.

```
#include <trdp_types.h>
```

Collaboration diagram for TRDP_DATASET_ELEMENT_T:



Data Fields

- [UINT32 type](#)
Data type (TRDP_DATA_TYPE_T 1.
- [UINT32 size](#)
Number of items or TDRP_VAR_SIZE (0).
- [struct TRDP_DATASET * pCachedDS](#)
Used internally for marshalling speed-up.

4.8.1 Detailed Description

Dataset element definition.

4.8.2 Field Documentation

4.8.2.1 [UINT32 TRDP_DATASET_ELEMENT_T::type](#)

Data type (TRDP_DATA_TYPE_T 1.

..99) or dataset id > 1000

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

- [trdp_types.h](#)

4.9 TRDP_DBG_CONFIG_T Struct Reference

Control for debug output device/file on application level.

```
#include <tau_xml.h>
```

Data Fields

- [TRDP_DBG_OPTION_T option](#)
Debug printout options for application use.
- `UINT32` [maxFileSize](#)
Maximal file size.
- `TRDP_FILE_NAME_T` [fileName](#)
Debug file name and path.

4.9.1 Detailed Description

Control for debug output device/file on application level.

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

- [tau_xml.h](#)

4.10 TRDP_ETB_INFO_T Struct Reference

Types for train configuration information.

```
#include <tau_tti_types.h>
```

Data Fields

- **UINT8 [etbId](#)**
identification of train backbone; value range: 0.
- **UINT8 [cnCnt](#)**
number of CNs within consist connected to this ETB value range 1.
- **UINT16 [reserved01](#)**
reserved for future use (= 0)

4.10.1 Detailed Description

Types for train configuration information.

ETB information

4.10.2 Field Documentation

4.10.2.1 **UINT8 TRDP_ETB_INFO_T::etbId**

identification of train backbone; value range: 0.

.3

4.10.2.2 **UINT8 TRDP_ETB_INFO_T::cnCnt**

number of CNs within consist connected to this ETB value range 1.

.16 referring to cnId 0..15 acc. IEC61375-2-5

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

- [tau_tti_types.h](#)

4.11 TRDP_FUNCTION_INFO_T Struct Reference

function/device information structure

```
#include <tau_tti_types.h>
```

Data Fields

- TRDP_LABEL_T [fctName](#)
function device or group label
- UINT16 [fctId](#)
host identification of the function device or group as defined in IEC 61375-2-5, application defined.
- BOOL8 [grp](#)
is a function group and will be resolved as IP multicast address
- UINT8 [reserved01](#)
reserved for future use (= 0)
- UINT8 [cstVehNo](#)
Sequence number of the vehicle in the consist the function belongs to.
- UINT8 [etbId](#)
number of connected train backbone.
- UINT8 [cnId](#)
identifier of connected consist network in the consist, related to the etbId.
- UINT8 [reserved02](#)
reserved for future use (= 0)

4.11.1 Detailed Description

function/device information structure

4.11.2 Field Documentation

4.11.2.1 UINT16 TRDP_FUNCTION_INFO_T::fctId

host identification of the function device or group as defined in IEC 61375-2-5, application defined.

Value range: 1..16383 (device), 256..16383 (group)

4.11.2.2 UINT8 TRDP_FUNCTION_INFO_T::cstVehNo

Sequence number of the vehicle in the consist the function belongs to.

Value range: 1..16, 0 = not defined

4.11.2.3 `UINT8 TRDP_FUNCTION_INFO_T::etbId`

number of connected train backbone.

Value range: 0..3

4.11.2.4 `UINT8 TRDP_FUNCTION_INFO_T::cnId`

identifier of connected consist network in the consist, related to the etbId.

Value range: 0..31

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

- [tau_tti_types.h](#)

4.12 TRDP_HANDLE Struct Reference

Hidden handle definition, used as unique addressing item.

```
#include <trdp_private.h>
```

Data Fields

- [UINT32 comId](#)
comId for packets to send/receive
- [TRDP_IP_ADDR_T srcIpAddr](#)
source IP for PD
- [TRDP_IP_ADDR_T destIpAddr](#)
destination IP for PD
- [TRDP_IP_ADDR_T mcGroup](#)
multicast group to join for PD
- [UINT32 etbTopoCnt](#)
etb topocount belongs to addressing item
- [UINT32 opTrnTopoCnt](#)
opTrn topocount belongs to addressing item

4.12.1 Detailed Description

Hidden handle definition, used as unique addressing item.

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

- [trdp_private.h](#)

4.13 TRDP_LIST_STATISTICS_T Struct Reference

Information about a particular MD listener.

```
#include <trdp_types.h>
```

Data Fields

- [UINT32 comId](#)
ComId to listen to.
- [TRDP_URI_USER_T uri](#)
URI user part to listen to.
- [TRDP_IP_ADDR_T joinedAddr](#)
Joined IP address.
- [UINT32 callBack](#)
Call back function if used.
- [UINT32 userRef](#)
User reference if used.
- [UINT32 numSessions](#)
Number of sessions.

4.13.1 Detailed Description

Information about a particular MD listener.

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

- [trdp_types.h](#)

4.14 TRDP_MARSHALL_CONFIG_T Struct Reference

Marshaling/unmarshalling configuration.

```
#include <trdp_types.h>
```

Data Fields

- [TRDP_MARSHALL_T pfCbMarshall](#)
Pointer to marshall callback function.
- [TRDP_UNMARSHALL_T pfCbUnmarshall](#)
Pointer to unmarshall callback function.
- void * [pRefCon](#)
Pointer to user context for call back.

4.14.1 Detailed Description

Marshaling/unmarshalling configuration.

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

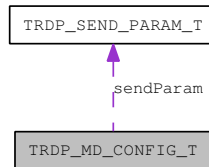
- [trdp_types.h](#)

4.15 TRDP_MD_CONFIG_T Struct Reference

Default MD configuration.

```
#include <trdp_types.h>
```

Collaboration diagram for TRDP_MD_CONFIG_T:



Data Fields

- [TRDP_MD_CALLBACK_T pfCbFunction](#)
Pointer to MD callback function.
- void * [pRefCon](#)
Pointer to user context for call back.
- [TRDP_SEND_PARAM_T sendParam](#)
Default send parameters.
- [TRDP_FLAGS_T flags](#)
Default flags for MD packets.
- UINT32 [replyTimeout](#)
Default reply timeout in us.
- UINT32 [confirmTimeout](#)
Default confirmation timeout in us.
- UINT32 [connectTimeout](#)
Default connection timeout in us.
- UINT32 [sendingTimeout](#)
Default sending timeout in us.
- UINT16 [udpPort](#)
Port to be used for UDP MD communication.
- UINT16 [tcpPort](#)
Port to be used for TCP MD communication.
- UINT32 [maxNumSessions](#)
Maximal number of replier sessions.

4.15.1 Detailed Description

Default MD configuration.

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

- [trdp_types.h](#)

4.16 TRDP_MD_INFO_T Struct Reference

Message data info from received telegram; allows the application to generate responses.

```
#include <trdp_types.h>
```

Data Fields

- [TRDP_IP_ADDR_T srcIpAddr](#)
source IP address for filtering
- [TRDP_IP_ADDR_T destIpAddr](#)
destination IP address for filtering
- [UINT32 seqCount](#)
sequence counter
- [UINT16 protVersion](#)
Protocol version.
- [TRDP_MSG_T msgType](#)
Protocol ('PD', 'MD', .
- [UINT32 comId](#)
ComID.
- [UINT32 etbTopoCnt](#)
received topocount
- [UINT32 opTrnTopoCnt](#)
received topocount
- [BOOL8 aboutToDie](#)
session is about to die
- [UINT32 numRepliesQuery](#)
number of ReplyQuery received
- [UINT32 numConfirmSent](#)
number of Confirm sent
- [UINT32 numConfirmTimeout](#)
number of Confirm Timeouts (incremented by listeners
- [UINT16 userStatus](#)
error code, user stat
- [TRDP_REPLY_STATUS_T replyStatus](#)
reply status

- [TRDP_UUID_T sessionId](#)
for response
- [UINT32 replyTimeout](#)
reply timeout in us given with the request
- [TRDP_URI_USER_T destURI](#)
destination URI user part from MD header
- [TRDP_URI_USER_T srcURI](#)
source URI user part from MD header
- [UINT32 numExpReplies](#)
number of expected replies, 0 if unknown
- [UINT32 numReplies](#)
actual number of replies for the request
- [const void * pUserRef](#)
User reference given with the local call.
- [TRDP_ERR_T resultCode](#)
error code

4.16.1 Detailed Description

Message data info from received telegram; allows the application to generate responses.

Note: Not all fields are relevant for each message type!

4.16.2 Field Documentation

4.16.2.1 TRDP_MSG_T TRDP_MD_INFO_T::msgType

Protocol ('PD', 'MD', .

..)

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

- [trdp_types.h](#)

4.17 TRDP_MD_STATISTICS_T Struct Reference

Structure containing all general MD statistics information.

```
#include <trdp_types.h>
```

Data Fields

- UINT32 [defQos](#)
default QoS for MD
- UINT32 [defTtl](#)
default TTL for MD
- UINT32 [defReplyTimeout](#)
default reply timeout in us for MD
- UINT32 [defConfirmTimeout](#)
default confirm timeout in us for MD
- UINT32 [numList](#)
number of listeners
- UINT32 [numRcv](#)
number of received MD packets
- UINT32 [numCrcErr](#)
number of received MD packets with CRC err
- UINT32 [numProtErr](#)
number of received MD packets with protocol err
- UINT32 [numTopoErr](#)
number of received MD packets with wrong topo count
- UINT32 [numNoListener](#)
number of received MD packets without listener
- UINT32 [numReplyTimeout](#)
number of reply timeouts
- UINT32 [numConfirmTimeout](#)
number of confirm timeouts
- UINT32 [numSend](#)
number of sent MD packets

4.17.1 Detailed Description

Structure containing all general MD statistics information.

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

- [trdp_types.h](#)

4.18 TRDP_MEM_CONFIG_T Struct Reference

Enumeration type for memory pre-fragmentation, reuse of VOS definition.

```
#include <trdp_types.h>
```

Data Fields

- `UINT8 * p`
pointer to static or allocated memory
- `UINT32 size`
size of static or allocated memory
- `UINT32 prealloc [VOS_MEM_NBLOCKSIZES]`
memory block structure

4.18.1 Detailed Description

Enumeration type for memory pre-fragmentation, reuse of VOS definition.

Structure describing memory (and its pre-fragmentation)

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

- [trdp_types.h](#)

4.19 TRDP_MEM_STATISTICS_T Struct Reference

TRDP statistics type definitions.

```
#include <trdp_types.h>
```

Data Fields

- [UINT32 total](#)
total memory size
- [UINT32 free](#)
free memory size
- [UINT32 minFree](#)
minimal free memory size in statistics interval
- [UINT32 numAllocBlocks](#)
allocated memory blocks
- [UINT32 numAllocErr](#)
allocation errors
- [UINT32 numFreeErr](#)
free errors
- [UINT32 blockSize](#) [VOS_MEM_NBLOCKSIZES]
preallocated memory blocks
- [UINT32 usedBlockSize](#) [VOS_MEM_NBLOCKSIZES]
used memory blocks

4.19.1 Detailed Description

TRDP statistics type definitions.

Statistical data regarding the former info provided via SNMP the following information was left out/can be implemented additionally using MD:

- PD subscr table: ComId, sourceIpAddr, destIpAddr, cbFct?, timeout, toBehavior, counter
- PD publish table: ComId, destIpAddr, redId, redState cycle, ttl, qos, counter
- PD join table: joined MC address table
- MD listener table: ComId destIpAddr, destUri, cbFct?, counter
- Memory usage Structure containing all general memory statistics information.

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

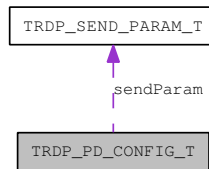
- [trdp_types.h](#)

4.20 TRDP_PD_CONFIG_T Struct Reference

Default PD configuration.

```
#include <trdp_types.h>
```

Collaboration diagram for TRDP_PD_CONFIG_T:



Data Fields

- [TRDP_PD_CALLBACK_T pfCbFunction](#)
Pointer to PD callback function.
- `void *` [pRefCon](#)
Pointer to user context for call back.
- [TRDP_SEND_PARAM_T sendParam](#)
Default send parameters.
- [TRDP_FLAGS_T flags](#)
Default flags for PD packets.
- `UINT32` [timeout](#)
Default timeout in us.
- [TRDP_TO_BEHAVIOR_T toBehavior](#)
Default timeout behavior.
- `UINT16` [port](#)
Port to be used for PD communication.

4.20.1 Detailed Description

Default PD configuration.

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

- [trdp_types.h](#)

4.21 TRDP_PD_INFO_T Struct Reference

Process data info from received telegram; allows the application to generate responses.

```
#include <trdp_types.h>
```

Data Fields

- [TRDP_IP_ADDR_T srcIpAddr](#)
source IP address for filtering
- [TRDP_IP_ADDR_T destIpAddr](#)
destination IP address for filtering
- [UINT32 seqCount](#)
sequence counter
- [UINT16 protVersion](#)
Protocol version.
- [TRDP_MSG_T msgType](#)
Protocol ('PD', 'MD', .
- [UINT32 comId](#)
ComID.
- [UINT32 etbTopoCnt](#)
received ETB topocount
- [UINT32 opTrnTopoCnt](#)
received operational train directory topocount
- [UINT32 replyComId](#)
ComID for reply (request only).
- [TRDP_IP_ADDR_T replyIpAddr](#)
IP address for reply (request only).
- [const void * pUserRef](#)
User reference given with the local subscribe.
- [TRDP_ERR_T resultCode](#)
error code

4.21.1 Detailed Description

Process data info from received telegram; allows the application to generate responses.

Note: Not all fields are relevant for each message type!

4.21.2 Field Documentation

4.21.2.1 TRDP_MSG_T TRDP_PD_INFO_T::msgType

Protocol ('PD', 'MD', .

..)

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

- [trdp_types.h](#)

4.22 TRDP_PD_STATISTICS_T Struct Reference

Structure containing all general PD statistics information.

```
#include <trdp_types.h>
```

Data Fields

- UINT32 [defQos](#)
default QoS for PD
- UINT32 [defTtl](#)
default TTL for PD
- UINT32 [defTimeout](#)
default timeout in us for PD
- UINT32 [numSubs](#)
number of subscribed ComId's
- UINT32 [numPub](#)
number of published ComId's
- UINT32 [numRcv](#)
number of received PD packets
- UINT32 [numCrcErr](#)
number of received PD packets with CRC err
- UINT32 [numProtErr](#)
number of received PD packets with protocol err
- UINT32 [numTopoErr](#)
number of received PD packets with wrong topo count
- UINT32 [numNoSubs](#)
number of received PD push packets without subscription
- UINT32 [numNoPub](#)
number of received PD pull packets without publisher
- UINT32 [numTimeout](#)
number of PD timeouts
- UINT32 [numSend](#)
number of sent PD packets

4.22.1 Detailed Description

Structure containing all general PD statistics information.

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

- [trdp_types.h](#)

4.23 TRDP_PROCESS_CONFIG_T Struct Reference

Various flags/general TRDP options for library initialization.

```
#include <trdp_types.h>
```

Data Fields

- TRDP_LABEL_T [hostName](#)
Host name.
- TRDP_LABEL_T [leaderName](#)
Leader name dependant on redundancy concept.
- UINT32 [cycleTime](#)
TRDP main process cycle time in us.
- UINT32 [priority](#)
TRDP main process cycle time (0-255, 0=default, 255=highest).
- TRDP_OPTION_T [options](#)
TRDP options.

4.23.1 Detailed Description

Various flags/general TRDP options for library initialization.

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

- [trdp_types.h](#)

4.24 TRDP_PROP_T Struct Reference

Application defined properties.

```
#include <tau_tti_types.h>
```

Data Fields

- TRDP_SHORT_VERSION_T [ver](#)
properties version information, application defined
- UINT16 [len](#)
properties length in number of octets, application defined, must be a multiple of 4 octets for alignment reasons value range: 0.
- UINT8 [prop](#) [1]
properties, application defined

4.24.1 Detailed Description

Application defined properties.

4.24.2 Field Documentation

4.24.2.1 UINT16 TRDP_PROP_T::len

properties length in number of octets, application defined, must be a multiple of 4 octets for alignment reasons value range: 0.

.32768

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

- [tau_tti_types.h](#)

4.25 TRDP_PUB_STATISTICS_T Struct Reference

Table containing particular PD publishing information.

```
#include <trdp_types.h>
```

Data Fields

- [UINT32 comId](#)
Published ComId.
- [TRDP_IP_ADDR_T destAddr](#)
IP address of destination for this publishing.
- [UINT32 cycle](#)
Publishing cycle in us.
- [UINT32 redId](#)
Redundancy group id.
- [UINT32 redState](#)
Redundant state.Leader or Follower.
- [UINT32 numPut](#)
Number of packet updates.
- [UINT32 numSend](#)
Number of packets sent out.

4.25.1 Detailed Description

Table containing particular PD publishing information.

4.25.2 Field Documentation

4.25.2.1 TRDP_IP_ADDR_T TRDP_PUB_STATISTICS_T::destAddr

IP address of destination for this publishing.

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

- [trdp_types.h](#)

4.26 TRDP_RED_STATISTICS_T Struct Reference

A table containing PD redundant group information.

```
#include <trdp_types.h>
```

Data Fields

- [UINT32 id](#)
Redundant Id.
- [TRDP_RED_STATE_T state](#)
Redundant state.Leader or Follower.

4.26.1 Detailed Description

A table containing PD redundant group information.

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

- [trdp_types.h](#)

4.27 TRDP_SDT_PAR_T Struct Reference

Types to read out the XML configuration.

```
#include <tau_xml.h>
```

Data Fields

- [UINT32 smi1](#)
Safe message identifier - unique for this message at consist level.
- [UINT32 smi2](#)
Safe message identifier - unique for this message at consist level.
- [UINT32 cmThr](#)
Channel monitoring threshold.
- [UINT16 udv](#)
User data version.
- [UINT16 rxPeriod](#)
Sink cycle time.
- [UINT16 txPeriod](#)
Source cycle time.
- [UINT16 nGuard](#)
Initial timeout cycles.
- [UINT8 nrxSafe](#)
Timeout cycles.
- [UINT8 reserved1](#)
Reserved for future use.
- [UINT16 reserved2](#)
Reserved for future use.

4.27.1 Detailed Description

Types to read out the XML configuration.

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

- [tau_xml.h](#)

4.28 TRDP_SEND_PARAM_T Struct Reference

Quality/type of service and time to live.

```
#include <trdp_types.h>
```

Data Fields

- `UINT8 qos`
Quality of service (default should be 5 for PD and 3 for MD).
- `UINT8 ttl`
Time to live (default should be 64).

4.28.1 Detailed Description

Quality/type of service and time to live.

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

- [trdp_types.h](#)

4.29 TRDP_SEQ_CNT_ENTRY_T Struct Reference

Tuples of last received sequence counter per comId.

```
#include <trdp_private.h>
```

Data Fields

- [UINT32 lastSeqCnt](#)
Sequence counter value for comId.
- [TRDP_IP_ADDR_T srcIpAddr](#)
Source IP address.
- [TRDP_MSG_T msgType](#)
message type

4.29.1 Detailed Description

Tuples of last received sequence counter per comId.

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

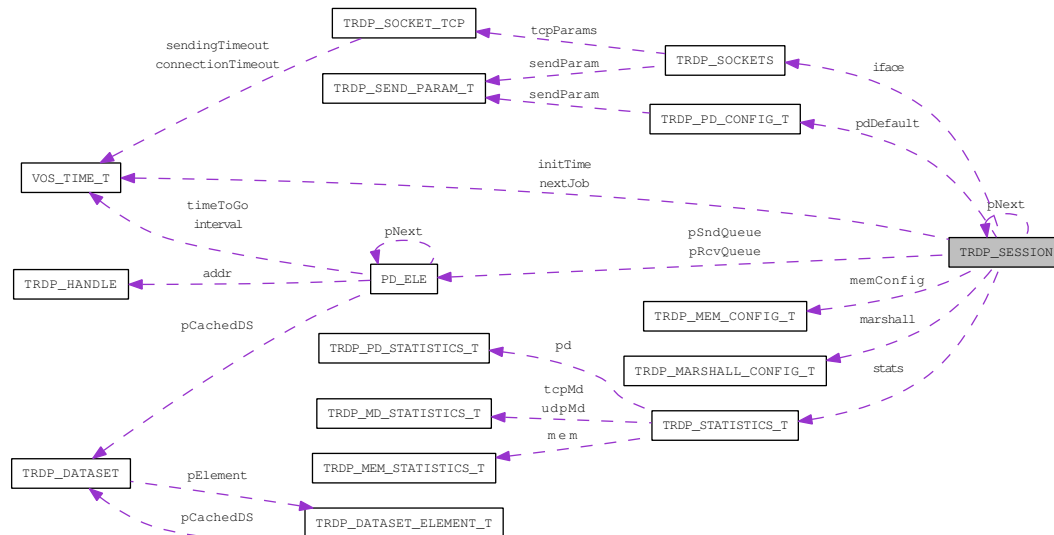
- [trdp_private.h](#)

4.30 TRDP_SESSION Struct Reference

Session/application variables store.

```
#include <trdp_private.h>
```

Collaboration diagram for TRDP_SESSION:



Data Fields

- struct **TRDP_SESSION** * **pNext**
Pointer to next session.
- **VOS_MUTEX_T** **mutex**
protect this session
- **TRDP_IP_ADDR_T** **realIP**
Real IP address.
- **TRDP_IP_ADDR_T** **virtualIP**
Virtual IP address.
- **BOOL8** **beQuiet**
if set, only react on ownIP requests
- **UINT32** **redID**
redundant comId
- **UINT32** **etbTopoCnt**
current valid topocount or zero
- **UINT32** **opTrnTopoCnt**
current valid topocount or zero

- [TRDP_TIME_T nextJob](#)
Store for next select interval.
- [TRDP_PRINT_DBG_T pPrintDebugString](#)
Pointer to function to print debug information.
- [TRDP_MARSHALL_CONFIG_T marshall](#)
Marshalling(unMarshalling configuration.
- [TRDP_PD_CONFIG_T pdDefault](#)
Default configuration for process data.
- [TRDP_MEM_CONFIG_T memConfig](#)
Internal memory handling configuration.
- [TRDP_OPTION_T option](#)
Stack behavior options.
- [TRDP_SOCKETS_T iface](#) [VOS_MAX_SOCKET_CNT]
Collection of sockets to use.
- [PD_ELE_T * pSndQueue](#)
pointer to first element of send queue
- [PD_ELE_T * pRcvQueue](#)
pointer to first element of rcv queue
- [TRDP_TIME_T initTime](#)
initialization time of session
- [TRDP_STATISTICS_T stats](#)
statistics of this session

4.30.1 Detailed Description

Session/application variables store.

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

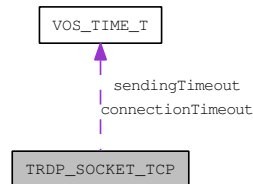
- [trdp_private.h](#)

4.31 TRDP_SOCKET_TCP Struct Reference

TCP parameters.

```
#include <trdp_private.h>
```

Collaboration diagram for TRDP_SOCKET_TCP:



Data Fields

- [TRDP_IP_ADDR_T](#) `cornerIp`
The other TCP corner Ip.
- `BOOL8` [notSend](#)
If the message has been sent uncompleted.
- [TRDP_TIME_T](#) `connectionTimeout`
TCP socket connection Timeout.
- `BOOL8` [sendNotOk](#)
The sending timeout will be start.
- [TRDP_TIME_T](#) `sendingTimeout`
The timeout sending the message.
- `BOOL8` [addFileDesc](#)
Ready to add the socket in the fd.
- `BOOL8` [morituri](#)
about to die

4.31.1 Detailed Description

TCP parameters.

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

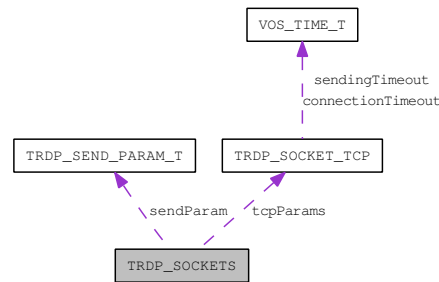
- [trdp_private.h](#)

4.32 TRDP_SOCKETS Struct Reference

Socket item.

```
#include <trdp_private.h>
```

Collaboration diagram for TRDP_SOCKETS:



Data Fields

- INT32 [sock](#)
vos socket descriptor to use
- [TRDP_IP_ADDR_T](#) [bindAddr](#)
Defines the interface to use.
- [TRDP_SEND_PARAM_T](#) [sendParam](#)
Send parameters.
- [TRDP SOCK_TYPE_T](#) [type](#)
Usage of this socket.
- BOOL8 [rcvMostly](#)
Used for receiving.
- INT16 [usage](#)
No.
- [TRDP_SOCKET_TCP_T](#) [tcpParams](#)
Params used for TCP.
- [TRDP_IP_ADDR_T](#) [mcGroups](#) [VOS_MAX_MULTICAST_CNT]
List of multicast addresses for this socket.

4.32.1 Detailed Description

Socket item.

4.32.2 Field Documentation

4.32.2.1 INT16 TRDP_SOCKETS::usage

No.

of current users of this socket

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

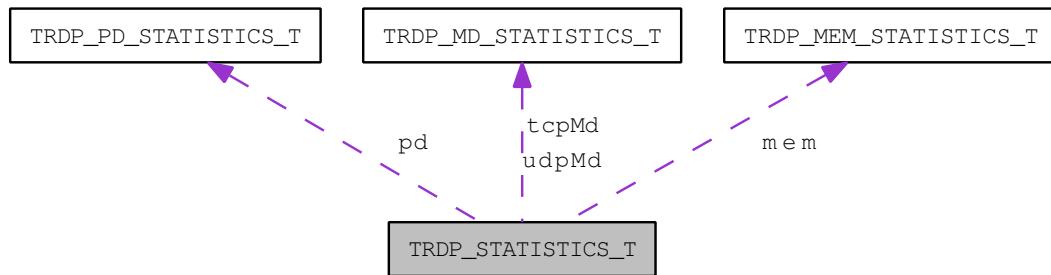
- [trdp_private.h](#)

4.33 TRDP_STATISTICS_T Struct Reference

Structure containing all general memory, PD and MD statistics information.

```
#include <trdp_types.h>
```

Collaboration diagram for TRDP_STATISTICS_T:



Data Fields

- `UINT32` [version](#)
TRDP version.
- `TIMEDATE64` [timeStamp](#)
actual time stamp
- `TIMEDATE32` [upTime](#)
time in sec since last initialisation
- `TIMEDATE32` [statisticTime](#)
time in sec since last reset of statistics
- `TRDP_LABEL_T` [hostName](#)
host name
- `TRDP_LABEL_T` [leaderName](#)
leader host name
- `TRDP_IP_ADDR_T` [ownIpAddr](#)
own IP address
- `TRDP_IP_ADDR_T` [leaderIpAddr](#)
leader IP address
- `UINT32` [processPrio](#)
priority of TRDP process
- `UINT32` [processCycle](#)
cycle time of TRDP process in microseconds

- [UINT32 numJoin](#)
number of joins
- [UINT32 numRed](#)
number of redundancy groups
- [TRDP_MEM_STATISTICS_T mem](#)
memory statistics
- [TRDP_PD_STATISTICS_T pd](#)
pd statistics
- [TRDP_MD_STATISTICS_T udpMd](#)
UDP md statistics.
- [TRDP_MD_STATISTICS_T tcpMd](#)
TCP md statistics.

4.33.1 Detailed Description

Structure containing all general memory, PD and MD statistics information.

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

- [trdp_types.h](#)

4.34 TRDP_SUBS_STATISTICS_T Struct Reference

Table containing particular PD subscription information.

```
#include <trdp_types.h>
```

Data Fields

- [UINT32 comId](#)
Subscribed ComId.
- [TRDP_IP_ADDR_T joinedAddr](#)
Joined IP address.
- [TRDP_IP_ADDR_T filterAddr](#)
Filter IP address, i.e IP address of the sender for this subscription, 0.0.0.0 in case all senders.
- [UINT32 callBack](#)
call back function if used
- [UINT32 userRef](#)
User reference if used.
- [UINT32 timeout](#)
Time-out value in us.
- [TRDP_ERR_T status](#)
Receive status information TRDP_NO_ERR, TRDP_TIMEOUT_ERR.
- [TRDP_TO_BEHAVIOR_T toBehav](#)
Behavior at time-out.
- [UINT32 numRecv](#)
Number of packets received for this subscription.

4.34.1 Detailed Description

Table containing particular PD subscription information.

4.34.2 Field Documentation

4.34.2.1 TRDP_IP_ADDR_T TRDP_SUBS_STATISTICS_T::filterAddr

Filter IP address, i.e IP address of the sender for this subscription, 0.0.0.0 in case all senders.

4.34.2.2 UINT32 TRDP_SUBS_STATISTICS_T::timeout

Time-out value in us.

0 = No time-out supervision

4.34.2.3 TRDP_TO_BEHAVIOR_T TRDP_SUBS_STATISTICS_T::toBehav

Behavior at time-out.

Set data to zero / keep last value

4.34.2.4 UINT32 TRDP_SUBS_STATISTICS_T::numRecv

Number of packets received for this subscription.

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

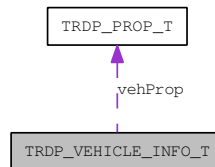
- [trdp_types.h](#)

4.35 TRDP_VEHICLE_INFO_T Struct Reference

vehicle information structure

```
#include <tau_tti_types.h>
```

Collaboration diagram for TRDP_VEHICLE_INFO_T:



Data Fields

- TRDP_LABEL_T [vehId](#)
vehicle identifier label,application defined (e.g.
- TRDP_LABEL_T [vehType](#)
vehicle type,application defined
- UINT8 [vehOrient](#)
vehicle orientation '01'B = same as consist direction '10'B = inverse to consist direction
- UINT8 [cstVehNo](#)
Sequence number of vehicle in consist(1.
- ANTIVALENT8 [tractVeh](#)
vehicle is a traction vehicle '01'B = vehicle is not a traction vehicle '10'B = vehicle is a traction vehicle
- UINT8 [reserved01](#)
for future use (= 0)
- TRDP_PROP_T [vehProp](#)
static vehicle properties

4.35.1 Detailed Description

vehicle information structure

4.35.2 Field Documentation

4.35.2.1 TRDP_LABEL_T TRDP_VEHICLE_INFO_T::vehId

vehicle identifier label,application defined (e.g.

UIC vehicle identification number) vehId of vehicle with vehNo==1 is used also as cstId

4.35.2.2 UINT8 TRDP_VEHICLE_INFO_T::cstVehNo

Sequence number of vehicle in consist(1.

.16)

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

- [tau_tti_types.h](#)

4.36 TRDP_VERSION_T Struct Reference

Version information.

```
#include <trdp_types.h>
```

Data Fields

- `UINT8 ver`
Version - incremented for incompatible changes.
- `UINT8 rel`
Release - incremented for compatible changes.
- `UINT8 upd`
Update - incremented for bug fixes.
- `UINT8 evo`
Evolution - incremented for build.

4.36.1 Detailed Description

Version information.

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

- [trdp_types.h](#)

4.37 TRDP_XML_DOC_HANDLE_T Struct Reference

Parsed XML document handle.

```
#include <tau_xml.h>
```

Data Fields

- void * [pXmlDocument](#)
Pointer to parsed XML document.
- void * [pRootElement](#)
Pointer to the document root element.
- void * [pXPathContext](#)
Pointer to prepared XPath context.

4.37.1 Detailed Description

Parsed XML document handle.

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

- [tau_xml.h](#)

4.38 VOS SOCK_OPT_T Struct Reference

Common socket options.

```
#include <vos_sock.h>
```

Data Fields

- [UINT8 qos](#)
quality/type of service 0.
- [UINT8 ttl](#)
time to live for unicast (default 64)
- [UINT8 ttl_multicast](#)
time to live for multicast
- [BOOL8 reuseAddrPort](#)
allow reuse of address and port
- [BOOL8 nonBlocking](#)
use non blocking calls
- [BOOL8 no_mc_loop](#)
no multicast loop back
- [BOOL8 no_udp_crc](#)
supress udp crc computation

4.38.1 Detailed Description

Common socket options.

4.38.2 Field Documentation

4.38.2.1 [UINT8 VOS SOCK_OPT_T::qos](#)

quality/type of service 0.

..7

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

- [vos_sock.h](#)

4.39 VOS_TIME_T Struct Reference

Timer value compatible with timeval / select.

```
#include <vos_types.h>
```

Data Fields

- UINT32 [tv_sec](#)
full seconds
- INT32 [tv_usec](#)
Micro seconds (max.

4.39.1 Detailed Description

Timer value compatible with timeval / select.

Relative or absolute date, depending on usage

4.39.2 Field Documentation

4.39.2.1 INT32 VOS_TIME_T::tv_usec

Micro seconds (max.

value 999999)

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

- [vos_types.h](#)

Chapter 5

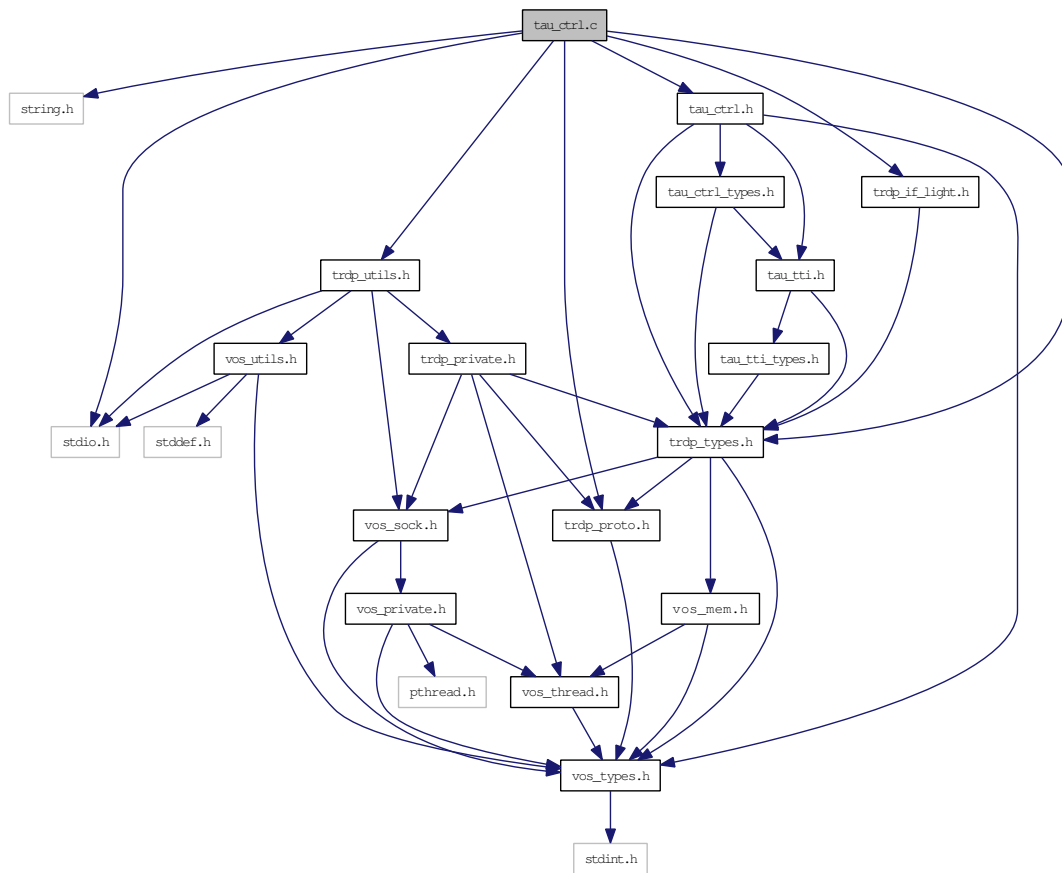
File Documentation

5.1 tau_ctrl.c File Reference

Functions for train switch control.

```
#include <string.h>
#include <stdio.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "trdp_if_light.h"
#include "trdp_proto.h"
#include "tau_ctrl.h"
```

Include dependency graph for tau_ctrl.c:



Functions

- EXT_DECL [TRDP_ERR_T](#) tau_initEcspCtrl ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_IP_ADDR_T](#) ecspIpAddr, [TRDP_IP_ADDR_T](#) ecscIpAddr)
Function to init ECSP control interface.
- EXT_DECL [TRDP_ERR_T](#) tau_terminateEcspCtrl ([TRDP_APP_SESSION_T](#) appHandle)
Function to close ECSP control interface.
- EXT_DECL [TRDP_ERR_T](#) tau_setEcspCtrl ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_ECSP_CTRL_T](#) *pEcspCtrl)
Function to set ECSP control information.
- EXT_DECL [TRDP_ERR_T](#) tau_getEcspStat ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_ECSP_STAT_T](#) *pEcspStat, [TRDP_PD_INFO_T](#) *pPdInfo)
Function to get ECSP status information.
- EXT_DECL [TRDP_ERR_T](#) tau_requestEcspConfirm ([TRDP_APP_SESSION_T](#) appHandle, const void *pUserRef, [TRDP_MD_CALLBACK_T](#) pfCbFunction, [TRDP_ECSP_CONF_REQUEST_T](#) *pEcspConfRequest)

Function for ECSP confirmation/correction request, reply will be received via call back.

5.1.1 Detailed Description

Functions for train switch control.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

[tau_ctrl.c](#) 1354 2014-11-11 15:22:13Z ahweiss

5.1.2 Function Documentation

5.1.2.1 EXT_DECL TRDP_ERR_T tau_getEcspStat (TRDP_APP_SESSION_T *appHandle*, TRDP_ECSP_STAT_T **pEcspStat*, TRDP_PD_INFO_T **pPdInfo*)

Function to get ECSP status information.

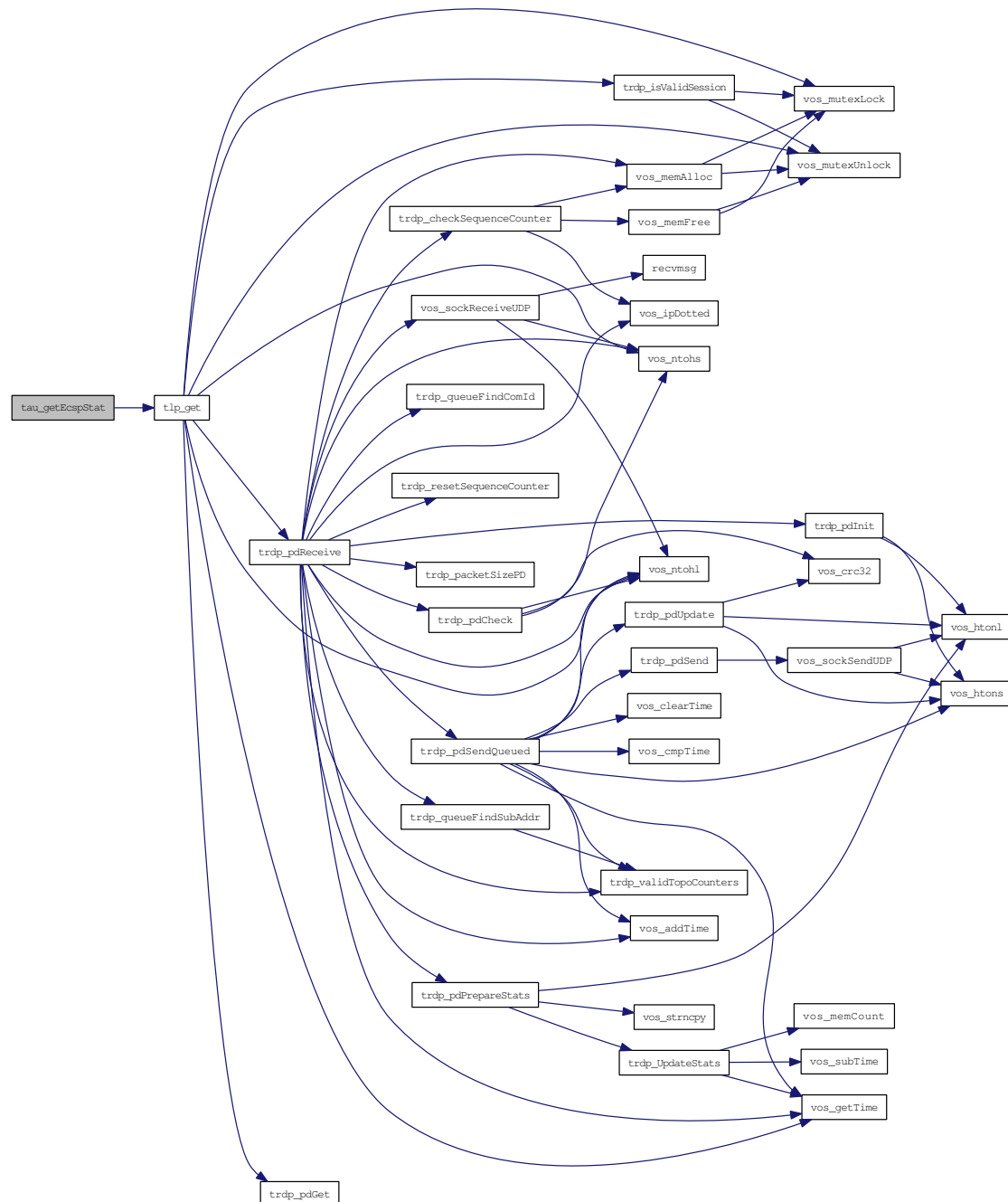
Parameters:

- ← *appHandle* Application handle
- ↔ *pEcspStat* Pointer to the ECSP status structure
- ↔ *pPdInfo* Pointer to PD status information

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

Here is the call graph for this function:



5.1.2.2 EXT_DECL TRDP_ERR_T tau_initEcspCtrl (TRDP_APP_SESSION_T *appHandle*, TRDP_IP_ADDR_T *ecspIpAddr*, TRDP_IP_ADDR_T *ecscIpAddr*)

Function to init ECSP control interface.

Parameters:

← *appHandle* Application handle

← *ecspIpAddr* ECSP address

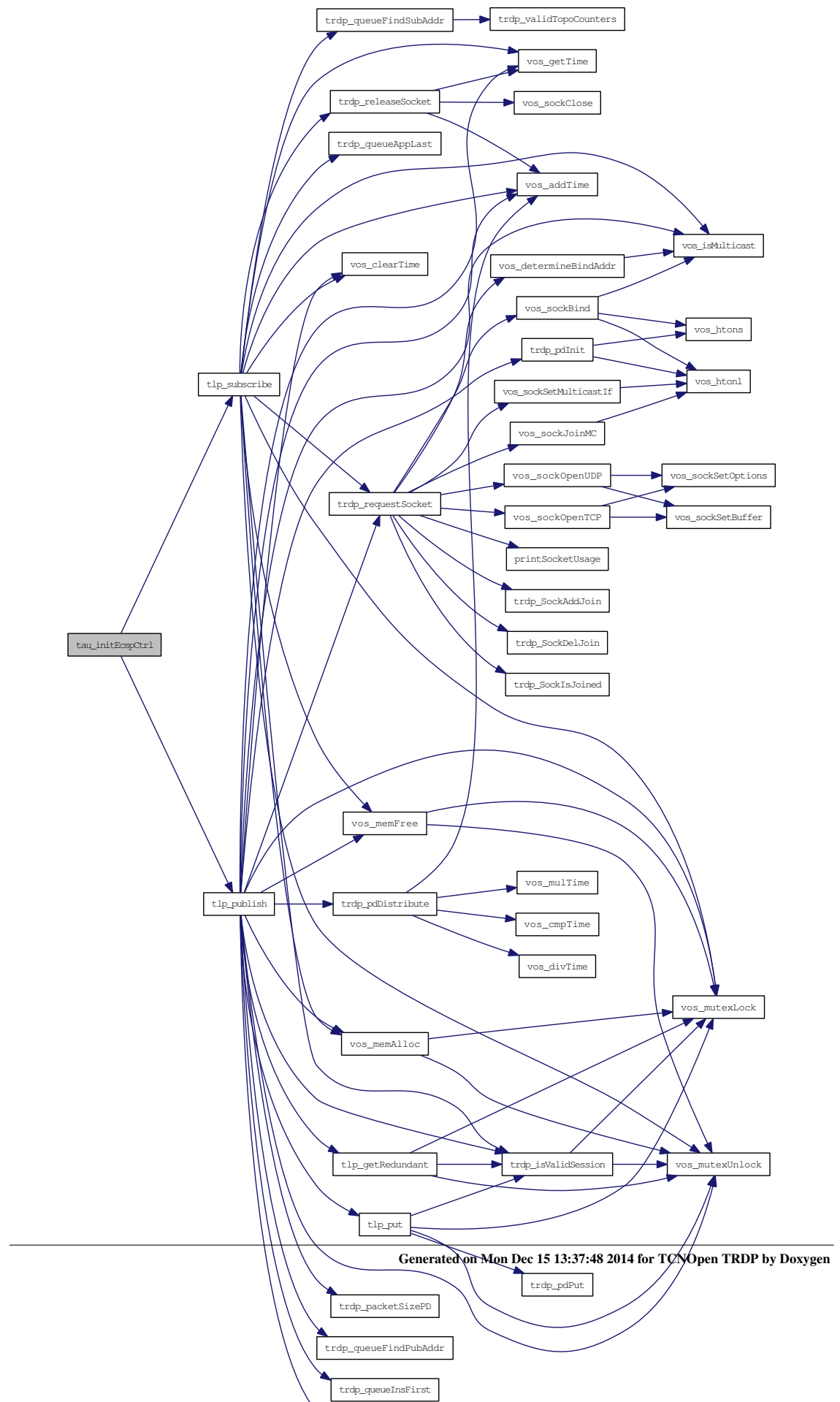
← *ecscIpAddr* ECSC address

Return values:

TRDP_NO_ERR no error

TRDP_INIT_ERR initialisation error

Here is the call graph for this function:



5.1.2.3 EXT_DECL TRDP_ERR_T tau_requestEespConfirm (TRDP_APP_SESSION_T *appHandle*, const void **pUserRef*, TRDP_MD_CALLBACK_T *pfCbFunction*, TRDP_ECSP_CONF_REQUEST_T **pEespConfRequest*)

Function for ECSP confirmation/correction request, reply will be received via call back.

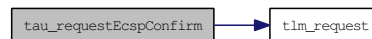
Parameters:

- ← *appHandle* Application Handle
- ← *pUserRef* user reference returned with reply
- ← *pfCbFunction* Pointer to callback function, NULL for default
- ← *pEespConfRequest* Pointer to confirmation data

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

Here is the call graph for this function:



5.1.2.4 EXT_DECL TRDP_ERR_T tau_setEespCtrl (TRDP_APP_SESSION_T *appHandle*, TRDP_ECSP_CTRL_T **pEespCtrl*)

Function to set ECSP control information.

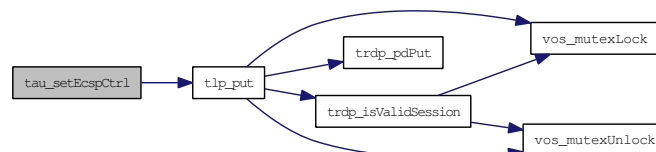
Parameters:

- ← *appHandle* Application handle
- ← *pEespCtrl* Pointer to the ECSP control structure

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

Here is the call graph for this function:



5.1.2.5 EXT_DECL TRDP_ERR_T tau_terminateEcspCtrl (TRDP_APP_SESSION_T *appHandle*)

Function to close ECSP control interface.

Parameters:

← *appHandle* Application handle

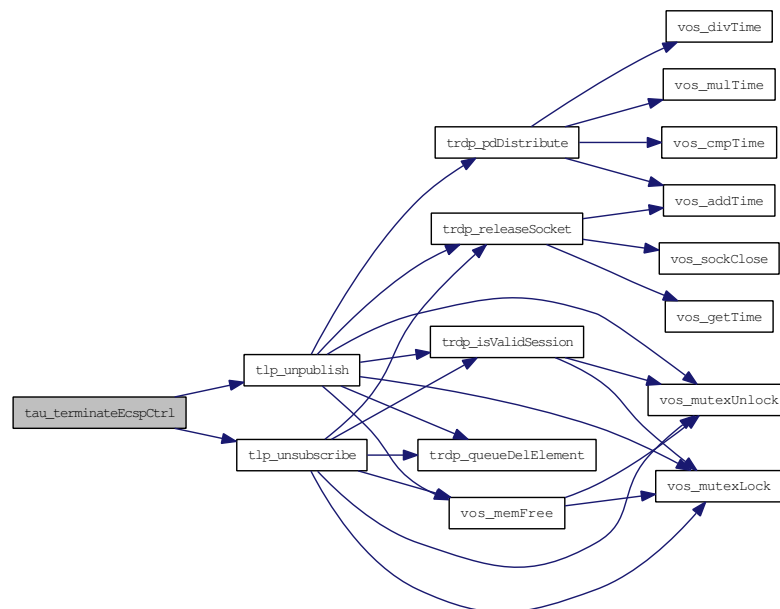
Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR module not initialised

TRDP_UNKNOWN_ERR undefined error

Here is the call graph for this function:

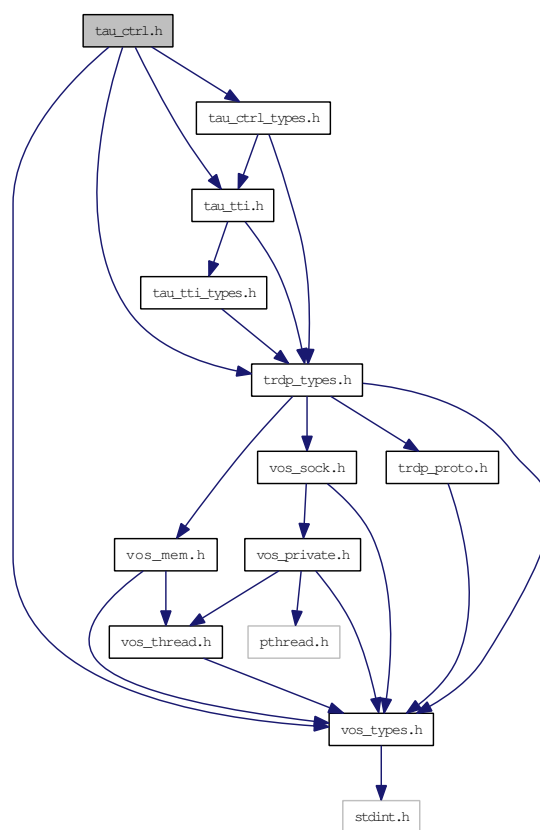


5.2 tau_ctrl.h File Reference

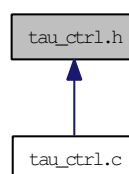
TRDP utility interface definitions.

```
#include "vos_types.h"
#include "trdp_types.h"
#include "tau_tti.h"
#include "tau_ctrl_types.h"
```

Include dependency graph for tau_ctrl.h:



This graph shows which files directly or indirectly include this file:



Functions

- EXT_DECL [TRDP_ERR_T](#) [tau_initEcspCtrl](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_IP_ADDR_T](#) ecspIpAddr, [TRDP_IP_ADDR_T](#) ecscIpAddr)
Function to init ECSP control interface.
- EXT_DECL [TRDP_ERR_T](#) [tau_terminateEcspCtrl](#) ([TRDP_APP_SESSION_T](#) appHandle)
Function to close ECSP control interface.
- EXT_DECL [TRDP_ERR_T](#) [tau_setEcspCtrl](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_ECSP_CTRL_T](#) *pEcspCtrl)
Function to set ECSP control information.
- EXT_DECL [TRDP_ERR_T](#) [tau_getEcspStat](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_ECSP_STAT_T](#) *pEcspStat, [TRDP_PD_INFO_T](#) *pPdInfo)
Function to get ECSP status information.
- EXT_DECL [TRDP_ERR_T](#) [tau_requestEcspConfirm](#) ([TRDP_APP_SESSION_T](#) appHandle, const void *pUserRef, [TRDP_MD_CALLBACK_T](#) pfCbFunction, [TRDP_ECSP_CONF_REQUEST_T](#) *pEcspConfRequest)
Function for ECSP confirmation/correction request, reply will be received via call back.

5.2.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- ETB control

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

[tau_ctrl.h](#) 1349 2014-11-04 11:40:43Z ahweiss

5.2.2 Function Documentation

5.2.2.1 EXT_DECL [TRDP_ERR_T](#) [tau_getEcspStat](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_ECSP_STAT_T](#) *pEcspStat, [TRDP_PD_INFO_T](#) *pPdInfo)

Function to get ECSP status information.

Parameters:

- ← *appHandle* Application Handle
- ↔ *pEcspStat* Pointer to the ECSP status structure
- ↔ *pPdInfo* Pointer to PD status information

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

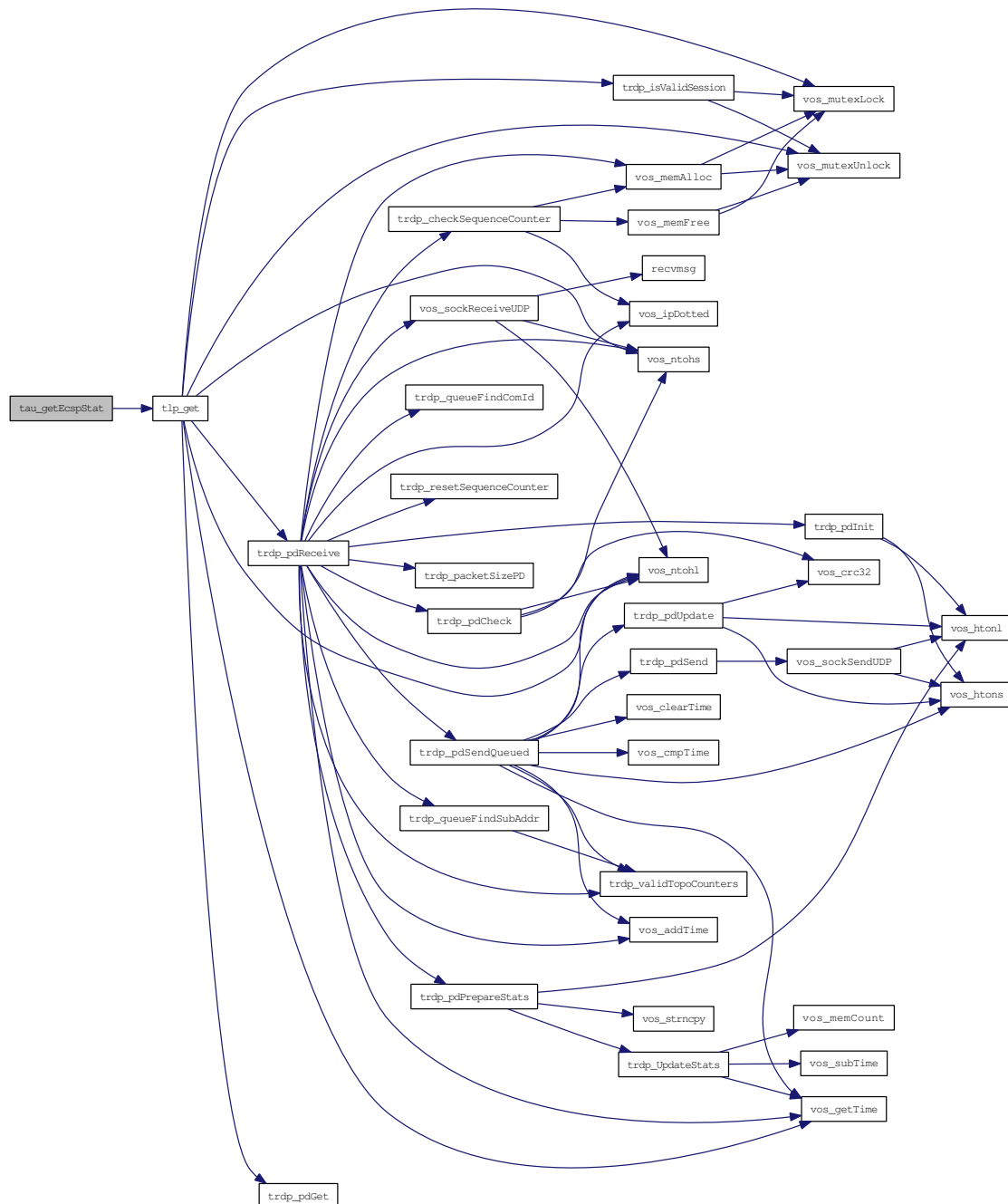
Parameters:

- ← *appHandle* Application handle
- ↔ *pEcspStat* Pointer to the ECSP status structure
- ↔ *pPdInfo* Pointer to PD status information

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

Here is the call graph for this function:



5.2.2.2 EXT_DECL TRDP_ERR_T tau_initEcspCtrl (TRDP_APP_SESSION_T *appHandle*, TRDP_IP_ADDR_T *ecspIpAddr*, TRDP_IP_ADDR_T *ecscIpAddr*)

Function to init ECSP control interface.

Parameters:

← *appHandle* Application handle

← *ecspIpAddr* ECSP address

← *ecscIpAddr* ECSC address

Return values:

TRDP_NO_ERR no error

TRDP_INIT_ERR initialisation error

Parameters:

← *appHandle* Application handle

← *ecspIpAddr* ECSP address

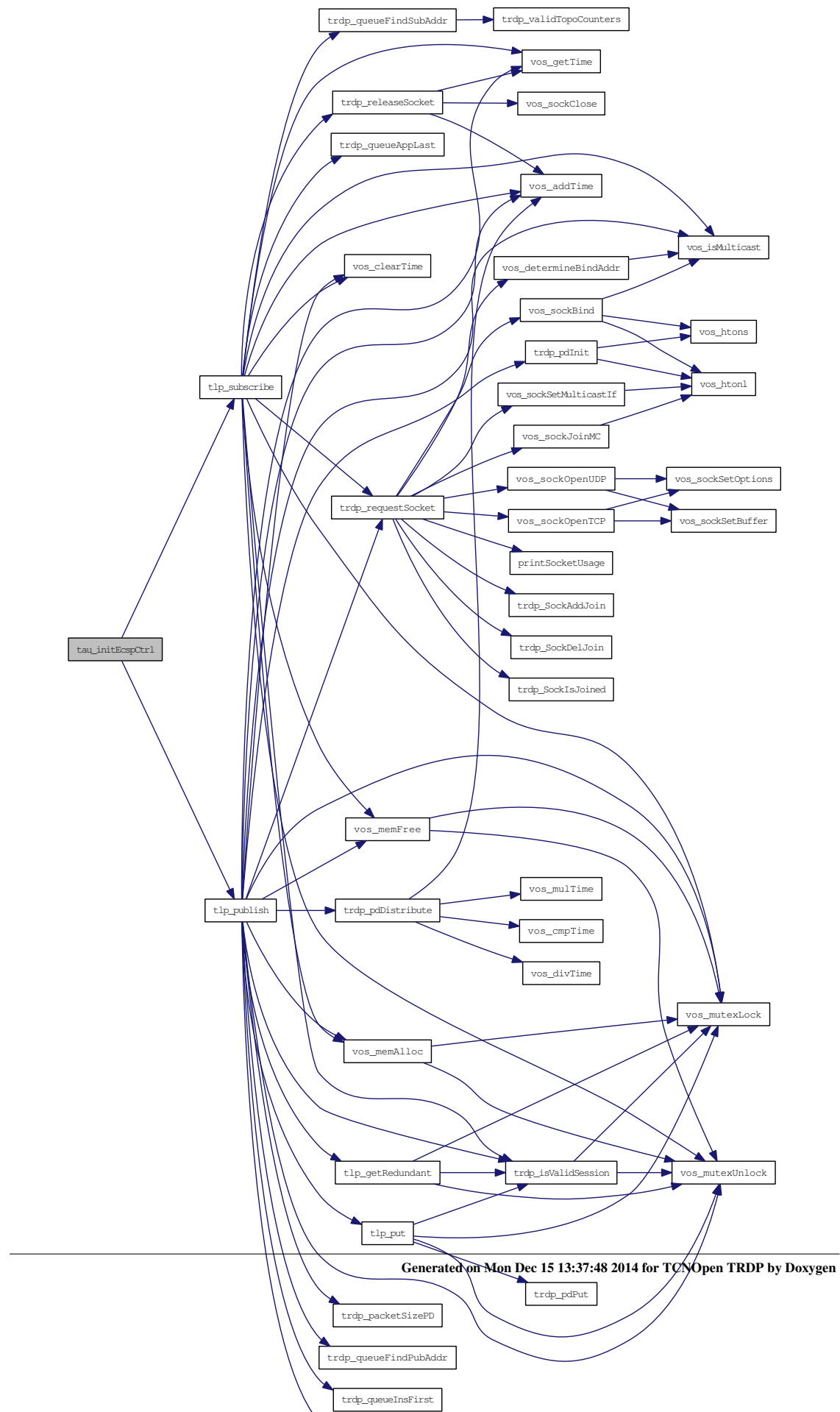
← *ecscIpAddr* ECSC address

Return values:

TRDP_NO_ERR no error

TRDP_INIT_ERR initialisation error

Here is the call graph for this function:



5.2.2.3 EXT_DECL TRDP_ERR_T tau_requestEcspConfirm (TRDP_APP_SESSION_T *appHandle*, const void * *pUserRef*, TRDP_MD_CALLBACK_T *pfCbFunction*, TRDP_ECSP_CONF_REQUEST_T * *pEcspConfRequest*)

Function for ECSP confirmation/correction request, reply will be received via call back.

Parameters:

- ← *appHandle* Application Handle
- ← *pUserRef* user reference returned with reply
- ← *pfCbFunction* Pointer to callback function, NULL for default
- ← *pEcspConfRequest* Pointer to confirmation data

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

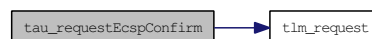
Parameters:

- ← *appHandle* Application Handle
- ← *pUserRef* user reference returned with reply
- ← *pfCbFunction* Pointer to callback function, NULL for default
- ← *pEcspConfRequest* Pointer to confirmation data

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* module not initialised
- TRDP_PARAM_ERR* Parameter error

Here is the call graph for this function:



5.2.2.4 EXT_DECL TRDP_ERR_T tau_setEcspCtrl (TRDP_APP_SESSION_T *appHandle*, TRDP_ECSP_CTRL_T * *pEcspCtrl*)

Function to set ECSP control information.

Parameters:

- ← *appHandle* Application handle
- ← *pEcspCtrl* Pointer to the ECSP control structure

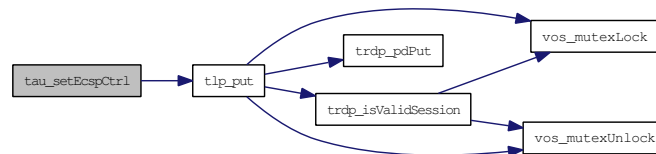
Return values:

- TRDP_NO_ERR* no error

TRDP_NOINIT_ERR module not initialised

TRDP_PARAM_ERR Parameter error

Here is the call graph for this function:



5.2.2.5 EXT_DECL TRDP_ERR_T tau_terminateEcspCtrl (TRDP_APP_SESSION_T appHandle)

Function to close ECSP control interface.

Parameters:

← **appHandle** Application handle

Return values:

TRDP_NO_ERR no error

TRDP_UNKNOWN_ERR undefined error

Parameters:

← **appHandle** Application handle

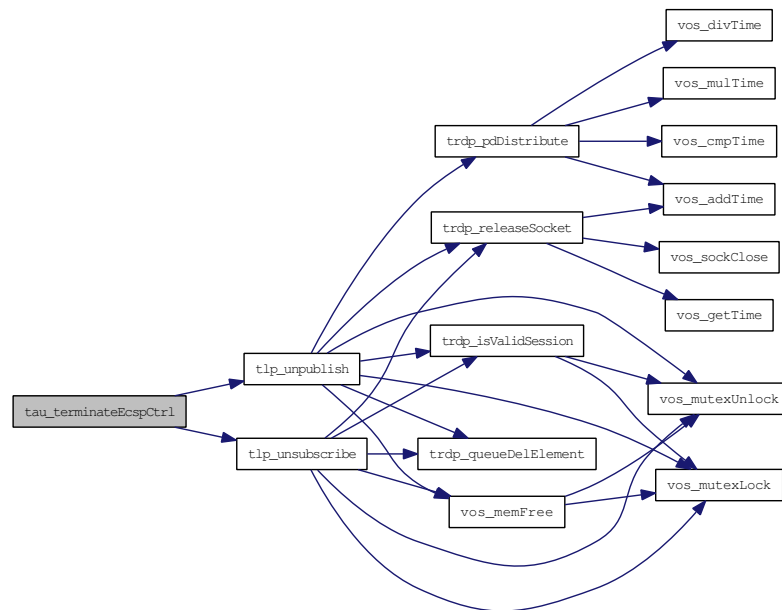
Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR module not initialised

TRDP_UNKNOWN_ERR undefined error

Here is the call graph for this function:



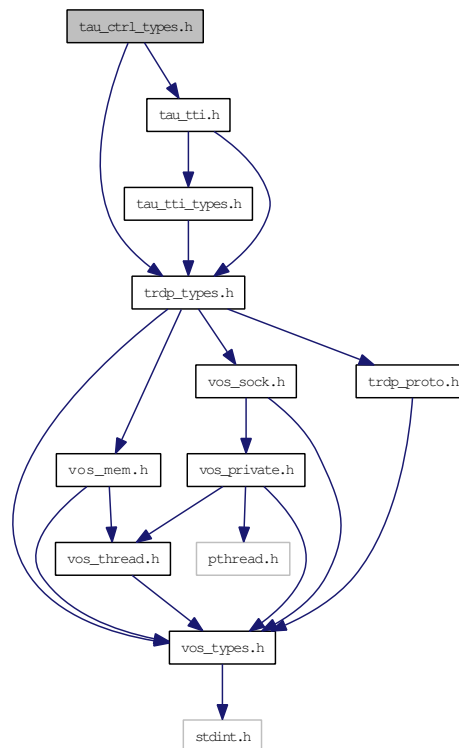
5.3 tau_ctrl_types.h File Reference

TRDP utility interface definitions.

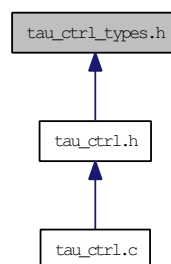
```
#include "trdp_types.h"
```

```
#include "tau_tti.h"
```

Include dependency graph for tau_ctrl_types.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct `GNU_PACKED`
Types for ETB control.

- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.

5.3.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following

- ETB control type definitions acc. to IEC61375-2-3

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

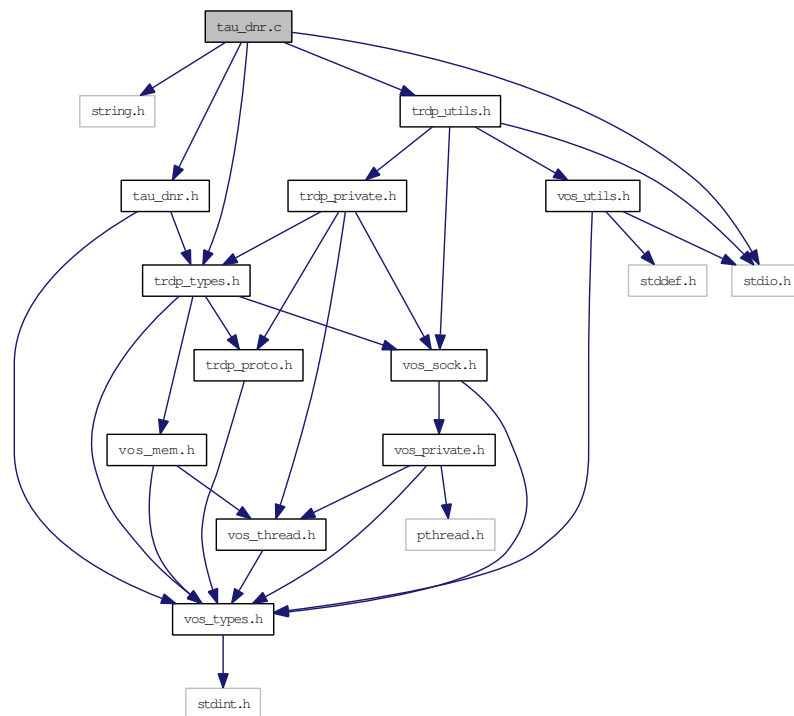
[tau_ctrl_types.h](#) 1349 2014-11-04 11:40:43Z ahweiss

5.4 tau_dnr.c File Reference

Functions for domain name resolution.

```
#include <string.h>
#include <stdio.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "tau_dnr.h"
```

Include dependency graph for tau_dnr.c:



5.4.1 Detailed Description

Functions for domain name resolution.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

[tau_dnr.c](#) 1279 2014-08-07 06:18:07Z ahweiss

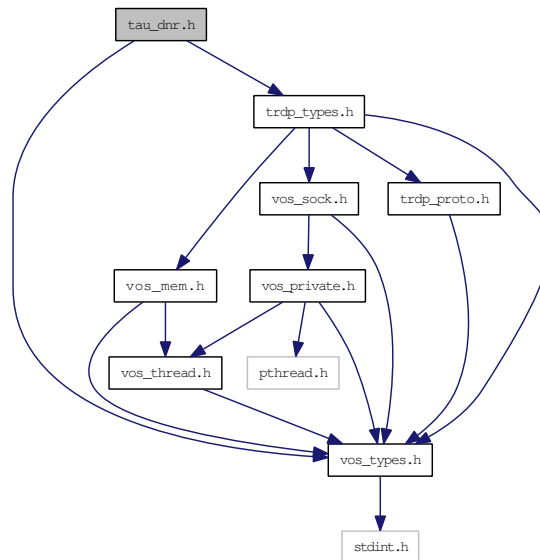
5.5 tau_dnr.h File Reference

TRDP utility interface definitions.

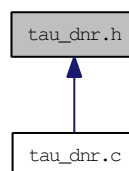
```
#include "vos_types.h"
```

```
#include "trdp_types.h"
```

Include dependency graph for tau_dnr.h:



This graph shows which files directly or indirectly include this file:



Functions

- EXT_DECL [TRDP_ERR_T](#) [tau_initDnr](#) (void)
Function to init DNR.
- EXT_DECL [TRDP_ERR_T](#) [tau_getOwnIds](#) (TRDP_LABEL_T devId, TRDP_LABEL_T vehId, TRDP_LABEL_T cstId)
Who am I ?.
- EXT_DECL [TRDP_IP_ADDR_T](#) [tau_getOwnAddr](#) (void)
Function to get the own IP address.
- EXT_DECL [TRDP_ERR_T](#) [tau_uri2Addr](#) (TRDP_IP_ADDR_T *pAddr, UINT32 *pTopoCnt, const TRDP_URI_T uri)

Function to convert a URI to an IP address.

- EXT_DECL [TRDP_ERR_T](#) [tau_addr2Uri](#) (TRDP_URI_HOST_T uri, UINT32 *pTopoCnt, [TRDP_IP_ADDR_T](#) addr)

Function to convert an IP address to a URI.

- EXT_DECL [TRDP_ERR_T](#) [tau_label2VehId](#) (TRDP_LABEL_T vehId, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

Function to retrieve the vehId of the car with label vehLabel in the consist with cstLabel.

- EXT_DECL [TRDP_ERR_T](#) [tau_label2TcnVehNo](#) (UINT8 *pTcnVehNo, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

Function The function delivers the TCN vehicle number to the given label.

- EXT_DECL [TRDP_ERR_T](#) [tau_label2OpVehNo](#) (UINT8 *pOpVehNo, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

Function The function delivers the operational vehicle sequence number to the given label.

- EXT_DECL [TRDP_ERR_T](#) [tau_tcnVehNo2Ids](#) (TRDP_LABEL_T vehId, TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 tcnVehNo, UINT8 tcnCstNo)

Function to retrieve the car and consist id of the car given with carNo and trnCstNo.

- EXT_DECL [TRDP_ERR_T](#) [tau_opVehNo2Ids](#) (TRDP_LABEL_T vehId, TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 opVehNo)

Function to retrieve the vehicle and consist id from a given operational vehicle sequence number.

- EXT_DECL [TRDP_ERR_T](#) [tau_addr2VehId](#) (TRDP_LABEL_T vehId, UINT32 *pTopoCnt, [TRDP_IP_ADDR_T](#) ipAddr)

Function to retrieve the vehId of the car hosting a device with the IPAddress ipAddr.

- EXT_DECL [TRDP_ERR_T](#) [tau_addr2TcnVehNo](#) (UINT8 *pTcnVehNo, UINT8 *pTopoCnt, [TRDP_IP_ADDR_T](#) ipAddr)

Function to retrieve the TCN vehicle number in consist of the car hosting the device with the given IP address.

- EXT_DECL [TRDP_ERR_T](#) [tau_addr2OpVehNo](#) (UINT8 *pOpVehNo, UINT8 *pTopoCnt, [TRDP_IP_ADDR_T](#) ipAddr)

Function to retrieve the operational vehicle number of the vehicle hosting the device with the given IP address.

- EXT_DECL [TRDP_ERR_T](#) [tau_tcnCstNo2CstId](#) (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 tcnCstNo)

Function to retrieve the consist identifier of the consist with train consist sequence number cstNo.

- EXT_DECL [TRDP_ERR_T](#) [tau_iecCstNo2CstId](#) (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 opCstNo)

Function to retrieve the consist identifier of the consist with IEC sequence consist number iecCstNo.

- EXT_DECL [TRDP_ERR_T](#) [tau_label2CstId](#) (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

Function to retrieve the consist identifier of the consist hosting a car with label vehLabel.

- EXT_DECL [TRDP_ERR_T tau_label2TcnCstNo](#) (UINT8 *pTcnCstNo, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel)

Function to retrieve the TCN consist sequence number of the consist hosting a vehicle with label vehLabel.

- EXT_DECL [TRDP_ERR_T tau_label2OpCstNo](#) (UINT8 *pOpCstNo, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel)

Function to retrieve the operational consist sequence number of the consist hosting a vehicle with label vehLabel.

- EXT_DECL [TRDP_ERR_T tau_addr2CstId](#) (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, [TRDP_IP_ADDR_T](#) ipAddr)

Function to retrieve the consist identifier of the consist hosting the device with the IP-Address ipAddr.

- EXT_DECL [TRDP_ERR_T tau_addr2TcnCstNo](#) (UINT8 *pTcnCstNo, UINT32 *pTopoCnt, [TRDP_IP_ADDR_T](#) ipAddr)

Function to retrieve the TCN consist number of the consist hosting the device with the IP-Address ipAddr.

- EXT_DECL [TRDP_ERR_T tau_addr2OpCstNo](#) (UINT8 *pOpCstNo, UINT32 *pTopoCnt, [TRDP_IP_ADDR_T](#) ipAddr)

Function to retrieve the operational consist number of the consist hosting the device with the IP-Address ipAddr.

5.5.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- IP - URI address translation

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

[tau_dnr.h](#) 1323 2014-08-29 14:09:08Z bloehr

5.5.2 Function Documentation

5.5.2.1 EXT_DECL TRDP_ERR_T tau_addr2CstId (TRDP_LABEL_T *cstId*, UINT32 * *pTopoCnt*, TRDP_IP_ADDR_T *ipAddr*)

Function to retrieve the consist identifier of the consist hosting the device with the IP-Address *ipAddr*.

Parameters:

- *cstId* Pointer to the consist id to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *ipAddr* IP address. 0 means own device, so the own consist id is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.2 EXT_DECL TRDP_ERR_T tau_addr2OpCstNo (UINT8 * *pOpCstNo*, UINT32 * *pTopoCnt*, TRDP_IP_ADDR_T *ipAddr*)

Function to retrieve the operational consist number of the consist hosting the device with the IP-Address *ipAddr*.

Parameters:

- *pOpCstNo* Pointer to the operational consist number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *ipAddr* IP address. 0 means own device, so the own IEC consist number is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.3 EXT_DECL TRDP_ERR_T tau_addr2OpVehNo (UINT8 * *pOpVehNo*, UINT8 * *pTopoCnt*, TRDP_IP_ADDR_T *ipAddr*)

Function to retrieve the operational vehicle number of the vehicle hosting the device with the given IP address.

Parameters:

- *pOpVehNo* Pointer to the operational vehicle number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *ipAddr* IP address. 0 means own address, so the own operational vehicle number is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.4 EXT_DECL TRDP_ERR_T tau_addr2TcnCstNo (UINT8 * *pTcnCstNo*, UINT32 * *pTopoCnt*, TRDP_IP_ADDR_T *ipAddr*)

Function to retrieve the TCN consist number of the consist hosting the device with the IP-Address *ipAddr*.

Parameters:

- *pTcnCstNo* Pointer to the TCN consist number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *ipAddr* IP address. 0 means own device, so the own consist number is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.5 EXT_DECL TRDP_ERR_T tau_addr2TcnVehNo (UINT8 * *pTcnVehNo*, UINT8 * *pTopoCnt*, TRDP_IP_ADDR_T *ipAddr*)

Function to retrieve the TCN vehicle number in consist of the car hosting the device with the given IP address.

Parameters:

- *pTcnVehNo* Pointer to the TCN vehicle number in consist to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *ipAddr* IP address. 0 means own address, so the own vehicle number is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.6 EXT_DECL TRDP_ERR_T tau_addr2Uri (TRDP_URI_HOST_T *uri*, UINT32 * *pTopoCnt*, TRDP_IP_ADDR_T *addr*)

Function to convert an IP address to a URI.

Receives an IP-Address and translates it into the host part of the corresponding URI. Both unicast and multicast addresses are accepted.

Parameters:

- *uri* Pointer to a string to return the URI host part
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *addr* IP address, 0==own address

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.7 EXT_DECL TRDP_ERR_T tau_addr2VehId (TRDP_LABEL_T *vehId*, UINT32 * *pTopoCnt*, TRDP_IP_ADDR_T *ipAddr*)

Function to retrieve the *vehId* of the car hosting a device with the IP address *ipAddr*.

Parameters:

- *vehId* Pointer to the vehicle id to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *ipAddr* IP address. 0 means own address, so the own vehicle id is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.8 EXT_DECL TRDP_IP_ADDR_T tau_getOwnAddr (void)

Function to get the own IP address.

Return values:

- own* IP address

5.5.2.9 EXT_DECL TRDP_ERR_T tau_getOwnIds (TRDP_LABEL_T *devId*, TRDP_LABEL_T *vehId*, TRDP_LABEL_T *cstId*)

Who am I ?.

Realizes a kind of 'Who am I' function. It is used to determine the own identifiers (i.e. the own labels), which may be used as host part of the own fully qualified domain name.

Parameters:

- *devId* Returns the device label (host name)
- *vehId* Returns the vehicle label
- *cstId* Returns the consist label

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.10 EXT_DECL TRDP_ERR_T tau_iecCstNo2CstId (TRDP_LABEL_T *cstId*, UINT32 * *pTopoCnt*, UINT8 *opCstNo*)

Function to retrieve the consist identifier of the consist with IEC sequence consist number *iecCstNo*.

Parameters:

- *cstId* Pointer to the consist id to be returned

- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *opCstNo* Operational consist sequence number based on the leading car. 0 means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.11 EXT_DECL TRDP_ERR_T tau_initDnr (void)

Function to init DNR.

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* initialisation error

5.5.2.12 EXT_DECL TRDP_ERR_T tau_label2CstId (TRDP_LABEL_T cstId, UINT32 * pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

Function to retrieve the consist identifier of the consist hosting a car with label vehLabel.

Parameters:

- *cstId* Pointer to the consist id to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to a vehicle label. NULL means any car.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.13 EXT_DECL TRDP_ERR_T tau_label2OpCstNo (UINT8 * pOpCstNo, UINT32 * pTopoCnt, const TRDP_LABEL_T vehLabel)

Function to retrieve the operational consist sequence number of the consist hosting a vehicle with label vehLabel.

Parameters:

- *pOpCstNo* Pointer to the operational consist number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to a vehicle label. NULL means own vehicle, so the own IEC consist number is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.14 EXT_DECL TRDP_ERR_T tau_label2OpVehNo (UINT8 * *pOpVehNo*, UINT32 * *pTopoCnt*, const TRDP_LABEL_T *vehLabel*, const TRDP_LABEL_T *cstLabel*)

Function The function delivers the operational vehicle sequence number to the given label.

The first match of the table will be returned in case there is no unique label given.

Parameters:

- *pOpVehNo* Pointer to the operational vehicle sequence number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to a vehicle label. NULL means own vehicle.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.15 EXT_DECL TRDP_ERR_T tau_label2TcnCstNo (UINT8 * *pTcnCstNo*, UINT32 * *pTopoCnt*, const TRDP_LABEL_T *vehLabel*)

Function to retrieve the TCN consist sequence number of the consist hosting a vehicle with label *vehLabel*.

Parameters:

- *pTcnCstNo* Pointer to the TCN consist number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to a vehicle label, NULL means own vehicle, so the own consist number is returned.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.16 EXT_DECL TRDP_ERR_T tau_label2TcnVehNo (UINT8 * *pTcnVehNo*, UINT32 * *pTopoCnt*, const TRDP_LABEL_T *vehLabel*, const TRDP_LABEL_T *cstLabel*)

Function The function delivers the TCN vehicle number to the given label.

The first match of the table will be returned in case there is no unique label given.

Parameters:

- *pTcnVehNo* Pointer to the TCN vehicle number to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to the vehicle label. NULL means own vehicle.
- ← *cstLabel* Pointer to the consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.17 EXT_DECL TRDP_ERR_T tau_label2VehId (TRDP_LABEL_T *vehId*, UINT32 * *pTopoCnt*, const TRDP_LABEL_T *vehLabel*, const TRDP_LABEL_T *cstLabel*)

Function to retrieve the *vehId* of the car with label *vehLabel* in the consist with *cstLabel*.

Parameters:

- *vehId* Pointer to a label string to return the vehicle id
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to the vehicle label. NULL means own vehicle if *cstLabel* == NULL.
- ← *cstLabel* Pointer to the consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.18 EXT_DECL TRDP_ERR_T tau_opVehNo2Ids (TRDP_LABEL_T *vehId*, TRDP_LABEL_T *cstId*, UINT32 * *pTopoCnt*, UINT8 *opVehNo*)

Function to retrieve the vehicle and consist id from a given operational vehicle sequence number.

Parameters:

- *vehId* Pointer to the vehicle id to be returned
- *cstId* Pointer to the consist id to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *opVehNo* Operational vehicle sequence number. 0 means own vehicle.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.19 EXT_DECL TRDP_ERR_T tau_tcnCstNo2CstId (TRDP_LABEL_T *cstId*, UINT32 * *pTopoCnt*, UINT8 *tcnCstNo*)

Function to retrieve the consist identifier of the consist with train consist sequence number *cstNo*.

Parameters:

- *cstId* Pointer to the consist id to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *tcnCstNo* Consist sequence number based on IP reference direction. 0 means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.20 EXT_DECL TRDP_ERR_T tau_tcnVehNo2Ids (TRDP_LABEL_T *vehId*, TRDP_LABEL_T *cstId*, UINT32 **pTopoCnt*, UINT8 *tcnVehNo*, UINT8 *tcnCstNo*)

Function to retrieve the car and consist id of the car given with carNo and trnCstNo.

Parameters:

- *vehId* Pointer to the vehicle id to be returned
- *cstId* Pointer to the consist id to be returned
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *tcnVehNo* Vehicle number in consist. 0 means own vehicle when trnCstNo == 0.
- ← *tcnCstNo* TCN consist sequence number in train. 0 means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.5.2.21 EXT_DECL TRDP_ERR_T tau_uri2Addr (TRDP_IP_ADDR_T **pAddr*, UINT32 **pTopoCnt*, const TRDP_URI_T *uri*)

Function to convert a URI to an IP address.

Receives a URI as input variable and translates this URI to an IP-Address. The URI may specify either a unicast or a multicast IP-Address. The caller may specify a topographic counter, which will be checked.

Parameters:

- *pAddr* Pointer to return the IP address
- ↔ *pTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *uri* Pointer to a URI or an IP Address string, NULL==own URI

Return values:

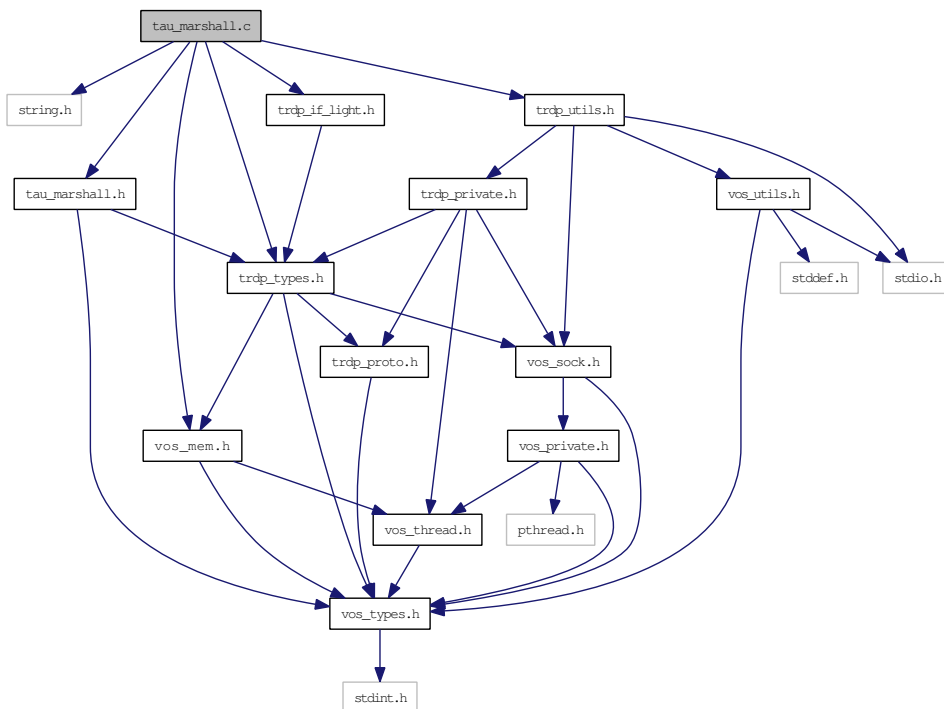
- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.6 tau_marshall.c File Reference

Marshalling functions for TRDP.

```
#include <string.h>
#include "trdp_types.h"
#include "trdp_if_light.h"
#include "trdp_utils.h"
#include "vos_mem.h"
#include "tau_marshall.h"
```

Include dependency graph for tau_marshall.c:



Data Structures

- struct [TAU_MARSHALL_INFO_T](#)
Marshalling info, used to and from wire.

Functions

- EXT_DECL [TRDP_ERR_T](#) [tau_initMarshall](#) (void **ppRefCon, UINT32 numComId, [TRDP_COMID_DSID_MAP_T](#) *pComIdDsIdMap, UINT32 numDataSet, [TRDP_DATASET_T](#) *pDataset[])

Function to initialise the marshalling/unmarshalling.

- EXT_DECL [TRDP_ERR_T tau_marshall](#) (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
marshall function.
- EXT_DECL [TRDP_ERR_T tau_unmarshall](#) (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
unmarshall function.
- EXT_DECL [TRDP_ERR_T tau_marshallDs](#) (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
marshall data set function.
- EXT_DECL [TRDP_ERR_T tau_unmarshallDs](#) (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
unmarshall data set function.
- EXT_DECL [TRDP_ERR_T tau_calcDatasetSize](#) (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
Calculate data set size by given data set id.
- EXT_DECL [TRDP_ERR_T tau_calcDatasetSizeByComId](#) (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
Calculate data set size by given ComId.

5.6.1 Detailed Description

Marshalling functions for TRDP.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[tau_marshall.c](#) 1190 2014-03-12 13:15:17Z ahweiss

5.6.2 Function Documentation

5.6.2.1 EXT_DECL TRDP_ERR_T tau_calcDatasetSize (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT32 *pDestSize, TRDP_DATASET_T **ppDSPointer)

Calculate data set size by given data set id.

Parameters:

- ← *pRefCon* Pointer to user context
- ← *dsId* Dataset id to identify the structure out of a configuration
- ← *pSrc* Pointer to received original message
- *pDestSize* Pointer to the size of the data set
- ↔ *ppDSPointer* pointer to pointer to cached dataset, set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_PARAM_ERR* data set id not existing

5.6.2.2 EXT_DECL TRDP_ERR_T tau_calcDatasetSizeByComId (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

Calculate data set size by given ComId.

Parameters:

- ← *pRefCon* Pointer to user context
- ← *comId* ComId id to identify the structure out of a configuration
- ← *pSrc* Pointer to received original message
- *pDestSize* Pointer to the size of the data set
- ↔ *ppDSPointer* pointer to pointer to cached dataset, set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_PARAM_ERR* data set id not existing

5.6.2.3 EXT_DECL TRDP_ERR_T tau_initMarshall (void ** *ppRefCon*, UINT32 *numComId*, TRDP_COMID_DSID_MAP_T * *pComIdDsIdMap*, UINT32 *numDataSet*, TRDP_DATASET_T * *pDataset*[])

Function to initialise the marshalling/unmarshalling.

Types for marshalling / unmarshalling.

The supplied array must be sorted by ComIds. The array must exist during the use of the marshalling functions (until [tlc_terminate\(\)](#)).

Parameters:

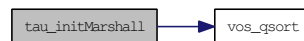
- ↔ *ppRefCon* Returns a pointer to be used for the reference context of marshalling/unmarshalling
- ← *numComId* Number of datasets found in the configuration

- ← *pComIdsIdMap* Pointer to an array of structures of type TRDP_DATASET_T
- ← *numDataSet* Number of datasets found in the configuration
- ← *pDataset* Pointer to an array of pointers to structures of type TRDP_DATASET_T

Return values:

- TRDP_NO_ERR** no error
- TRDP_MEM_ERR** provided buffer to small
- TRDP_PARAM_ERR** Parameter error

Here is the call graph for this function:



5.6.2.4 EXT_DECL TRDP_ERR_T tau_marshall (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

marshall function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *comId* ComId to identify the structure out of a configuration
- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message
- ↔ *pDestSize* size of the provide buffer / size of the treated message
- ↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR** no error
- TRDP_MEM_ERR** provided buffer to small
- TRDP_INIT_ERR** marshalling not initialised
- TRDP_COMID_ERR** comid not existing
- TRDP_PARAM_ERR** Parameter error

5.6.2.5 EXT_DECL TRDP_ERR_T tau_marshallDs (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

marshall data set function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *dsId* Data set id to identify the structure out of a configuration

- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message
- ↔ *pDestSize* size of the provide buffer / size of the treated message
- ↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provided buffer too small
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_COMID_ERR* comid not existing
- TRDP_PARAM_ERR* Parameter error

5.6.2.6 EXT_DECL TRDP_ERR_T tau_unmarshall (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

unmarshall function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *comId* ComId to identify the structure out of a configuration
- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message
- ↔ *pDestSize* size of the provide buffer / size of the treated message
- ↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provided buffer too small
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_COMID_ERR* comid not existing

5.6.2.7 EXT_DECL TRDP_ERR_T tau_unmarshallDs (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

unmarshall data set function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *dsId* Data set id to identify the structure out of a configuration
- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message

↔ *pDestSize* size of the provide buffer / size of the treated message

↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR provided buffer too small

TRDP_INIT_ERR marshalling not initialised

TRDP_COMID_ERR comid not existing

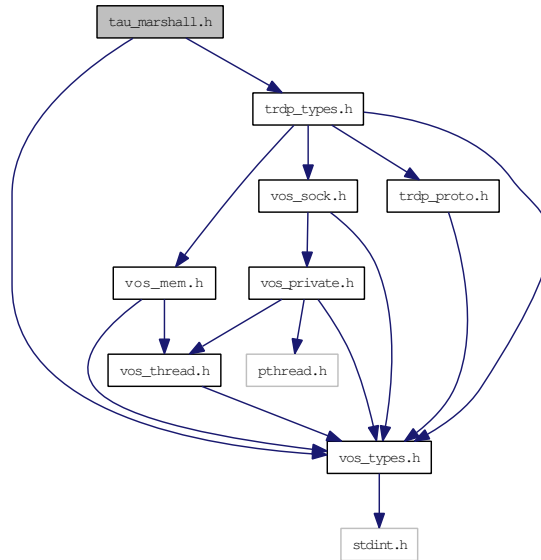
5.7 tau_marshall.h File Reference

TRDP utility interface definitions.

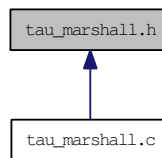
```
#include "vos_types.h"
```

```
#include "trdp_types.h"
```

Include dependency graph for tau_marshall.h:



This graph shows which files directly or indirectly include this file:



Functions

- EXT_DECL [TRDP_ERR_T](#) [tau_initMarshall](#) (void **ppRefCon, UINT32 numComId, [TRDP_COMID_DSID_MAP_T](#) *pComIdDsIdMap, UINT32 numDataSet, [TRDP_DATASET_T](#) *pDataset[])

Types for marshalling / unmarshall.
- EXT_DECL [TRDP_ERR_T](#) [tau_marshall](#) (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T](#) **ppDSPointer)

marshall function.
- EXT_DECL [TRDP_ERR_T](#) [tau_marshallDs](#) (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T](#) **ppDSPointer)

marshall data set function.

- EXT_DECL [TRDP_ERR_T tau_unmarshall](#) (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
unmarshall function.
- EXT_DECL [TRDP_ERR_T tau_unmarshallDs](#) (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
unmarshall data set function.
- EXT_DECL [TRDP_ERR_T tau_calcDatasetSize](#) (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
Calculate data set size by given data set id.
- EXT_DECL [TRDP_ERR_T tau_calcDatasetSizeByComId](#) (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT32 *pDestSize, [TRDP_DATASET_T **ppDSPointer](#))
Calculate data set size by given ComId.

5.7.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- marshall/unmarshalling

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss

Remarks:

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Id

[tau_marshall.h](#) 1279 2014-08-07 06:18:07Z ahweiss

5.7.2 Function Documentation

5.7.2.1 EXT_DECL TRDP_ERR_T tau_calcDatasetSize (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT32 *pDestSize, TRDP_DATASET_T **ppDSPointer)

Calculate data set size by given data set id.

Parameters:

← *pRefCon* Pointer to user context

- ← *dsId* Dataset id to identify the structure out of a configuration
- ← *pSrc* Pointer to received original message
- *pDestSize* Pointer to the size of the data set
- ↔ *ppDSPointer* pointer to pointer to cached dataset, set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_PARAM_ERR* data set id not existing

5.7.2.2 EXT_DECL TRDP_ERR_T tau_calcDatasetSizeByComId (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

Calculate data set size by given ComId.

Parameters:

- ← *pRefCon* Pointer to user context
- ← *comId* ComId id to identify the structure out of a configuration
- ← *pSrc* Pointer to received original message
- *pDestSize* Pointer to the size of the data set
- ↔ *ppDSPointer* pointer to pointer to cached dataset, set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_PARAM_ERR* data set id not existing

5.7.2.3 EXT_DECL TRDP_ERR_T tau_initMarshall (void ** *ppRefCon*, UINT32 *numComId*, TRDP_COMID_DSID_MAP_T * *pComIdsIdMap*, UINT32 *numDataSet*, TRDP_DATASET_T * *pDataset*[])

Types for marshalling / unmarshalling.

Function to initialise the marshalling/unmarshalling.

Parameters:

- ↔ *ppRefCon* Returns a pointer to be used for the reference context of marshalling/unmarshalling
- ← *numComId* Number of datasets found in the configuration
- ← *pComIdsIdMap* Pointer to an array of structures of type TRDP_DATASET_T
- ← *numDataSet* Number of datasets found in the configuration
- ← *pDataset* Pointer to an array of pointers to structures of type TRDP_DATASET_T

Return values:

TRDP_NO_ERR no error
TRDP_MEM_ERR provided buffer to small
TRDP_PARAM_ERR Parameter error

Types for marshalling / unmarshalling.

The supplied array must be sorted by ComIds. The array must exist during the use of the marshalling functions (until [tlc_terminate\(\)](#)).

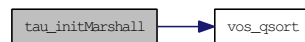
Parameters:

↔ **ppRefCon** Returns a pointer to be used for the reference context of marshalling/unmarshalling
 ← **numComId** Number of datasets found in the configuration
 ← **pComIdDsIdMap** Pointer to an array of structures of type TRDP_DATASET_T
 ← **numDataSet** Number of datasets found in the configuration
 ← **pDataset** Pointer to an array of pointers to structures of type TRDP_DATASET_T

Return values:

TRDP_NO_ERR no error
TRDP_MEM_ERR provided buffer to small
TRDP_PARAM_ERR Parameter error

Here is the call graph for this function:



5.7.2.4 EXT_DECL TRDP_ERR_T tau_marshall (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, TRDP_DATASET_T **ppDSPointer)

marshall function.

Parameters:

← **pRefCon** pointer to user context
 ← **comId** ComId to identify the structure out of a configuration
 ← **pSrc** pointer to received original message
 ← **pDest** pointer to a buffer for the treated message
 ↔ **pDestSize** size of the provide buffer / size of the treated message
 ↔ **ppDSPointer** pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

TRDP_NO_ERR no error
TRDP_MEM_ERR provided buffer to small
TRDP_INIT_ERR marshalling not initialised
TRDP_COMID_ERR comid not existing
TRDP_PARAM_ERR Parameter error

5.7.2.5 EXT_DECL TRDP_ERR_T tau_marshall (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

marshall data set function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *dsId* Data set id to identify the structure out of a configuration
- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message
- ↔ *pDestSize* size of the provide buffer / size of the treated message
- ↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provided buffer to small
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_COMID_ERR* comid not existing
- TRDP_PARAM_ERR* Parameter error

5.7.2.6 EXT_DECL TRDP_ERR_T tau_unmarshall (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

unmarshall function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *comId* ComId to identify the structure out of a configuration
- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message
- ↔ *pDestSize* size of the provide buffer / size of the treated message
- ↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provided buffer to small
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_COMID_ERR* comid not existing

5.7.2.7 EXT_DECL TRDP_ERR_T tau_unmarshallDs (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT8 * *pDest*, UINT32 * *pDestSize*, TRDP_DATASET_T ** *ppDSPointer*)

unmarshall data set function.

Parameters:

- ← *pRefCon* pointer to user context
- ← *dsId* Data set id to identify the structure out of a configuration
- ← *pSrc* pointer to received original message
- ← *pDest* pointer to a buffer for the treated message
- ↔ *pDestSize* size of the provide buffer / size of the treated message
- ↔ *ppDSPointer* pointer to pointer to cached dataset set NULL if not used, set content NULL if unknown

Return values:

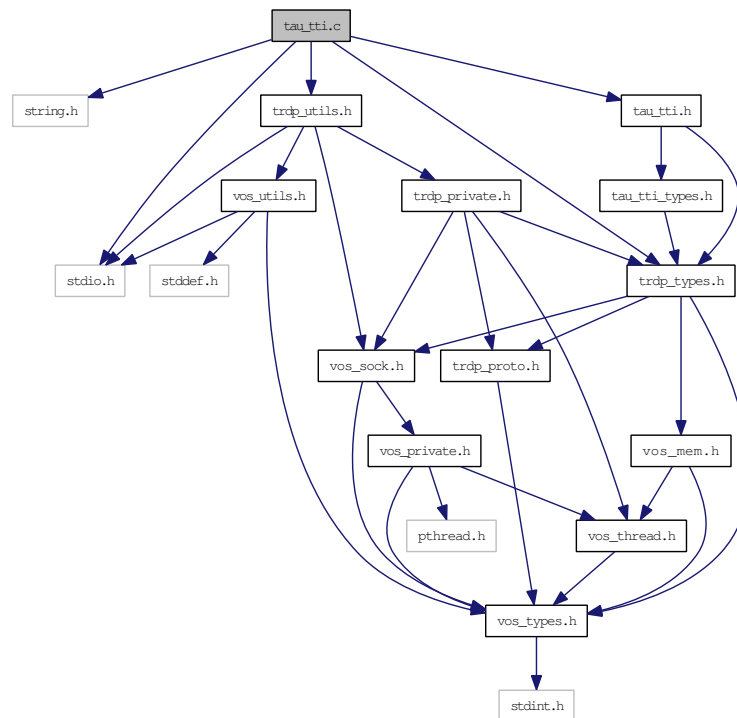
- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provided buffer to small
- TRDP_INIT_ERR* marshalling not initialised
- TRDP_COMID_ERR* comid not existing

5.8 tau_tti.c File Reference

Functions for train topology information access.

```
#include <string.h>
#include <stdio.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "tau_tti.h"
```

Include dependency graph for tau_tti.c:



5.8.1 Detailed Description

Functions for train topology information access.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

[tau_tti.c](#) 1279 2014-08-07 06:18:07Z ahweiss

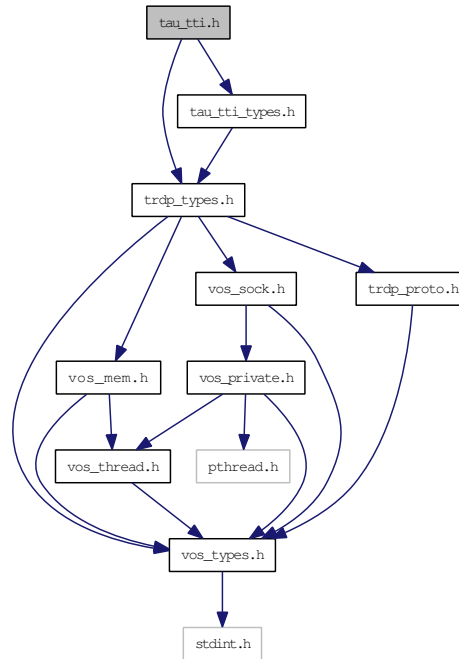
5.9 tau_tti.h File Reference

TRDP utility interface definitions.

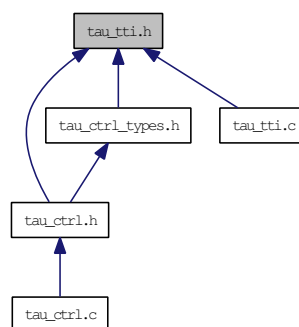
```
#include "trdp_types.h"
```

```
#include "tau_tti_types.h"
```

Include dependency graph for tau_tti.h:



This graph shows which files directly or indirectly include this file:



Functions

- EXT_DECL [TRDP_ERR_T tau_initTtiAccess](#) (void)

Function to init TTI access.

- EXT_DECL [TRDP_ERR_T](#) [tau_getOpTrDirectory](#) ([TRDP_OP_TRAIN_DIR_STATE_T](#) *pOpTrDirState, [TRDP_OP_TRAIN_DIR_T](#) *pOpTrDir, [UINT8](#) const etbId)
Function to retrieve the operational train directory state.
- EXT_DECL [TRDP_ERR_T](#) [tau_getTrDirectory](#) ([TRDP_TRAIN_DIR_T](#) *pTrDir, [UINT8](#) const etbId)
Function to retrieve the operational train directory.
- EXT_DECL [TRDP_ERR_T](#) [tau_getStaticCstInfo](#) ([TRDP_CONSIST_INFO_T](#) *pCstInfo, [TRDP_UUID_T](#) const cstUUID)
Function to retrieve the operational train directory.
- EXT_DECL [TRDP_ERR_T](#) [tau_getTTI](#) ([TRDP_OP_TRAIN_DIR_STATE_T](#) *pOpTrDirState, [TRDP_OP_TRAIN_DIR_T](#) *pOpTrDir, [TRDP_TRAIN_DIR_T](#) *pTrDir, [TRDP_TRAIN_NET_DIR_T](#) *pTrNetDir, [UINT8](#) const etbId)
Function to retrieve the operational train directory.
- EXT_DECL [TRDP_ERR_T](#) [tau_getTrnCstCnt](#) ([UINT16](#) *pTrnCstCnt, [UINT32](#) *pOpTrTopoCnt)
Function to retrieve the total number of consists in the train.
- EXT_DECL [TRDP_ERR_T](#) [tau_getTrnCarCnt](#) ([UINT16](#) *pTrnCarCnt, [UINT32](#) *pOpTrTopoCnt)
Function to retrieve the total number of consists in the train.
- EXT_DECL [TRDP_ERR_T](#) [tau_getCstCarCnt](#) ([UINT16](#) *pCstCarCnt, [UINT32](#) *pOpTrTopoCnt, [const](#) [TRDP_LABEL_T](#) cstLabel)
Function to retrieve the total number of cars in a consist.
- EXT_DECL [TRDP_ERR_T](#) [tau_getCstFctCnt](#) ([UINT16](#) *pCstFctCnt, [UINT32](#) *pOpTrTopoCnt, [const](#) [TRDP_LABEL_T](#) cstLabel)
Function to retrieve the total number of functions in a consist.
- EXT_DECL [TRDP_ERR_T](#) [tau_getCarDevCnt](#) ([UINT16](#) *pDevCnt, [UINT32](#) *pOpTrTopoCnt, [const](#) [TRDP_LABEL_T](#) vehLabel, [const](#) [TRDP_LABEL_T](#) cstLabel)
Function to retrieve the total number of devices in a car.
- EXT_DECL [TRDP_ERR_T](#) [tau_getCstFctInfo](#) ([TRDP_FUNCTION_INFO_T](#) *pFctInfo, [UINT32](#) *pOpTrTopoCnt, [const](#) [TRDP_LABEL_T](#) cstLabel, [UINT16](#) maxFctCnt)
Function to retrieve the function information of the consist.
- EXT_DECL [TRDP_ERR_T](#) [tau_getVehInfo](#) ([TRDP_VEHICLE_INFO_T](#) *pVehInfo, [UINT32](#) *pOpTrTopoCnt, [const](#) [TRDP_LABEL_T](#) vehLabel, [const](#) [TRDP_LABEL_T](#) cstLabel, [UINT32](#) carPropLen)
Function to retrieve the car information of a consist's car.
- EXT_DECL [TRDP_ERR_T](#) [tau_getCstInfo](#) ([TRDP_CONSIST_INFO_T](#) *pCstInfo, [UINT32](#) *pOpTrTopoCnt, [const](#) [TRDP_LABEL_T](#) cstLabel)
Function to retrieve the consist information of a train's consist.
- EXT_DECL [TRDP_ERR_T](#) [tau_getVehOrient](#) ([UINT8](#) *pCarOrient, [UINT8](#) *pCstOrient, [UINT32](#) *pOpTrTopoCnt, [TRDP_LABEL_T](#) vehLabel, [TRDP_LABEL_T](#) cstLabel)
Function to retrieve the orientation of the given vehicle.

- EXT_DECL [TRDP_ERR_T tau_getIecCarOrient](#) (UINT8 *pIecCarOrient, UINT8 *pIecCstOrient, UINT32 *pOpTrTopoCnt, TRDP_LABEL_T vehLabel, TRDP_LABEL_T cstLabel)

Function to retrieve the leading car depending IEC orientation of the given consist.

5.9.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- train topology information access

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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[tau_tti.h](#) 1323 2014-08-29 14:09:08Z bloehr

5.9.2 Function Documentation

5.9.2.1 EXT_DECL TRDP_ERR_T tau_getCarDevCnt (UINT16 *pDevCnt, UINT32 *pOpTrTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

Function to retrieve the total number of devices in a car.

Parameters:

- *pDevCnt* Pointer to the device count to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to a vehicle label. NULL means own vehicle if cstLabel == NULL.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.2 EXT_DECL TRDP_ERR_T tau_getCstCarCnt (UINT16 * *pCstCarCnt*, UINT32 * *pOpTrTopoCnt*, const TRDP_LABEL_T *cstLabel*)

Function to retrieve the total number of cars in a consist.

Parameters:

- *pCstCarCnt* Pointer to the number of cars to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.3 EXT_DECL TRDP_ERR_T tau_getCstFctCnt (UINT16 * *pCstFctCnt*, UINT32 * *pOpTrTopoCnt*, const TRDP_LABEL_T *cstLabel*)

Function to retrieve the total number of functions in a consist.

Parameters:

- *pCstFctCnt* Pointer to the number of functions to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.4 EXT_DECL TRDP_ERR_T tau_getCstFctInfo (TRDP_FUNCTION_INFO_T * *pFctInfo*, UINT32 * *pOpTrTopoCnt*, const TRDP_LABEL_T *cstLabel*, UINT16 *maxFctCnt*)

Function to retrieve the function information of the consist.

Parameters:

- *pFctInfo* Pointer to function info list to be returned. Memory needs to be provided by application. Set NULL if not used.
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.
- ← *maxFctCnt* Maximal number of functions to be returned in provided buffer.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.5 EXT_DECL TRDP_ERR_T tau_getCstInfo (TRDP_CONSIST_INFO_T * *pCstInfo*, UINT32 * *pOpTrTopoCnt*, const TRDP_LABEL_T *cstLabel*)

Function to retrieve the consist information of a train's consist.

Parameters:

- *pCstInfo* Pointer to the consist info to be returned.
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.6 EXT_DECL TRDP_ERR_T tau_getIecCarOrient (UINT8 * *pIecCarOrient*, UINT8 * *pIecCstOrient*, UINT32 * *pOpTrTopoCnt*, TRDP_LABEL_T *vehLabel*, TRDP_LABEL_T *cstLabel*)

Function to retrieve the leading car depending IEC orientation of the given consist.

Parameters:

- *pIecCarOrient* Pointer to the IEC car orientation to be returned
- *pIecCstOrient* Pointer to the IEC consist orientation to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* *vehLabel* = NULL means own vehicle if *cstLabel* == NULL
- ← *cstLabel* *cstLabel* = NULL means own consist

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.7 EXT_DECL TRDP_ERR_T tau_getOpTrDirectory (TRDP_OP_TRAIN_DIR_STATE_T * *pOpTrDirState*, TRDP_OP_TRAIN_DIR_T * *pOpTrDir*, UINT8 const *etbId*)

Function to retrieve the operational train directory state.

Parameters:

- *pOpTrDirState* Pointer to an operational train directory state structure to be returned.
- *pOpTrDir* Pointer to an operational train directory structure to be returned.
- ← *etbId* Identifier of the ETB the train directory state is asked for.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.8 EXT_DECL TRDP_ERR_T tau_getStaticCstInfo (TRDP_CONSIST_INFO_T * *pCstInfo*, TRDP_UUID_T const *cstUUID*)

Function to retrieve the operational train directory.

Parameters:

- *pCstInfo* Pointer to a consist info structure to be returned.
- ← *cstUUID* UUID of the consist the consist info is requested for.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.9 EXT_DECL TRDP_ERR_T tau_getTrDirectory (TRDP_TRAIN_DIR_T * *pTrDir*, UINT8 const *etbId*)

Function to retrieve the operational train directory.

Parameters:

- *pTrDir* Pointer to a train directory structure to be returned.
- ← *etbId* Identifier of the ETB the train directory is requested for.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.10 EXT_DECL TRDP_ERR_T tau_getTrnCarCnt (UINT16 * *pTrnCarCnt*, UINT32 * *pOpTrTopoCnt*)

Function to retrieve the total number of consists in the train.

Parameters:

- *pTrnCarCnt* Pointer to the number of cars to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.11 EXT_DECL TRDP_ERR_T tau_getTrnCstCnt (UINT16 * *pTrnCstCnt*, UINT32 * *pOpTrTopoCnt*)

Function to retrieve the total number of consists in the train.

Parameters:

- *pTrnCstCnt* Pointer to the number of consists to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.12 EXT_DECL TRDP_ERR_T tau_getTTI (TRDP_OP_TRAIN_DIR_STATE_T * *pOpTrDirState*, TRDP_OP_TRAIN_DIR_T * *pOpTrDir*, TRDP_TRAIN_DIR_T * *pTrDir*, TRDP_TRAIN_NET_DIR_T * *pTrNetDir*, UINT8 const *etbId*)

Function to retrieve the operational train directory.

Parameters:

- *pOpTrDirState* Pointer to an operational train directory state structure to be returned.
- *pOpTrDir* Pointer to an operational train directory structure to be returned.
- *pTrDir* Pointer to a train directory structure to be returned.
- *pTrNetDir* Pointer to a train network directory structure to be returned.
- ← *etbId* Identifier of the ETB the train directory state is requested for.

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.13 EXT_DECL TRDP_ERR_T tau_getVehInfo (TRDP_VEHICLE_INFO_T * *pVehInfo*, UINT32 * *pOpTrTopoCnt*, const TRDP_LABEL_T *vehLabel*, const TRDP_LABEL_T *cstLabel*, UINT32 *carPropLen*)

Function to retrieve the car information of a consist's car.

Parameters:

- *pVehInfo* Pointer to the vehicle info to be returned.
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* Pointer to a vehicle label. NULL means own vehicle if *cstLabel* refers to own consist.
- ← *cstLabel* Pointer to a consist label. NULL means own consist.
- ← *carPropLen* Size of properties

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.14 EXT_DECL TRDP_ERR_T tau_getVehOrient (UINT8 * *pCarOrient*, UINT8 * *pCstOrient*, UINT32 * *pOpTrTopoCnt*, TRDP_LABEL_T *vehLabel*, TRDP_LABEL_T *cstLabel*)

Function to retrieve the orientation of the given vehicle.

Parameters:

- *pCarOrient* Pointer to the vehicle orientation to be returned
- *pCstOrient* Pointer to the consist orientation to be returned
- ↔ *pOpTrTopoCnt* Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
- ← *vehLabel* *vehLabel* = NULL means own vehicle if *cstLabel* == NULL
- ← *cstLabel* *cstLabel* = NULL means own consist

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* Parameter error

5.9.2.15 EXT_DECL TRDP_ERR_T tau_initTtiAccess (void)

Function to init TTI access.

Return values:

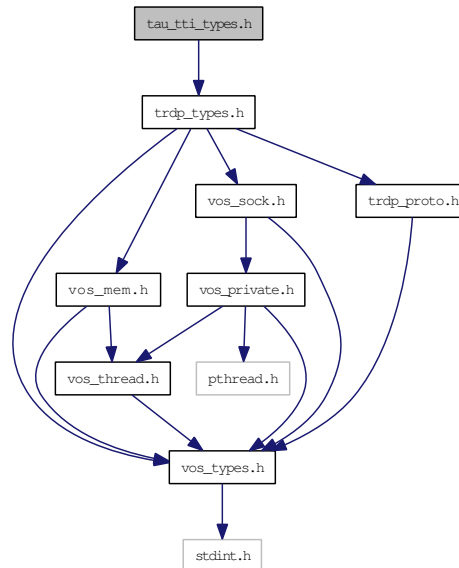
- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* initialisation error

5.10 tau_tti_types.h File Reference

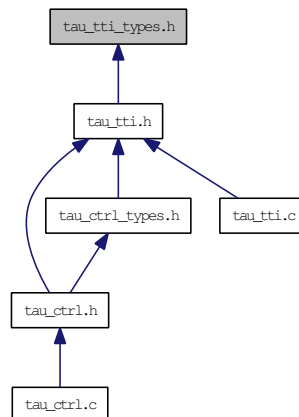
TRDP utility interface definitions.

```
#include "trdp_types.h"
```

Include dependency graph for tau_tti_types.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [GNU_PACKED](#)
Types for ETB control.
- struct [TRDP_ETB_INFO_T](#)
Types for train configuration information.

- struct [TRDP_CLTR_CST_INFO_T](#)
Closed train consists information.
- struct [TRDP_PROP_T](#)
Application defined properties.
- struct [TRDP_FUNCTION_INFO_T](#)
function/device information structure
- struct [TRDP_VEHICLE_INFO_T](#)
vehicle information structure
- struct [TRDP_CONSIST_INFO_T](#)
consist information structure
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
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- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [GNU_PACKED](#)
Types for ETB control.

Defines

- #define [TRDP_MAX_CST_CNT](#) 63
max number of consists per train
- #define [TRDP_MAX_VEH_CNT](#) 63
max number of vehicles per train

5.10.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- train topology information access type definitions acc. to IEC61375-2-3

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

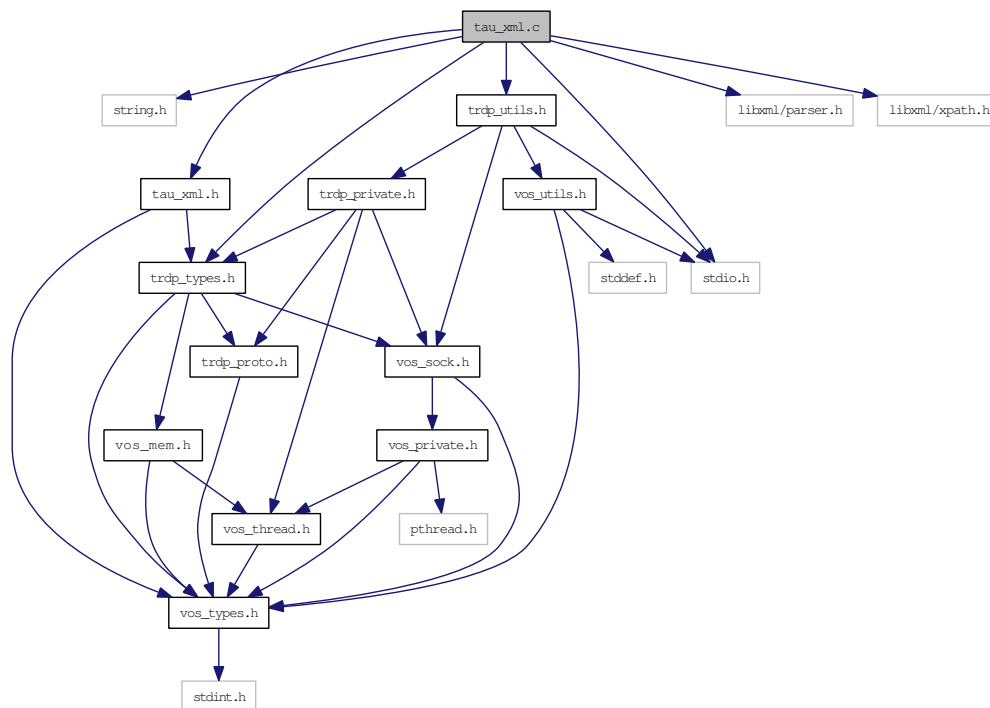
[tau_tti_types.h](#) 1335 2014-09-30 07:11:05Z ahweiss

5.11 tau_xml.c File Reference

Functions for XML file parsing.

```
#include <string.h>
#include <stdio.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "tau_xml.h"
#include "libxml/parser.h"
#include "libxml/xpath.h"
```

Include dependency graph for tau_xml.c:



Defines

- `#define TRDP_SDT_DEFAULT_SMI2 0`
Default SDT safe message identifier.
- `#define TRDP_SDT_DEFAULT_NRXSAFE 3`
Default SDT timeout cycles.
- `#define TRDP_SDT_DEFAULT_NGUARD 100`
Default SDT initial timeout cycles.
- `#define TRDP_SDT_DEFAULT_CMTHR 10`

Default SDT chan.

Functions

- EXT_DECL [TRDP_ERR_T](#) [tau_prepareXmlDoc](#) (const [CHAR8](#) *pFileName, [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd)
Load XML file into DOM tree, prepare XPath context.
- EXT_DECL void [tau_freeXmlDoc](#) ([TRDP_XML_DOC_HANDLE_T](#) *pDocHnd)
Free all the memory allocated by tau_prepareXmlDoc.
- EXT_DECL [TRDP_ERR_T](#) [tau_readXmlDeviceConfig](#) (const [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd, [TRDP_MEM_CONFIG_T](#) *pMemConfig, [TRDP_DBG_CONFIG_T](#) *pDbgConfig, [UINT32](#) *pNumComPar, [TRDP_COM_PAR_T](#) **ppComPar, [UINT32](#) *pNumIfConfig, [TRDP_IF_CONFIG_T](#) **ppIfConfig)
Function to read the TRDP device configuration parameters out of the XML configuration file.
- EXT_DECL [TRDP_ERR_T](#) [tau_readXmlDatasetConfig](#) (const [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd, [UINT32](#) *pNumComId, [TRDP_COMID_DSID_MAP_T](#) **ppComIdDsIdMap, [UINT32](#) *pNumDataset, [papTRDP_DATASET_T](#) papDataset)
Function to read the DataSet configuration out of the XML configuration file.
- EXT_DECL [TRDP_ERR_T](#) [tau_readXmlInterfaceConfig](#) (const [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd, const [CHAR8](#) *pIfName, [TRDP_PROCESS_CONFIG_T](#) *pProcessConfig, [TRDP_PD_CONFIG_T](#) *pPdConfig, [TRDP_MD_CONFIG_T](#) *pMdConfig, [UINT32](#) *pNumExchgPar, [TRDP_EXCHG_PAR_T](#) **ppExchgPar)
Read the interface relevant telegram parameters (except data set configuration) out of the configuration file
- EXT_DECL void [tau_freeTelegrams](#) ([UINT32](#) numExchgPar, [TRDP_EXCHG_PAR_T](#) *pExchgPar)
Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

5.11.1 Detailed Description

Functions for XML file parsing.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Tomas Svoboda, UniContorls a.s.

Remarks:

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Id

[tau_xml.c](#) 1265 2014-07-14 16:11:53Z bloehr

5.11.2 Define Documentation**5.11.2.1 #define TRDP_SDT_DEFAULT_CMTTHR 10**

Default SDT chan.
monitoring threshold

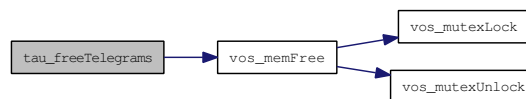
5.11.3 Function Documentation**5.11.3.1 EXT_DECL void tau_freeTelegrams (UINT32 *numExchgPar*, TRDP_EXCHG_PAR_T * *pExchgPar*)**

Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

Parameters:

- ← *numExchgPar* Number of telegram configurations in the array
- ← *pExchgPar* Pointer to array of telegram configurations

Here is the call graph for this function:

**5.11.3.2 EXT_DECL void tau_freeXmlDoc (TRDP_XML_DOC_HANDLE_T * *pDocHnd*)**

Free all the memory allocated by tau_prepareXmlDoc.

Parameters:

- ← *pDocHnd* Handle of the parsed XML file

5.11.3.3 EXT_DECL TRDP_ERR_T tau_prepareXmlDoc (const CHAR8 * *pFileName*, TRDP_XML_DOC_HANDLE_T * *pDocHnd*)

Load XML file into DOM tree, prepare XPath context.

Parameters:

- ← *pFileName* Path and filename of the xml configuration file
- *pDocHnd* Handle of the parsed XML file

Return values:

TRDP_NO_ERR no error
TRDP_PARAM_ERR File does not exist

5.11.3.4 EXT_DECL TRDP_ERR_T tau_readXmlDatasetConfig (const TRDP_XML_DOC_HANDLE_T * *pDocHnd*, UINT32 * *pNumComId*, TRDP_COMID_DSID_MAP_T ** *ppComIdsIdMap*, UINT32 * *pNumDataset*, papTRDP_DATASET_T *papDataset*)

Function to read the DataSet configuration out of the XML configuration file.

Parameters:

← *pDocHnd* Handle of the XML document prepared by tau_prepareXmlDoc
→ *pNumComId* Pointer to the number of entries in the ComId DatasetId mapping list
→ *ppComIdsIdMap* Pointer to an array of a structures of type [TRDP_COMID_DSID_MAP_T](#)
→ *pNumDataset* Pointer to the number of datasets found in the configuration
→ *papDataset* Pointer to an array of pointers to a structures of type TRDP_DATASET_T

Return values:

TRDP_NO_ERR no error
TRDP_MEM_ERR provided buffer to small
TRDP_PARAM_ERR File not existing

5.11.3.5 EXT_DECL TRDP_ERR_T tau_readXmlDeviceConfig (const TRDP_XML_DOC_HANDLE_T * *pDocHnd*, TRDP_MEM_CONFIG_T * *pMemConfig*, TRDP_DBG_CONFIG_T * *pDbgConfig*, UINT32 * *pNumComPar*, TRDP_COM_PAR_T ** *ppComPar*, UINT32 * *pNumIfConfig*, TRDP_IF_CONFIG_T ** *ppIfConfig*)

Function to read the TRDP device configuration parameters out of the XML configuration file.

Parameters:

← *pDocHnd* Handle of the XML document prepared by tau_prepareXmlDoc
→ *pMemConfig* Memory configuration
→ *pDbgConfig* Debug printout configuration for application use
→ *pNumComPar* Number of configured com parameters
→ *ppComPar* Pointer to array of com parameters
→ *pNumIfConfig* Number of configured interfaces
→ *ppIfConfig* Pointer to an array of interface parameter sets

Return values:

TRDP_NO_ERR no error
TRDP_MEM_ERR provided buffer to small
TRDP_PARAM_ERR File not existing

5.11.3.6 EXT_DECL TRDP_ERR_T tau_readXmlInterfaceConfig (const TRDP_XML_DOC_HANDLE_T * *pDocHnd*, const CHAR8 * *pIfName*, TRDP_PROCESS_CONFIG_T * *pProcessConfig*, TRDP_PD_CONFIG_T * *pPdConfig*, TRDP_MD_CONFIG_T * *pMdConfig*, UINT32 * *pNumExchgPar*, TRDP_EXCHG_PAR_T ** *ppExchgPar*)

Read the interface relevant telegram parameters (except data set configuration) out of the configuration file .

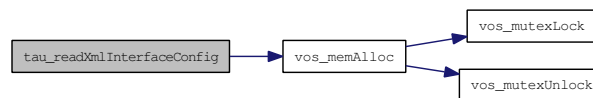
Parameters:

- ← *pDocHnd* Handle of the XML document prepared by tau_prepareXmlDoc
- ← *pIfName* Interface name
- *pProcessConfig* TRDP process (session) configuration for the interface
- *pPdConfig* PD default configuration for the interface
- *pMdConfig* MD default configuration for the interface
- *pNumExchgPar* Number of configured telegrams
- *ppExchgPar* Pointer to array of telegram configurations

Return values:

- TRDP_NO_ERR** no error
- TRDP_MEM_ERR** provided buffer to small
- TRDP_PARAM_ERR** File not existing

Here is the call graph for this function:



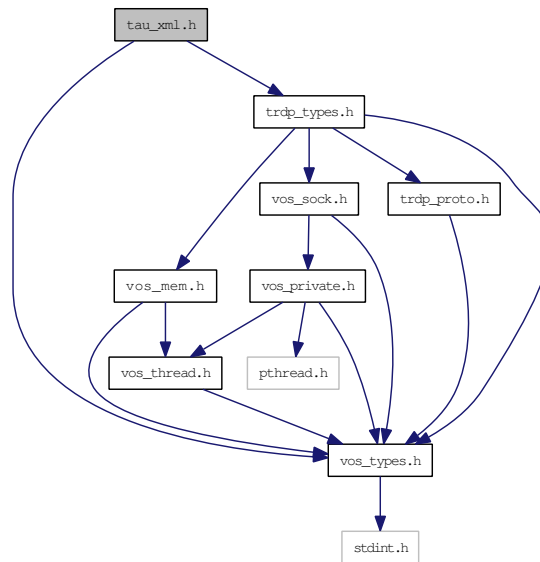
5.12 tau_xml.h File Reference

TRDP utility interface definitions.

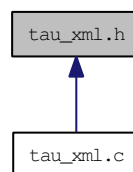
```
#include "vos_types.h"
```

```
#include "trdp_types.h"
```

Include dependency graph for tau_xml.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [TRDP_SDT_PAR_T](#)
Types to read out the XML configuration.
- struct [TRDP_DBG_CONFIG_T](#)
Control for debug output device/file on application level.
- struct [TRDP_XML_DOC_HANDLE_T](#)
Parsed XML document handle.

Enumerations

- enum [TRDP_DBG_OPTION_T](#) {
[TRDP_DBG_DEFAULT](#) = 0,
[TRDP_DBG_OFF](#) = 0x01,
[TRDP_DBG_ERR](#) = 0x02,
[TRDP_DBG_WARN](#) = 0x04,
[TRDP_DBG_INFO](#) = 0x08,
[TRDP_DBG_DBG](#) = 0x10,
[TRDP_DBG_TIME](#) = 0x20,
[TRDP_DBG_LOC](#) = 0x40,
[TRDP_DBG_CAT](#) = 0x80 }

Control for debug output format on application level.

Functions

- EXT_DECL [TRDP_ERR_T](#) [tau_prepareXmlDoc](#) (const [CHAR8](#) *pFileName, [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd)
Load XML file into DOM tree, prepare XPath context.
- EXT_DECL void [tau_freeXmlDoc](#) ([TRDP_XML_DOC_HANDLE_T](#) *pDocHnd)
Free all the memory allocated by tau_prepareXmlDoc.
- EXT_DECL [TRDP_ERR_T](#) [tau_readXmlDeviceConfig](#) (const [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd, [TRDP_MEM_CONFIG_T](#) *pMemConfig, [TRDP_DBG_CONFIG_T](#) *pDbgConfig, [UINT32](#) *pNumComPar, [TRDP_COM_PAR_T](#) **ppComPar, [UINT32](#) *pNumIfConfig, [TRDP_IF_CONFIG_T](#) **ppIfConfig)
Function to read the TRDP device configuration parameters out of the XML configuration file.
- EXT_DECL [TRDP_ERR_T](#) [tau_readXmlInterfaceConfig](#) (const [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd, const [CHAR8](#) *pIfName, [TRDP_PROCESS_CONFIG_T](#) *pProcessConfig, [TRDP_PD_CONFIG_T](#) *pPdConfig, [TRDP_MD_CONFIG_T](#) *pMdConfig, [UINT32](#) *pNumExchgPar, [TRDP_EXCHG_PAR_T](#) **ppExchgPar)
Read the interface relevant telegram parameters (except data set configuration) out of the configuration file
- EXT_DECL [TRDP_ERR_T](#) [tau_readXmlDatasetConfig](#) (const [TRDP_XML_DOC_HANDLE_T](#) *pDocHnd, [UINT32](#) *pNumComId, [TRDP_COMID_DSID_MAP_T](#) **ppComIdDsIdMap, [UINT32](#) *pNumDataset, [papTRDP_DATASET_T](#) papDataset)
Function to read the DataSet configuration out of the XML configuration file.
- EXT_DECL void [tau_freeTelegrams](#) ([UINT32](#) numExchgPar, [TRDP_EXCHG_PAR_T](#) *pExchgPar)
Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

5.12.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- read xml configuration interpreter

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss (initial version)

Remarks:

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Id

[tau_xml.h](#) 1298 2014-08-25 14:58:54Z bloehr

5.12.2 Enumeration Type Documentation

5.12.2.1 enum TRDP_DBG_OPTION_T

Control for debug output format on application level.

Enumerator:

TRDP_DBG_DEFAULT Printout default.

TRDP_DBG_OFF Printout off.

TRDP_DBG_ERR Printout error.

TRDP_DBG_WARN Printout warning and error.

TRDP_DBG_INFO Printout info, warning and error.

TRDP_DBG_DBG Printout debug, info, warning and error.

TRDP_DBG_TIME Printout timestamp.

TRDP_DBG_LOC Printout file name and line.

TRDP_DBG_CAT Printout category (DBG, INFO, WARN, ERR).

5.12.3 Function Documentation

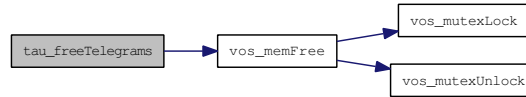
5.12.3.1 EXT_DECL void tau_freeTelegrams (UINT32 numExchgPar, TRDP_EXCHG_PAR_T * pExchgPar)

Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

Parameters:

- ← *numExchgPar* Number of telegram configurations in the array
- ← *pExchgPar* Pointer to array of telegram configurations

Here is the call graph for this function:



5.12.3.2 EXT_DECL void tau_freeXmlDoc (TRDP_XML_DOC_HANDLE_T * *pDocHnd*)

Free all the memory allocated by `tau_prepareXmlDoc`.

Parameters:

- ← *pDocHnd* Handle of the parsed XML file
- ← *pDocHnd* Handle of the parsed XML file

5.12.3.3 EXT_DECL TRDP_ERR_T tau_prepareXmlDoc (const CHAR8 * *pFileName*, TRDP_XML_DOC_HANDLE_T * *pDocHnd*)

Load XML file into DOM tree, prepare XPath context.

Parameters:

- ← *pFileName* Path and filename of the xml configuration file
- *pDocHnd* Handle of the parsed XML file

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* File does not exist

5.12.3.4 EXT_DECL TRDP_ERR_T tau_readXmlDatasetConfig (const TRDP_XML_DOC_HANDLE_T * *pDocHnd*, UINT32 * *pNumComId*, TRDP_COMID_DSID_MAP_T ** *ppComIdsIdMap*, UINT32 * *pNumDataset*, papTRDP_DATASET_T *papDataset*)

Function to read the DataSet configuration out of the XML configuration file.

Parameters:

- ← *pDocHnd* Handle of the XML document prepared by `tau_prepareXmlDoc`
- *pNumComId* Pointer to the number of entries in the ComId DatasetId mapping list
- *ppComIdsIdMap* Pointer to an array of a structures of type [TRDP_COMID_DSID_MAP_T](#)
- *pNumDataset* Pointer to the number of datasets found in the configuration

→ *papDataset* Pointer to an array of pointers to a structures of type TRDP_DATASET_T

Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR provided buffer to small

TRDP_PARAM_ERR File not existing

5.12.3.5 EXT_DECL TRDP_ERR_T tau_readXmlDeviceConfig (const TRDP_XML_DOC_HANDLE_T * *pDocHnd*, TRDP_MEM_CONFIG_T * *pMemConfig*, TRDP_DBG_CONFIG_T * *pDbgConfig*, UINT32 * *pNumComPar*, TRDP_COM_PAR_T ** *ppComPar*, UINT32 * *pNumIfConfig*, TRDP_IF_CONFIG_T ** *ppIfConfig*)

Function to read the TRDP device configuration parameters out of the XML configuration file.

Parameters:

← *pDocHnd* Handle of the XML document prepared by tau_prepareXmlDoc

→ *pMemConfig* Memory configuration

→ *pDbgConfig* Debug printout configuration for application use

→ *pNumComPar* Number of configured com parameters

→ *ppComPar* Pointer to array of com parameters

→ *pNumIfConfig* Number of configured interfaces

→ *ppIfConfig* Pointer to an array of interface parameter sets

Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR provided buffer to small

TRDP_PARAM_ERR File not existing

5.12.3.6 EXT_DECL TRDP_ERR_T tau_readXmlInterfaceConfig (const TRDP_XML_DOC_HANDLE_T * *pDocHnd*, const CHAR8 * *pIfName*, TRDP_PROCESS_CONFIG_T * *pProcessConfig*, TRDP_PD_CONFIG_T * *pPdConfig*, TRDP_MD_CONFIG_T * *pMdConfig*, UINT32 * *pNumExchgPar*, TRDP_EXCHG_PAR_T ** *ppExchgPar*)

Read the interface relevant telegram parameters (except data set configuration) out of the configuration file

Parameters:

← *pDocHnd* Handle of the XML document prepared by tau_prepareXmlDoc

← *pIfName* Interface name

→ *pProcessConfig* TRDP process (session) configuration for the interface

→ *pPdConfig* PD default configuration for the interface

→ *pMdConfig* MD default configuration for the interface

→ *pNumExchgPar* Number of configured telegrams

→ *ppExchgPar* Pointer to array of telegram configurations

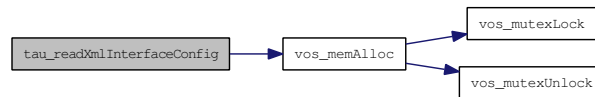
Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR provided buffer to small

TRDP_PARAM_ERR File not existing

Here is the call graph for this function:



5.13 trdp_dllmain.c File Reference

Windows DLL main function.

5.13.1 Detailed Description

Windows DLL main function.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss, Bombardier

Remarks:

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Id

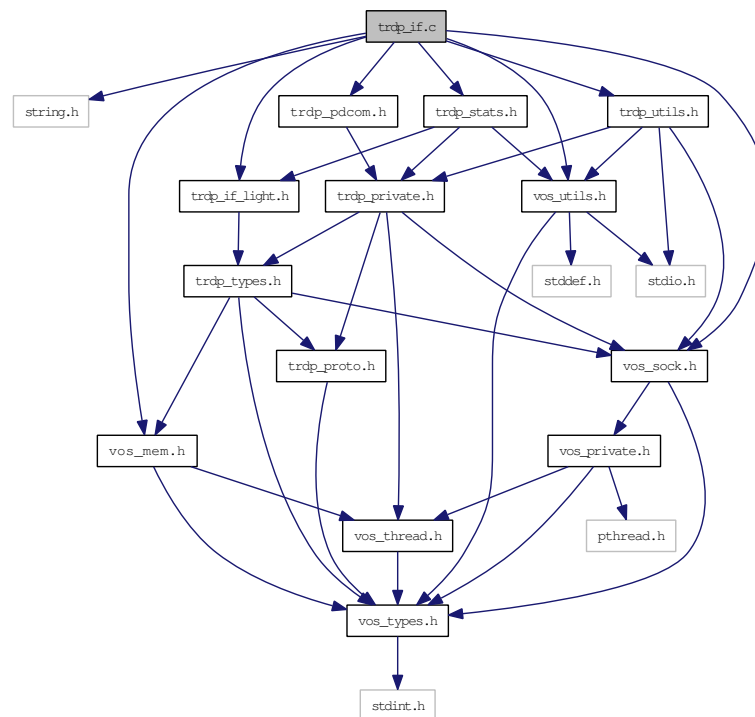
[trdp_dllmain.c](#) 1065 2013-09-06 08:12:09Z aweiss

5.14 trdp_if.c File Reference

Functions for ECN communication.

```
#include <string.h>
#include "trdp_if_light.h"
#include "trdp_utils.h"
#include "trdp_pdcom.h"
#include "trdp_stats.h"
#include "vos_sock.h"
#include "vos_mem.h"
#include "vos_utils.h"
```

Include dependency graph for trdp_if.c:



Functions

- **BOOL8** [trdp_isValidSession](#) ([TRDP_APP_SESSION_T](#) pSessionHandle)
Check if the session handle is valid.
- [TRDP_APP_SESSION_T](#) * [trdp_sessionQueue](#) (void)
Get the session queue head pointer.
- **EXT_DECL** [TRDP_ERR_T](#) [t1c_init](#) (const [TRDP_PRINT_DBG_T](#) pPrintDebugString, const [TRDP_MEM_CONFIG_T](#) *pMemConfig)

Initialize the TRDP stack.

- EXT_DECL [TRDP_ERR_T](#) [tlc_openSession](#) ([TRDP_APP_SESSION_T](#) *pAppHandle, [TRDP_IP_ADDR_T](#) ownIpAddr, [TRDP_IP_ADDR_T](#) leaderIpAddr, const [TRDP_MARSHALL_CONFIG_T](#) *pMarshall, const [TRDP_PD_CONFIG_T](#) *pPdDefault, const [TRDP_MD_CONFIG_T](#) *pMdDefault, const [TRDP_PROCESS_CONFIG_T](#) *pProcessConfig)

Open a session with the TRDP stack.

- EXT_DECL [TRDP_ERR_T](#) [tlc_closeSession](#) ([TRDP_APP_SESSION_T](#) appHandle)

Close a session.

- EXT_DECL [TRDP_ERR_T](#) [tlc_terminate](#) (void)

Un-Initialize.

- EXT_DECL [TRDP_ERR_T](#) [tlc_reinitSession](#) ([TRDP_APP_SESSION_T](#) appHandle)

Re-Initialize.

- const char * [tlc_getVersionString](#) (void)

Return a human readable version representation.

- EXT_DECL const [TRDP_VERSION_T](#) * [tlc_getVersion](#) (void)

Return version.

- [TRDP_ERR_T](#) [tlp_setRedundant](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT32 redId, BOOL8 leader)

Do not send non-redundant PDs when we are follower.

- EXT_DECL [TRDP_ERR_T](#) [tlp_getRedundant](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT32 redId, BOOL8 *pLeader)

Get status of redundant ComIds.

- EXT_DECL [TRDP_ERR_T](#) [tlc_setETBTopoCount](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT32 etbTopoCnt)

Set new topoCount for trainwide communication.

- EXT_DECL [TRDP_ERR_T](#) [tlc_setOpTrainTopoCount](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT32 opTrnTopoCnt)

Set new operational train topoCount for direction/orientation sensitive communication.

- EXT_DECL [TRDP_ERR_T](#) [tlp_publish](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) *pPubHandle, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, UINT32 interval, UINT32 redId, [TRDP_FLAGS_T](#) pktFlags, const [TRDP_SEND_PARAM_T](#) *pSendParam, const UINT8 *pData, UINT32 dataSize)

Prepare for sending PD messages.

- EXT_DECL [TRDP_ERR_T](#) [tlp_republish](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) pubHandle, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, const UINT8 *pData, UINT32 dataSize)

Prepare for sending PD messages.

- [TRDP_ERR_T](#) [tlp_unpublish](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) pubHandle)

Stop sending PD messages.

- `TRDP_ERR_T tlp_put` (`TRDP_APP_SESSION_T` appHandle, `TRDP_PUB_T` pubHandle, const `UINT8 *pData`, `UINT32` dataSize)

Update the process data to send.

- `EXT_DECL TRDP_ERR_T tlc_getInterval` (`TRDP_APP_SESSION_T` appHandle, `TRDP_TIME_T` *pInterval, `TRDP_FDS_T` *pFileDesc, `INT32` *pNoDesc)

Get the lowest time interval for PDs.

- `EXT_DECL TRDP_ERR_T tlc_process` (`TRDP_APP_SESSION_T` appHandle, `TRDP_FDS_T` *pRfds, `INT32` *pCount)

Work loop of the TRDP handler.

- `EXT_DECL TRDP_ERR_T tlp_request` (`TRDP_APP_SESSION_T` appHandle, `TRDP_SUB_T` subHandle, `UINT32` comId, `UINT32` etbTopoCnt, `UINT32` opTrnTopoCnt, `TRDP_IP_ADDR_T` srcIpAddr, `TRDP_IP_ADDR_T` destIpAddr, `UINT32` redId, `TRDP_FLAGS_T` pktFlags, const `TRDP_SEND_PARAM_T` *pSendParam, const `UINT8 *pData`, `UINT32` dataSize, `UINT32` replyComId, `TRDP_IP_ADDR_T` replyIpAddr)

Initiate sending PD messages (PULL).

- `EXT_DECL TRDP_ERR_T tlp_subscribe` (`TRDP_APP_SESSION_T` appHandle, `TRDP_SUB_T` *pSubHandle, const void *pUserRef, `TRDP_PD_CALLBACK_T` pfCbFunction, `UINT32` comId, `UINT32` etbTopoCnt, `UINT32` opTrnTopoCnt, `TRDP_IP_ADDR_T` srcIpAddr, `TRDP_IP_ADDR_T` destIpAddr, `TRDP_FLAGS_T` pktFlags, `UINT32` timeout, `TRDP_TO_BEHAVIOR_T` toBehavior)

Prepare for receiving PD messages.

- `EXT_DECL TRDP_ERR_T tlp_unsubscribe` (`TRDP_APP_SESSION_T` appHandle, `TRDP_SUB_T` subHandle)

Stop receiving PD messages.

- `EXT_DECL TRDP_ERR_T tlp_resubscribe` (`TRDP_APP_SESSION_T` appHandle, `TRDP_SUB_T` subHandle, `UINT32` etbTopoCnt, `UINT32` opTrnTopoCnt, `TRDP_IP_ADDR_T` srcIpAddr, `TRDP_IP_ADDR_T` destIpAddr)

Reprepare for receiving PD messages.

- `EXT_DECL TRDP_ERR_T tlp_get` (`TRDP_APP_SESSION_T` appHandle, `TRDP_SUB_T` subHandle, `TRDP_PD_INFO_T` *pPdInfo, `UINT8 *pData`, `UINT32 *pDataSize`)

Get the last valid PD message.

5.14.1 Detailed Description

Functions for ECN communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_if.c](#) 1378 2014-12-01 16:26:17Z ahweiss

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed

BL 2014-06-03: Do not return error on data-less tlp_request

BL 2014-06-02: Ticket #41: Sequence counter handling fixed Removing receive queue on session close added BL 2014-02-27: Ticket #24: [trdp_if.c](#) won't compile without MD_SUPPORT

BL 2013-06-24: ID 125: Time-out handling and ready descriptors fixed

BL 2013-02-01: ID 53: Zero dataset size fixed for PD

BL 2013-01-25: ID 20: Redundancy handling fixed

BL 2013-01-08: LADDER: Removed/Changed some ladder specific code in [tlp_subscribe\(\)](#)

BL 2012-12-03: ID 1: "using uninitialized PD_ELE_T.pullIpAddress variable" ID 2: "uninitialized PD_ELE_T newPD → pNext in tlp_subscribe()"

5.14.2 Function Documentation**5.14.2.1 EXT_DECL TRDP_ERR_T tlc_closeSession (TRDP_APP_SESSION_T appHandle)**

Close a session.

Clean up and release all resources of that session

Parameters:

← *appHandle* The handle returned by tlc_openSession

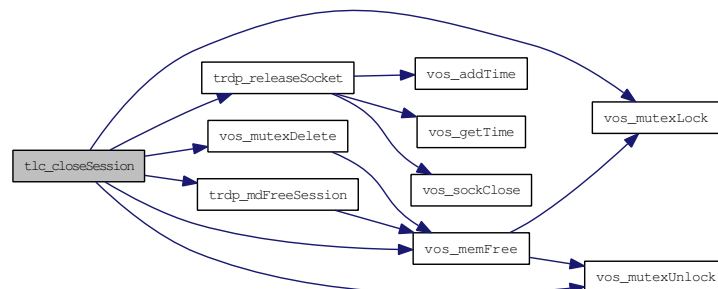
Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR handle NULL

Here is the call graph for this function:



5.14.2.2 EXT_DECL TRDP_ERR_T tlc_getInterval (TRDP_APP_SESSION_T *appHandle*, TRDP_TIME_T **pInterval*, TRDP_FDS_T **pFileDesc*, INT32 **pNoDesc*)

Get the lowest time interval for PDs.

Return the maximum time interval suitable for 'select()' so that we can send due PD packets in time. If the PD send queue is empty, return zero time

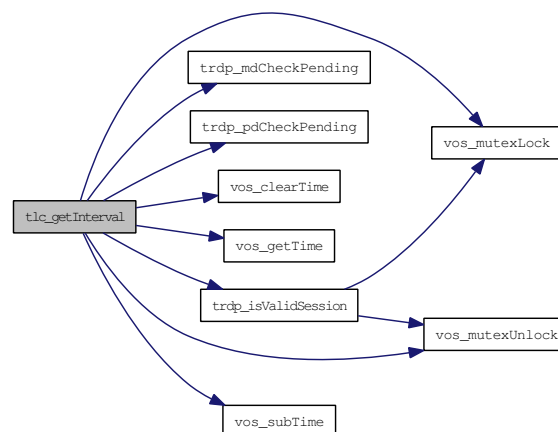
Parameters:

- ← *appHandle* The handle returned by tlc_openSession
- *pInterval* pointer to needed interval
- ↔ *pFileDesc* pointer to file descriptor set
- *pNoDesc* pointer to put no of highest used descriptors (for select())

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.14.2.3 EXT_DECL const TRDP_VERSION_T* tlc_getVersion (void)

Return version.

Return pointer to version structure

Return values:

TRDP_VERSION_T

5.14.2.4 const char* tlc_getVersionString (void)

Return a human readable version representation.

Return string in the form 'v.r.u.b'

Return values:

const string

5.14.2.5 EXT_DECL TRDP_ERR_T tlc_init (const TRDP_PRINT_DBG_T *pPrintDebugString*, const TRDP_MEM_CONFIG_T **pMemConfig*)

Initialize the TRDP stack.

tlc_init returns in pAppHandle a unique handle to be used in further calls to the stack.

Parameters:

← *pPrintDebugString* Pointer to debug print function

← *pMemConfig* Pointer to memory configuration

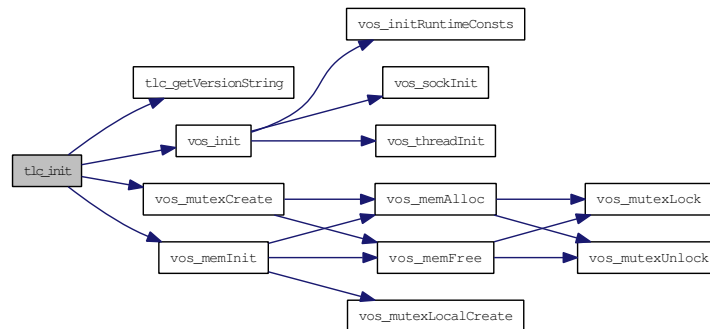
Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR memory allocation failed

TRDP_PARAM_ERR initialization error

Here is the call graph for this function:



5.14.2.6 EXT_DECL TRDP_ERR_T tlc_openSession (TRDP_APP_SESSION_T **pAppHandle*, TRDP_IP_ADDR_T *ownIpAddr*, TRDP_IP_ADDR_T *leaderIpAddr*, const TRDP_MARSHALL_CONFIG_T **pMarshall*, const TRDP_PD_CONFIG_T **pPdDefault*, const TRDP_MD_CONFIG_T **pMdDefault*, const TRDP_PROCESS_CONFIG_T **pProcessConfig*)

Open a session with the TRDP stack.

tlc_openSession returns in pAppHandle a unique handle to be used in further calls to the stack.

Parameters:

→ *pAppHandle* A handle for further calls to the trdp stack

← *ownIpAddr* Own IP address, can be different for each process in multihoming systems, if zero, the default interface / IP will be used.

← *leaderIpAddr* IP address of redundancy leader

← *pMarshall* Pointer to marshalling configuration

← *pPdDefault* Pointer to default PD configuration

← *pMdDefault* Pointer to default MD configuration

← *pProcessConfig* Pointer to process configuration only option parameter is used here to define session behavior all other parameters are only used to feed statistics

Return values:

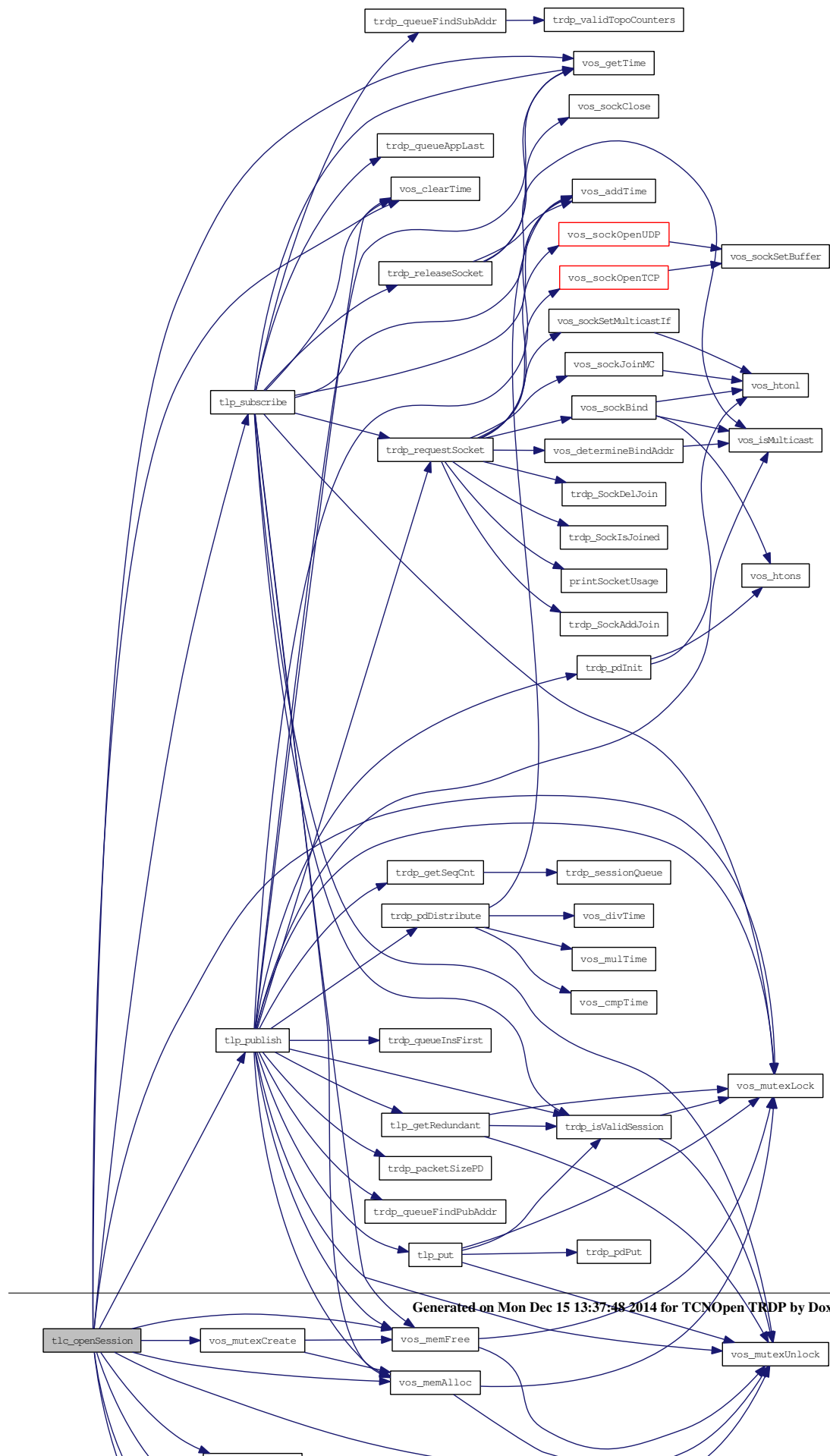
TRDP_NO_ERR no error

TRDP_INIT_ERR not yet initied

TRDP_PARAM_ERR parameter error

TRDP SOCK_ERR socket error

Here is the call graph for this function:



5.14.2.7 EXT_DECL TRDP_ERR_T tlc_process (TRDP_APP_SESSION_T *appHandle*, TRDP_FDS_T **pRfds*, INT32 **pCount*)

Work loop of the TRDP handler.

Search the queue for pending PDs to be sent Search the receive queue for pending PDs (time out)

Parameters:

← *appHandle* The handle returned by tlc_openSession

← *pRfds* pointer to set of ready descriptors

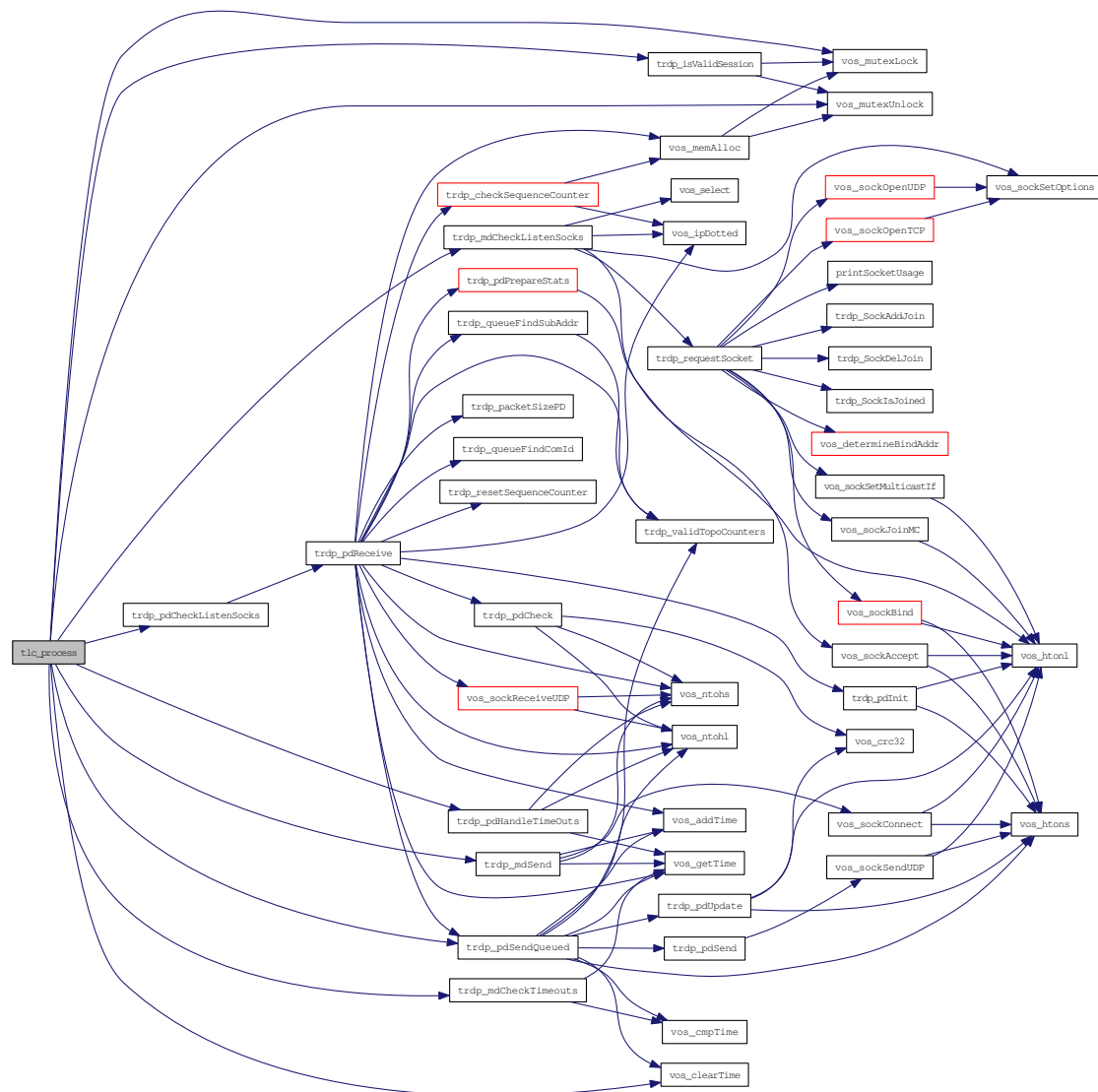
↔ *pCount* pointer to number of ready descriptors

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.14.2.8 EXT_DECL TRDP_ERR_T tlc_reinitSession (TRDP_APP_SESSION_T appHandle)

Re-Initialize.

Should be called by the application when a link-down/link-up event has occurred during normal operation. We need to re-join the multicast groups...

Parameters:

← *appHandle* The handle returned by tlc_openSession

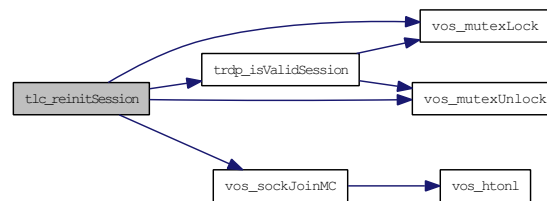
Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR handle NULL

Here is the call graph for this function:



5.14.2.9 EXT_DECL TRDP_ERR_T tlc_setETBTopoCount (TRDP_APP_SESSION_T appHandle, UINT32 etbTopoCnt)

Set new topocount for trainwide communication.

This value is used for validating outgoing and incoming packets only!

Parameters:

← **appHandle** the handle returned by tlc_openSession

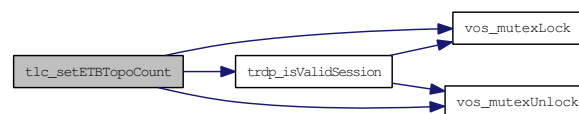
← **etbTopoCnt** New etbTopoCnt value

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.14.2.10 EXT_DECL TRDP_ERR_T tlc_setOpTrainTopoCount (TRDP_APP_SESSION_T appHandle, UINT32 opTrnTopoCnt)

Set new operational train topocount for direction/orientation sensitive communication.

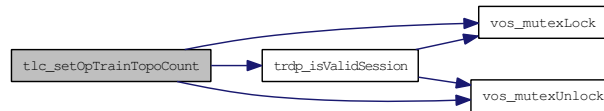
This value is used for validating outgoing and incoming packets only!

Parameters:

← **appHandle** The handle returned by tlc_init

← **opTrnTopoCnt** New operational topocount value

Here is the call graph for this function:



5.14.2.11 EXT_DECL TRDP_ERR_T tlc_terminate (void)

Un-Initialize.

Clean up and close all sessions. Mainly used for debugging/test runs. No further calls to library allowed

Return values:

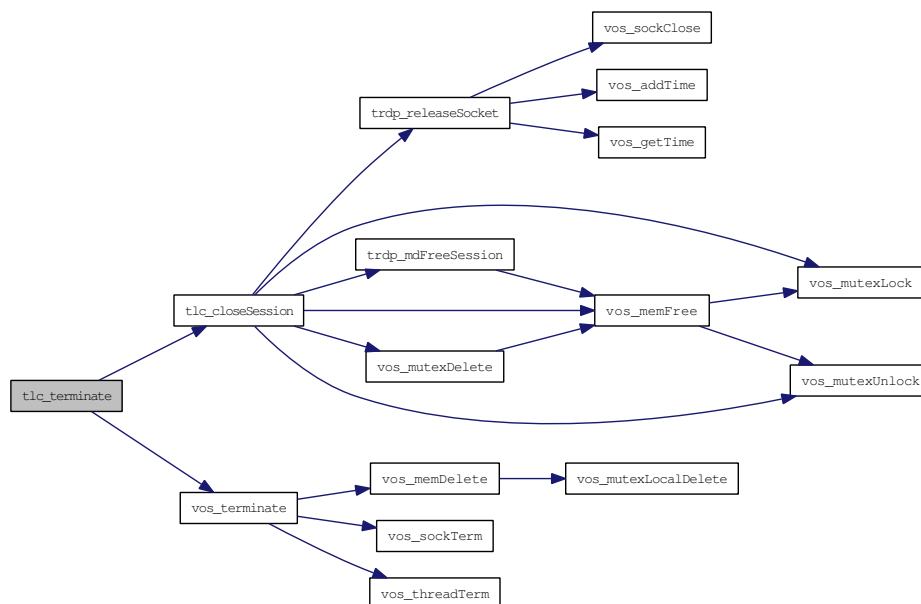
TRDP_NO_ERR no error

TRDP_INIT_ERR no error

TRDP_MEM_ERR TrafficStore nothing

TRDP_MUTEX_ERR TrafficStore mutex err

Here is the call graph for this function:



5.14.2.12 EXT_DECL TRDP_ERR_T tlp_get (TRDP_APP_SESSION_T appHandle, TRDP_SUB_T subHandle, TRDP_PD_INFO_T * pPdInfo, UINT8 * pData, UINT32 * pDataSize)

Get the last valid PD message.

This allows polling of PDs instead of event driven handling by callbacks

Parameters:

← *appHandle* the handle returned by `tlc_openSession`

← *subHandle* the handle returned by subscription

↔ *pPdInfo* pointer to application's info buffer

↔ *pData* pointer to application's data buffer

↔ *pDataSize* in: size of buffer, out: size of data

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

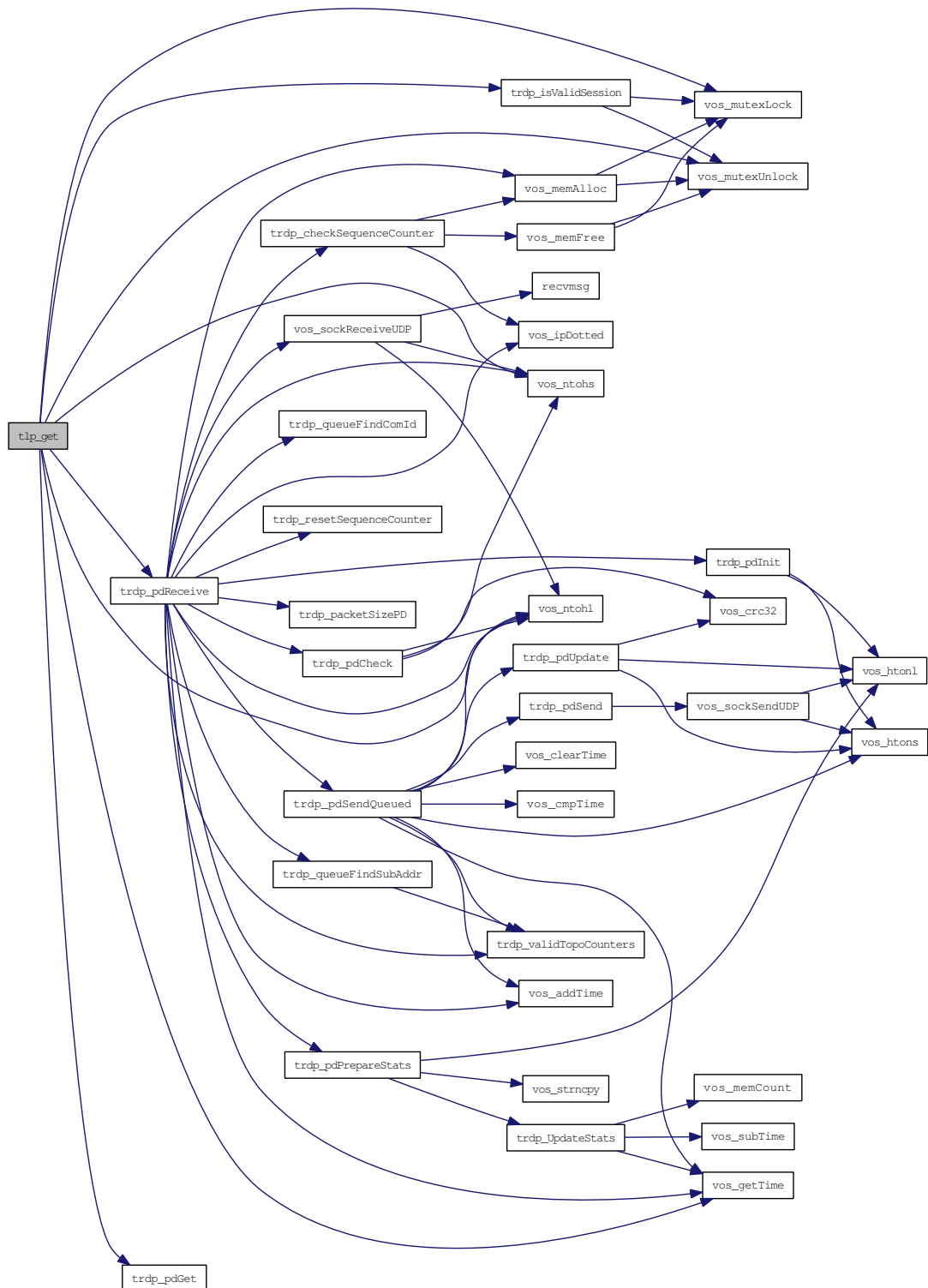
TRDP_SUB_ERR not subscribed

TRDP_TIMEOUT_ERR packet timed out

TRDP_NOINIT_ERR handle invalid

TRDP_COMID_ERR ComID not found when marshalling

Here is the call graph for this function:



5.14.2.13 EXT_DECL TRDP_ERR_T tlp_getRedundant (TRDP_APP_SESSION_T *appHandle*, UINT32 *redId*, BOOL8 **pLeader*)

Get status of redundant ComIds.

Only the status of the first redundancy group entry is returned will be returned!

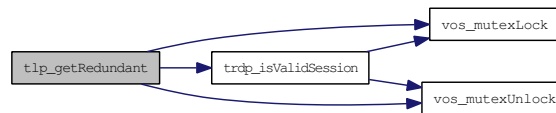
Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *redId* will be returned for all ComID's with the given redId
- ↔ *pLeader* TRUE if we're sending this redundancy group (leader)

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error / redId not existing
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.14.2.14 EXT_DECL TRDP_ERR_T tlp_publish (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T **pPubHandle*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, UINT32 *interval*, UINT32 *redId*, TRDP_FLAGS_T *pktFlags*, const TRDP_SEND_PARAM_T **pSendParam*, const UINT8 **pData*, UINT32 *dataSize*)

Prepare for sending PD messages.

Queue a PD message, it will be send when tlc_publish has been called

Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- *pPubHandle* returned handle for related unprepare
- ← *comId* comId of packet to send
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *interval* frequency of PD packet (>= 10ms) in usec, 0 if PD PULL
- ← *redId* 0 - Non-redundant, > 0 valid redundancy group
- ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-MARSHALL, TRDP_FLAGS_CALLBACK

← *pSendParam* optional pointer to send parameter, NULL - default parameters are used

← *pData* pointer to packet data / dataset

← *dataSize* size of packet data <= 1436 without FCS

Return values:

TRDP_NO_ERR no error

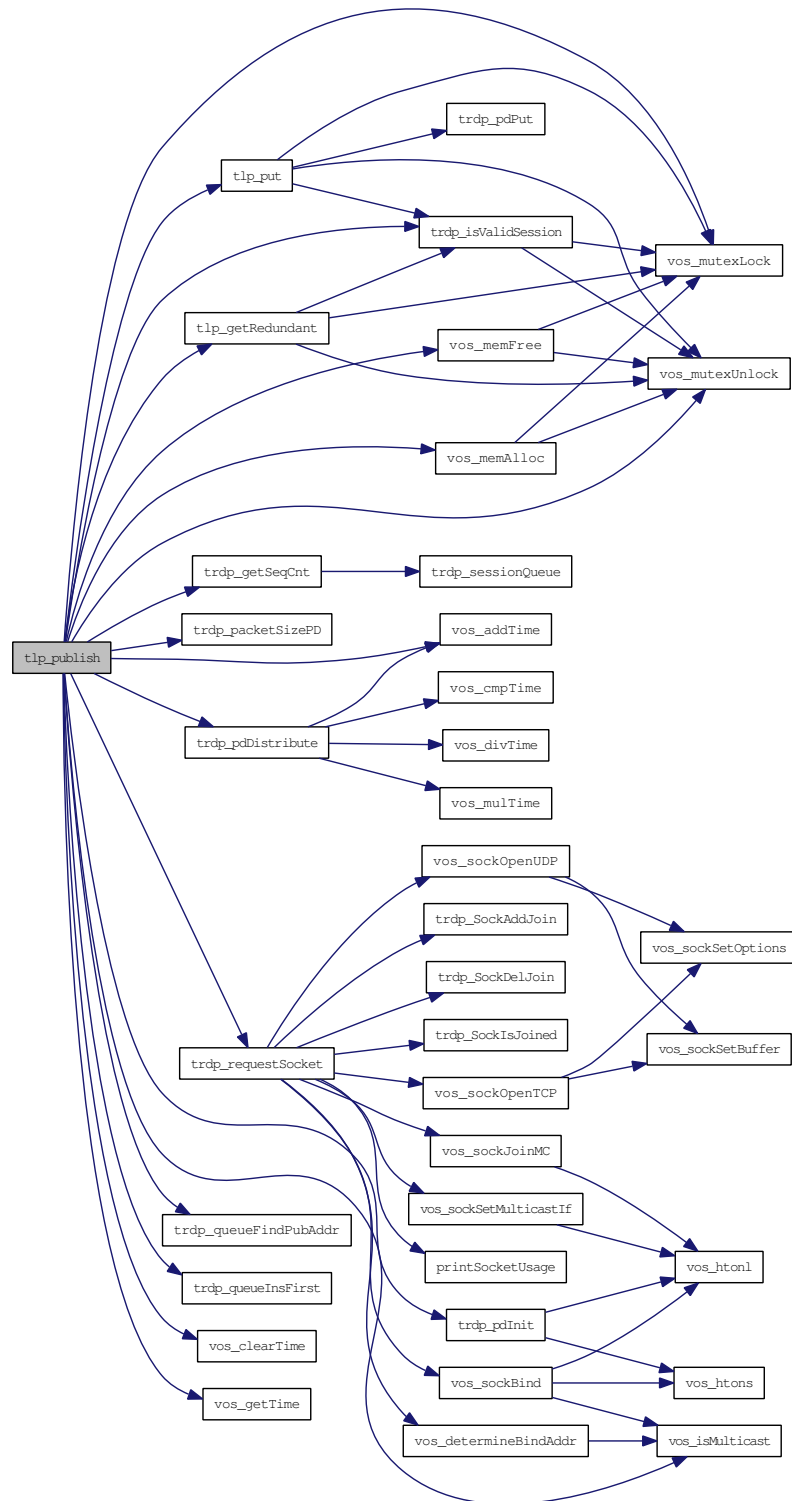
TRDP_PARAM_ERR parameter error

TRDP_MEM_ERR could not insert (out of memory)

TRDP_NOINIT_ERR handle invalid

TRDP_NOPUB_ERR Already published

Here is the call graph for this function:



5.14.2.15 TRDP_ERR_T tlp_put (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T *pubHandle*, const UINT8 * *pData*, UINT32 *dataSize*)

Update the process data to send.

Update previously published data. The new telegram will be sent earliest when tlc_process is called.

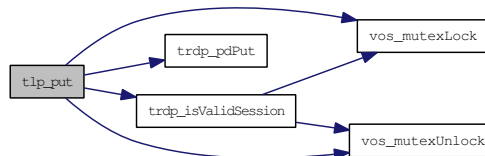
Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ← *pubHandle* the handle returned by publish
- ↔ *pData* pointer to application's data buffer
- ↔ *dataSize* size of data

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error on uninitialized parameter or changed dataSize compared to published one
- TRDP_NOPUB_ERR** not published
- TRDP_NOINIT_ERR** handle invalid
- TRDP_COMID_ERR** ComID not found when marshalling

Here is the call graph for this function:



5.14.2.16 EXT_DECL TRDP_ERR_T tlp_republish (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T *pubHandle*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, const UINT8 * *pData*, UINT32 *dataSize*)

Prepare for sending PD messages.

Reinitialize and queue a PD message, it will be send when tlc_publish has been called

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pubHandle* handle for related unpublish
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *pData* pointer to packet data / dataset

← *dataSize* size of packet data

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_MEM_ERR could not insert (out of memory)

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.14.2.17 **EXT_DECL** **TRDP_ERR_T** **tlp_request** (**TRDP_APP_SESSION_T** *appHandle*, **TRDP_SUB_T** *subHandle*, **UINT32** *comId*, **UINT32** *etbTopoCnt*, **UINT32** *opTrnTopoCnt*, **TRDP_IP_ADDR_T** *srcIpAddr*, **TRDP_IP_ADDR_T** *destIpAddr*, **UINT32** *redId*, **TRDP_FLAGS_T** *pktFlags*, **const** **TRDP_SEND_PARAM_T** * *pSendParam*, **const** **UINT8** * *pData*, **UINT32** *dataSize*, **UINT32** *replyComId*, **TRDP_IP_ADDR_T** *replyIpAddr*)

Initiate sending PD messages (PULL).

Send a PD request message

Parameters:

← *appHandle* the handle returned by tlc_openSession

← *subHandle* handle from related subscribe

← *comId* comId of packet to be sent

← *etbTopoCnt* ETB topocount to use, 0 if consist local communication

← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication

← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack

← *destIpAddr* where to send the packet to

← *redId* 0 - Non-redundant, > 0 valid redundancy group

← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK

← *pSendParam* optional pointer to send parameter, NULL - default parameters are used

← *pData* pointer to packet data / dataset

← *dataSize* size of packet data

← *replyComId* comId of reply

← *replyIpAddr* IP for reply

Return values:

TRDP_NO_ERR no error

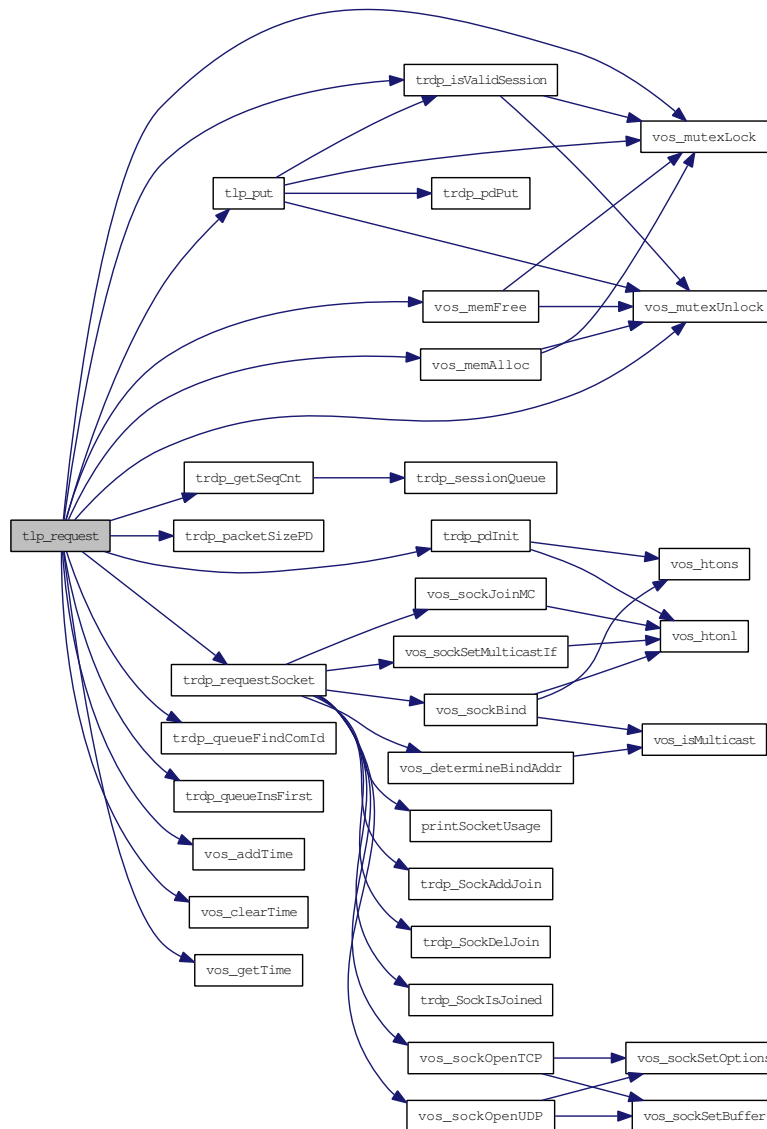
TRDP_PARAM_ERR parameter error

TRDP_MEM_ERR could not insert (out of memory)

TRDP_NOINIT_ERR handle invalid

TRDP_NOSUB_ERR no matching subscription found

Here is the call graph for this function:



5.14.2.18 EXT_DECL TRDP_ERR_T tlp_resubscribe (TRDP_APP_SESSION_T appHandle, TRDP_SUB_T subHandle, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, TRDP_IP_ADDR_T srcIpAddr, TRDP_IP_ADDR_T destIpAddr)

Reprepare for receiving PD messages.

Resubscribe to a specific PD ComID and source IP

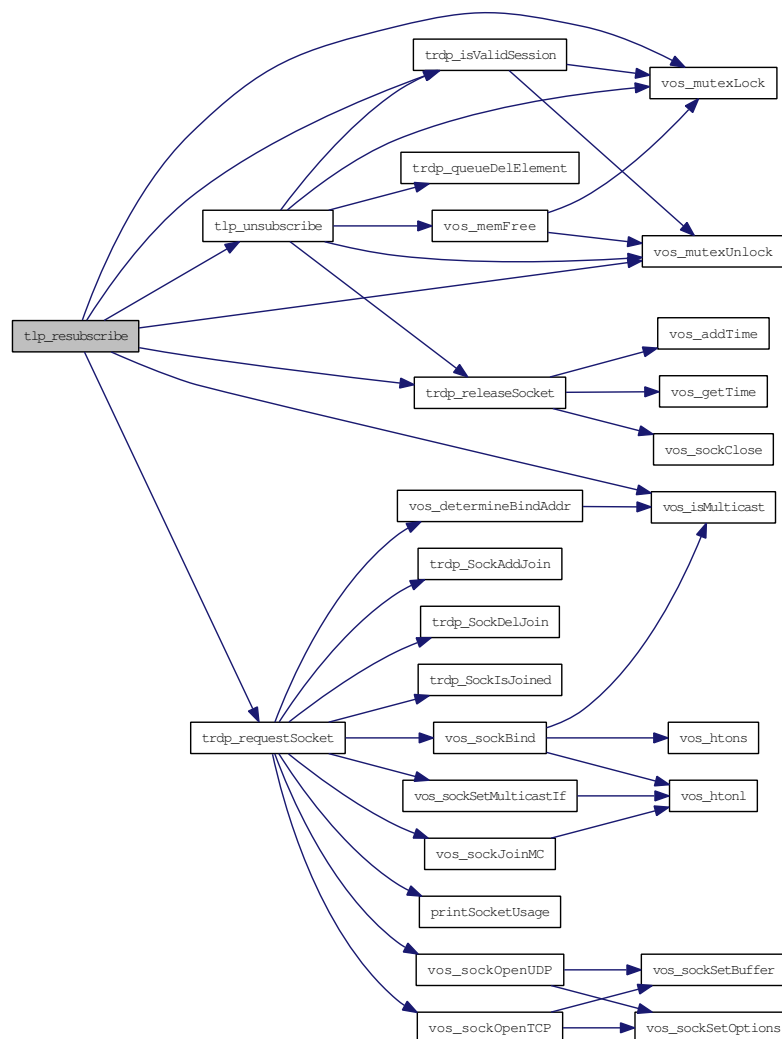
Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *subHandle* handle for this subscription
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* IP for source filtering, set 0 if not used
- ← *destIpAddr* IP address to join

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** could not reserve memory (out of memory)
- TRDP_NOINIT_ERR** handle invalid
- TRDP SOCK_ERR** Resource (socket) not available, subscription canceled

Here is the call graph for this function:



5.14.2.19 TRDP_ERR_T tlp_setRedundant (TRDP_APP_SESSION_T *appHandle*, UINT32 *redId*, BOOL8 *leader*)

Do not send non-redundant PDs when we are follower.

Do not send redundant PD's when we are follower.

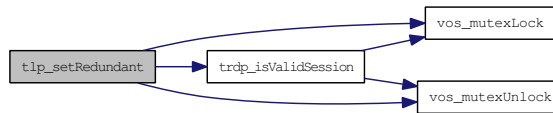
Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *redId* will be set for all ComID's with the given redId, 0 to change for all redId
- ← *leader* TRUE if we send

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error / redId not existing
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.14.2.20 EXT_DECL TRDP_ERR_T tlp_subscribe (TRDP_APP_SESSION_T *appHandle*, TRDP_SUB_T * *pSubHandle*, const void * *pUserRef*, TRDP_PD_CALLBACK_T *pfCbFunction*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, TRDP_FLAGS_T *pktFlags*, UINT32 *timeout*, TRDP_TO_BEHAVIOR_T *toBehavior*)

Prepare for receiving PD messages.

Subscribe to a specific PD ComID and source IP.

Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- *pSubHandle* return a handle for this subscription
- ← *pUserRef* user supplied value returned within the info structure
- ← *pfCbFunction* Pointer to subscriber specific callback function, NULL to use default function
- ← *comId* comId of packet to receive
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* IP for source filtering, set 0 if not used
- ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-MARSHALL, TRDP_FLAGS_CALLBACK
- ← *destIpAddr* IP address to join

← *timeout* timeout (≥ 10 ms) in usec

← *toBehavior* timeout behavior

Return values:

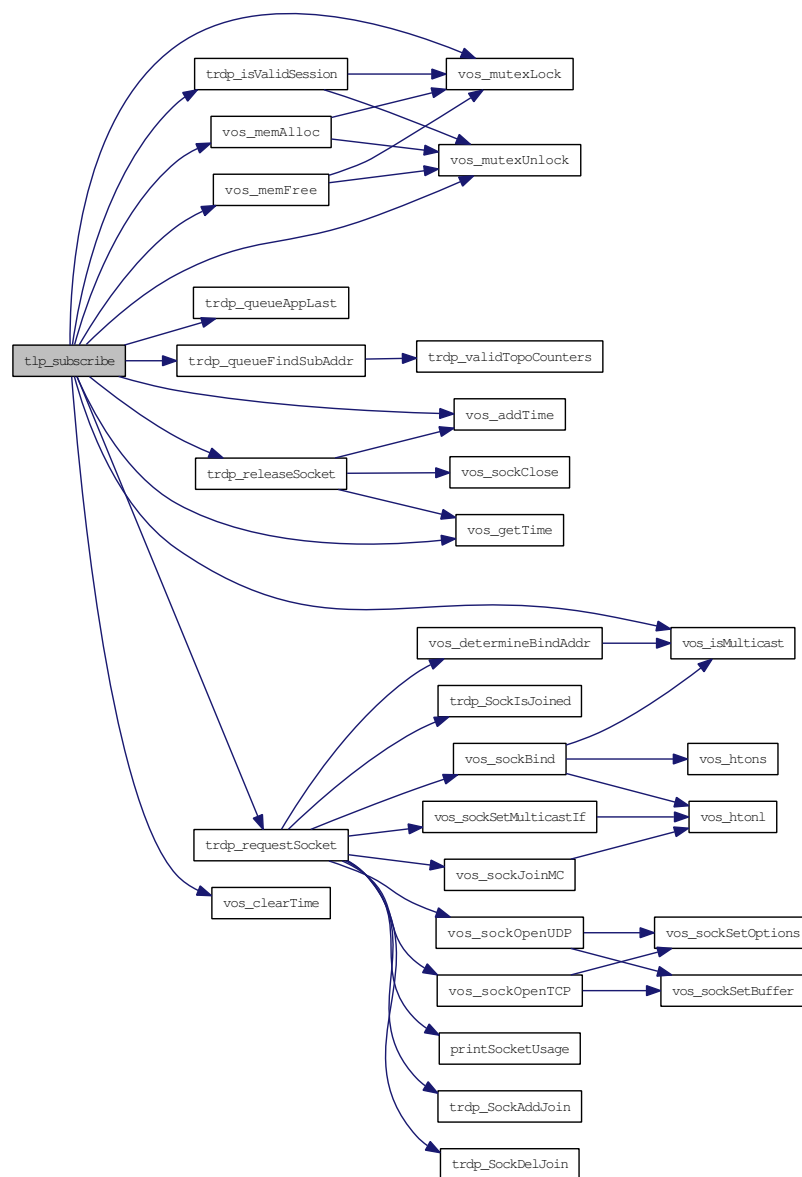
TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_MEM_ERR could not reserve memory (out of memory)

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.14.2.21 TRDP_ERR_T tlp_unpublish (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T *pubHandle*)

Stop sending PD messages.

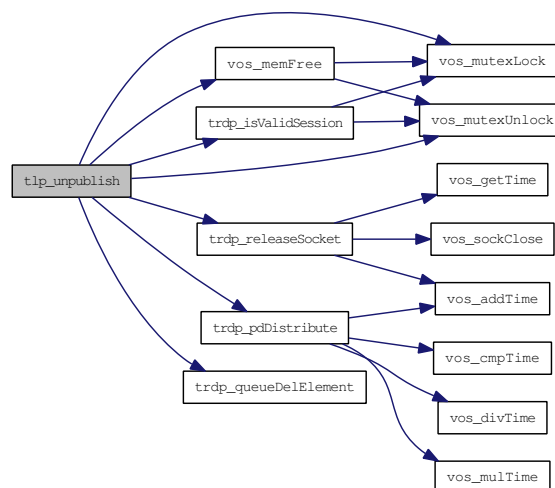
Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ← *pubHandle* the handle returned by prepare

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_NOPUB_ERR** not published
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.14.2.22 EXT_DECL TRDP_ERR_T tlp_unsubscribe (TRDP_APP_SESSION_T *appHandle*, TRDP_SUB_T *subHandle*)

Stop receiving PD messages.

Unsubscribe to a specific PD ComID

Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ← *subHandle* the handle for this subscription

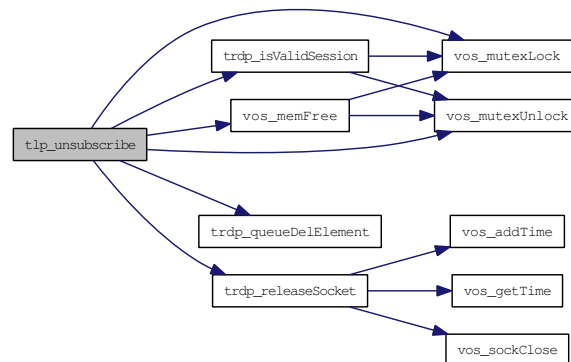
Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error

TRDP_NOSUB_ERR not subscribed

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.14.2.23 BOOL8 trdp_isValidSession (TRDP_APP_SESSION_T *pSessionHandle*)

Check if the session handle is valid.

Parameters:

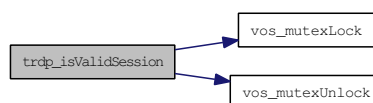
← *pSessionHandle* pointer to packet data (dataset)

Return values:

TRUE is valid

FALSE is invalid

Here is the call graph for this function:



5.14.2.24 TRDP_APP_SESSION_T* trdp_sessionQueue (void)

Get the session queue head pointer.

Return values:

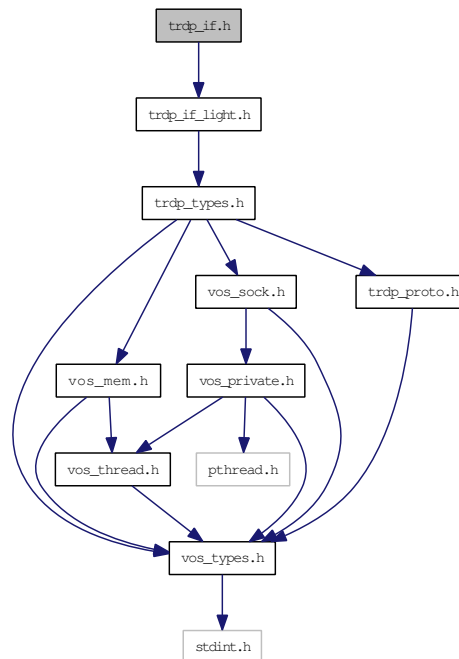
&sSession

5.15 trdp_if.h File Reference

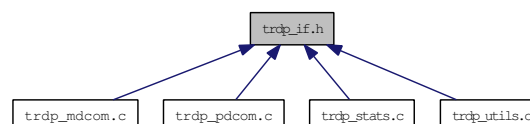
Typedefs for TRDP communication.

```
#include "trdp_if_light.h"
```

Include dependency graph for trdp_if.h:



This graph shows which files directly or indirectly include this file:



Functions

- **BOOL8** [trdp_isValidSession](#) (**TRDP_APP_SESSION_T** pSessionHandle)
Check if the session handle is valid.
- **TRDP_APP_SESSION_T *** [trdp_sessionQueue](#) (void)
Get the session queue head pointer.

5.15.1 Detailed Description

Typedefs for TRDP communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_if.h](#) 1264 2014-07-14 15:54:26Z bloehr

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed

5.15.2 Function Documentation

5.15.2.1 BOOL8 trdp_isValidSession (TRDP_APP_SESSION_T *pSessionHandle*)

Check if the session handle is valid.

Parameters:

← *pSessionHandle* pointer to packet data (dataset)

Return values:

TRUE is valid

FALSE is invalid

Parameters:

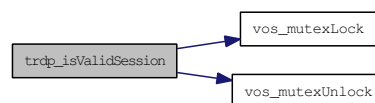
← *pSessionHandle* pointer to packet data (dataset)

Return values:

TRUE is valid

FALSE is invalid

Here is the call graph for this function:



5.15.2.2 TRDP_APP_SESSION_T* trdp_sessionQueue (void)

Get the session queue head pointer.

Return values:

&sSession

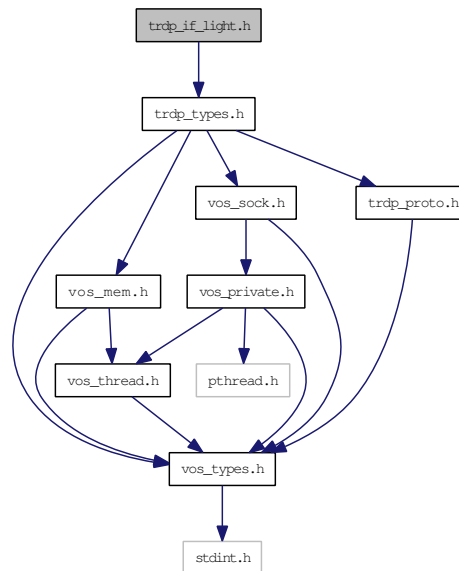
&sSession

5.16 trdp_if_light.h File Reference

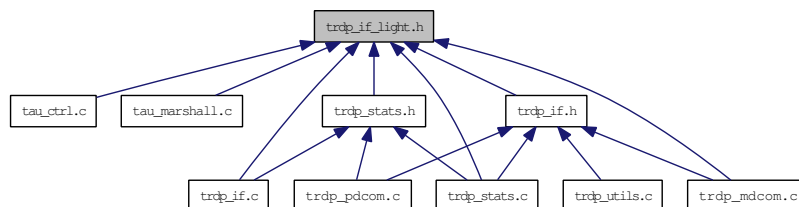
TRDP Light interface functions (API).

```
#include "trdp_types.h"
```

Include dependency graph for trdp_if_light.h:



This graph shows which files directly or indirectly include this file:



Defines

- `#define MD_SUPPORT 1`
Support for message data can only be excluded during compile time!

Functions

- `EXT_DECL TRDP_ERR_T tlc_init (const TRDP_PRINT_DBG_T pPrintDebugString, const TRDP_MEM_CONFIG_T *pMemConfig)`
Initialize the TRDP stack.

- EXT_DECL [TRDP_ERR_T tlc_openSession](#) ([TRDP_APP_SESSION_T](#) *pAppHandle, [TRDP_IP_ADDR_T](#) ownIpAddr, [TRDP_IP_ADDR_T](#) leaderIpAddr, const [TRDP_MARSHALL_CONFIG_T](#) *pMarshall, const [TRDP_PD_CONFIG_T](#) *pPdDefault, const [TRDP_MD_CONFIG_T](#) *pMdDefault, const [TRDP_PROCESS_CONFIG_T](#) *pProcessConfig)
Open a session with the TRDP stack.
- EXT_DECL [TRDP_ERR_T tlc_reinitSession](#) ([TRDP_APP_SESSION_T](#) appHandle)
Re-Initialize.
- EXT_DECL [TRDP_ERR_T tlc_closeSession](#) ([TRDP_APP_SESSION_T](#) appHandle)
Close a session.
- EXT_DECL [TRDP_ERR_T tlc_terminate](#) (void)
Un-Initialize.
- EXT_DECL [TRDP_ERR_T tlc_setETBTopoCount](#) ([TRDP_APP_SESSION_T](#) appHandle, [UINT32](#) etbTopoCnt)
Set new topocount for trainwide communication.
- EXT_DECL [TRDP_ERR_T tlc_setOpTrainTopoCount](#) ([TRDP_APP_SESSION_T](#) appHandle, [UINT32](#) opTrnTopoCnt)
Set new operational train topocount for direction/orientation sensitive communication.
- EXT_DECL [TRDP_ERR_T tlc_freeBuf](#) ([TRDP_APP_SESSION_T](#) appHandle, char *pBuf)
Frees the buffer reserved by the TRDP layer.
- EXT_DECL [TRDP_ERR_T tlc_getInterval](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_TIME_T](#) *pInterval, [TRDP_FDS_T](#) *pFileDesc, [INT32](#) *pNoDesc)
Get the lowest time interval for PDs.
- EXT_DECL [TRDP_ERR_T tlc_process](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_FDS_T](#) *pRfds, [INT32](#) *pCount)
Work loop of the TRDP handler.
- EXT_DECL [TRDP_ERR_T tlp_publish](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) *pPubHandle, [UINT32](#) comId, [UINT32](#) etbTopoCnt, [UINT32](#) opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, [UINT32](#) interval, [UINT32](#) redId, [TRDP_FLAGS_T](#) pktFlags, const [TRDP_SEND_PARAM_T](#) *pSendParam, const [UINT8](#) *pData, [UINT32](#) dataSize)
Prepare for sending PD messages.
- EXT_DECL [TRDP_ERR_T tlp_republish](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) pubHandle, [UINT32](#) etbTopoCnt, [UINT32](#) opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, const [UINT8](#) *pData, [UINT32](#) dataSize)
Prepare for sending PD messages.
- EXT_DECL [TRDP_ERR_T tlp_unpublish](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) pubHandle)
Stop sending PD messages.
- EXT_DECL [TRDP_ERR_T tlp_put](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_PUB_T](#) pubHandle, const [UINT8](#) *pData, [UINT32](#) dataSize)

Update the process data to send.

- EXT_DECL [TRDP_ERR_T tlp_setRedundant](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT32 redId, BOOL8 leader)

Do not send redundant PD's when we are follower.

- EXT_DECL [TRDP_ERR_T tlp_getRedundant](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT32 redId, BOOL8 *pLeader)

Get status of redundant ComIds.

- EXT_DECL [TRDP_ERR_T tlp_request](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_SUB_T](#) subHandle, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, UINT32 redId, [TRDP_FLAGS_T](#) pktFlags, const [TRDP_SEND_PARAM_T](#) *pSendParam, const UINT8 *pData, UINT32 dataSize, UINT32 replyComId, [TRDP_IP_ADDR_T](#) replyIpAddr)

Initiate sending PD messages (PULL).

- EXT_DECL [TRDP_ERR_T tlp_subscribe](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_SUB_T](#) *pSubHandle, const void *pUserRef, [TRDP_PD_CALLBACK_T](#) pfCbFunction, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, [TRDP_FLAGS_T](#) pktFlags, UINT32 timeout, [TRDP_TO_BEHAVIOR_T](#) toBehavior)

Prepare for receiving PD messages.

- EXT_DECL [TRDP_ERR_T tlp_resubscribe](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_SUB_T](#) subHandle, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr)

Reprepare for receiving PD messages.

- EXT_DECL [TRDP_ERR_T tlp_unsubscribe](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_SUB_T](#) subHandle)

Stop receiving PD messages.

- EXT_DECL [TRDP_ERR_T tlp_get](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_SUB_T](#) subHandle, [TRDP_PD_INFO_T](#) *pPdInfo, UINT8 *pData, UINT32 *pDataSize)

Get the last valid PD message.

- EXT_DECL [TRDP_ERR_T tlm_notify](#) ([TRDP_APP_SESSION_T](#) appHandle, const void *pUserRef, [TRDP_MD_CALLBACK_T](#) pfCbFunction, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, [TRDP_FLAGS_T](#) pktFlags, const [TRDP_SEND_PARAM_T](#) *pSendParam, const UINT8 *pData, UINT32 dataSize, const [TRDP_URI_USER_T](#) sourceURI, const [TRDP_URI_USER_T](#) destURI)

Initiate sending MD notification message.

- EXT_DECL [TRDP_ERR_T tlm_request](#) ([TRDP_APP_SESSION_T](#) appHandle, const void *pUserRef, [TRDP_MD_CALLBACK_T](#) pfCbFunction, [TRDP_UUID_T](#) *pSessionId, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) srcIpAddr, [TRDP_IP_ADDR_T](#) destIpAddr, [TRDP_FLAGS_T](#) pktFlags, UINT32 numReplies, UINT32 replyTimeout, UINT32 maxNumRetries, const [TRDP_SEND_PARAM_T](#) *pSendParam, const UINT8 *pData, UINT32 dataSize, const [TRDP_URI_USER_T](#) sourceURI, const [TRDP_URI_USER_T](#) destURI)

Initiate sending MD request message.

- EXT_DECL [TRDP_ERR_T tlm_confirm](#) ([TRDP_APP_SESSION_T](#) appHandle, const [TRDP_UUID_T](#) *pSessionId, UINT16 userStatus, const [TRDP_SEND_PARAM_T](#) *pSendParam)
Initiate sending MD confirm message.
- EXT_DECL [TRDP_ERR_T tlm_abortSession](#) ([TRDP_APP_SESSION_T](#) appHandle, const [TRDP_UUID_T](#) *pSessionId)
Cancel an open session.
- EXT_DECL [TRDP_ERR_T tlm_addListener](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_LIS_T](#) *pListenHandle, const void *pUserRef, [TRDP_MD_CALLBACK_T](#) pfCbFunction, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) mcDestIpAddr, [TRDP_FLAGS_T](#) pktFlags, const [TRDP_URI_USER_T](#) destURI)
Subscribe to MD messages.
- EXT_DECL [TRDP_ERR_T tlm_readListener](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_LIS_T](#) listenHandle, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, [TRDP_IP_ADDR_T](#) mcDestIpAddr)
Resubscribe to MD messages.
- EXT_DECL [TRDP_ERR_T tlm_delListener](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_LIS_T](#) listenHandle)
Remove Listener.
- [TRDP_ERR_T tlm_reply](#) ([TRDP_APP_SESSION_T](#) appHandle, const [TRDP_UUID_T](#) *pSessionId, UINT32 comId, UINT16 userStatus, const [TRDP_SEND_PARAM_T](#) *pSendParam, const UINT8 *pData, UINT32 dataSize)
Send a MD reply message.
- [TRDP_ERR_T tlm_replyQuery](#) ([TRDP_APP_SESSION_T](#) appHandle, const [TRDP_UUID_T](#) *pSessionId, UINT32 comId, UINT16 userStatus, UINT32 confirmTimeout, const [TRDP_SEND_PARAM_T](#) *pSendParam, const UINT8 *pData, UINT32 dataSize)
Send a MD reply query message.
- [TRDP_ERR_T tlm_replyErr](#) ([TRDP_APP_SESSION_T](#) appHandle, const [TRDP_UUID_T](#) *pSessionId, [TRDP_REPLY_STATUS_T](#) replyStatus, const [TRDP_SEND_PARAM_T](#) *pSendParam)
Send a MD reply message.
- EXT_DECL const CHAR8 * [tlc_getVersionString](#) (void)
Return a human readable version representation.
- EXT_DECL const [TRDP_VERSION_T](#) * [tlc_getVersion](#) (void)
Return version.
- EXT_DECL [TRDP_ERR_T tlc_getStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_STATISTICS_T](#) *pStatistics)
Return statistics.
- EXT_DECL [TRDP_ERR_T tlc_getSubsStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle, UINT16 *pNumSubs, [TRDP_SUBS_STATISTICS_T](#) *pStatistics)
Return PD subscription statistics.

- EXT_DECL [TRDP_ERR_T tlc_getPubStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle, [UINT16](#) *pNumPub, [TRDP_PUB_STATISTICS_T](#) *pStatistics)
Return PD publish statistics.
- EXT_DECL [TRDP_ERR_T tlc_getListStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle, [UINT16](#) *pNumList, [TRDP_LIST_STATISTICS_T](#) *pStatistics)
Return MD listener statistics.
- EXT_DECL [TRDP_ERR_T tlc_getRedStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle, [UINT16](#) *pNumRed, [TRDP_RED_STATISTICS_T](#) *pStatistics)
Return redundancy group statistics.
- EXT_DECL [TRDP_ERR_T tlc_getJoinStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle, [UINT16](#) *pNumJoin, [UINT32](#) *pIpAddr)
Return join statistics.
- EXT_DECL [TRDP_ERR_T tlc_resetStatistics](#) ([TRDP_APP_SESSION_T](#) appHandle)
Reset statistics.

5.16.1 Detailed Description

TRDP Light interface functions (API).

Low level functions for communicating using the TRDP protocol

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_if_light.h](#) 1341 2014-10-14 16:05:53Z bloehr

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed

5.16.2 Function Documentation

5.16.2.1 EXT_DECL TRDP_ERR_T tlc_closeSession (TRDP_APP_SESSION_T appHandle)

Close a session.

Clean up and release all resources of that session

Parameters:

← *appHandle* The handle returned by `tlc_openSession`

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR handle NULL

Clean up and release all resources of that session

Parameters:

← *appHandle* The handle returned by `tlc_openSession`

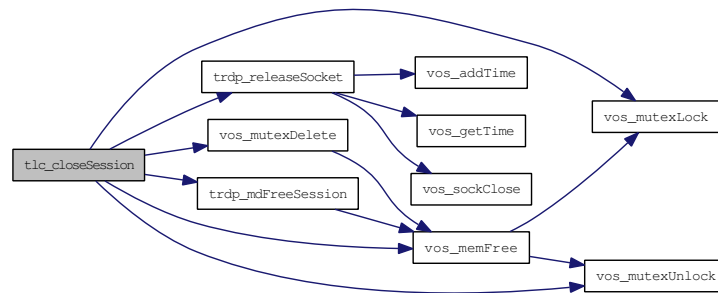
Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR handle NULL

Here is the call graph for this function:



5.16.2.2 EXT_DECL TRDP_ERR_T tlc_freeBuf (TRDP_APP_SESSION_T appHandle, char * pBuf)

Frees the buffer reserved by the TRDP layer.

Parameters:

← *appHandle* The handle returned by `tlc_init`

← *pBuf* pointer to the buffer to be freed

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR buffer pointer invalid

5.16.2.3 EXT_DECL TRDP_ERR_T tlc_getInterval (TRDP_APP_SESSION_T appHandle, TRDP_TIME_T *pInterval, TRDP_FDS_T *pFileDesc, INT32 *pNoDesc)

Get the lowest time interval for PDs.

Return the maximum time interval suitable for 'select()' so that we can send due PD packets in time. If the PD send queue is empty, return zero time

Parameters:

- ← *appHandle* The handle returned by tlc_init
- *pInterval* pointer to needed interval
- ↔ *pFileDesc* pointer to file descriptor set
- *pNoDesc* pointer to put no of used descriptors (for select())

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid

Return the maximum time interval suitable for 'select()' so that we can send due PD packets in time. If the PD send queue is empty, return zero time

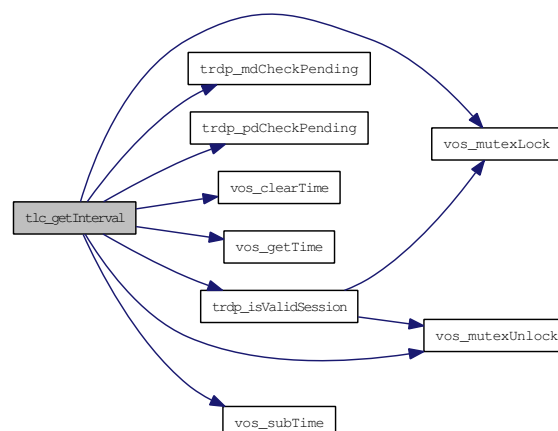
Parameters:

- ← *appHandle* The handle returned by tlc_openSession
- *pInterval* pointer to needed interval
- ↔ *pFileDesc* pointer to file descriptor set
- *pNoDesc* pointer to put no of highest used descriptors (for select())

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.16.2.4 EXT_DECL TRDP_ERR_T tlc_getJoinStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumJoin*, UINT32 **pIpAddr*)

Return join statistics.

Memory for statistics information must be provided by the user. The reserved length is given via *pNumJoin* implicitly.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumJoin* Pointer to the number of joined IP Adresses
- *pIpAddr* Pointer to a list with the joined IP adresses

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more items than requested

Memory for statistics information must be provided by the user.

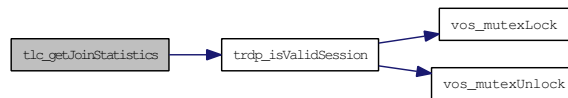
Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumJoin* Pointer to the number of joined IP Adresses
- *pIpAddr* Pointer to a list with the joined IP adresses

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more items than requested

Here is the call graph for this function:



5.16.2.5 EXT_DECL TRDP_ERR_T tlc_getListStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumList*, TRDP_LIST_STATISTICS_T **pStatistics*)

Return MD listener statistics.

Memory for statistics information must be provided by the user. The reserved length is given via *pNumLis* implicitly.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumList* Pointer to the number of listeners
- *pStatistics* Pointer to a list with the listener statistics information

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* handle invalid
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* there are more subscriptions than requested

5.16.2.6 EXT_DECL TRDP_ERR_T tlc_getPubStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumPub*, TRDP_PUB_STATISTICS_T **pStatistics*)

Return PD publish statistics.

Memory for statistics information must be provided by the user. The reserved length is given via *pNumPub* implicitly.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumPub* Pointer to the number of publishers
- *pStatistics* pointer to a list with the publish statistics information

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* handle invalid
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* there are more subscriptions than requested

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumPub* Pointer to the number of publishers
- *pStatistics* Pointer to a list with the publish statistics information

Return values:

- TRDP_NO_ERR* no error
- TRDP_NOINIT_ERR* handle invalid
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* there are more subscriptions than requested

Here is the call graph for this function:



5.16.2.7 EXT_DECL TRDP_ERR_T tlc_getRedStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumRed*, TRDP_RED_STATISTICS_T **pStatistics*)

Return redundancy group statistics.

Memory for statistics information must be provided by the user. The reserved length is given via *pNumRed* implicitly.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumRed* Pointer to the number of redundancy groups
- *pStatistics* Pointer to a list with the redundancy group information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumRed* Pointer to the number of redundancy groups
- *pStatistics* Pointer to a list with the redundancy group information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Here is the call graph for this function:



5.16.2.8 EXT_DECL TRDP_ERR_T tlc_getStatistics (TRDP_APP_SESSION_T *appHandle*, TRDP_STATISTICS_T **pStatistics*)

Return statistics.

Memory for statistics information must be preserved by the user.

Parameters:

- ← *appHandle* the handle returned by tlc_init
- *pStatistics* Pointer to statistics for this application session

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error

Memory for statistics information must be provided by the user.

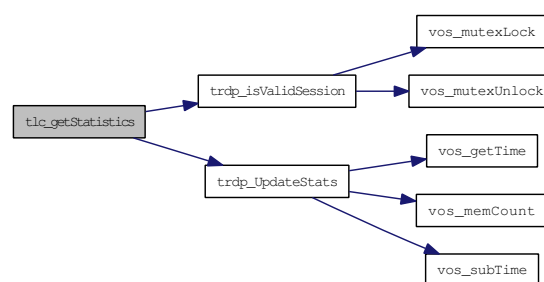
Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- *pStatistics* Pointer to statistics for this application session

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error

Here is the call graph for this function:



5.16.2.9 EXT_DECL TRDP_ERR_T tlc_getSubsStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumSubs*, TRDP_SUBS_STATISTICS_T **pStatistics*)

Return PD subscription statistics.

Memory for statistics information must be provided by the user. The reserved length is given via `pNumSub` implicitly.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumSubs* In: The number of subscriptions requested Out: Number of subscriptions returned
- ↔ *pStatistics* Pointer to an array with the subscription statistics information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumSubs* In: The number of subscriptions requested Out: Number of subscriptions returned
- ↔ *pStatistics* Pointer to an array with the subscription statistics information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Here is the call graph for this function:

**5.16.2.10 EXT_DECL const TRDP_VERSION_T* tlc_getVersion (void)**

Return version.

Return pointer to version structure

Return values:

const [*TRDP_VERSION_T*](#)

Return pointer to version structure

Return values:

[*TRDP_VERSION_T*](#)

5.16.2.11 EXT_DECL const CHAR8* tlc_getVersionString (void)

Return a human readable version representation.

Return string in the form 'v.r.u.b'

Return values:

const string

5.16.2.12 EXT_DECL TRDP_ERR_T tlc_init (const TRDP_PRINT_DBG_T pPrintDebugString, const TRDP_MEM_CONFIG_T *pMemConfig)

Initialize the TRDP stack.

tlc_init returns in pAppHandle a unique handle to be used in further calls to the stack.

Parameters:

← *pPrintDebugString* Pointer to debug print function

← *pMemConfig* Pointer to memory configuration

Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR memory allocation failed

TRDP_PARAM_ERR initialization error

tlc_init returns in pAppHandle a unique handle to be used in further calls to the stack.

Parameters:

← *pPrintDebugString* Pointer to debug print function

← *pMemConfig* Pointer to memory configuration

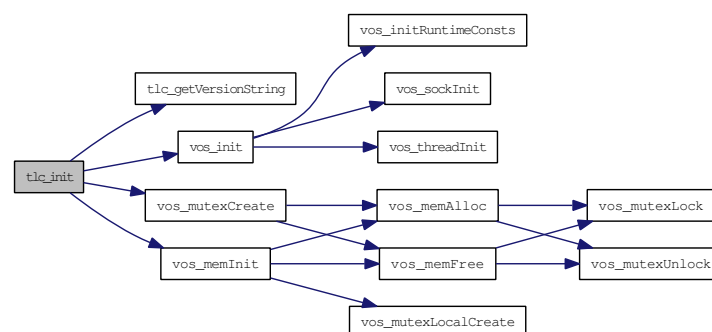
Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR memory allocation failed

TRDP_PARAM_ERR initialization error

Here is the call graph for this function:



5.16.2.13 `EXT_DECL TRDP_ERR_T tlc_openSession (TRDP_APP_SESSION_T * pAppHandle, TRDP_IP_ADDR_T ownIpAddr, TRDP_IP_ADDR_T leaderIpAddr, const TRDP_MARSHALL_CONFIG_T * pMarshall, const TRDP_PD_CONFIG_T * pPdDefault, const TRDP_MD_CONFIG_T * pMdDefault, const TRDP_PROCESS_CONFIG_T * pProcessConfig)`

Open a session with the TRDP stack.

`tlc_openSession` returns in `pAppHandle` a unique handle to be used in further calls to the stack.

Parameters:

- *pAppHandle* A handle for further calls to the trdp stack
- ← *ownIpAddr* Own IP address, can be different for each process in multihoming systems, if zero, the default interface / IP will be used.
- ← *leaderIpAddr* IP address of redundancy leader
- ← *pMarshall* Pointer to marshalling configuration
- ← *pPdDefault* Pointer to default PD configuration
- ← *pMdDefault* Pointer to default MD configuration
- ← *pProcessConfig* Pointer to process configuration only option parameter is used here to define session behavior all other parameters are only used to feed statistics

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* not yet initied
- TRDP_PARAM_ERR* parameter error
- TRDP SOCK_ERR* socket error

`tlc_openSession` returns in `pAppHandle` a unique handle to be used in further calls to the stack.

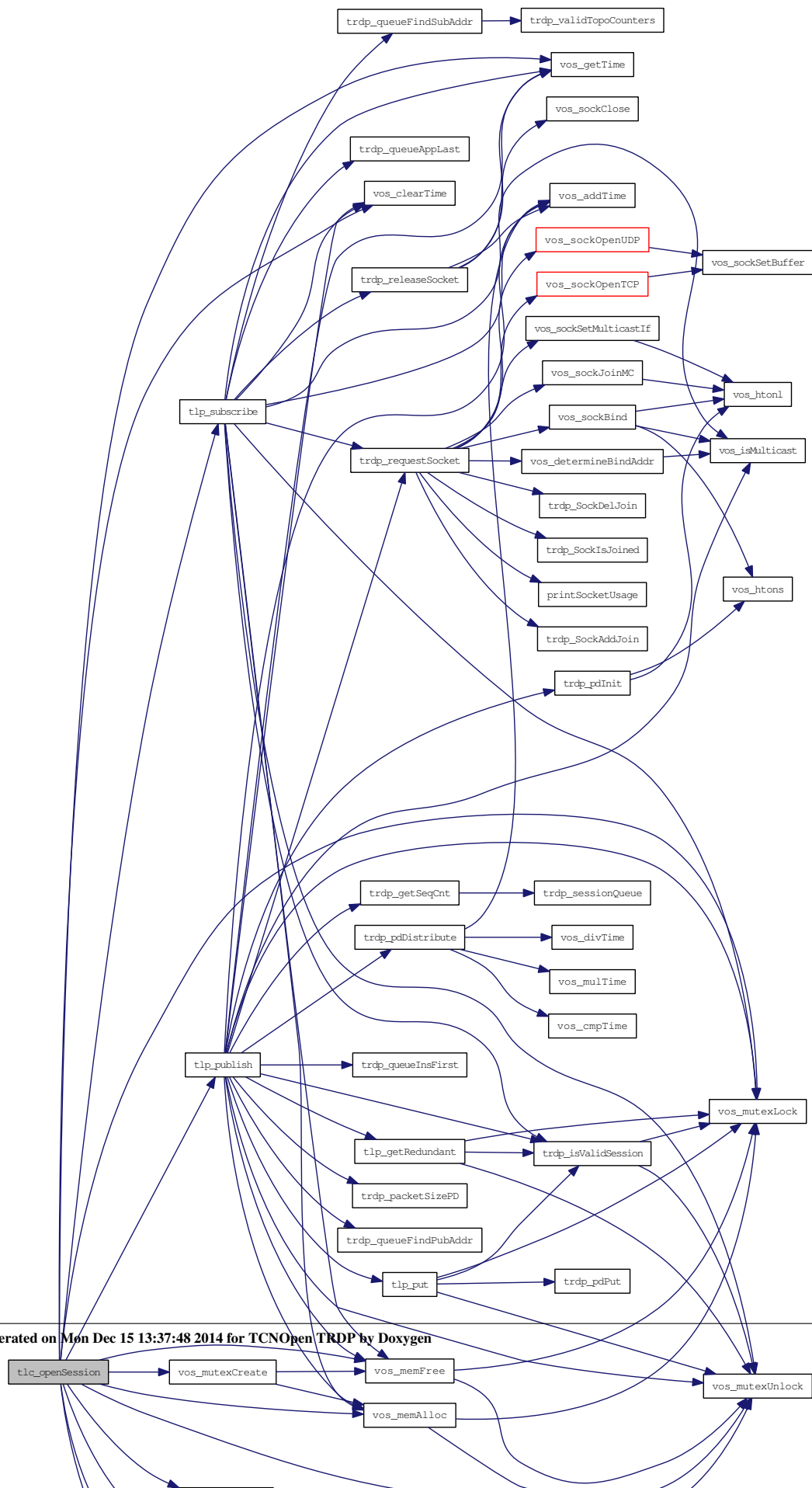
Parameters:

- *pAppHandle* A handle for further calls to the trdp stack
- ← *ownIpAddr* Own IP address, can be different for each process in multihoming systems, if zero, the default interface / IP will be used.
- ← *leaderIpAddr* IP address of redundancy leader
- ← *pMarshall* Pointer to marshalling configuration
- ← *pPdDefault* Pointer to default PD configuration
- ← *pMdDefault* Pointer to default MD configuration
- ← *pProcessConfig* Pointer to process configuration only option parameter is used here to define session behavior all other parameters are only used to feed statistics

Return values:

- TRDP_NO_ERR* no error
- TRDP_INIT_ERR* not yet initied
- TRDP_PARAM_ERR* parameter error
- TRDP SOCK_ERR* socket error

Here is the call graph for this function:



5.16.2.14 EXT_DECL TRDP_ERR_T tlc_process (TRDP_APP_SESSION_T *appHandle*, TRDP_FDS_T **pRfds*, INT32 **pCount*)

Work loop of the TRDP handler.

Search the queue for pending PDs to be sent Search the receive queue for pending PDs (time out)

Parameters:

← *appHandle* The handle returned by tlc_init

← *pRfds* pointer to set of ready descriptors

↔ *pCount* pointer to number of ready descriptors

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

Search the queue for pending PDs to be sent Search the receive queue for pending PDs (time out)

Parameters:

← *appHandle* The handle returned by tlc_openSession

← *pRfds* pointer to set of ready descriptors

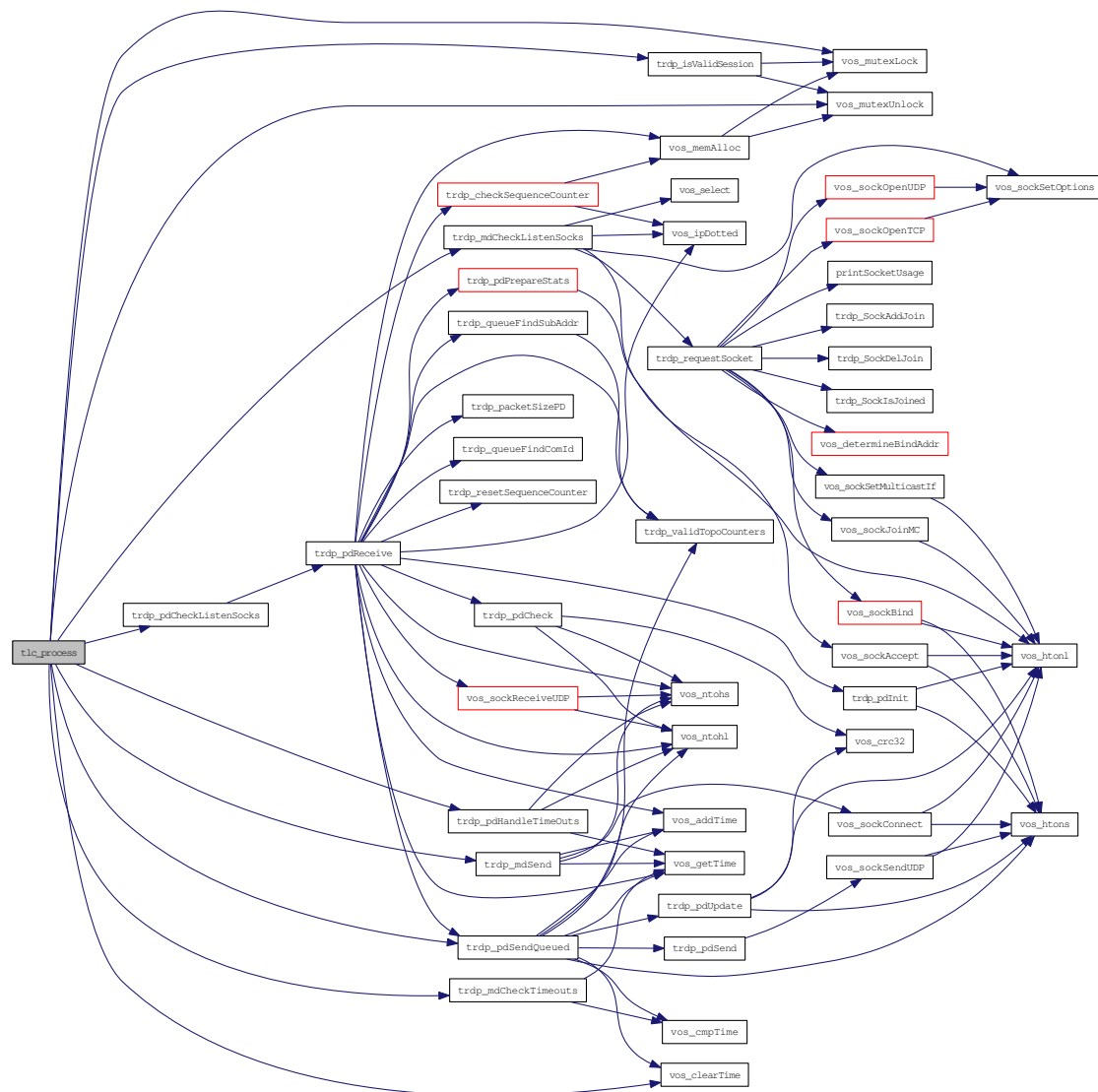
↔ *pCount* pointer to number of ready descriptors

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.16.2.15 EXT_DECL TRDP_ERR_T tlc_reinitSession (TRDP_APP_SESSION_T appHandle)

Re-Initialize.

Should be called by the application when a link-down/link-up event has occurred during normal operation. We need to re-join the multicast groups...

Parameters:

← *appHandle* The handle returned by tlc_openSession

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR handle NULL

Should be called by the application when a link-down/link-up event has occurred during normal operation. We need to re-join the multicast groups...

Parameters:

← **appHandle** The handle returned by `tlc_openSession`

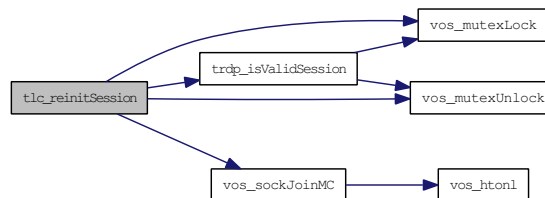
Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR handle NULL

Here is the call graph for this function:



5.16.2.16 EXT_DECL TRDP_ERR_T tlc_resetStatistics (TRDP_APP_SESSION_T appHandle)

Reset statistics.

Parameters:

← **appHandle** the handle returned by `tlc_init`

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR parameter error

Parameters:

← **appHandle** the handle returned by `tlc_openSession`

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

TRDP_PARAM_ERR parameter error

Here is the call graph for this function:



5.16.2.17 EXT_DECL TRDP_ERR_T tlc_setETBTopoCount (TRDP_APP_SESSION_T *appHandle*, UINT32 *etbTopoCnt*)

Set new topocount for trainwide communication.

This value is used for validating outgoing and incoming packets only!

Parameters:

← *appHandle* The handle returned by tlc_init

← *etbTopoCnt* New topocount value

This value is used for validating outgoing and incoming packets only!

Parameters:

← *appHandle* the handle returned by tlc_openSession

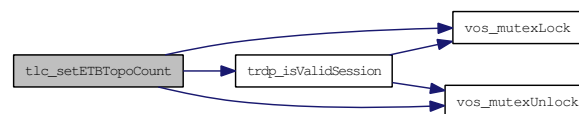
← *etbTopoCnt* New etbTopoCnt value

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.16.2.18 EXT_DECL TRDP_ERR_T tlc_setOpTrainTopoCount (TRDP_APP_SESSION_T *appHandle*, UINT32 *opTrnTopoCnt*)

Set new operational train topocount for direction/orientation sensitive communication.

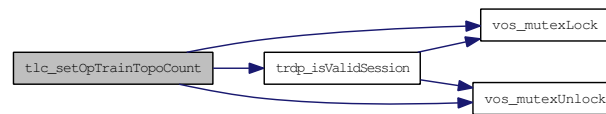
This value is used for validating outgoing and incoming packets only!

Parameters:

← *appHandle* The handle returned by tlc_init

← *opTrnTopoCnt* New operational topocount value

Here is the call graph for this function:



5.16.2.19 EXT_DECL TRDP_ERR_T tlc_terminate (void)

Un-Initialize.

Clean up and close all sessions. Mainly used for debugging/test runs. No further calls to library allowed

Return values:

TRDP_NO_ERR no error

Clean up and close all sessions. Mainly used for debugging/test runs. No further calls to library allowed

Return values:

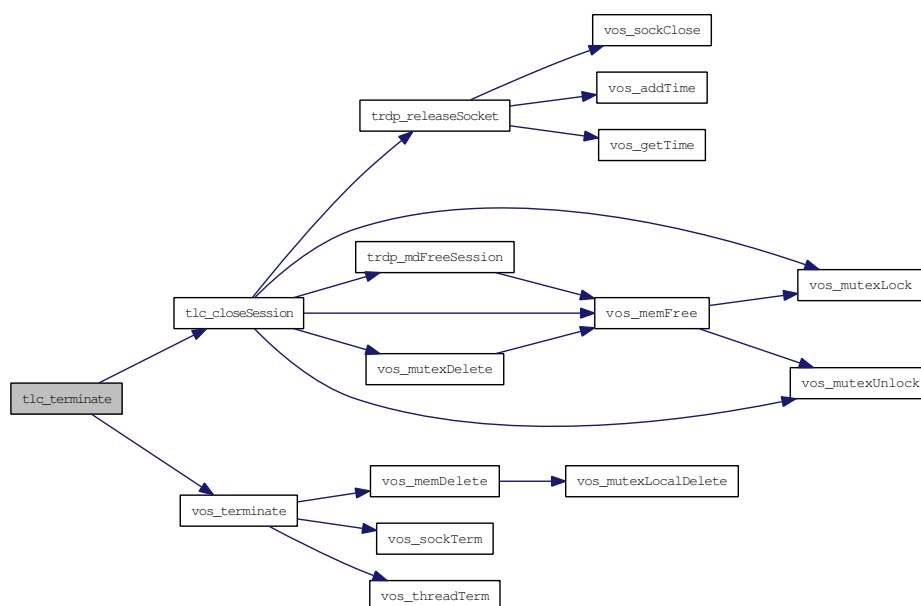
TRDP_NO_ERR no error

TRDP_INIT_ERR no error

TRDP_MEM_ERR TrafficStore nothing

TRDP_MUTEX_ERR TrafficStore mutex err

Here is the call graph for this function:



5.16.2.20 EXT_DECL TRDP_ERR_T tlm_abortSession (TRDP_APP_SESSION_T *appHandle*, const TRDP_UUID_T * *pSessionId*)

Cancel an open session.

Abort an open session; any pending messages will be dropped

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pSessionId* Session ID returned by request

Return values:

- TRDP_NO_ERR* no error
- TRDP_NO_SESSION_ERR* no such session
- TRDP_NOINIT_ERR* handle invalid

5.16.2.21 EXT_DECL TRDP_ERR_T tlm_addListener (TRDP_APP_SESSION_T *appHandle*, TRDP_LIS_T * *pListenHandle*, const void * *pUserRef*, TRDP_MD_CALLBACK_T *pfCbFunction*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *mcDestIpAddr*, TRDP_FLAGS_T *pktFlags*, const TRDP_URI_USER_T *destURI*)

Subscribe to MD messages.

Add a listener to TRDP to get notified when messages are received

Parameters:

- ← *appHandle* the handle returned by tlc_init
- *pListenHandle* Handle for this listener returned
- ← *pUserRef* user supplied value returned with received message
- ← *pfCbFunction* Pointer to listener specific callback function, NULL to use default function
- ← *comId* comId to be observed
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *mcDestIpAddr* multicast group to listen on
- ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_TCP
- ← *destURI* only functional group of destination URI

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NOINIT_ERR* handle invalid

5.16.2.22 EXT_DECL TRDP_ERR_T tlm_confirm (TRDP_APP_SESSION_T *appHandle*, const TRDP_UUID_T * *pSessionId*, UINT16 *userStatus*, const TRDP_SEND_PARAM_T * *pSendParam*)

Initiate sending MD confirm message.

Send a MD confirmation message User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pSessionId* Session ID returned by request
- ← *userStatus* Info for requester about application errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NO_SESSION_ERR* no such session
- TRDP_NOINIT_ERR* handle invalid

5.16.2.23 EXT_DECL TRDP_ERR_T tlm_delListener (TRDP_APP_SESSION_T *appHandle*, TRDP_LIS_T *listenHandle*)

Remove Listener.

Parameters:

- ← *appHandle* the handle returned by tlc_init
- *listenHandle* Handle for this listener

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_NOINIT_ERR* handle invalid

5.16.2.24 EXT_DECL TRDP_ERR_T tlm_notify (TRDP_APP_SESSION_T *appHandle*, const void * *pUserRef*, TRDP_MD_CALLBACK_T *pfCbFunction*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, TRDP_FLAGS_T *pktFlags*, const TRDP_SEND_PARAM_T * *pSendParam*, const UINT8 * *pData*, UINT32 *dataSize*, const TRDP_URI_USER_T *sourceURI*, const TRDP_URI_USER_T *destURI*)

Initiate sending MD notification message.

Send a MD notification message

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pUserRef* user supplied value returned with reply
- ← *pfCbFunction* Pointer to listener specific callback function, NULL to use default function
- ← *comId* comId of packet to be sent
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *pktFlags* OPTIONS: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_TCP
- ← *pSendParam* optional pointer to send parameter, NULL - default parameters are used
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data
- ← *sourceURI* only functional group of source URI
- ← *destURI* only functional group of destination URI

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NOINIT_ERR* handle invalid

5.16.2.25 EXT_DECL TRDP_ERR_T tlm_readdListener (TRDP_APP_SESSION_T *appHandle*, TRDP_LIS_T *listenHandle*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *mcDestIpAddr*)

Resubscribe to MD messages.

Readd a listener after topoCount changes to get notified when messages are received

Parameters:

- ← *appHandle* the handle returned by tlc_init
- *listenHandle* Handle for this listener
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *mcDestIpAddr* multicast group to listen on

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NOINIT_ERR* handle invalid

5.16.2.26 `TRDP_ERR_T tlm_reply (TRDP_APP_SESSION_T appHandle, const TRDP_UUID_T * pSessionId, UINT32 comId, UINT16 userStatus, const TRDP_SEND_PARAM_T * pSendParam, const UINT8 * pData, UINT32 dataSize)`

Send a MD reply message.

Send a MD reply message after receiving an request User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session

Parameters:

- ← *appHandle* the handle returned by `tlc_init`
- ← *pSessionId* Session ID returned by indication
- ← *comId* comId of packet to be sent
- ← *userStatus* Info for requester about application errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* Out of memory
- TRDP_NO_SESSION_ERR* no such session
- TRDP_NOINIT_ERR* handle invalid

5.16.2.27 `TRDP_ERR_T tlm_replyErr (TRDP_APP_SESSION_T appHandle, const TRDP_UUID_T * pSessionId, TRDP_REPLY_STATUS_T replyStatus, const TRDP_SEND_PARAM_T * pSendParam)`

Send a MD reply message.

Send a MD error reply message after receiving an request User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session

Parameters:

- ← *appHandle* the handle returned by `tlc_init`
- ← *pSessionId* Session ID returned by indication
- ← *replyStatus* Info for requester about stack errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NO_SESSION_ERR* no such session
- TRDP_NOINIT_ERR* handle invalid

5.16.2.28 TRDP_ERR_T tlm_replyQuery (TRDP_APP_SESSION_T *appHandle*, const TRDP_UUID_T * *pSessionId*, UINT32 *comId*, UINT16 *userStatus*, UINT32 *confirmTimeout*, const TRDP_SEND_PARAM_T * *pSendParam*, const UINT8 * *pData*, UINT32 *dataSize*)

Send a MD reply query message.

Send a MD reply query message after receiving a request and ask for confirmation. User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pSessionId* Session ID returned by indication
- ← *comId* comId of packet to be sent
- ← *userStatus* Info for requester about application errors
- ← *confirmTimeout* timeout for confirmation
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NO_SESSION_ERR* no such session
- TRDP_NOINIT_ERR* handle invalid

5.16.2.29 EXT_DECL TRDP_ERR_T tlm_request (TRDP_APP_SESSION_T *appHandle*, const void * *pUserRef*, TRDP_MD_CALLBACK_T *pfCbFunction*, TRDP_UUID_T * *pSessionId*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, TRDP_FLAGS_T *pktFlags*, UINT32 *numReplies*, UINT32 *replyTimeout*, UINT32 *maxNumRetries*, const TRDP_SEND_PARAM_T * *pSendParam*, const UINT8 * *pData*, UINT32 *dataSize*, const TRDP_URI_USER_T *sourceURI*, const TRDP_URI_USER_T *destURI*)

Initiate sending MD request message.

Send a MD request message

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pUserRef* user supplied value returned with reply
- ← *pfCbFunction* Pointer to listener specific callback function, NULL to use default function
- *pSessionId* return session ID
- ← *comId* comId of packet to be sent
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication

- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *pktFlags* OPTIONS: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_TCP
- ← *numReplies* number of expected replies, 0 if unknown
- ← *replyTimeout* timeout for reply
- ← *maxNumRetries* maximum number of retries (0 ... 2)
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data
- ← *sourceURI* only functional group of source URI
- ← *destURI* only functional group of destination URI

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory
- TRDP_NOINIT_ERR* handle invalid

5.16.2.30 EXT_DECL TRDP_ERR_T tlp_get (TRDP_APP_SESSION_T *appHandle*, TRDP_SUB_T *subHandle*, TRDP_PD_INFO_T **pPdInfo*, UINT8 **pData*, UINT32 **pDataSize*)

Get the last valid PD message.

This allows polling of PDs instead of event driven handling by callback

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *subHandle* the handle returned by subscription
- ↔ *pPdInfo* pointer to application's info buffer
- ↔ *pData* pointer to application's data buffer
- ↔ *pDataSize* in: size of buffer, out: size of data

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_SUB_ERR* not subscribed
- TRDP_TIMEOUT_ERR* packet timed out
- TRDP_NOINIT_ERR* handle invalid
- TRDP_COMID_ERR* ComID not found when marshalling

This allows polling of PDs instead of event driven handling by callbacks

Parameters:

← *appHandle* the handle returned by tlc_openSession

← *subHandle* the handle returned by subscription

↔ *pPdInfo* pointer to application's info buffer

↔ *pData* pointer to application's data buffer

↔ *pDataSize* in: size of buffer, out: size of data

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

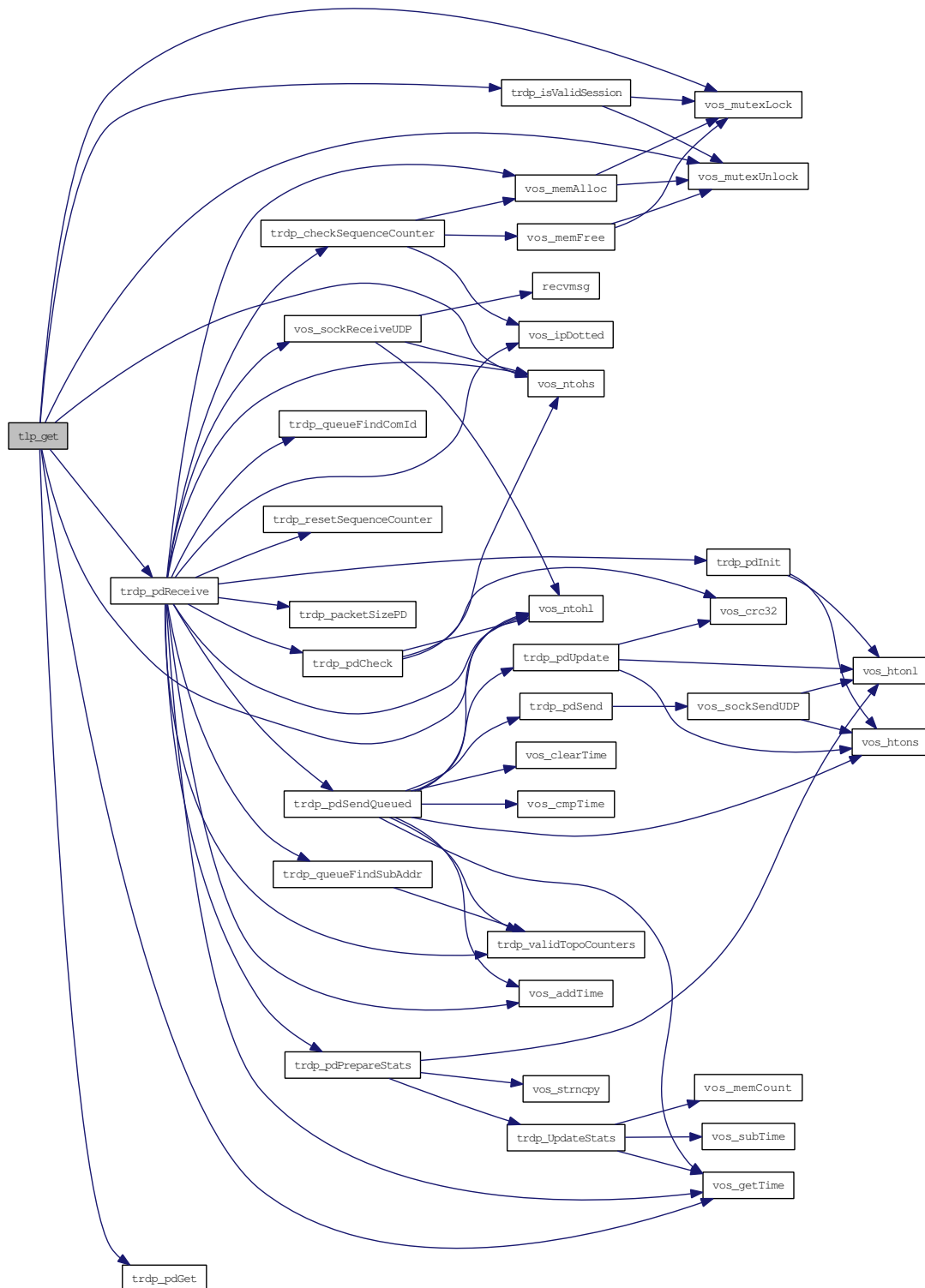
TRDP_SUB_ERR not subscribed

TRDP_TIMEOUT_ERR packet timed out

TRDP_NOINIT_ERR handle invalid

TRDP_COMID_ERR ComID not found when marshalling

Here is the call graph for this function:



5.16.2.31 EXT_DECL TRDP_ERR_T tlp_getRedundant (TRDP_APP_SESSION_T *appHandle*, UINT32 *redId*, BOOL8 **pLeader*)

Get status of redundant ComIds.

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *redId* will be set for all ComID's with the given redId, 0 for all redId
- ↔ *pLeader* TRUE if we send (leader)

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error / redId not existing
- TRDP_NOINIT_ERR** handle invalid

Only the status of the first redundancy group entry is returned will be returned!

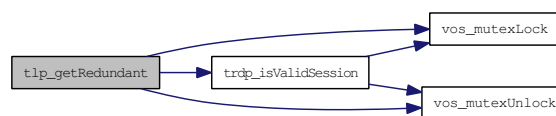
Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *redId* will be returned for all ComID's with the given redId
- ↔ *pLeader* TRUE if we're sending this redundancy group (leader)

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error / redId not existing
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.16.2.32 EXT_DECL TRDP_ERR_T tlp_publish (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T **pPubHandle*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, UINT32 *interval*, UINT32 *redId*, TRDP_FLAGS_T *pktFlags*, const TRDP_SEND_PARAM_T **pSendParam*, const UINT8 **pData*, UINT32 *dataSize*)

Prepare for sending PD messages.

Queue a PD message, it will be send when tlc_publish has been called

Parameters:

- ← *appHandle* the handle returned by tlc_init

→ *pPubHandle* returned handle for related re/unpublish
 ← *comId* comId of packet to send
 ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
 ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
 ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
 ← *destIpAddr* where to send the packet to
 ← *interval* frequency of PD packet (>= 10ms) in usec
 ← *redId* 0 - Non-redundant, > 0 valid redundancy group
 ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-
 MARSHALL, TRDP_FLAGS_CALLBACK
 ← *pSendParam* optional pointer to send parameter, NULL - default parameters are used
 ← *pData* pointer to packet data / dataset
 ← *dataSize* size of packet data

Return values:

TRDP_NO_ERR no error
TRDP_PARAM_ERR parameter error
TRDP_MEM_ERR could not insert (out of memory)
TRDP_NOINIT_ERR handle invalid

Queue a PD message, it will be send when tlc_publish has been called

Parameters:

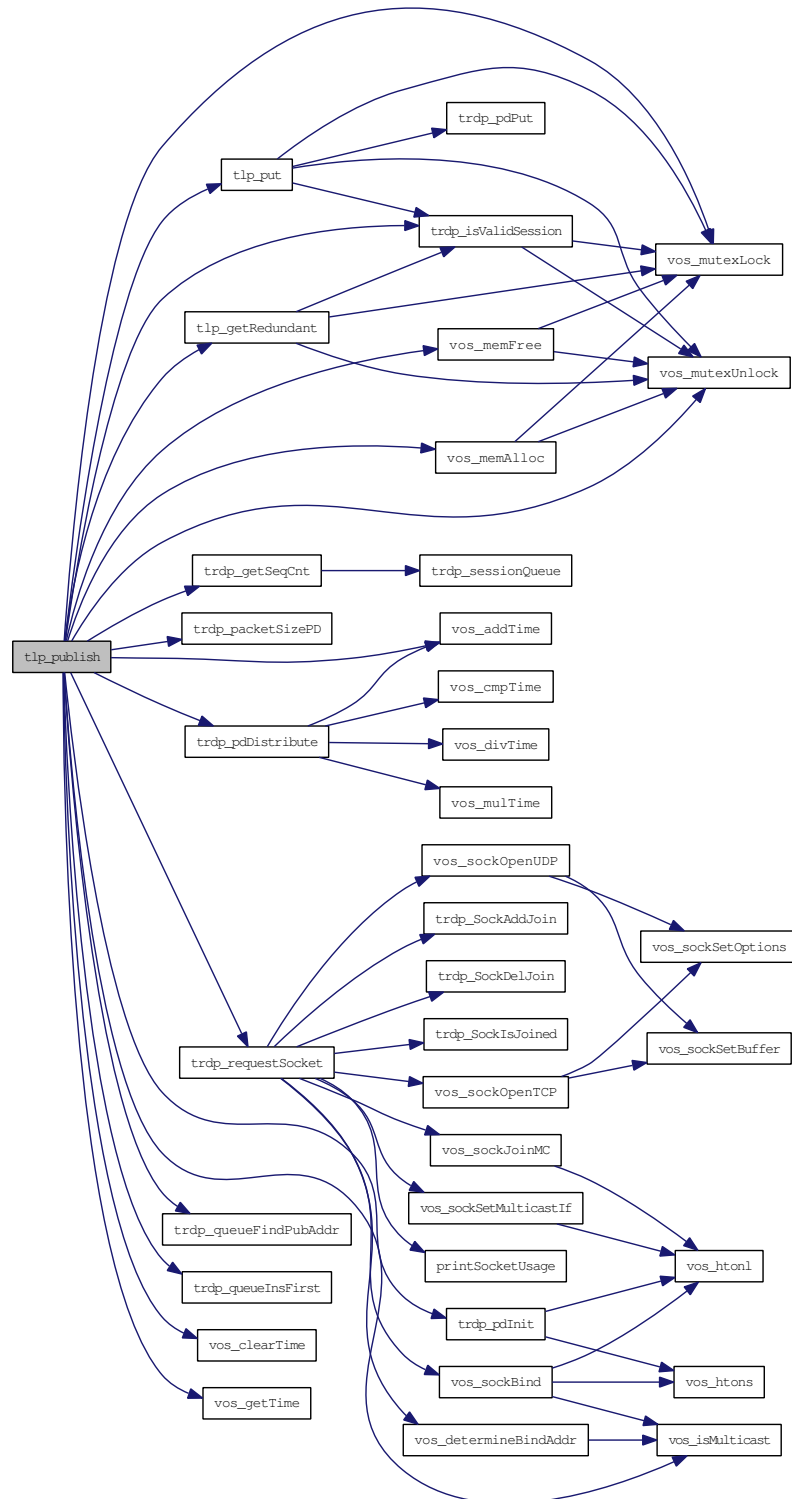
← *appHandle* the handle returned by tlc_openSession
 → *pPubHandle* returned handle for related unprepare
 ← *comId* comId of packet to send
 ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
 ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
 ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
 ← *destIpAddr* where to send the packet to
 ← *interval* frequency of PD packet (>= 10ms) in usec, 0 if PD PULL
 ← *redId* 0 - Non-redundant, > 0 valid redundancy group
 ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-
 MARSHALL, TRDP_FLAGS_CALLBACK
 ← *pSendParam* optional pointer to send parameter, NULL - default parameters are used
 ← *pData* pointer to packet data / dataset
 ← *dataSize* size of packet data <= 1436 without FCS

Return values:

TRDP_NO_ERR no error
TRDP_PARAM_ERR parameter error
TRDP_MEM_ERR could not insert (out of memory)
TRDP_NOINIT_ERR handle invalid

TRDP_NOPUB_ERR Already published

Here is the call graph for this function:



5.16.2.33 EXT_DECL TRDP_ERR_T tlp_put (TRDP_APP_SESSION_T appHandle, TRDP_PUB_T pubHandle, const UINT8 * pData, UINT32 dataSize)

Update the process data to send.

Update previously published data. The new telegram will be sent earliest when tlc_process is called.

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pubHandle* the handle returned by publish
- ↔ *pData* pointer to application's data buffer
- ↔ *dataSize* size of data

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error on uninitialized parameter or changed dataSize compared to published one
- TRDP_PUB_ERR** not published
- TRDP_NOINIT_ERR** handle invalid
- TRDP_COMID_ERR** ComID not found when marshalling

Update previously published data. The new telegram will be sent earliest when tlc_process is called.

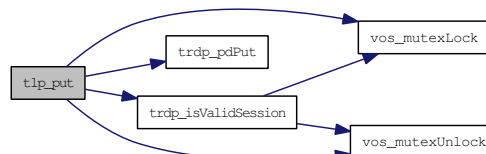
Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ← *pubHandle* the handle returned by publish
- ↔ *pData* pointer to application's data buffer
- ↔ *dataSize* size of data

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error on uninitialized parameter or changed dataSize compared to published one
- TRDP_NOPUB_ERR** not published
- TRDP_NOINIT_ERR** handle invalid
- TRDP_COMID_ERR** ComID not found when marshalling

Here is the call graph for this function:



5.16.2.34 EXT_DECL TRDP_ERR_T tlp_republish (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T *pubHandle*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, const UINT8 * *pData*, UINT32 *dataSize*)

Prepare for sending PD messages.

Reinitialize and queue a PD message, it will be send when tlc_publish has been called

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pubHandle* handle for related unpublish
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** could not insert (out of memory)
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.16.2.35 EXT_DECL TRDP_ERR_T tlp_request (TRDP_APP_SESSION_T *appHandle*, TRDP_SUB_T *subHandle*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, UINT32 *redId*, TRDP_FLAGS_T *pktFlags*, const TRDP_SEND_PARAM_T * *pSendParam*, const UINT8 * *pData*, UINT32 *dataSize*, UINT32 *replyComId*, TRDP_IP_ADDR_T *replyIpAddr*)

Initiate sending PD messages (PULL).

Send a PD request message

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *subHandle* handle from related subscribe

- ← *comId* comId of packet to be sent
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *redId* 0 - Non-redundant, > 0 valid redundancy group
- ← *pktFlags* OPTIONS: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK
- ← *pSendParam* optional pointer to send parameter, NULL - default parameters are used
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data
- ← *replyComId* comId of reply
- ← *replyIpAddr* IP for reply

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** could not insert (out of memory)
- TRDP_NOINIT_ERR** handle invalid

Send a PD request message

Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ← *subHandle* handle from related subscribe
- ← *comId* comId of packet to be sent
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *redId* 0 - Non-redundant, > 0 valid redundancy group
- ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK
- ← *pSendParam* optional pointer to send parameter, NULL - default parameters are used
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data
- ← *replyComId* comId of reply
- ← *replyIpAddr* IP for reply

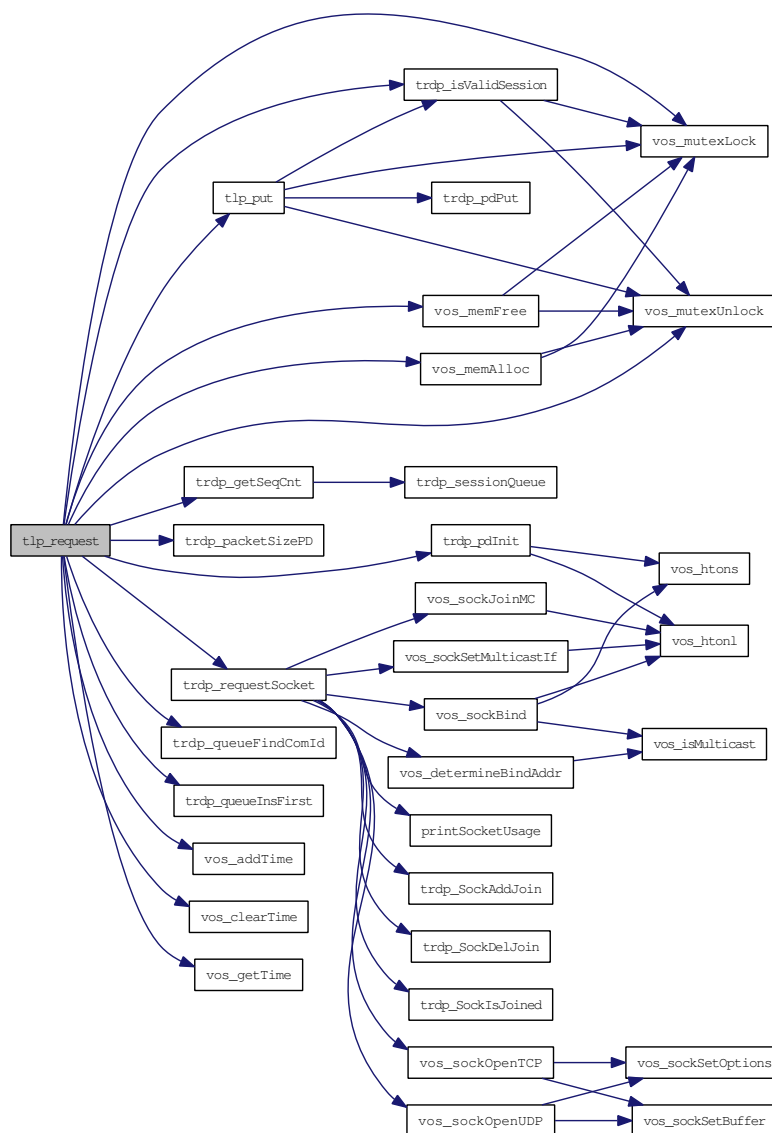
Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** could not insert (out of memory)

TRDP_NOINIT_ERR handle invalid

TRDP_NOSUB_ERR no matching subscription found

Here is the call graph for this function:



5.16.2.36 EXT_DECL TRDP_ERR_T tlp_resubscribe (TRDP_APP_SESSION_T *appHandle*, TRDP_SUB_T *subHandle*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*)

Reprepare for receiving PD messages.

Resubscribe to a specific PD ComID and source IP

Parameters:

← *appHandle* the handle returned by tlc_init

- ← *subHandle* handle for this subscription
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* IP for source filtering, set 0 if not used
- ← *destIpAddr* IP address to join

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* could not reserve memory (out of memory)
- TRDP_NOINIT_ERR* handle invalid

Resubscribe to a specific PD ComID and source IP

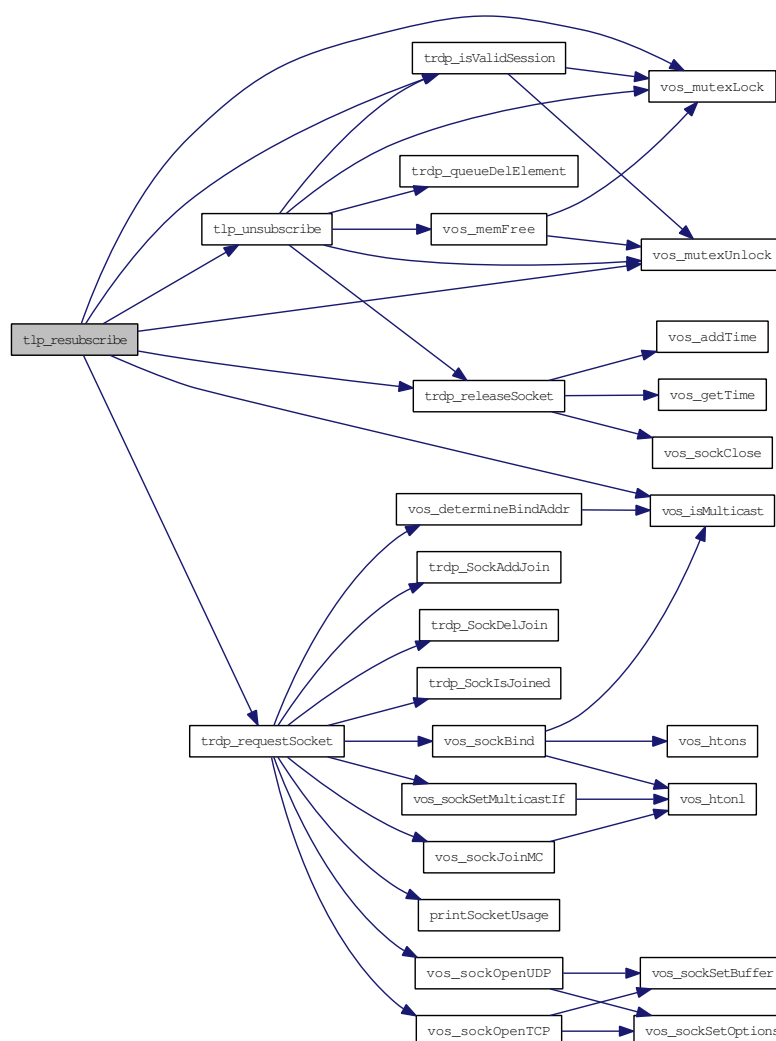
Parameters:

- ← *appHandle* the handle returned by *tlc_init*
- ← *subHandle* handle for this subscription
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* IP for source filtering, set 0 if not used
- ← *destIpAddr* IP address to join

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* could not reserve memory (out of memory)
- TRDP_NOINIT_ERR* handle invalid
- TRDP SOCK_ERR* Resource (socket) not available, subscription canceled

Here is the call graph for this function:



5.16.2.37 EXT_DECL TRDP_ERR_T tlp_setRedundant (TRDP_APP_SESSION_T *appHandle*, UINT32 *redId*, BOOL8 *leader*)

Do not send redundant PD's when we are follower.

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *redId* will be set for all ComID's with the given redId, 0 to change for all redId
- ← *leader* TRUE if we send

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error / redId not existing

TRDP_NOINIT_ERR handle invalid

Do not send redundant PD's when we are follower.

Parameters:

- ← **appHandle** the handle returned by `tlc_init`
- ← **redId** will be set for all ComID's with the given redId, 0 to change for all redId
- ← **leader** TRUE if we send

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error / redId not existing
- TRDP_NOINIT_ERR** handle invalid

Here is the call graph for this function:



5.16.238 EXT_DECL TRDP_ERR_T `tlp_subscribe` (TRDP_APP_SESSION_T *appHandle*, TRDP_SUB_T * *pSubHandle*, const void * *pUserRef*, TRDP_PD_CALLBACK_T *pfCbFunction*, UINT32 *comId*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, TRDP_IP_ADDR_T *srcIpAddr*, TRDP_IP_ADDR_T *destIpAddr*, TRDP_FLAGS_T *pktFlags*, UINT32 *timeout*, TRDP_TO_BEHAVIOR_T *toBehavior*)

Prepare for receiving PD messages.

Subscribe to a specific PD ComID and source IP

Parameters:

- ← **appHandle** the handle returned by `tlc_init`
- **pSubHandle** return a handle for this subscription
- ← **pUserRef** user supplied value returned within the info structure
- ← **pfCbFunction** Pointer to subscriber specific callback function, NULL to use default function
- ← **comId** comId of packet to receive
- ← **etbTopoCnt** ETB topocount to use, 0 if consist local communication
- ← **opTrnTopoCnt** operational topocount, != 0 for orientation/direction sensitive communication
- ← **srcIpAddr** IP for source filtering, set 0 if not used Used e.g. for source filtering of redundant devices.
- ← **destIpAddr** IP address to join
- ← **pktFlags** OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-MARSHALL, TRDP_FLAGS_CALLBACK
- ← **timeout** timeout (>= 10ms) in usec

← *toBehavior* OPTION: TRDP_TO_DEFAULT, TRDP_TO_SET_TO_ZERO, TRDP_TO_KEEP_LAST_VALUE

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_MEM_ERR could not reserve memory (out of memory)

TRDP_NOINIT_ERR handle invalid

Subscribe to a specific PD ComID and source IP.

Parameters:

← *appHandle* the handle returned by tlc_openSession

→ *pSubHandle* return a handle for this subscription

← *pUserRef* user supplied value returned within the info structure

← *pfCbFunction* Pointer to subscriber specific callback function, NULL to use default function

← *comId* comId of packet to receive

← *etbTopoCnt* ETB topocount to use, 0 if consist local communication

← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication

← *srcIpAddr* IP for source filtering, set 0 if not used

← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK

← *destIpAddr* IP address to join

← *timeout* timeout (>= 10ms) in usec

← *toBehavior* timeout behavior

Return values:

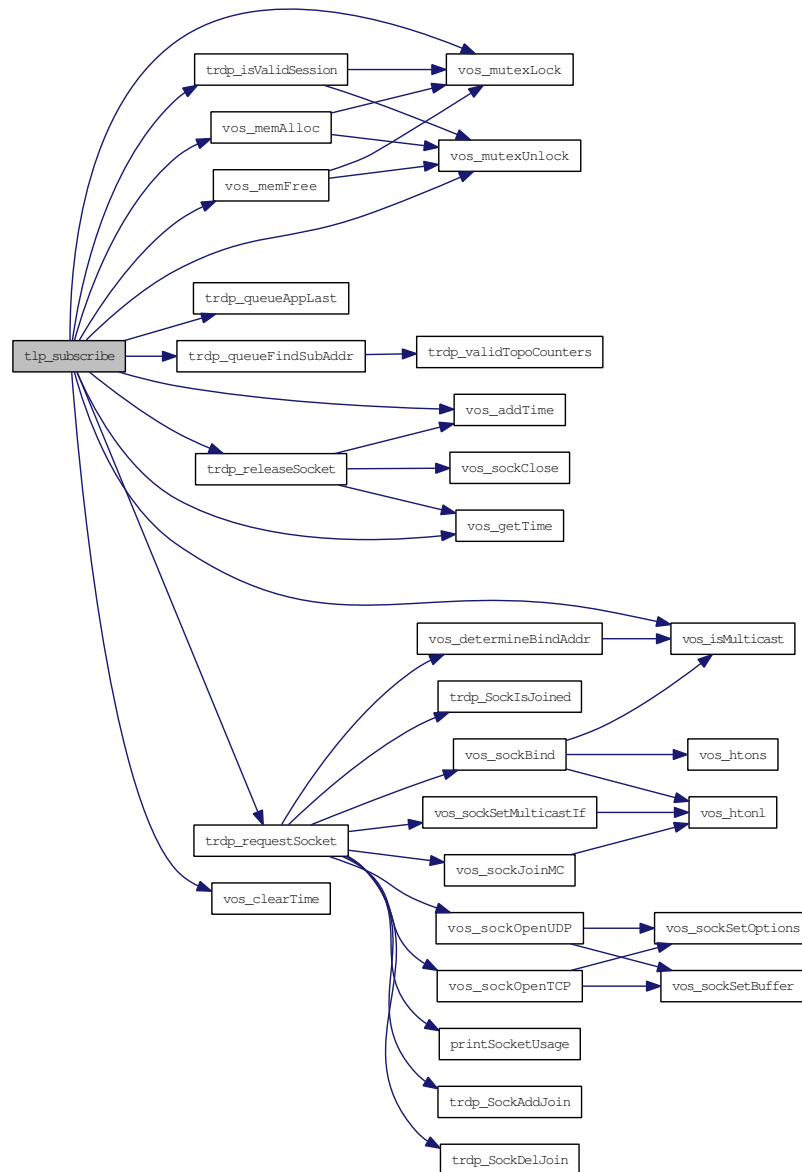
TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_MEM_ERR could not reserve memory (out of memory)

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.16.2.39 EXT_DECL TRDP_ERR_T tlp_unpublish (TRDP_APP_SESSION_T *appHandle*, TRDP_PUB_T *pubHandle*)

Stop sending PD messages.

Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pubHandle* the handle returned by publish

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_NOPUB_ERR not published

TRDP_NOINIT_ERR handle invalid

Parameters:

← **appHandle** the handle returned by `tlc_openSession`

← **pubHandle** the handle returned by `prepare`

Return values:

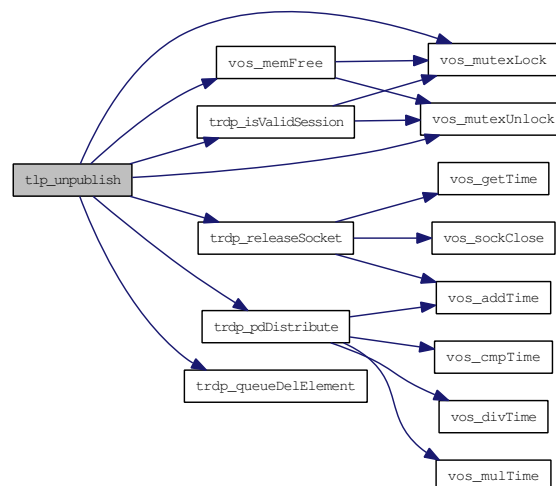
TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_NOPUB_ERR not published

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:



5.16.2.40 EXT_DECL TRDP_ERR_T tlp_unsubscribe (TRDP_APP_SESSION_T appHandle, TRDP_SUB_T subHandle)

Stop receiving PD messages.

Unsubscribe to a specific PD ComID

Parameters:

← **appHandle** the handle returned by `tlc_init`

← **subHandle** the handle for this subscription

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_SUB_ERR not subscribed

TRDP_NOINIT_ERR handle invalid

Unsubscribe to a specific PD ComID

Parameters:

← **appHandle** the handle returned by tlc_openSession

← **subHandle** the handle for this subscription

Return values:

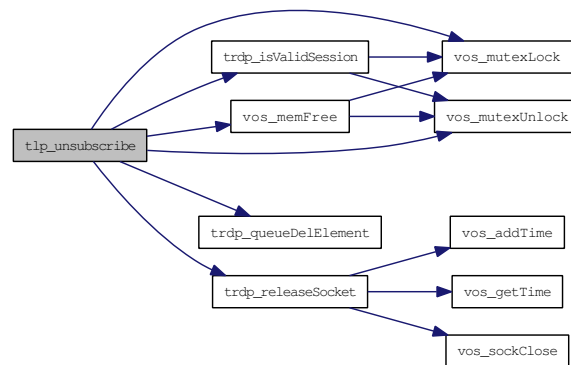
TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_NOSUB_ERR not subscribed

TRDP_NOINIT_ERR handle invalid

Here is the call graph for this function:

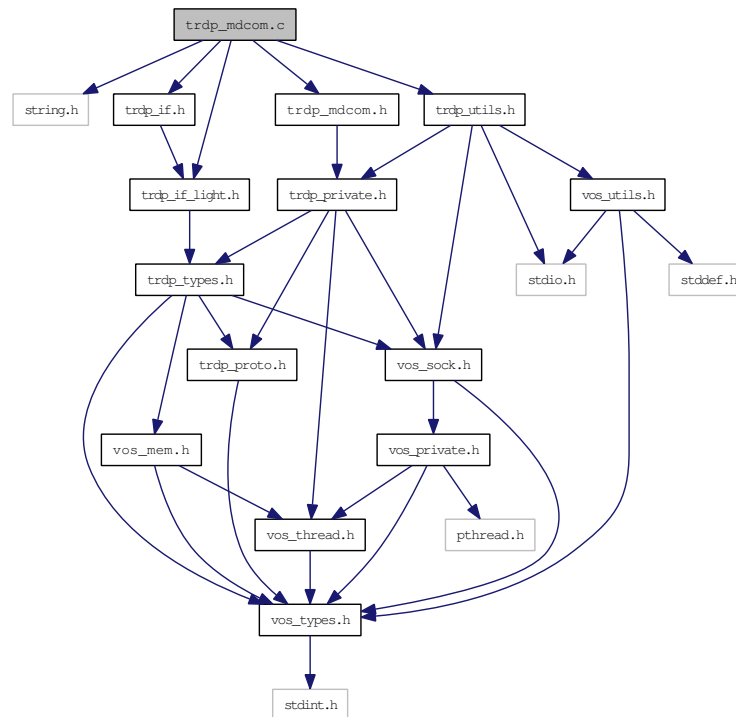


5.17 trdp_mdcom.c File Reference

Functions for MD communication.

```
#include <string.h>
#include "trdp_if_light.h"
#include "trdp_if.h"
#include "trdp_utils.h"
#include "trdp_mdcom.h"
```

Include dependency graph for trdp_mdcom.c:



Functions

- **TRDP_ERR_T** `trdp_mdGetTCPSocket` (**TRDP_SESSION_PT** pSession)
Initialize the specific parameters for message data Open a listening socket.
- void `trdp_mdFreeSession` (**MD_ELE_T** *pMDSession)
Free memory of session.
- **TRDP_ERR_T** `trdp_mdSend` (**TRDP_SESSION_PT** appHandle)
Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.
- void `trdp_mdCheckPending` (**TRDP_APP_SESSION_T** appHandle, **TRDP_FDS_T** *pFileDesc, **INT32** *pNoDesc)
Check for pending packets, set FD if non blocking.

- void `trdp_mdCheckListenSocks` (const `TRDP_SESSION_PT` appHandle, `TRDP_FDS_T` *pRfds, `INT32` *pCount)
Checking receive connection requests and data Call user's callback if needed.
- void `trdp_mdCheckTimeouts` (`TRDP_SESSION_PT` appHandle)
Checking message data timeouts Call user's callback if needed.
- `TRDP_ERR_T` `trdp_mdReply` (const `TRDP_MSG_T` msgType, `TRDP_APP_SESSION_T` appHandle, `TRDP_UUID_T` *pSessionId, `UINT32` comId, `UINT32` timeout, `INT32` replyStatus, const `TRDP_SEND_PARAM_T` *pSendParam, const `UINT8` *pData, `UINT32` dataSize)
Send a MD reply/reply query message.
- `TRDP_ERR_T` `trdp_mdCall` (const `TRDP_MSG_T` msgType, `TRDP_APP_SESSION_T` appHandle, const void *pUserRef, `TRDP_MD_CALLBACK_T` pfCbFunction, `TRDP_UUID_T` *pSessionId, `UINT32` comId, `UINT32` etbTopoCnt, `UINT32` opTrnTopoCnt, `TRDP_IP_ADDR_T` srcIpAddr, `TRDP_IP_ADDR_T` destIpAddr, `TRDP_FLAGS_T` pktFlags, `UINT32` numExReplies, `UINT32` replyTimeout, `INT32` replyStatus, `UINT32` maxNumRetries, const `TRDP_SEND_PARAM_T` *pSendParam, const `UINT8` *pData, `UINT32` dataSize, const `TRDP_URI_USER_T` srcURI, const `TRDP_URI_USER_T` destURI)
Initiate sending MD request message - private SW level Send a MD request message.
- `TRDP_ERR_T` `trdp_mdConfirm` (`TRDP_APP_SESSION_T` appHandle, const `TRDP_UUID_T` *pSessionId, `UINT16` userStatus, const `TRDP_SEND_PARAM_T` *pSendParam)
Initiate sending MD confirm message - private SW level Send a MD confirmation message User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session.

5.17.1 Detailed Description

Functions for MD communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Simone Pachera, FARsystems Gari Oiarbide, CAF Bernd Loehr, NewTec

Remarks:

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Id

`trdp_mdcom.c` 1380 2014-12-09 15:46:28Z ahweiss

BL 2014-08-28: Ticket #62: Failing TCP communication fixed, Do not read if there's nothing to read ('Mc' has no data!) BL 2014-08-25: Ticket #57+58: Padding / zero bytes trailing MD & PD packets fixed BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed Ticket #47: Protocol change: no FCS for data part of telegrams BL 2014-02-28: Ticket #25: CRC32 calculation is not according to IEEE802.3

5.17.2 Function Documentation

5.17.2.1 `TRDP_ERR_T trdp_mdCall (const TRDP_MSG_T msgType, TRDP_APP_SESSION_T appHandle, const void * pUserRef, TRDP_MD_CALLBACK_T pfCbFunction, TRDP_UUID_T * pSessionId, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, TRDP_IP_ADDR_T srcIpAddr, TRDP_IP_ADDR_T destIpAddr, TRDP_FLAGS_T pktFlags, UINT32 numExpReplies, UINT32 replyTimeout, INT32 replyStatus, UINT32 maxNumRetries, const TRDP_SEND_PARAM_T * pSendParam, const UINT8 * pData, UINT32 dataSize, const TRDP_URI_USER_T srcURI, const TRDP_URI_USER_T destURI)`

Initiate sending MD request message - private SW level Send a MD request message.

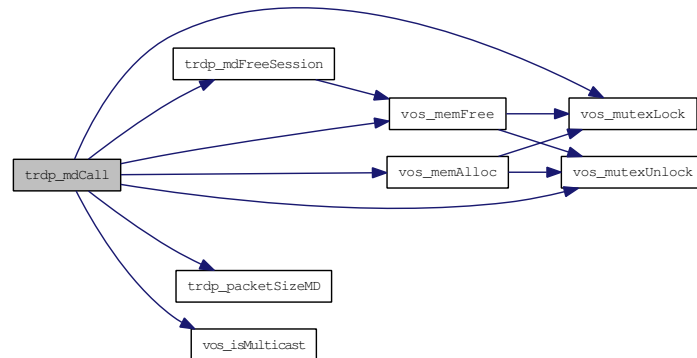
Parameters:

- ← *msgType* TRDP_MSG_MN or TRDP_MSG_MR
- ← *appHandle* the handle returned by `tlc_init`
- ← *pUserRef* user supplied value returned with reply
- ← *pfCbFunction* Pointer to listener specific callback function, NULL to use default function
- *pSessionId* return session ID
- ← *comId* comId of packet to be sent
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-MARSHALL
- ← *numExpReplies* number of expected replies, 0 if unknown
- ← *replyTimeout* timeout for reply
- ← *replyStatus* status to be returned
- ← *maxNumRetries* maximum number of retries (0 ... 2)
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data
- ← *srcURI* only functional group of source URI
- ← *destURI* only functional group of destination URI

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory

Here is the call graph for this function:



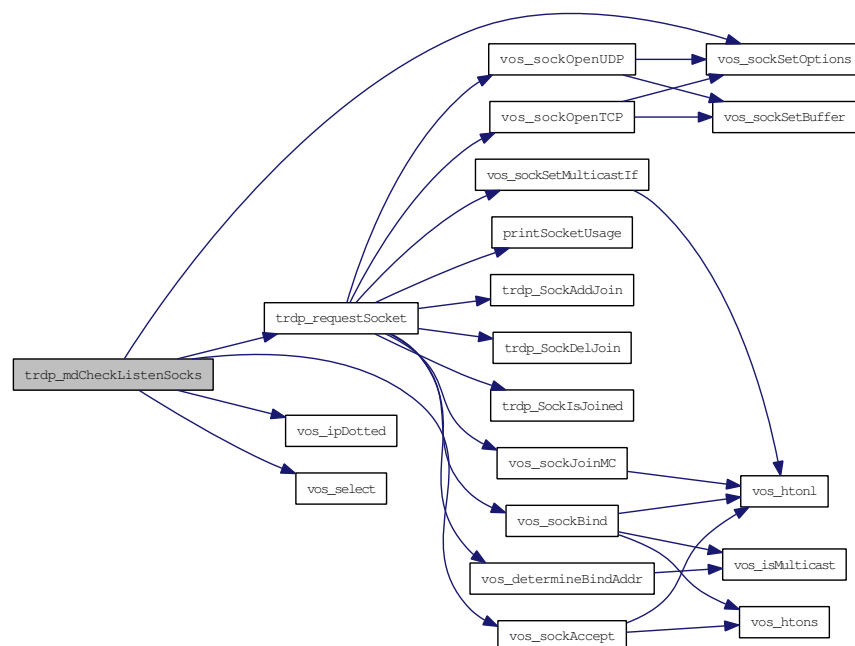
5.17.2.2 void trdp_mdCheckListenSocks (const TRDP_SESSION_PT *appHandle*, TRDP_FDS_T **pRfds*, INT32 **pCount*)

Checking receive connection requests and data Call user's callback if needed.

Parameters:

- ← *appHandle* session pointer
- ← *pRfds* pointer to set of ready descriptors
- ↔ *pCount* pointer to number of ready descriptors

Here is the call graph for this function:



5.17.2.3 void trdp_mdCheckPending (TRDP_APP_SESSION_T *appHandle*, TRDP_FDS_T * *pFileDesc*, INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters:

- ← *appHandle* session pointer
- ↔ *pFileDesc* pointer to set of ready descriptors
- ↔ *pNoDesc* pointer to number of ready descriptors

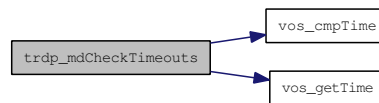
5.17.2.4 void trdp_mdCheckTimeouts (TRDP_SESSION_PT *appHandle*)

Checking message data timeouts Call user's callback if needed.

Parameters:

- ← *appHandle* session pointer

Here is the call graph for this function:



5.17.2.5 TRDP_ERR_T trdp_mdConfirm (TRDP_APP_SESSION_T *appHandle*, const TRDP_UUID_T * *pSessionId*, UINT16 *userStatus*, const TRDP_SEND_PARAM_T * *pSendParam*)

Initiate sending MD confirm message - private SW level Send a MD confirmation message User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session.

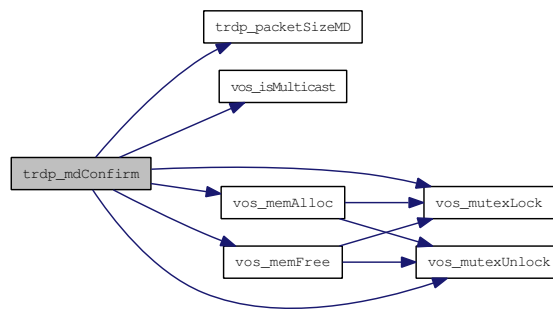
Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pSessionId* Session ID returned by request
- ← *userStatus* Info for requester about application errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** out of memory
- TRDP_NOSESSION_ERR** no such session

Here is the call graph for this function:



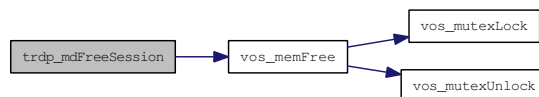
5.17.2.6 void trdp_mdFreeSession (MD_ELE_T * *pMDSession*)

Free memory of session.

Parameters:

← *pMDSession* session pointer

Here is the call graph for this function:



5.17.2.7 TRDP_ERR_T trdp_mdGetTCPSocket (TRDP_SESSION_PT *pSession*)

Initialize the specific parameters for message data Open a listening socket.

Parameters:

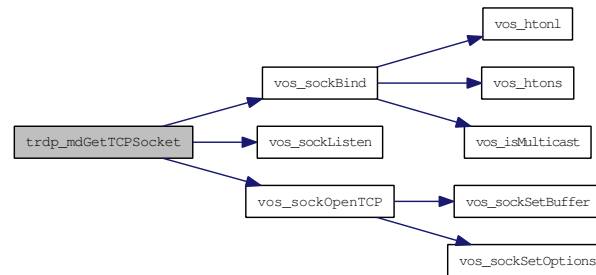
← *pSession* session parameters

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR initialization error

Here is the call graph for this function:



5.17.2.8 TRDP_ERR_T trdp_mdReply (const TRDP_MSG_T *msgType*, TRDP_APP_SESSION_T *appHandle*, TRDP_UUID_T * *pSessionId*, UINT32 *comId*, UINT32 *timeout*, INT32 *replyStatus*, const TRDP_SEND_PARAM_T * *pSendParam*, const UINT8 * *pData*, UINT32 *dataSize*)

Send a MD reply/reply query message.

Send either a MD reply message or a MD reply query message after receiving a request and ask for confirmation. User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session

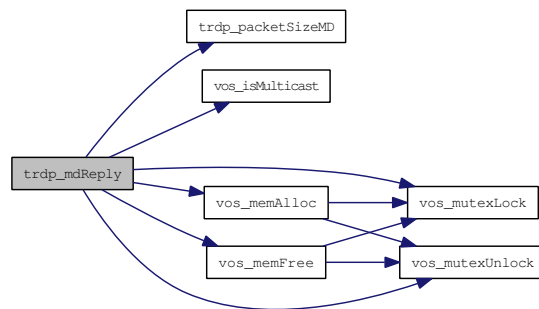
Parameters:

- ← *msgType* TRDP_MSG_MP or TRDP_MSG_MQ
- ← *appHandle* the handle returned by `tlc_init`
- ← *pSessionId* Session ID returned by indication
- ← *comId* `comId` of packet to be sent
- ← *timeout* time out for confirmations (zero for TRDP_MSG_MP)
- ← *replyStatus* Info for requester about application errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** out of memory
- TRDP_NO_SESSION_ERR** no such session

Here is the call graph for this function:



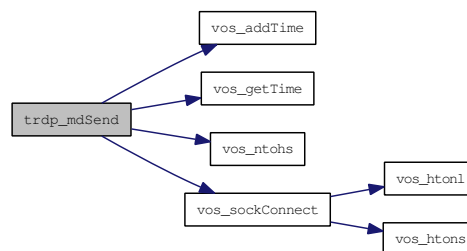
5.17.2.9 TRDP_ERR_T trdp_mdSend (TRDP_SESSION_PT *appHandle*)

Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.

Parameters:

← *appHandle* session pointer

Here is the call graph for this function:

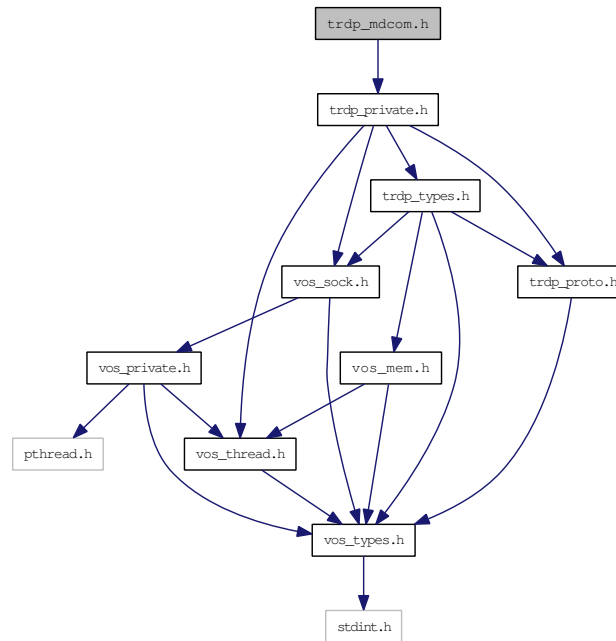


5.18 trdp_mdcom.h File Reference

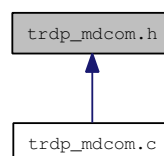
Functions for MD communication.

```
#include "trdp_private.h"
```

Include dependency graph for trdp_mdcom.h:



This graph shows which files directly or indirectly include this file:



Functions

- [TRDP_ERR_T trdp_mdGetTCPSocket](#) ([TRDP_SESSION_PT](#) pSession)
Initialize the specific parameters for message data Open a listening socket.
- void [trdp_mdFreeSession](#) ([MD_ELE_T](#) *pMDSession)
Free memory of session.
- [TRDP_ERR_T trdp_mdSend](#) ([TRDP_SESSION_PT](#) appHandle)
Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.
- void [trdp_mdCheckPending](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_FDS_T](#) *pFileDesc, [INT32](#) *pNoDesc)

Check for pending packets, set FD if non blocking.

- void `trdp_mdCheckListenSocks` (const `TRDP_SESSION_PT` appHandle, `TRDP_FDS_T` *pRfds, `INT32` *pCount)

Checking receive connection requests and data Call user's callback if needed.

- void `trdp_mdCheckTimeouts` (`TRDP_SESSION_PT` appHandle)

Checking message data timeouts Call user's callback if needed.

- `TRDP_ERR_T` `trdp_mdConfirm` (`TRDP_APP_SESSION_T` appHandle, const `TRDP_UUID_T` *pSessionId, `UINT16` userStatus, const `TRDP_SEND_PARAM_T` *pSendParam)

Initiate sending MD confirm message - private SW level Send a MD confirmation message User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session.

- `TRDP_ERR_T` `trdp_mdReply` (const `TRDP_MSG_T` msgType, `TRDP_APP_SESSION_T` appHandle, `TRDP_UUID_T` *pSessionId, `UINT32` comId, `UINT32` timeout, `INT32` replyStatus, const `TRDP_SEND_PARAM_T` *pSendParam, const `UINT8` *pData, `UINT32` dataSize)

Send a MD reply/reply query message.

- `TRDP_ERR_T` `trdp_mdCall` (const `TRDP_MSG_T` msgType, `TRDP_APP_SESSION_T` appHandle, const void *pUserRef, `TRDP_MD_CALLBACK_T` pfCbFunction, `TRDP_UUID_T` *pSessionId, `UINT32` comId, `UINT32` etbTopoCnt, `UINT32` opTrnTopoCnt, `TRDP_IP_ADDR_T` srcIpAddr, `TRDP_IP_ADDR_T` destIpAddr, `TRDP_FLAGS_T` pktFlags, `UINT32` numExpReplies, `UINT32` replyTimeout, `INT32` replyStatus, `UINT32` maxNumRetries, const `TRDP_SEND_PARAM_T` *pSendParam, const `UINT8` *pData, `UINT32` dataSize, const `TRDP_URI_USER_T` srcURI, const `TRDP_URI_USER_T` destURI)

Initiate sending MD request message - private SW level Send a MD request message.

5.18.1 Detailed Description

Functions for MD communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_mdcom.h](#) 1360 2014-11-17 09:59:26Z railroad-mike

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed Ticket #47: Protocol change: no FCS for data part of telegrams

5.18.2 Function Documentation

5.18.2.1 `TRDP_ERR_T trdp_mdCall (const TRDP_MSG_T msgType, TRDP_APP_SESSION_T appHandle, const void * pUserRef, TRDP_MD_CALLBACK_T pfCbFunction, TRDP_UUID_T * pSessionId, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, TRDP_IP_ADDR_T srcIpAddr, TRDP_IP_ADDR_T destIpAddr, TRDP_FLAGS_T pktFlags, UINT32 numExpReplies, UINT32 replyTimeout, INT32 replyStatus, UINT32 maxNumRetries, const TRDP_SEND_PARAM_T * pSendParam, const UINT8 * pData, UINT32 dataSize, const TRDP_URI_USER_T srcURI, const TRDP_URI_USER_T destURI)`

Initiate sending MD request message - private SW level Send a MD request message.

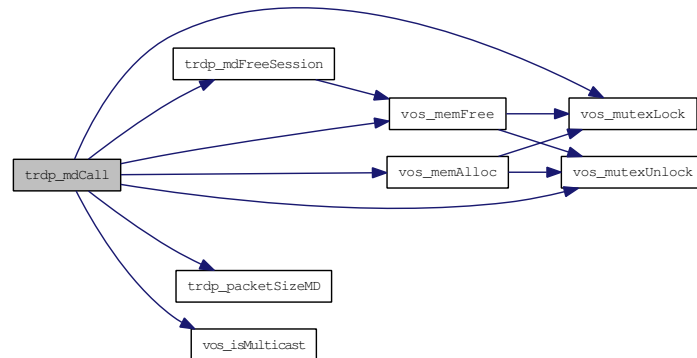
Parameters:

- ← *msgType* TRDP_MSG_MN or TRDP_MSG_MR
- ← *appHandle* the handle returned by `tlc_init`
- ← *pUserRef* user supplied value returned with reply
- ← *pfCbFunction* Pointer to listener specific callback function, NULL to use default function
- *pSessionId* return session ID
- ← *comId* comId of packet to be sent
- ← *etbTopoCnt* ETB topocount to use, 0 if consist local communication
- ← *opTrnTopoCnt* operational topocount, != 0 for orientation/direction sensitive communication
- ← *srcIpAddr* own IP address, 0 - srcIP will be set by the stack
- ← *destIpAddr* where to send the packet to
- ← *pktFlags* OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_-MARSHALL
- ← *numExpReplies* number of expected replies, 0 if unknown
- ← *replyTimeout* timeout for reply
- ← *replyStatus* status to be returned
- ← *maxNumRetries* maximum number of retries (0 ... 2)
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data
- ← *srcURI* only functional group of source URI
- ← *destURI* only functional group of destination URI

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_MEM_ERR* out of memory

Here is the call graph for this function:



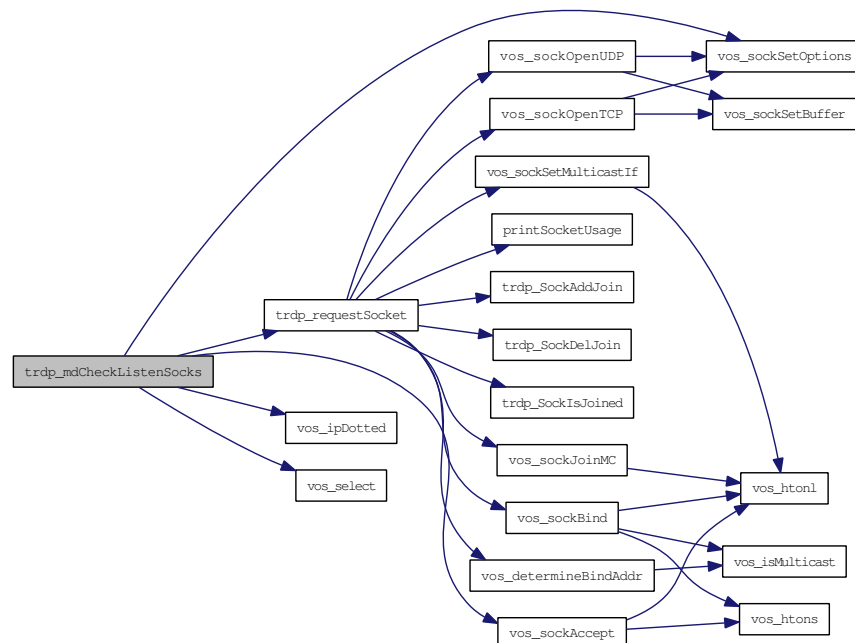
5.18.2.2 void trdp_mdCheckListenSocks (const TRDP_SESSION_PT *appHandle*, TRDP_FDS_T **pRfds*, INT32 **pCount*)

Checking receive connection requests and data Call user's callback if needed.

Parameters:

- ← *appHandle* session pointer
- ← *pRfds* pointer to set of ready descriptors
- ↔ *pCount* pointer to number of ready descriptors

Here is the call graph for this function:



5.18.2.3 void trdp_mdCheckPending (TRDP_APP_SESSION_T *appHandle*, TRDP_FDS_T * *pFileDesc*, INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters:

- ← *appHandle* session pointer
- ↔ *pFileDesc* pointer to set of ready descriptors
- ↔ *pNoDesc* pointer to number of ready descriptors

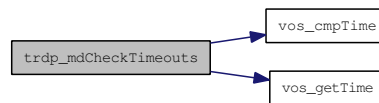
5.18.2.4 void trdp_mdCheckTimeouts (TRDP_SESSION_PT *appHandle*)

Checking message data timeouts Call user's callback if needed.

Parameters:

- ← *appHandle* session pointer

Here is the call graph for this function:



5.18.2.5 TRDP_ERR_T trdp_mdConfirm (TRDP_APP_SESSION_T *appHandle*, const TRDP_UUID_T * *pSessionId*, UINT16 *userStatus*, const TRDP_SEND_PARAM_T * *pSendParam*)

Initiate sending MD confirm message - private SW level Send a MD confirmation message User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session.

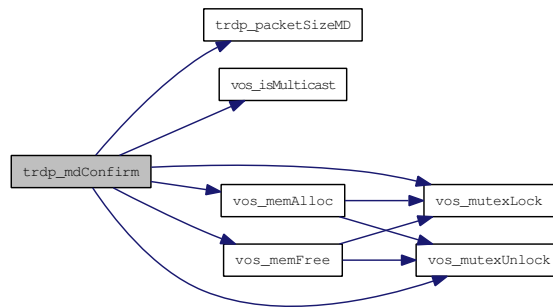
Parameters:

- ← *appHandle* the handle returned by tlc_init
- ← *pSessionId* Session ID returned by request
- ← *userStatus* Info for requester about application errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** out of memory
- TRDP_NOSESSION_ERR** no such session

Here is the call graph for this function:



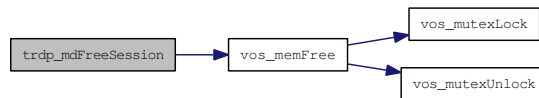
5.18.2.6 void trdp_mdFreeSession (MD_ELE_T * *pMDSession*)

Free memory of session.

Parameters:

← *pMDSession* session pointer

Here is the call graph for this function:



5.18.2.7 TRDP_ERR_T trdp_mdGetTCPSocket (TRDP_SESSION_PT *pSession*)

Initialize the specific parameters for message data Open a listening socket.

Parameters:

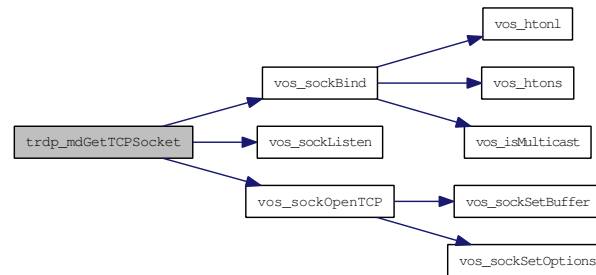
← *pSession* session parameters

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR initialization error

Here is the call graph for this function:



5.18.2.8 TRDP_ERR_T trdp_mdReply (const TRDP_MSG_T *msgType*, TRDP_APP_SESSION_T *appHandle*, TRDP_UUID_T * *pSessionId*, UINT32 *comId*, UINT32 *timeout*, INT32 *replyStatus*, const TRDP_SEND_PARAM_T * *pSendParam*, const UINT8 * *pData*, UINT32 *dataSize*)

Send a MD reply/reply query message.

Send either a MD reply message or a MD reply query message after receiving a request and ask for confirmation. User reference, source and destination IP addresses as well as topo counts and packet flags are taken from the session

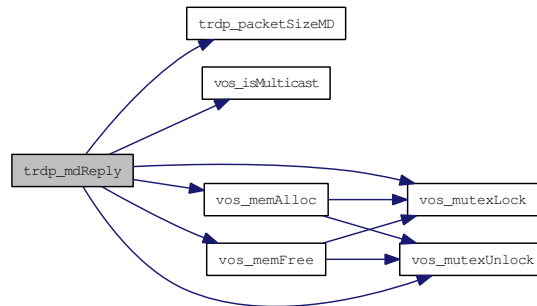
Parameters:

- ← *msgType* TRDP_MSG_MP or TRDP_MSG_MQ
- ← *appHandle* the handle returned by `tlc_init`
- ← *pSessionId* Session ID returned by indication
- ← *comId* `comId` of packet to be sent
- ← *timeout* time out for confirmations (zero for TRDP_MSG_MP)
- ← *replyStatus* Info for requester about application errors
- ← *pSendParam* Pointer to send parameters, NULL to use default send parameters
- ← *pData* pointer to packet data / dataset
- ← *dataSize* size of packet data

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** out of memory
- TRDP_NO_SESSION_ERR** no such session

Here is the call graph for this function:



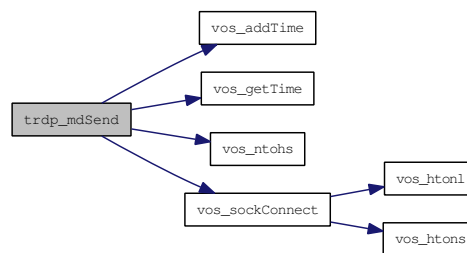
5.18.2.9 TRDP_ERR_T trdp_mdSend (TRDP_SESSION_PT *appHandle*)

Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.

Parameters:

← *appHandle* session pointer

Here is the call graph for this function:

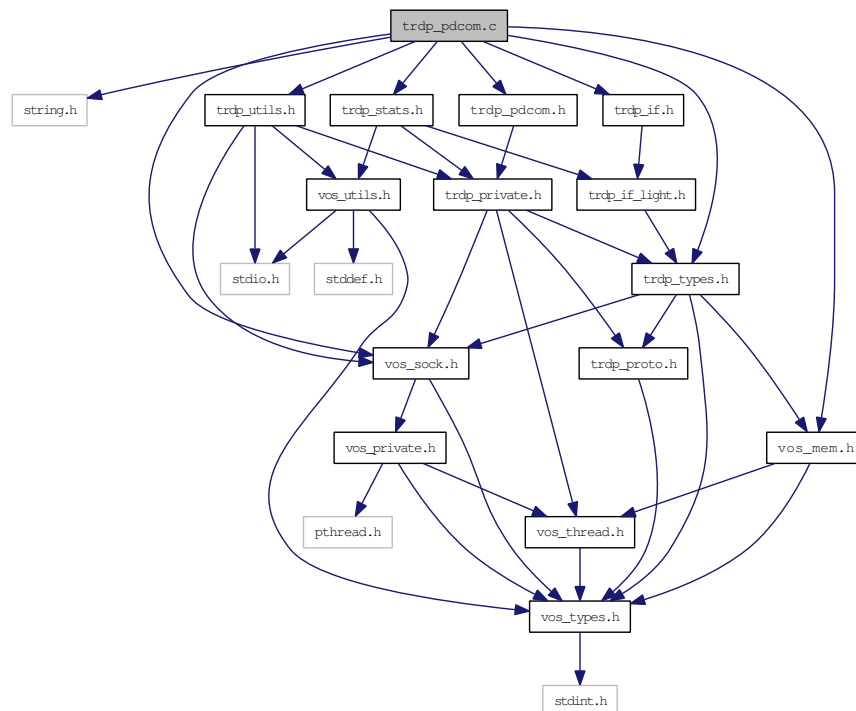


5.19 trdp_pdcom.c File Reference

Functions for PD communication.

```
#include <string.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "trdp_pdcom.h"
#include "trdp_if.h"
#include "trdp_stats.h"
#include "vos_sock.h"
#include "vos_mem.h"
```

Include dependency graph for trdp_pdcom.c:



Functions

- void [trdp_pdInit](#) ([PD_ELE_T](#) *pPacket, [TRDP_MSG_T](#) type, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, UINT32 replyComId, UINT32 replyIpAddress)
Initialize/construct the packet Set the header infos.
- [TRDP_ERR_T](#) [trdp_pdPut](#) ([PD_ELE_T](#) *pPacket, [TRDP_MARSHALL_T](#) marshall, void *refCon, const UINT8 *pData, UINT32 dataSize)
Copy data Set the header infos.

- `TRDP_ERR_T trdp_pdGet (PD_ELE_T *pPacket, TRDP_UNMARSHALL_T unmarshall, void *refCon, const UINT8 *pData, UINT32 *pDataSize)`
Copy data Set the header infos.
- `TRDP_ERR_T trdp_pdSendQueued (TRDP_SESSION_PT appHandle)`
Send all due PD messages.
- `TRDP_ERR_T trdp_pdReceive (TRDP_SESSION_PT appHandle, INT32 sock)`
*Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T
Check for protocol errors and compare the received data to the data in our receive queue.*
- `void trdp_pdCheckPending (TRDP_APP_SESSION_T appHandle, TRDP_FDS_T *pFileDesc, INT32 *pNoDesc)`
Check for pending packets, set FD if non blocking.
- `void trdp_pdHandleTimeOuts (TRDP_SESSION_PT appHandle)`
Check for time outs.
- `TRDP_ERR_T trdp_pdCheckListenSocks (TRDP_SESSION_PT appHandle, TRDP_FDS_T *pRfds, INT32 *pCount)`
Checking receive connection requests and data Call user's callback if needed.
- `void trdp_pdUpdate (PD_ELE_T *pPacket)`
Update the header values.
- `TRDP_ERR_T trdp_pdCheck (PD_HEADER_T *pPacket, UINT32 packetSize)`
Check if the PD header values and the CRCs are sane.
- `TRDP_ERR_T trdp_pdSend (INT32 pdSock, PD_ELE_T *pPacket, UINT16 port)`
Send one PD packet.
- `TRDP_ERR_T trdp_pdDistribute (PD_ELE_T *pSndQueue)`
Distribute send time of PD packets over time.

5.19.1 Detailed Description

Functions for PD communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_pdcom.c](#) 1379 2014-12-01 16:27:24Z ahweiss

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed Ticket #47: Protocol change: no FCS for data part of telegrams Ticket #43: Usage of memset() in the [trdp_pdReceive\(\)](#) function BL 2014-06-02: Ticket #41: Sequence counter handling fixed Ticket #42: memcmp only if callback enabled BL 2014-02-28: Ticket #25: CRC32 calculation is not according IEEE802.3 BL 2014-02-27: Ticket #23: [tlc_getInterval\(\)](#) always returning 10ms BL 2014-01-09: Ticket #14: Wrong error return in [trdp_pdDistribute\(\)](#) BL 2013-06-24: ID 125: Time-out handling and ready descriptors fixed BL 2013-04-09: ID 92: Pull request led to reset of push message type BL 2013-01-25: ID 20: Redundancy handling fixed

5.19.2 Function Documentation**5.19.2.1 TRDP_ERR_T trdp_pdCheck (PD_HEADER_T * *pPacket*, UINT32 *packetSize*)**

Check if the PD header values and the CRCs are sane.

Parameters:

← *pPacket* pointer to the packet to check

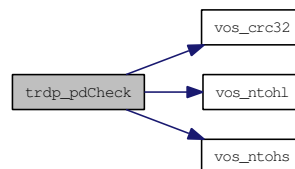
← *packetSize* max size to check

Return values:

TRDP_NO_ERR

TRDP_CRC_ERR

Here is the call graph for this function:

**5.19.2.2 TRDP_ERR_T trdp_pdCheckListenSocks (TRDP_SESSION_PT *appHandle*, TRDP_FDS_T * *pRfds*, INT32 * *pCount*)**

Checking receive connection requests and data Call user's callback if needed.

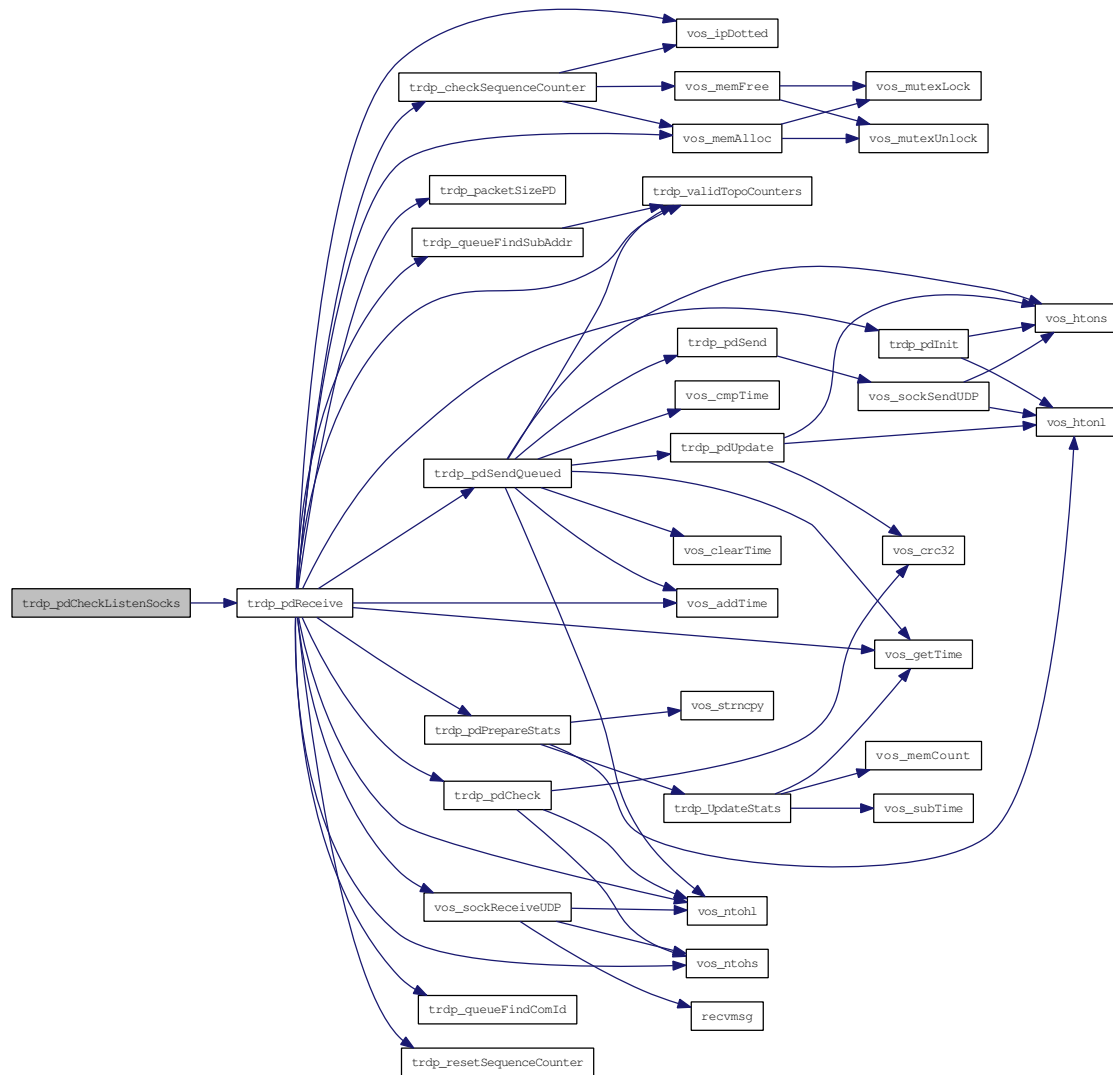
Parameters:

← *appHandle* session pointer

← *pRfds* pointer to set of ready descriptors

↔ *pCount* pointer to number of ready descriptors

Here is the call graph for this function:



5.19.2.3 void trdp_pdCheckPending (TRDP_APP_SESSION_T *appHandle*, TRDP_FDS_T * *pFileDesc*, INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters:

- ← *appHandle* session pointer
- ↔ *pFileDesc* pointer to set of ready descriptors
- ↔ *pNoDesc* pointer to number of ready descriptors

5.19.2.4 TRDP_ERR_T trdp_pdDistribute (PD_ELE_T * *pSndQueue*)

Distribute send time of PD packets over time.

The duration of PD packets on a 100MBit/s network ranges from 3us to 150us max. Because a cyclic thread scheduling below 5ms would put a too heavy load on the system, and PD packets cannot get larger than 1436 (+ UDP header), we will not account for differences in packet size. Another factor is the differences in intervals for different packets: We should only change the starting times of the packets within 1/2 the interval time. Otherwise a late addition of packets could lead to timeouts of already queued packets. Scheduling will be computed based on the smallest interval time.

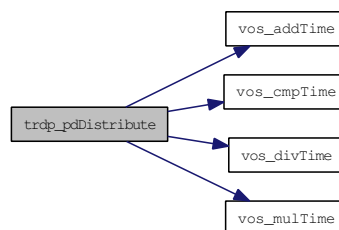
Parameters:

← *pSndQueue* pointer to send queue

Return values:

TRDP_NO_ERR

Here is the call graph for this function:



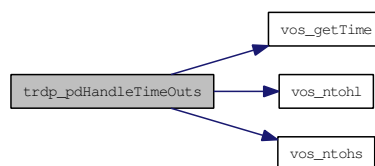
5.19.2.5 void trdp_pdHandleTimeOuts (TRDP_SESSION_PT *appHandle*)

Check for time outs.

Parameters:

← *appHandle* application handle

Here is the call graph for this function:



5.19.2.6 void trdp_pdInit (PD_ELE_T * *pPacket*, TRDP_MSG_T *type*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, UINT32 *replyComId*, UINT32 *replyIpAddress*)

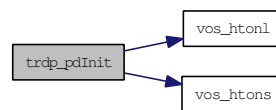
Initialize/construct the packet Set the header infos.

Parameters:

← *pPacket* pointer to the packet element to init

- ← *type* type the packet
- ← *etbTopoCnt* topocount to use for PD frame
- ← *opTrnTopoCnt* topocount to use for PD frame
- ← *replyComId* Pull request comId
- ← *replyIpAddress* Pull request Ip

Here is the call graph for this function:



5.19.2.7 TRDP_ERR_T trdp_pdReceive (TRDP_SESSION_PT *appHandle*, INT32 *sock*)

Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T Check for protocol errors and compare the received data to the data in our receive queue.

If it is a new packet, check if it is a PD Request (PULL). If it is an update, exchange the existing entry with the new one Call user's callback if needed

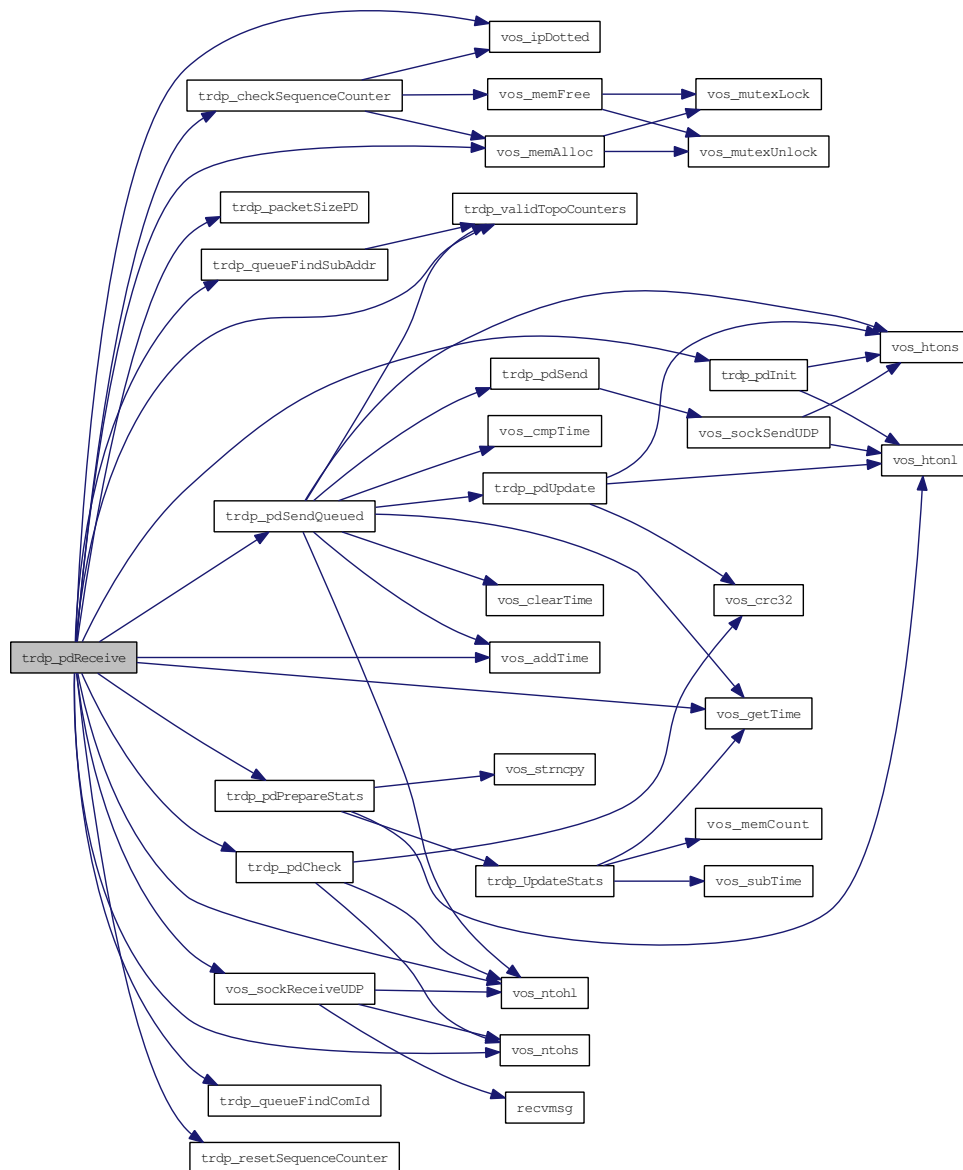
Parameters:

- ← *appHandle* session pointer
- ← *sock* the socket to read from

Return values:

- TRDP_NO_ERR* no error
- TRDP_PARAM_ERR* parameter error
- TRDP_WIRE_ERR* protocol error (late packet, version mismatch)
- TRDP_QUEUE_ERR* not in queue
- TRDP_CRC_ERR* header checksum
- TRDP_TOPOCOUNT_ERR* invalid topocount

Here is the call graph for this function:



5.19.2.8 TRDP_ERR_T trdp_pdSend (INT32 *pdSock*, PD_ELE_T * *pPacket*, UINT16 *port*)

Send one PD packet.

Parameters:

- ← *pdSock* socket descriptor
- ← *pPacket* pointer to packet to be sent
- ← *port* port on which to send

Return values:*TRDP_NO_ERR**TRDP_IO_ERR*

Here is the call graph for this function:



5.19.2.9 TRDP_ERR_T trdp_pdSendQueued (TRDP_SESSION_PT *appHandle*)

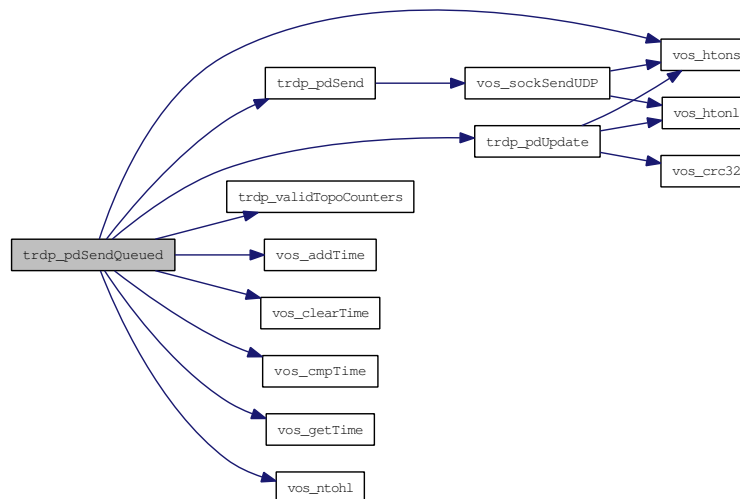
Send all due PD messages.

Parameters:

← *appHandle* session pointer

Return values:*TRDP_NO_ERR* no error*TRDP_IO_ERR* socket I/O error

Here is the call graph for this function:



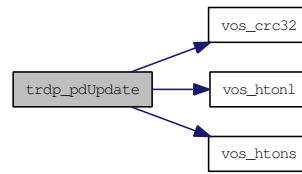
5.19.2.10 void trdp_pdUpdate (PD_ELE_T * *pPacket*)

Update the header values.

Parameters:

← *pPacket* pointer to the packet to update

Here is the call graph for this function:

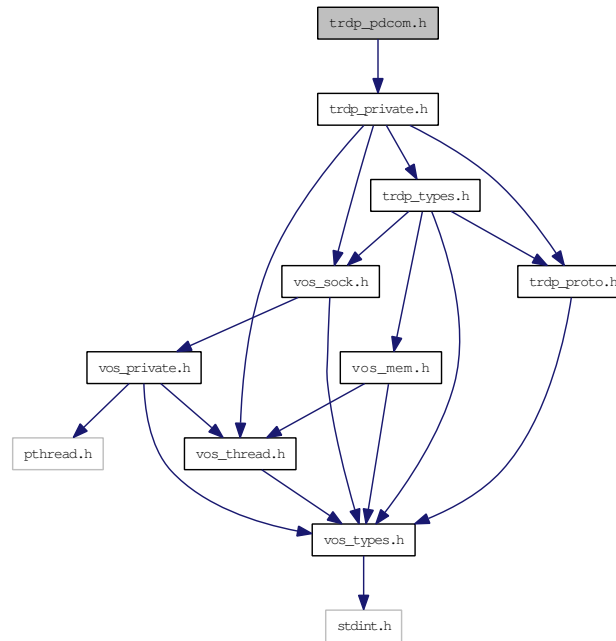


5.20 trdp_pdcom.h File Reference

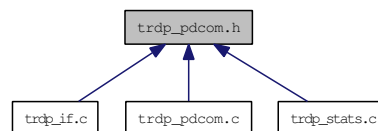
Functions for PD communication.

```
#include "trdp_private.h"
```

Include dependency graph for trdp_pdcom.h:



This graph shows which files directly or indirectly include this file:



Functions

- void [trdp_pdInit](#) ([PD_ELE_T](#) *, [TRDP_MSG_T](#), UINT32 topoCount, UINT32 optopoCount, UINT32 replyComId, UINT32 replyIpAddress)
Initialize/construct the packet Set the header infos.
- void [trdp_pdUpdate](#) ([PD_ELE_T](#) *)
Update the header values.
- [TRDP_ERR_T](#) [trdp_pdPut](#) ([PD_ELE_T](#) *, [TRDP_MARSHALL_T](#) func, void *refCon, const UINT8 *pData, UINT32 dataSize)
Copy data Set the header infos.
- [TRDP_ERR_T](#) [trdp_pdCheck](#) ([PD_HEADER_T](#) *pPacket, UINT32 packetSize)

Check if the PD header values and the CRCs are sane.

- [TRDP_ERR_T trdp_pdSend](#) (INT32 pdSock, [PD_ELE_T](#) *pPacket, UINT16 port)
Send one PD packet.
- [TRDP_ERR_T trdp_pdGet](#) ([PD_ELE_T](#) *pPacket, [TRDP_UNMARSHALL_T](#) unmarshall, void *refCon, const UINT8 *pData, UINT32 *pDataSize)
Copy data Set the header infos.
- [TRDP_ERR_T trdp_pdSendQueued](#) ([TRDP_SESSION_PT](#) appHandle)
Send all due PD messages.
- [TRDP_ERR_T trdp_pdReceive](#) ([TRDP_SESSION_PT](#) pSessionHandle, INT32 sock)
*Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T
Check for protocol errors and compare the received data to the data in our receive queue.*
- void [trdp_pdCheckPending](#) ([TRDP_APP_SESSION_T](#) appHandle, [TRDP_FDS_T](#) *pFileDesc, INT32 *pNoDesc)
Check for pending packets, set FD if non blocking.
- void [trdp_pdHandleTimeOuts](#) ([TRDP_SESSION_PT](#) appHandle)
Check for time outs.
- [TRDP_ERR_T trdp_pdCheckListenSocks](#) ([TRDP_SESSION_PT](#) appHandle, [TRDP_FDS_T](#) *pRfds, INT32 *pCount)
Checking receive connection requests and data Call user's callback if needed.
- [TRDP_ERR_T trdp_pdDistribute](#) ([PD_ELE_T](#) *pSndQueue)
Distribute send time of PD packets over time.

5.20.1 Detailed Description

Functions for PD communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_pdcom.h](#) 1377 2014-12-01 15:43:03Z ahweiss

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed Ticket #47: Protocol change: no FCS for data part of telegrams

5.20.2 Function Documentation

5.20.2.1 TRDP_ERR_T trdp_pdCheck (PD_HEADER_T * *pPacket*, UINT32 *packetSize*)

Check if the PD header values and the CRCs are sane.

Parameters:

← *pPacket* pointer to the packet to check

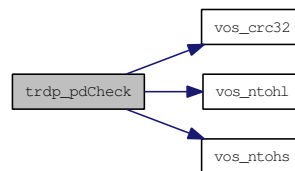
← *packetSize* max size to check

Return values:

TRDP_NO_ERR

TRDP_CRC_ERR

Here is the call graph for this function:



5.20.2.2 TRDP_ERR_T trdp_pdCheckListenSocks (TRDP_SESSION_PT *appHandle*, TRDP_FDS_T * *pRfds*, INT32 * *pCount*)

Checking receive connection requests and data Call user's callback if needed.

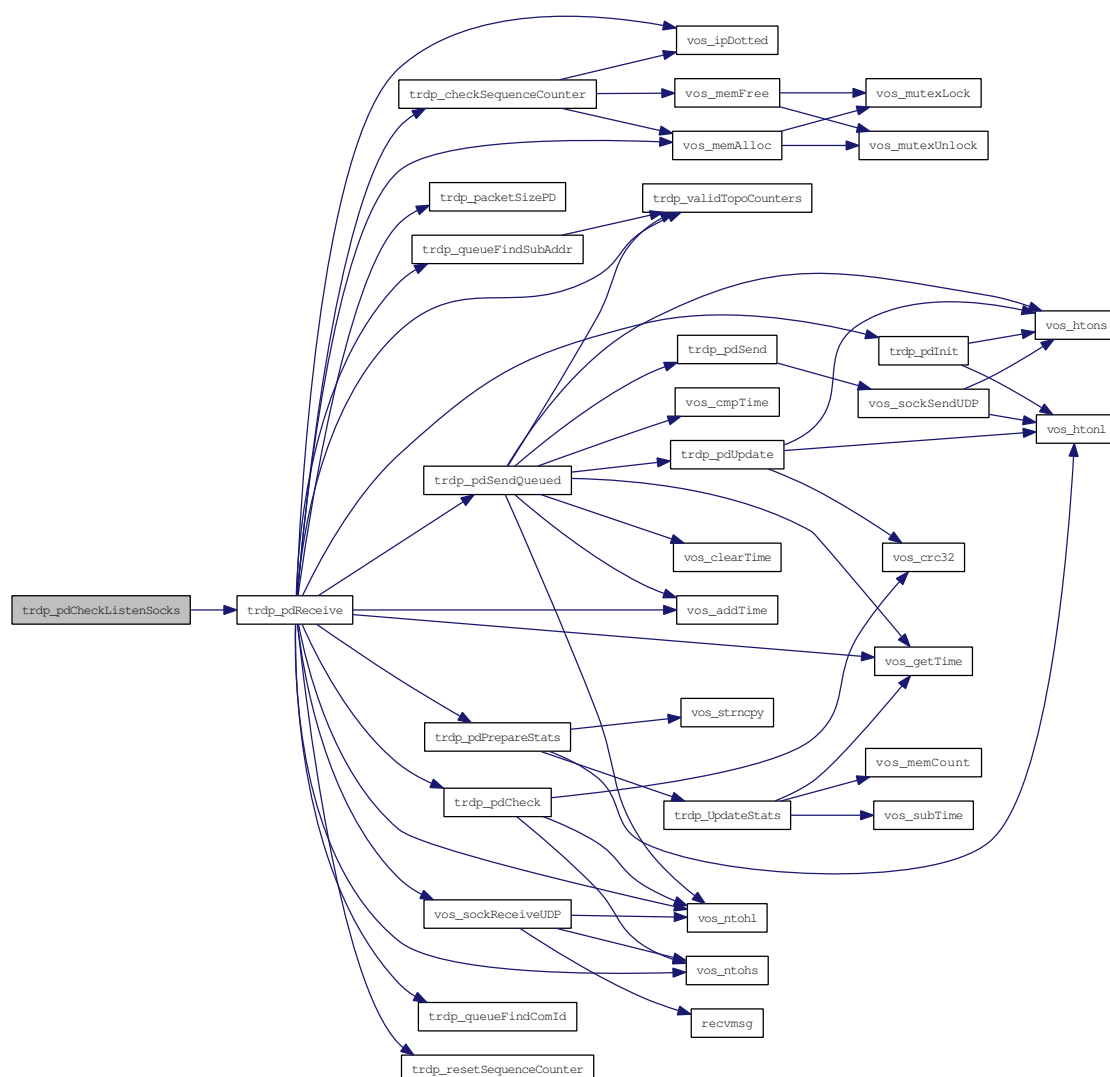
Parameters:

← *appHandle* session pointer

← *pRfds* pointer to set of ready descriptors

↔ *pCount* pointer to number of ready descriptors

Here is the call graph for this function:



5.20.2.3 void trdp_pdCheckPending (TRDP_APP_SESSION_T *appHandle*, TRDP_FDS_T * *pFileDesc*, INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters:

- ← *appHandle* session pointer
- ↔ *pFileDesc* pointer to set of ready descriptors
- ↔ *pNoDesc* pointer to number of ready descriptors

5.20.2.4 TRDP_ERR_T trdp_pdDistribute (PD_ELE_T * *pSndQueue*)

Distribute send time of PD packets over time.

The duration of PD packets on a 100MBit/s network ranges from 3us to 150us max. Because a cyclic thread scheduling below 5ms would put a too heavy load on the system, and PD packets cannot get larger than 1436 (+ UDP header), we will not account for differences in packet size. Another factor is the differences in intervals for different packets: We should only change the starting times of the packets within 1/2 the interval time. Otherwise a late addition of packets could lead to timeouts of already queued packets. Scheduling will be computed based on the smallest interval time.

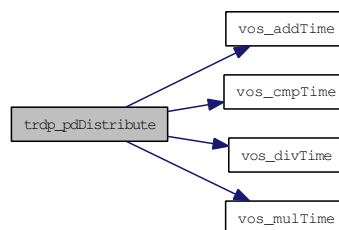
Parameters:

← *pSndQueue* pointer to send queue

Return values:

TRDP_NO_ERR

Here is the call graph for this function:



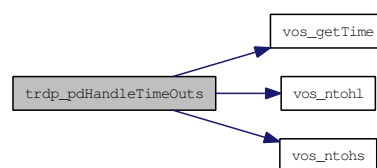
5.20.2.5 void trdp_pdHandleTimeOuts (TRDP_SESSION_PT *appHandle*)

Check for time outs.

Parameters:

← *appHandle* application handle

Here is the call graph for this function:



5.20.2.6 void trdp_pdInit (PD_ELE_T * *pPacket*, TRDP_MSG_T *type*, UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, UINT32 *replyComId*, UINT32 *replyIpAddress*)

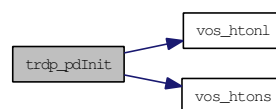
Initialize/construct the packet Set the header infos.

Parameters:

← *pPacket* pointer to the packet element to init

- ← *type* type the packet
- ← *etbTopoCnt* topocount to use for PD frame
- ← *opTrnTopoCnt* topocount to use for PD frame
- ← *replyComId* Pull request comId
- ← *replyIpAddress* Pull request Ip

Here is the call graph for this function:



5.20.2.7 TRDP_ERR_T trdp_pdReceive (TRDP_SESSION_PT *appHandle*, INT32 *sock*)

Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T Check for protocol errors and compare the received data to the data in our receive queue.

If it is a new packet, check if it is a PD Request (PULL). If it is an update, exchange the existing entry with the new one Call user's callback if needed

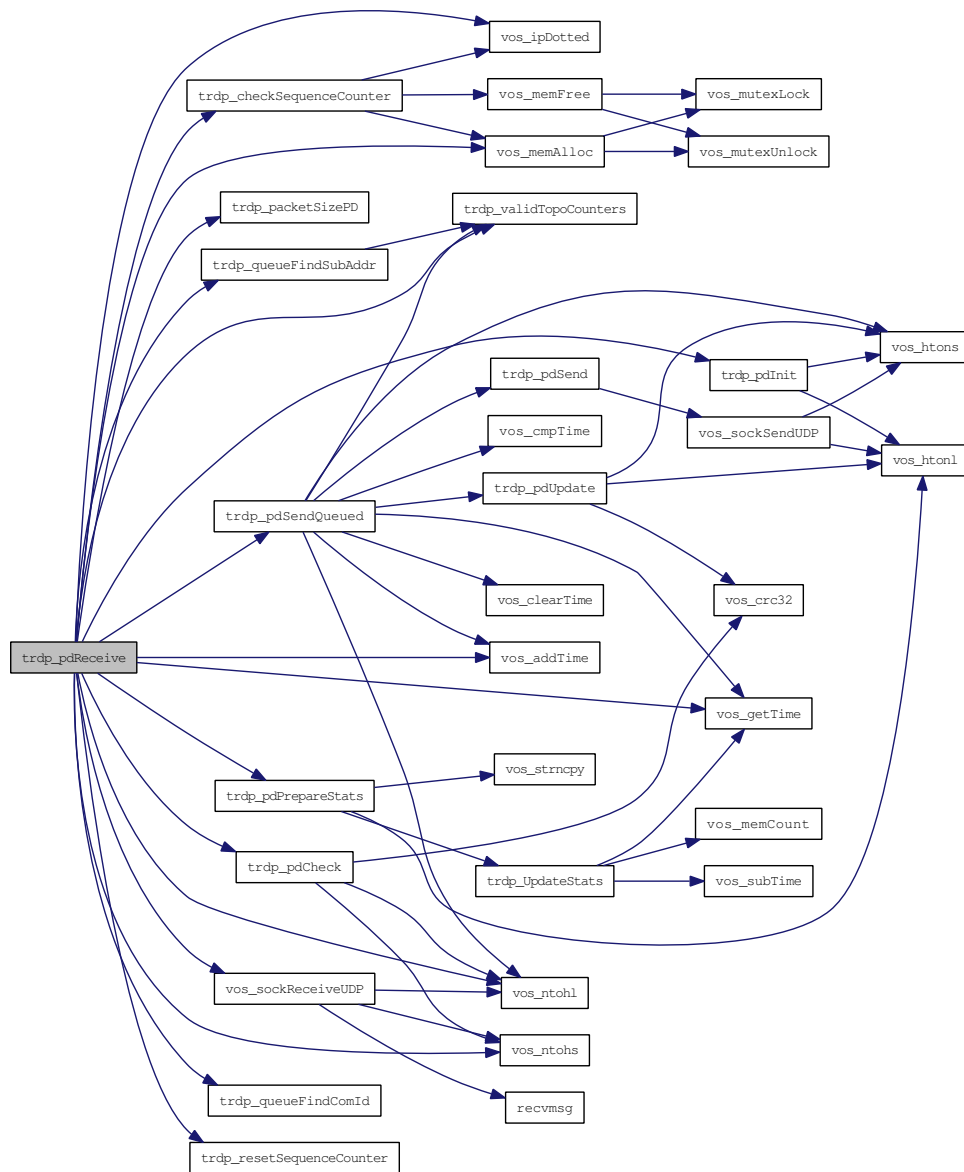
Parameters:

- ← *appHandle* session pointer
- ← *sock* the socket to read from

Return values:

- TRDP_NO_ERR** no error
- TRDP_PARAM_ERR** parameter error
- TRDP_WIRE_ERR** protocol error (late packet, version mismatch)
- TRDP_QUEUE_ERR** not in queue
- TRDP_CRC_ERR** header checksum
- TRDP_TOPOCOUNT_ERR** invalid topocount

Here is the call graph for this function:



5.20.2.8 TRDP_ERR_T trdp_pdSend (INT32 *pdSock*, PD_ELE_T * *pPacket*, UINT16 *port*)

Send one PD packet.

Parameters:

- ← *pdSock* socket descriptor
- ← *pPacket* pointer to packet to be sent
- ← *port* port on which to send

Return values:***TRDP_NO_ERR******TRDP_IO_ERR***

Here is the call graph for this function:



5.20.2.9 TRDP_ERR_T trdp_pdSendQueued (TRDP_SESSION_PT *appHandle*)

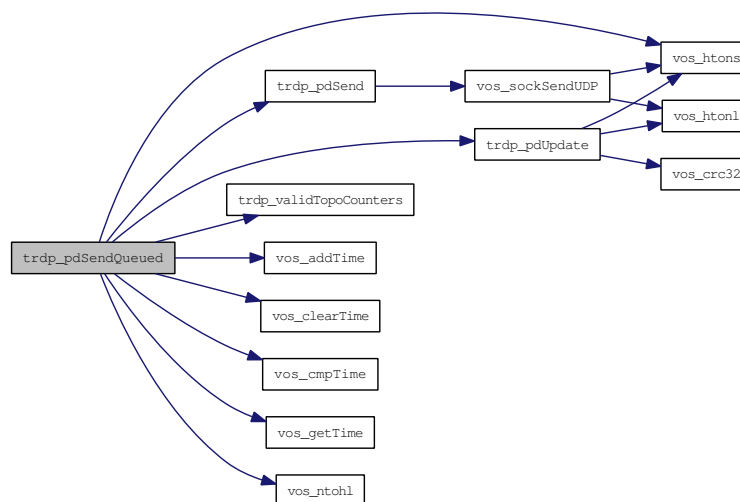
Send all due PD messages.

Parameters:

← *appHandle* session pointer

Return values:***TRDP_NO_ERR*** no error***TRDP_IO_ERR*** socket I/O error

Here is the call graph for this function:



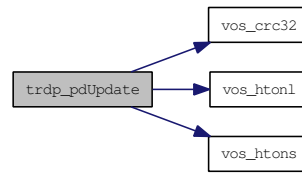
5.20.2.10 void trdp_pdUpdate (PD_ELE_T * *pPacket*)

Update the header values.

Parameters:

← *pPacket* pointer to the packet to update

Here is the call graph for this function:

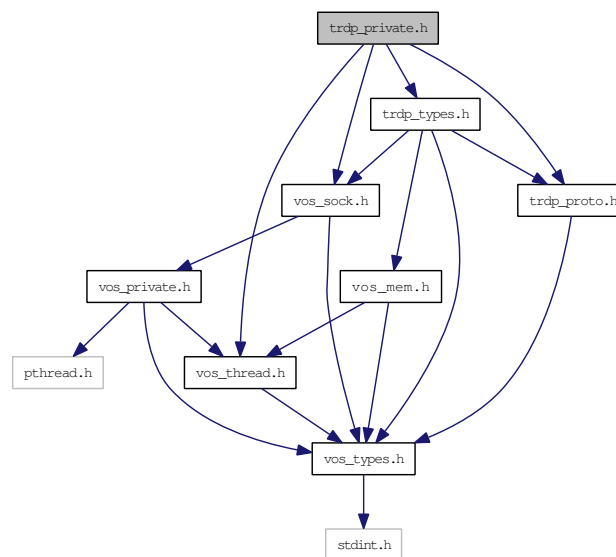


5.21 trdp_private.h File Reference

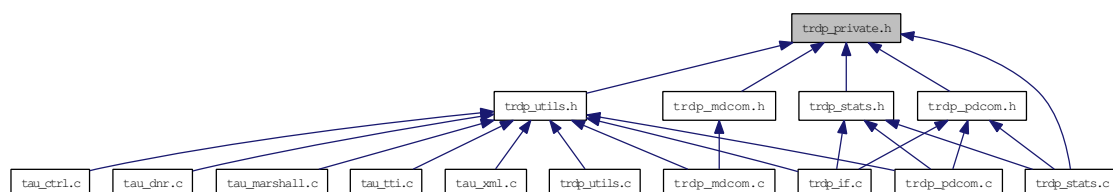
Typedefs for TRDP communication.

```
#include "trdp_types.h"
#include "trdp_proto.h"
#include "vos_thread.h"
#include "vos_sock.h"
```

Include dependency graph for trdp_private.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [TRDP_HANDLE](#)
Hidden handle definition, used as unique addressing item.
- struct [TRDP_SEQ_CNT_ENTRY_T](#)
Tuples of last received sequence counter per comId.
- struct [TRDP_SOCKET_TCP](#)
TCP parameters.

- struct [TRDP_SOCKETS](#)
Socket item.
- struct [GNU_PACKED](#)
Types for ETB control.
- struct [PD_ELE](#)
Queue element for PD packets to send or receive.
- struct [TRDP_SESSION](#)
Session/application variables store.

Defines

- #define [TRDP_TIMER_GRANULARITY](#) 10000
granularity in us
- #define [TRDP_TIMER_FOREVER](#) 0xffffffff
granularity in us
- #define [TRDP_MD_DEFAULT_REPLY_TIMEOUT](#) 5000000
default reply time out 5s
- #define [TRDP_MD_DEFAULT_CONFIRM_TIMEOUT](#) 1000000
default confirm time out 1s
- #define [TRDP_MD_DEFAULT_CONNECTION_TIMEOUT](#) 60000000
Socket connection time out 1 minute.
- #define [TRDP_MD_DEFAULT_SENDING_TIMEOUT](#) 5000000
Socket sending time out 5s.
- #define [TRDP_PROCESS_DEFAULT_CYCLE_TIME](#) 10000
Default cycle time for TRDP process.
- #define [TRDP_PROCESS_DEFAULT_PRIORITY](#) 64
Default priority of TRDP process.
- #define [TRDP_PROCESS_DEFAULT_OPTIONS](#) TRDP_OPTION_TRAFFIC_SHAPING
Default options for TRDP process.
- #define [TRDP_DEBUG_DEFAULT_FILE_SIZE](#) 65536
Default maximum size of log file.
- #define [TRDP_SEQ_CNT_START_ARRAY_SIZE](#) 64
This should be enough for the start.

Typedefs

- typedef struct [TRDP_HANDLE](#) [TRDP_ADDRESSES_T](#)
Hidden handle definition, used as unique addressing item.
- typedef struct [TRDP_SOCKET_TCP](#) [TRDP_SOCKET_TCP_T](#)
TCP parameters.
- typedef struct [TRDP_SOCKETS](#) [TRDP_SOCKETS_T](#)
Socket item.
- typedef struct [PD_ELE](#) [PD_ELE_T](#)
Queue element for PD packets to send or receive.
- typedef struct [TRDP_SESSION](#) [TRDP_SESSION_T](#)
Session/application variables store.

Enumerations

- enum [TRDP_MD_ELE_ST_T](#) {
[TRDP_ST_NONE](#) = 0,
[TRDP_ST_TX_NOTIFY_ARM](#) = 1,
[TRDP_ST_TX_REQUEST_ARM](#) = 2,
[TRDP_ST_TX_REPLY_ARM](#) = 3,
[TRDP_ST_TX_REPLYQUERY_ARM](#) = 4,
[TRDP_ST_TX_CONFIRM_ARM](#) = 5,
[TRDP_ST_RX_READY](#) = 6,
[TRDP_ST_TX_REQUEST_W4REPLY](#) = 7,
[TRDP_ST_RX_REPLYQUERY_W4C](#) = 8,
[TRDP_ST_RX_REQ_W4AP_REPLY](#) = 9,
[TRDP_ST_TX_REQ_W4AP_CONFIRM](#) = 10,
[TRDP_ST_RX_REPLY_SENT](#) = 11,
[TRDP_ST_RX_NOTIFY_RECEIVED](#) = 12,
[TRDP_ST_TX_REPLY_RECEIVED](#) = 13,
[TRDP_ST_RX_CONF_RECEIVED](#) = 14 }
Internal MD state.
- enum [TRDP_PRIV_FLAGS_T](#) { ,
[TRDP_TIMED_OUT](#) = 0x2,
[TRDP_INVALID_DATA](#) = 0x4,
[TRDP_REQ_2B_SENT](#) = 0x8,
[TRDP_PULL_SUB](#) = 0x10,
[TRDP_REDUNDANT](#) = 0x20 }
Internal flags for packets.

- enum `TRDP SOCK_TYPE_T` {
`TRDP SOCK_PD` = 0,
`TRDP SOCK_MD_UDP` = 1,
`TRDP SOCK_MD_TCP` = 2 }

Socket usage.

5.21.1 Detailed Description

Typedefs for TRDP communication.

TRDP internal type definitions

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_private.h](#) 1329 2014-09-04 16:03:50Z bloehr

BL 2014-06-02: Ticket #41: Sequence counter handling fixed

5.21.2 Enumeration Type Documentation

5.21.2.1 enum TRDP_MD_ELE_ST_T

Internal MD state.

Enumerator:

TRDP_ST_NONE neutral value
TRDP_ST_TX_NOTIFY_ARM ready to send notify MD
TRDP_ST_TX_REQUEST_ARM ready to send request MD
TRDP_ST_TX_REPLY_ARM ready to send reply MD
TRDP_ST_TX_REPLYQUERY_ARM ready to send reply with confirm request MD
TRDP_ST_TX_CONFIRM_ARM ready to send confirm MD
TRDP_ST_RX_READY armed listener
TRDP_ST_TX_REQUEST_W4REPLY request sent, wait for reply
TRDP_ST_RX_REPLYQUERY_W4C reply send, with confirm request MD

TRDP_ST_RX_REQ_W4AP_REPLY request received, wait for application reply send
TRDP_ST_TX_REQ_W4AP_CONFIRM reply conf.
rq. tx, wait for application conf send
TRDP_ST_RX_REPLY_SENT reply sent
TRDP_ST_RX_NOTIFY_RECEIVED notification received, wait for application to accept
TRDP_ST_TX_REPLY_RECEIVED reply received
TRDP_ST_RX_CONF_RECEIVED confirmation received

5.21.2.2 enum TRDP_PRIV_FLAGS_T

Internal flags for packets.

Enumerator:

TRDP_TIMED_OUT if set, inform the user
TRDP_INVALID_DATA if set, inform the user
TRDP_REQ_2B_SENT if set, the request needs to be sent
TRDP_PULL_SUB if set, its a PULL subscription
TRDP_REDUNDANT if set, packet should not be sent (redundant)

5.21.2.3 enum TRDP SOCK_TYPE_T

Socket usage.

Enumerator:

TRDP SOCK_PD Socket is used for UDP process data.
TRDP SOCK_MD_UDP Socket is used for UDP message data.
TRDP SOCK_MD_TCP Socket is used for TCP message data.

message data TCP port

- #define [TRDP_PROTO_VER](#) 0x0100
Protocol version.
- #define [TRDP_PROTOCOL_VERSION_CHECK_MASK](#) 0xFF00
Version check, two digits are relevant.
- #define [TRDP_SESS_ID_SIZE](#) 16
Session ID (UUID) size in MD header.
- #define [TRDP_DEST_URI_SIZE](#) 32
max.
- #define [TRDP_MIN_PD_HEADER_SIZE](#) sizeof(PD_HEADER_T)
PD header size with FCS.
- #define [TRDP_MAX_PD_DATA_SIZE](#) 1432
PD data.
- #define [TRDP_MAX_LABEL_LEN](#) 16
Maximum values.
- #define [TRDP_MAX_URI_USER_LEN](#) (2 * TRDP_MAX_LABEL_LEN)
URI user part incl.
- #define [TRDP_MAX_URI_HOST_LEN](#) (4 * TRDP_MAX_LABEL_LEN)
URI host part length incl.
- #define [TRDP_MAX_URI_LEN](#) ((6 * TRDP_MAX_LABEL_LEN) + 8)
URI length incl.
- #define [TRDP_MAX_FILE_NAME_LEN](#) 128
path and file name length incl.
- #define [TDRP_VAR_SIZE](#) 0
Variable size dataset.
- #define [TRDP_ETBCTRL_COMID](#) 1
TRDP reserved COMIDs in the range 1 .
- #define [TRDP_ETBCTRL_DSID](#) 1
TRDP reserved data set ids in the range 1 .

Enumerations

- enum TRDP_MSG_T {
 TRDP_MSG_PD = 0x5064,
 TRDP_MSG_PP = 0x5070,
 TRDP_MSG_PR = 0x5072,
 TRDP_MSG_PE = 0x5065,
 TRDP_MSG_MN = 0x4D6E,
 TRDP_MSG_MR = 0x4D72,
 TRDP_MSG_MP = 0x4D70,
 TRDP_MSG_MQ = 0x4D71,
 TRDP_MSG_MC = 0x4D63,
 TRDP_MSG_ME = 0x4D65 }

Message Types.

5.22.1 Detailed Description

Definitions for the TRDP protocol.

TRDP internal type definitions

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_proto.h](#) 1363 2014-11-21 14:25:16Z railroad-mike

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed

5.22.2 Define Documentation

5.22.2.1 #define TRDP_DEST_URI_SIZE 32

max.

Dest URI size in MD header

5.22.2.2 `#define TRDP_ETBCTRL_COMID 1`

TRDP reserved COMIDs in the range 1 .

.. 1000

5.22.2.3 `#define TRDP_ETBCTRL_DSID 1`

TRDP reserved data set ids in the range 1 .

.. 1000

5.22.2.4 `#define TRDP_MAX_FILE_NAME_LEN 128`

path and file name length incl.

terminating '0'

5.22.2.5 `#define TRDP_MAX_LABEL_LEN 16`

Maximum values.

A uri is a string of the following form: `trdp://[user part]@[host part]trdp://instLabel.funcLabel@devLabel.carLabel.cstLabel.trainLabel` Hence the exact max. uri length is: $7 + (6 * 15) + 5 * (\text{sizeof}(\text{separator})) + 1$ (terminating 0) to facilitate alignment the size will be increased by 1 byte label length incl. terminating '0'

5.22.2.6 `#define TRDP_MAX_URI_HOST_LEN (4 * TRDP_MAX_LABEL_LEN)`

URI host part length incl.

terminating '0'

5.22.2.7 `#define TRDP_MAX_URI_LEN ((6 * TRDP_MAX_LABEL_LEN) + 8)`

URI length incl.

terminating '0' and 1 padding byte

5.22.2.8 `#define TRDP_MAX_URI_USER_LEN (2 * TRDP_MAX_LABEL_LEN)`

URI user part incl.

terminating '0'

5.22.3 Enumeration Type Documentation

5.22.3.1 `enum TRDP_MSG_T`

Message Types.

Enumerator:

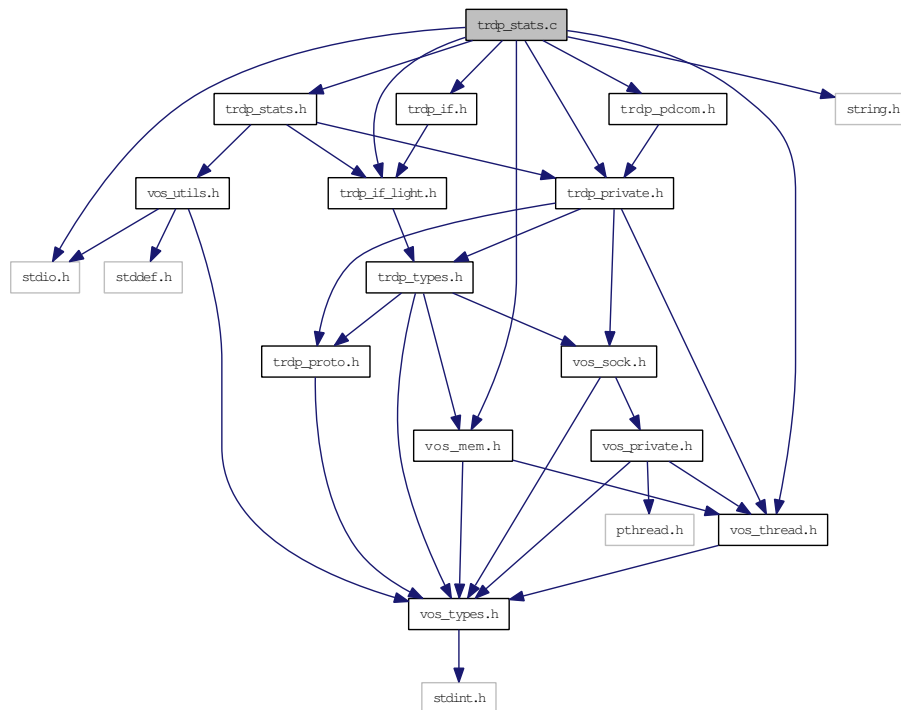
TRDP_MSG_PD 'Pd' PD Data
TRDP_MSG_PP 'Pp' PD Data (Pull Reply)
TRDP_MSG_PR 'Pr' PD Request
TRDP_MSG_PE 'Pe' PD Error
TRDP_MSG_MN 'Mn' MD Notification (Request without reply)
TRDP_MSG_MR 'Mr' MD Request with reply
TRDP_MSG_MP 'Mp' MD Reply without confirmation
TRDP_MSG_MQ 'Mq' MD Reply with confirmation
TRDP_MSG_MC 'Mc' MD Confirm
TRDP_MSG_ME 'Me' MD Error

5.23 trdp_stats.c File Reference

Statistics functions for TRDP communication.

```
#include <stdio.h>
#include <string.h>
#include "trdp_stats.h"
#include "trdp_if_light.h"
#include "trdp_if.h"
#include "trdp_private.h"
#include "trdp_pdcom.h"
#include "vos_mem.h"
#include "vos_thread.h"
```

Include dependency graph for trdp_stats.c:



Functions

- void [trdp_UpdateStats](#) (TRDP_APP_SESSION_T appHandle)
Update the statistics.
- void [trdp_initStats](#) (TRDP_APP_SESSION_T appHandle)
Init statistics.
- EXT_DECL [TRDP_ERR_T tlc_resetStatistics](#) (TRDP_APP_SESSION_T appHandle)

Reset statistics.

- EXT_DECL `TRDP_ERR_T tlc_getStatistics (TRDP_APP_SESSION_T appHandle, TRDP_STATISTICS_T *pStatistics)`

Return statistics.

- EXT_DECL `TRDP_ERR_T tlc_getSubsStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumSubs, TRDP_SUBS_STATISTICS_T *pStatistics)`

Return PD subscription statistics.

- EXT_DECL `TRDP_ERR_T tlc_getPubStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumPub, TRDP_PUB_STATISTICS_T *pStatistics)`

Return PD publish statistics.

- EXT_DECL `TRDP_ERR_T tlc_getRedStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumRed, TRDP_RED_STATISTICS_T *pStatistics)`

Return redundancy group statistics.

- EXT_DECL `TRDP_ERR_T tlc_getJoinStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumJoin, UINT32 *pIpAddr)`

Return join statistics.

- void `trdp_pdPrepareStats (TRDP_APP_SESSION_T appHandle, PD_ELE_T *pPacket)`

Fill the statistics packet.

5.23.1 Detailed Description

Statistics functions for TRDP communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_stats.c](#) 1336 2014-09-30 07:25:02Z ahweiss

5.23.2 Function Documentation

5.23.2.1 EXT_DECL TRDP_ERR_T tlc_getJoinStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumJoin, UINT32 *pIpAddr)

Return join statistics.

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumJoin* Pointer to the number of joined IP Addresses
- *pIpAddr* Pointer to a list with the joined IP addresses

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more items than requested

Here is the call graph for this function:



5.23.2.2 EXT_DECL TRDP_ERR_T tlc_getPubStatistics (TRDP_APP_SESSION_T appHandle, UINT16 * pNumPub, TRDP_PUB_STATISTICS_T * pStatistics)

Return PD publish statistics.

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by `tlc_openSession`
- ↔ *pNumPub* Pointer to the number of publishers
- *pStatistics* Pointer to a list with the publish statistics information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Here is the call graph for this function:



5.23.2.3 EXT_DECL TRDP_ERR_T tlc_getRedStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumRed*, TRDP_RED_STATISTICS_T **pStatistics*)

Return redundancy group statistics.

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ↔ *pNumRed* Pointer to the number of redundancy groups
- *pStatistics* Pointer to a list with the redundancy group information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Here is the call graph for this function:



5.23.2.4 EXT_DECL TRDP_ERR_T tlc_getStatistics (TRDP_APP_SESSION_T *appHandle*, TRDP_STATISTICS_T **pStatistics*)

Return statistics.

Memory for statistics information must be provided by the user.

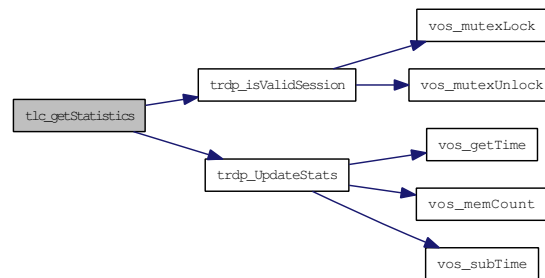
Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- *pStatistics* Pointer to statistics for this application session

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error

Here is the call graph for this function:



5.23.2.5 EXT_DECL TRDP_ERR_T tlc_getSubsStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 **pNumSubs*, TRDP_SUBS_STATISTICS_T **pStatistics*)

Return PD subscription statistics.

Memory for statistics information must be provided by the user.

Parameters:

- ← *appHandle* the handle returned by tlc_openSession
- ↔ *pNumSubs* In: The number of subscriptions requested Out: Number of subscriptions returned
- ↔ *pStatistics* Pointer to an array with the subscription statistics information

Return values:

- TRDP_NO_ERR** no error
- TRDP_NOINIT_ERR** handle invalid
- TRDP_PARAM_ERR** parameter error
- TRDP_MEM_ERR** there are more subscriptions than requested

Here is the call graph for this function:



5.23.2.6 EXT_DECL TRDP_ERR_T tlc_resetStatistics (TRDP_APP_SESSION_T *appHandle*)

Reset statistics.

Parameters:

- ← *appHandle* the handle returned by tlc_openSession

Return values:

- TRDP_NO_ERR** no error

TRDP_NOINIT_ERR handle invalid
TRDP_PARAM_ERR parameter error

Here is the call graph for this function:



5.23.2.7 void trdp_initStats (TRDP_APP_SESSION_T *appHandle*)

Init statistics.

Clear the stats structure for a session.

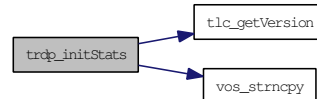
Parameters:

← ***appHandle*** the handle returned by `tlc_openSession`

< host name

< leader host name

Here is the call graph for this function:



5.23.2.8 void trdp_pdPrepareStats (TRDP_APP_SESSION_T *appHandle*, PD_ELE_T **pPacket*)

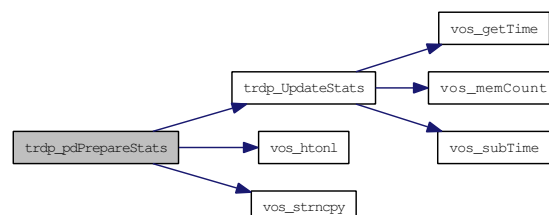
Fill the statistics packet.

Parameters:

← ***appHandle*** the handle returned by `tlc_openSession`

↔ ***pPacket*** pointer to the packet to fill

Here is the call graph for this function:



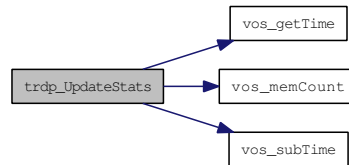
5.23.2.9 void trdp_UpdateStats (TRDP_APP_SESSION_T *appHandle*)

Update the statistics.

Parameters:

← *appHandle* the handle returned by tlc_openSession

Here is the call graph for this function:

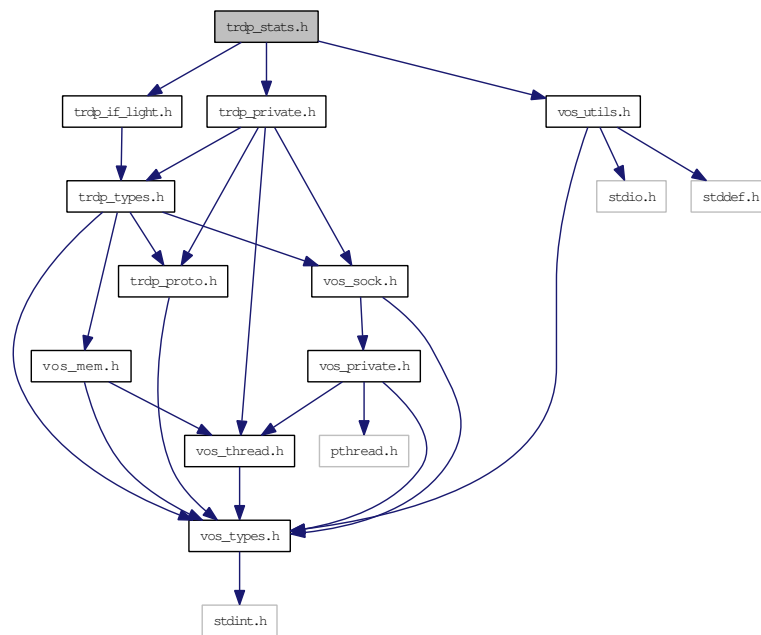


5.24 trdp_stats.h File Reference

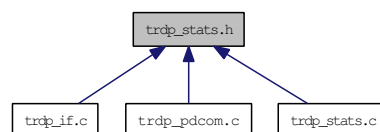
Statistics for TRDP communication.

```
#include "trdp_if_light.h"
#include "trdp_private.h"
#include "vos_utils.h"
```

Include dependency graph for trdp_stats.h:



This graph shows which files directly or indirectly include this file:



Functions

- void [trdp_initStats](#) (TRDP_APP_SESSION_T appHandle)
Init statistics.
- void [trdp_pdPrepareStats](#) (TRDP_APP_SESSION_T appHandle, PD_ELE_T *pPacket)
Fill the statistics packet.

5.24.1 Detailed Description

Statistics for TRDP communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_stats.h](#) 1065 2013-09-06 08:12:09Z aweiss

5.24.2 Function Documentation

5.24.2.1 void trdp_initStats (TRDP_APP_SESSION_T *appHandle*)

Init statistics.

Clear the stats structure for a session.

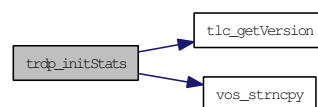
Parameters:

← *appHandle* the handle returned by tlc_openSession

< host name

< leader host name

Here is the call graph for this function:



5.24.2.2 void trdp_pdPrepareStats (TRDP_APP_SESSION_T *appHandle*, PD_ELE_T **pPacket*)

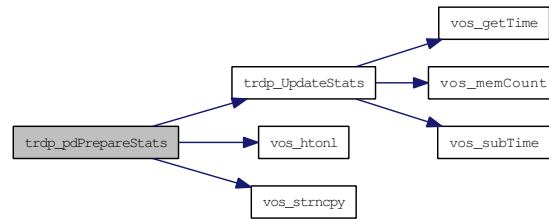
Fill the statistics packet.

Parameters:

← *appHandle* the handle returned by tlc_openSession

↔ *pPacket* pointer to the packet to fill

Here is the call graph for this function:

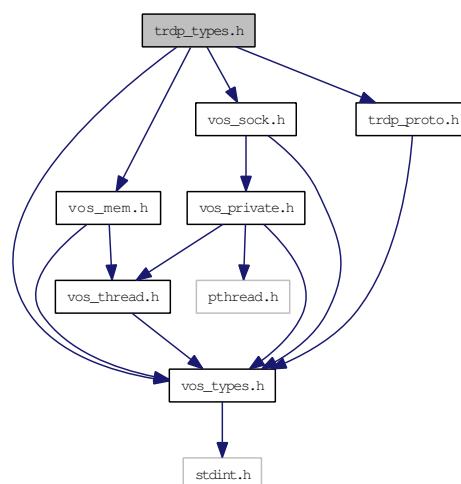


5.25 trdp_types.h File Reference

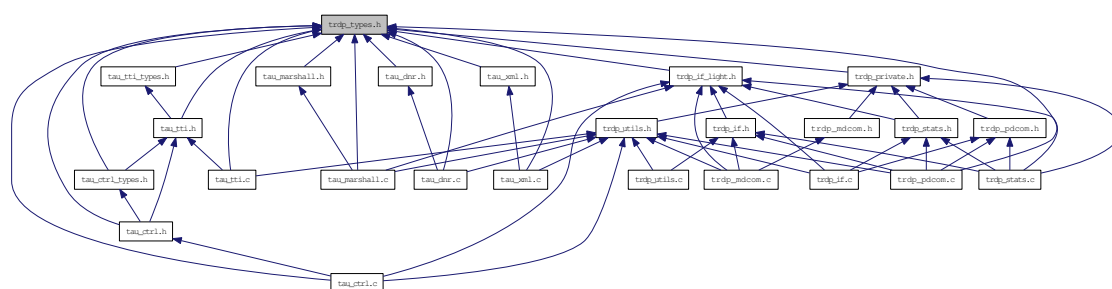
Typedefs for TRDP communication.

```
#include "vos_types.h"
#include "vos_mem.h"
#include "vos_sock.h"
#include "trdp_proto.h"
```

Include dependency graph for trdp_types.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [TRDP_VERSION_T](#)
Version information.
- struct [TRDP_PD_INFO_T](#)
Process data info from received telegram; allows the application to generate responses.
- struct [TRDP_MD_INFO_T](#)
Message data info from received telegram; allows the application to generate responses.

- struct [TRDP_SEND_PARAM_T](#)
Quality/type of service and time to live.
- struct [TRDP_DATASET_ELEMENT_T](#)
Dataset element definition.
- struct [TRDP_DATASET](#)
Dataset definition.
- struct [TRDP_COMID_DSID_MAP_T](#)
ComId - data set mapping element definition.
- struct [TRDP_MEM_STATISTICS_T](#)
TRDP statistics type definitions.
- struct [TRDP_PD_STATISTICS_T](#)
Structure containing all general PD statistics information.
- struct [TRDP_MD_STATISTICS_T](#)
Structure containing all general MD statistics information.
- struct [TRDP_STATISTICS_T](#)
Structure containing all general memory, PD and MD statistics information.
- struct [TRDP_SUBS_STATISTICS_T](#)
Table containing particular PD subscription information.
- struct [TRDP_PUB_STATISTICS_T](#)
Table containing particular PD publishing information.
- struct [TRDP_LIST_STATISTICS_T](#)
Information about a particular MD listener.
- struct [TRDP_RED_STATISTICS_T](#)
A table containing PD redundant group information.
- struct [TRDP_MARSHALL_CONFIG_T](#)
Marshaling/unmarshalling configuration.
- struct [TRDP_PD_CONFIG_T](#)
Default PD configuration.
- struct [TRDP_MD_CONFIG_T](#)
Default MD configuration.
- struct [TRDP_MEM_CONFIG_T](#)
Enumeration type for memory pre-fragmentation, reuse of VOS definition.
- struct [TRDP_PROCESS_CONFIG_T](#)
Various flags/general TRDP options for library initialization.

Defines

- `#define USE_HEAP 0`
If this is set, we can allocate dynamically memory.
- `#define TRDP_BOOL8 TRDP_BITSET8`
1 bit relevant (equal to zero = false, not equal to zero = true)
- `#define TRDP_ANTIVALENT8 TRDP_BITSET8`
2 bit relevant (0x0 = error; 0x01 = false, 0x02 = true, 0x03 undefined)

Typedefs

- `typedef VOS_IP4_ADDR_T TRDP_IP_ADDR_T`
TRDP general type definitions.
- `typedef VOS_TIME_T TRDP_TIME_T`
Timer value compatible with timeval / select.
- `typedef VOS_FDS_T TRDP_FDS_T`
File descriptor set compatible with fd_set / select.
- `typedef VOS_UUID_T TRDP_UUID_T`
UUID definition reuses the VOS definition.
- `typedef struct TRDP_DATASET TRDP_DATASET_T`
Dataset definition.
- `typedef TRDP_DATASET_T * pTRDP_DATASET_T`
Array of pointers to dataset.
- `typedef VOS_PRINT_DBG_T TRDP_PRINT_DBG_T`
TRDP configuration type definitions.
- `typedef VOS_LOG_T TRDP_LOG_T`
Categories for logging, reuse of the VOS definition.
- `typedef TRDP_ERR_T(* TRDP_MARSHALL_T)(void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDst, UINT32 *pDstSize, TRDP_DATASET_T **ppCachedDS)`
Function type for marshalling .
- `typedef TRDP_ERR_T(* TRDP_UNMARSHALL_T)(void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDst, UINT32 *pDstSize, TRDP_DATASET_T **ppCachedDS)`
Function type for unmarshalling.
- `typedef void(* TRDP_PD_CALLBACK_T)(void *pRefCon, TRDP_APP_SESSION_T appHandle, const TRDP_PD_INFO_T *pMsg, UINT8 *pData, UINT32 dataSize)`
Callback for receiving indications, timeouts, releases, responses.

- typedef void(* [TRDP_MD_CALLBACK_T](#))(void *pRefCon, [TRDP_APP_SESSION_T](#) appHandle, const [TRDP_MD_INFO_T](#) *pMsg, UINT8 *pData, UINT32 dataSize)

Callback for receiving indications, timeouts, releases, responses.

Enumerations

- enum [TRDP_ERR_T](#) {
 [TRDP_NO_ERR](#) = 0,
 [TRDP_PARAM_ERR](#) = -1,
 [TRDP_INIT_ERR](#) = -2,
 [TRDP_NOINIT_ERR](#) = -3,
 [TRDP_TIMEOUT_ERR](#) = -4,
 [TRDP_NODATA_ERR](#) = -5,
 [TRDP_SOCKET_ERR](#) = -6,
 [TRDP_IO_ERR](#) = -7,
 [TRDP_MEM_ERR](#) = -8,
 [TRDP_SEMA_ERR](#) = -9,
 [TRDP_QUEUE_ERR](#) = -10,
 [TRDP_QUEUE_FULL_ERR](#) = -11,
 [TRDP_MUTEX_ERR](#) = -12,
 [TRDP_THREAD_ERR](#) = -13,
 [TRDP_BLOCK_ERR](#) = -14,
 [TRDP_INTEGRATION_ERR](#) = -15,
 [TRDP_NOCONN_ERR](#) = -16,
 [TRDP_NOSESSION_ERR](#) = -30,
 [TRDP_SESSION_ABORT_ERR](#) = -31,
 [TRDP_NOSUB_ERR](#) = -32,
 [TRDP_NOPUB_ERR](#) = -33,
 [TRDP_NOLIST_ERR](#) = -34,
 [TRDP_CRC_ERR](#) = -35,
 [TRDP_WIRE_ERR](#) = -36,
 [TRDP_TOPO_ERR](#) = -37,
 [TRDP_COMID_ERR](#) = -38,
 [TRDP_STATE_ERR](#) = -39,
 [TRDP_APP_TIMEOUT_ERR](#) = -40,
 [TRDP_APP_REPLYTO_ERR](#) = -41,
 [TRDP_APP_CONFIRMTO_ERR](#) = -42,
 [TRDP_REPLYTO_ERR](#) = -43,
 [TRDP_CONFIRMTO_ERR](#) = -44,
 [TRDP_REQCONFIRMTO_ERR](#) = -45,
 [TRDP_PACKET_ERR](#) = -46,
 [TRDP_UNKNOWN_ERR](#) = -99 }

Return codes for all API functions, -1.

- enum [TRDP_REPLY_STATUS_T](#)

TRDP data transfer type definitions.

- enum [TRDP_FLAGS_T](#) {
 [TRDP_FLAGS_DEFAULT](#) = 0,
 [TRDP_FLAGS_NONE](#) = 0x01,
 [TRDP_FLAGS_MARSHALL](#) = 0x02,
 [TRDP_FLAGS_CALLBACK](#) = 0x04,
 [TRDP_FLAGS_TCP](#) = 0x08 }

Various flags for PD and MD packets.

- enum [TRDP_RED_STATE_T](#) {
 [TRDP_RED_FOLLOWER](#) = 0,
 [TRDP_RED_LEADER](#) = 1 }

Redundancy states.

- enum [TRDP_TO_BEHAVIOR_T](#) {
 [TRDP_TO_DEFAULT](#) = 0,
 [TRDP_TO_SET_TO_ZERO](#) = 1,
 [TRDP_TO_KEEP_LAST_VALUE](#) = 2 }

How invalid PD shall be handled.

- enum [TRDP_DATA_TYPE_T](#) {
 [TRDP_BITSET8](#) = 1,
 [TRDP_CHAR8](#) = 2,
 [TRDP_UTF16](#) = 3,
 [TRDP_INT8](#) = 4,
 [TRDP_INT16](#) = 5,
 [TRDP_INT32](#) = 6,
 [TRDP_INT64](#) = 7,
 [TRDP_UINT8](#) = 8,
 [TRDP_UINT16](#) = 9,
 [TRDP_UINT32](#) = 10,
 [TRDP_UINT64](#) = 11,
 [TRDP_REAL32](#) = 12,
 [TRDP_REAL64](#) = 13,
 [TRDP_TIMEDATE32](#) = 14,
 [TRDP_TIMEDATE48](#) = 15,
 [TRDP_TIMEDATE64](#) = 16,
 [TRDP_TYPE_MAX](#) = 30 }

TRDP dataset description definitions.

- enum `TRDP_OPTION_T` { ,
`TRDP_OPTION_BLOCK` = 0x01,
`TRDP_OPTION_TRAFFIC_SHAPING` = 0x02,
`TRDP_OPTION_NO_REUSE_ADDR` = 0x04,
`TRDP_OPTION_NO_MC_LOOP_BACK` = 0x08,
`TRDP_OPTION_NO_UDP_CHK` = 0x10 }

Various flags/general TRDP options for library initialization.

5.25.1 Detailed Description

Typedefs for TRDP communication.

F

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_types.h](#) 1350 2014-11-06 12:41:20Z ahweiss

BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed BL 2014-02-27: Ticket #17: [t1p_subscribe\(\)](#) returns wrong *pSubHandle

5.25.2 Typedef Documentation

5.25.2.1 typedef VOS_IP4_ADDR_T TRDP_IP_ADDR_T

TRDP general type definitions.

5.25.2.2 typedef TRDP_ERR_T(* TRDP_MARSHALL_T)(void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDst, UINT32 *pDstSize, TRDP_DATASET_T **ppCachedDS)

Function type for marshalling .

The function must know about the dataset's alignment etc.

Parameters:

← **pRefCon* pointer to user context

- ← *comId* ComId to identify the structure out of a configuration
- ← **pSrc* pointer to received original message
- ← **pDst* pointer to a buffer for the treated message
- ↔ **pDstSize* size of the provide buffer / size of the treated message
- ↔ **ppCachedDS* pointer to pointer of cached dataset

Return values:

- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provided buffer to small
- TRDP_COMID_ERR* comid not existing

5.25.2.3 typedef void(* TRDP_MD_CALLBACK_T)(void *pRefCon, TRDP_APP_SESSION_T appHandle, const TRDP_MD_INFO_T *pMsg, UINT8 *pData, UINT32 dataSize)

Callback for receiving indications, timeouts, releases, responses.

Parameters:

- ← *appHandle* handle returned also by tlc_init
- ← **pRefCon* pointer to user context
- ← **pMsg* pointer to received message information
- ← **pData* pointer to received data
- ← *dataSize* size of received data pointer to received data

5.25.2.4 typedef void(* TRDP_PD_CALLBACK_T)(void *pRefCon, TRDP_APP_SESSION_T appHandle, const TRDP_PD_INFO_T *pMsg, UINT8 *pData, UINT32 dataSize)

Callback for receiving indications, timeouts, releases, responses.

Parameters:

- ← **pRefCon* pointer to user context
- ← *appHandle* application handle returned by tlc_openSession
- ← **pMsg* pointer to received message information
- ← **pData* pointer to received data
- ← *dataSize* size of received data pointer to received data

5.25.2.5 typedef VOS_PRINT_DBG_T TRDP_PRINT_DBG_T

TRDP configuration type definitions.

Callback function definition for error/debug output, reuse of the VOS defined function.

5.25.2.6 typedef VOS_TIME_T TRDP_TIME_T

Timer value compatible with timeval / select.

Relative or absolute date, depending on usage

5.25.2.7 typedef TRDP_ERR_T(* TRDP_UNMARSHALL_T)(void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDst, UINT32 *pDstSize, TRDP_DATASET_T **ppCachedDS)

Function type for unmarshalling.

The function must know about the dataset's alignment etc.

Parameters:

- ← **pRefCon* pointer to user context
- ← *comId* ComId to identify the structure out of a configuration
- ← **pSrc* pointer to received original message
- ← **pDst* pointer to a buffer for the treated message
- ↔ **pDstSize* size of the provide buffer / size of the treated message
- ↔ **ppCachedDS* pointer to pointer of cached dataset

Return values:

- TRDP_NO_ERR* no error
- TRDP_MEM_ERR* provide buffer to small
- TRDP_COMID_ERR* comid not existing

5.25.3 Enumeration Type Documentation

5.25.3.1 enum TRDP_DATA_TYPE_T

TRDP dataset description definitions.

Dataset element definition

Enumerator:

- TRDP_BITSET8* =UINT8
- TRDP_CHAR8* char, can be used also as UTF8
- TRDP_UTF16* Unicode UTF-16 character.
- TRDP_INT8* Signed integer, 8 bit.
- TRDP_INT16* Signed integer, 16 bit.
- TRDP_INT32* Signed integer, 32 bit.
- TRDP_INT64* Signed integer, 64 bit.
- TRDP_UINT8* Unsigned integer, 8 bit.
- TRDP_UINT16* Unsigned integer, 16 bit.
- TRDP_UINT32* Unsigned integer, 32 bit.
- TRDP_UINT64* Unsigned integer, 64 bit.
- TRDP_REAL32* Floating point real, 32 bit.
- TRDP_REAL64* Floating point real, 64 bit.
- TRDP_TIMEDATE32* 32 bit UNIX time
- TRDP_TIMEDATE48* 48 bit TCN time (32 bit UNIX time and 16 bit ticks)
- TRDP_TIMEDATE64* 32 bit UNIX time + 32 bit microseconds (== struct timeval)
- TRDP_TYPE_MAX* Values greater are considered nested datasets.

5.25.3.2 enum TRDP_ERR_T

Return codes for all API functions, -1.

.-29 taken over from vos

Enumerator:

TRDP_NO_ERR No error.

TRDP_PARAM_ERR Parameter missing or out of range.

TRDP_INIT_ERR Call without valid initialization.

TRDP_NOINIT_ERR Call with invalid handle.

TRDP_TIMEOUT_ERR Timeout.

TRDP_NODATA_ERR Non blocking mode: no data received.

TRDP SOCK_ERR Socket error / option not supported.

TRDP_IO_ERR Socket IO error, data can't be received/sent.

TRDP_MEM_ERR No more memory available.

TRDP_SEMA_ERR Semaphore not available.

TRDP_QUEUE_ERR Queue empty.

TRDP_QUEUE_FULL_ERR Queue full.

TRDP_MUTEX_ERR Mutex not available.

TRDP_THREAD_ERR Thread error.

TRDP_BLOCK_ERR System call would have blocked in blocking mode.

TRDP_INTEGRATION_ERR Alignment or endianness for selected target wrong.

TRDP_NOCONN_ERR No TCP connection.

TRDP_NOSESSION_ERR No such session.

TRDP_SESSION_ABORT_ERR Session aborted.

TRDP_NOSUB_ERR No subscriber.

TRDP_NOPUB_ERR No publisher.

TRDP_NOLIST_ERR No listener.

TRDP_CRC_ERR Wrong CRC.

TRDP_WIRE_ERR Wire.

TRDP_TOPO_ERR Invalid topo count.

TRDP_COMID_ERR Unknown ComId.

TRDP_STATE_ERR Call in wrong state.

TRDP_APP_TIMEOUT_ERR Application Timeout.

TRDP_APP_REPLYTO_ERR Application Reply Sent Timeout.

TRDP_APP_CONFIRMTO_ERR Application Confirm Sent Timeout.

TRDP_REPLYTO_ERR Protocol Reply Timeout.

TRDP_CONFIRMTO_ERR Protocol Confirm Timeout.

TRDP_REQCONFIRMTO_ERR Protocol Confirm Timeout (Request sender).

TRDP_PACKET_ERR Incomplete message data packet.

TRDP_UNKNOWN_ERR Unspecified error.

5.25.3.3 enum TRDP_FLAGS_T

Various flags for PD and MD packets.

Enumerator:

TRDP_FLAGS_DEFAULT Default value defined in tlc_openDession will be taken.

TRDP_FLAGS_NONE No flags set.

TRDP_FLAGS_MARSHALL Optional marshalling/unmarshalling in TRDP stack.

TRDP_FLAGS_CALLBACK Use of callback function.

TRDP_FLAGS_TCP Use TCP for message data.

5.25.3.4 enum TRDP_OPTION_T

Various flags/general TRDP options for library initialization.

Enumerator:

TRDP_OPTION_BLOCK Default: Use nonblocking I/O calls, polling necessary Set: Read calls will block, use select().

TRDP_OPTION_TRAFFIC_SHAPING Use traffic shaping - distribute packet sending Default: OFF.

TRDP_OPTION_NO_REUSE_ADDR Do not allow re-use of address/port (-> no multihoming) Default: Allow.

TRDP_OPTION_NO_MC_LOOP_BACK Do not allow loop back of multicast traffic Default: Allow.

TRDP_OPTION_NO_UDP_CHK Suppress UDP CRC generation Default: Compute UDP CRC.

5.25.3.5 enum TRDP_RED_STATE_T

Redundancy states.

Enumerator:

TRDP_RED_FOLLOWER Redundancy follower - redundant PD will be not sent out.

TRDP_RED_LEADER Redundancy leader - redundant PD will be sent out.

5.25.3.6 enum TRDP_REPLY_STATUS_T

TRDP data transfer type definitions.

Reply status messages

5.25.3.7 enum TRDP_TO_BEHAVIOR_T

How invalid PD shall be handled.

Enumerator:

TRDP_TO_DEFAULT Default value defined in tlc_openDession will be taken.

TRDP_TO_SET_TO_ZERO If set, data will be reset to zero on time out.

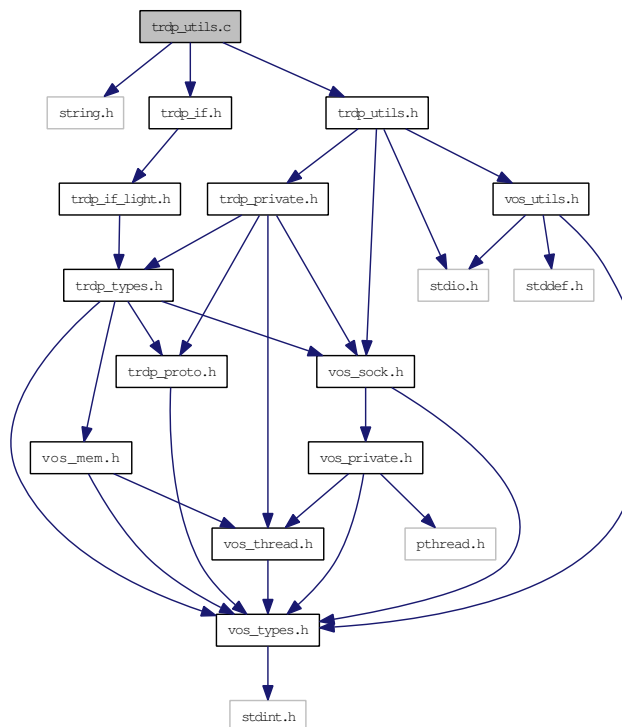
TRDP_TO_KEEP_LAST_VALUE If set, last received values will be returned.

5.26 trdp_utils.c File Reference

Helper functions for TRDP communication.

```
#include <string.h>
#include "trdp_if.h"
#include "trdp_utils.h"
```

Include dependency graph for trdp_utils.c:



Functions

- void [printSocketUsage](#) ([TRDP_SOCKETS_T](#) iface[])

Debug socket usage output.
- [BOOL8 trdp_SockIsJoined](#) (const [TRDP_IP_ADDR_T](#) mcList[VOS_MAX_MULTICAST_CNT], [TRDP_IP_ADDR_T](#) mcGroup)

Check if a mc group is in the list.
- [BOOL8 trdp_SockAddJoin](#) ([TRDP_IP_ADDR_T](#) mcList[VOS_MAX_MULTICAST_CNT], [TRDP_IP_ADDR_T](#) mcGroup)

Add mc group to the list.
- [BOOL8 trdp_SockDelJoin](#) ([TRDP_IP_ADDR_T](#) mcList[VOS_MAX_MULTICAST_CNT], [TRDP_IP_ADDR_T](#) mcGroup)

remove mc group from the list

- UINT32 `trdp_packetSizePD` (UINT32 dataSize)
Get the packet size from the raw data size.
- UINT32 `trdp_packetSizeMD` (UINT32 dataSize)
Get the packet size from the raw data size.
- PD_ELE_T * `trdp_queueFindComId` (PD_ELE_T *pHead, UINT32 comId)
Return the element with same comId.
- PD_ELE_T * `trdp_queueFindPubAddr` (PD_ELE_T *pHead, TRDP_ADDRESSES_T *addr)
Return the element with same comId and IP addresses.
- PD_ELE_T * `trdp_queueFindSubAddr` (PD_ELE_T *pHead, TRDP_ADDRESSES_T *addr)
Return the element with same comId and IP addresses.
- void `trdp_queueDelElement` (PD_ELE_T **ppHead, PD_ELE_T *pDelete)
Delete an element.
- BOOL8 `trdp_validTopoCounters` (UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, UINT32 etbTopoCntFilter, UINT32 opTrnTopoCntFilter)
Check topography counters The applied conformance pattern follows Table A.5/A.21 (positive match): Telegram to be sent Locally stored value (appSession) Case etbTopoCnt opTrnTopoCnt etbTopoCntFilter opTrnTopoCntFilter 1 any any 0 0 2 any equal 0 equal 3 equal any equal 0 4 equal equal equal equal.
- void `trdp_queueAppLast` (PD_ELE_T **ppHead, PD_ELE_T *pNew)
Append an element at end of queue.
- void `trdp_queueInsFirst` (PD_ELE_T **ppHead, PD_ELE_T *pNew)
Insert an element at front of queue.
- void `trdp_initSockets` (TRDP_SOCKETS_T iface[])
Handle the socket pool: Initialize it.
- TRDP_ERR_T `trdp_requestSocket` (TRDP_SOCKETS_T iface[], UINT32 port, const TRDP_SEND_PARAM_T *params, TRDP_IP_ADDR_T srcIP, TRDP_IP_ADDR_T mcGroup, TRDP SOCK_TYPE_T usage, TRDP_OPTION_T options, BOOL8 rcvMostly, INT32 useSocket, INT32 *pIndex, TRDP_IP_ADDR_T cornerIp)
Handle the socket pool: Request a socket from our socket pool First we loop through the socket pool and check if there is already a socket which would suit us.
- void `trdp_releaseSocket` (TRDP_SOCKETS_T iface[], INT32 lIndex, UINT32 connectTimeout, BOOL8 checkAll)
Handle the socket pool: if a received TCP socket is unused, the socket connection timeout is started.
- UINT32 `trdp_getSeqCnt` (UINT32 comId, TRDP_MSG_T msgType, TRDP_IP_ADDR_T srcIPAddr)
Get the initial sequence counter for the comID/message type and subnet (source IP).
- void `trdp_resetSequenceCounter` (PD_ELE_T *pElement, TRDP_IP_ADDR_T srcIP, TRDP_MSG_T msgType)
remove the sequence counter for the comID/source IP.

- `int trdp_checkSequenceCounter (PD_ELE_T *pElement, UINT32 sequenceCounter, TRDP_IP_ADDR_T srcIP, TRDP_MSG_T msgType)`
check and update the sequence counter for the comID/source IP.
- `BOOL8 trdp_isAddressed (const TRDP_URI_USER_T listUri, const TRDP_URI_USER_T destUri)`
Check if listener URI is in addressing range of destination URI.

5.26.1 Detailed Description

Helper functions for TRDP communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_utils.c](#) 1380 2014-12-09 15:46:28Z ahweiss

BL 2014-08-25: Ticket #57+58: Padding / zero bytes trailing MD & PD packets fixed
BL 2014-06-02: Ticket #41: Sequence counter handling fixed

5.26.2 Function Documentation

5.26.2.1 void printSocketUsage (TRDP_SOCKETS_T iface[])

Debug socket usage output.

Parameters:

← *iface[]* List of sockets

5.26.2.2 int trdp_checkSequenceCounter (PD_ELE_T *pElement, UINT32 sequenceCounter, TRDP_IP_ADDR_T srcIP, TRDP_MSG_T msgType)

check and update the sequence counter for the comID/source IP.

If the comID/srcIP is not found, update it and return 0 - else if already received, return 1 On memory error, return -1

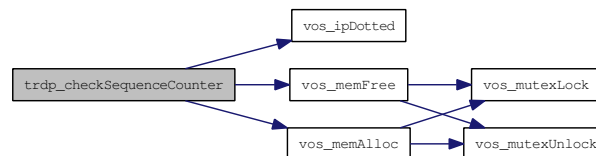
Parameters:

- ← *pElement* subscription element
- ← *sequenceCounter* sequence counter to check
- ← *srcIP* Source IP address
- ← *msgType* type of the message

Return values:

- 0 - no duplicate 1 - duplicate sequence counter -1 - memory error

Here is the call graph for this function:



5.26.2.3 UINT32 trdp_getSeqCnt (UINT32 *comId*, TRDP_MSG_T *msgType*, TRDP_IP_ADDR_T *srcIpAddr*)

Get the initial sequence counter for the comID/message type and subnet (source IP).

If the comID/srcIP is not found elsewhere, return 0 - else return its current sequence number (the redundant packet needs the same seqNo)

Note: The standard demands that sequenceCounter is managed per comID/msgType at each publisher, but shall be the same for redundant telegrams (subnet/srcIP).

Parameters:

- ← *comId* comID to look for
- ← *msgType* PD/MD type
- ← *srcIpAddr* Source IP address

Return values:

- return* the sequence number

Here is the call graph for this function:



5.26.2.4 void trdp_initSockets (TRDP_SOCKETS_T *iface*[])

Handle the socket pool: Initialize it.

Parameters:

- ← *iface* pointer to the socket pool

5.26.2.5 **BOOL8 trdp_isAddressed (const TRDP_URI_USER_T *listUri*, const TRDP_URI_USER_T *destUri*)**

Check if listener URI is in addressing range of destination URI.

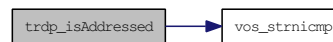
Parameters:

- ← *listUri* Null terminated listener URI string to compare
- ← *destUri* Null terminated destination URI string to compare

Return values:

- FALSE** - not in addressing range
- TRUE** - listener URI is in addressing range of destination URI

Here is the call graph for this function:



5.26.2.6 **UINT32 trdp_packetSizeMD (UINT32 *dataSize*)**

Get the packet size from the raw data size.

Parameters:

- ← *dataSize* net data size

Return values:

- packet** size the size of the complete packet to be sent or received

5.26.2.7 **UINT32 trdp_packetSizePD (UINT32 *dataSize*)**

Get the packet size from the raw data size.

Parameters:

- ← *dataSize* net data size

Return values:

- packet** size the size of the complete packet to be sent or received

5.26.2.8 **void trdp_queueAppLast (PD_ELE_T ** *ppHead*, PD_ELE_T * *pNew*)**

Append an element at end of queue.

Parameters:

- ← *ppHead* pointer to pointer to head of queue
- ← *pNew* pointer to element to append

5.26.2.9 void trdp_queueDelElement (PD_ELE_T ** *ppHead*, PD_ELE_T * *pDelete*)

Delete an element.

Parameters:

- ← *ppHead* pointer to pointer to head of queue
- ← *pDelete* pointer to element to delete

5.26.2.10 PD_ELE_T* trdp_queueFindComId (PD_ELE_T * *pHead*, UINT32 *comId*)

Return the element with same comId.

Parameters:

- ← *pHead* pointer to head of queue
- ← *comId* ComID to search for

Return values:

- != NULL pointer to PD element
- NULL No PD element found

5.26.2.11 PD_ELE_T* trdp_queueFindPubAddr (PD_ELE_T * *pHead*, TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters:

- ← *pHead* pointer to head of queue
- ← *addr* Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values:

- != NULL pointer to PD element
- NULL No PD element found

5.26.2.12 PD_ELE_T* trdp_queueFindSubAddr (PD_ELE_T * *pHead*, TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters:

- ← *pHead* pointer to head of queue
- ← *addr* Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values:

- != NULL pointer to PD element

NULL No PD element found

Here is the call graph for this function:



5.26.2.13 void trdp_queueInsFirst (PD_ELE_T ** *ppHead*, PD_ELE_T * *pNew*)

Insert an element at front of queue.

Parameters:

- ← *ppHead* pointer to pointer to head of queue
- ← *pNew* pointer to element to insert

5.26.2.14 void trdp_releaseSocket (TRDP_SOCKETS_T *iface*[], INT32 *lIndex*, UINT32 *connectTimeout*, BOOL8 *checkAll*)

Handle the socket pool: if a received TCP socket is unused, the socket connection timeout is started.

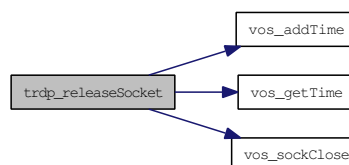
Handle the socket pool: Release a socket from our socket pool.

In Udp, Release a socket from our socket pool

Parameters:

- ↔ *iface* socket pool
- ← *lIndex* index of socket to release
- ← *connectTimeout* time out
- ← *checkAll* release all TCP pending sockets

Here is the call graph for this function:



5.26.2.15 TRDP_ERR_T trdp_requestSocket (TRDP_SOCKETS_T *iface*[], UINT32 *port*, const TRDP_SEND_PARAM_T * *params*, TRDP_IP_ADDR_T *srcIP*, TRDP_IP_ADDR_T *mcGroup*, TRDP SOCK_TYPE_T *usage*, TRDP_OPTION_T *options*, BOOL8 *rcvMostly*, INT32 *useSocket*, INT32 * *pIndex*, TRDP_IP_ADDR_T *cornerIp*)

Handle the socket pool: Request a socket from our socket pool First we loop through the socket pool and check if there is already a socket which would suit us.

Handle the socket pool: Request a socket from our socket pool.

If a multicast group should be joined, we do that on an otherwise suitable socket - up to 20 multicast groups can be joined per socket. If a socket for multicast publishing is requested, we also use the source IP to determine the interface for outgoing multicast traffic.

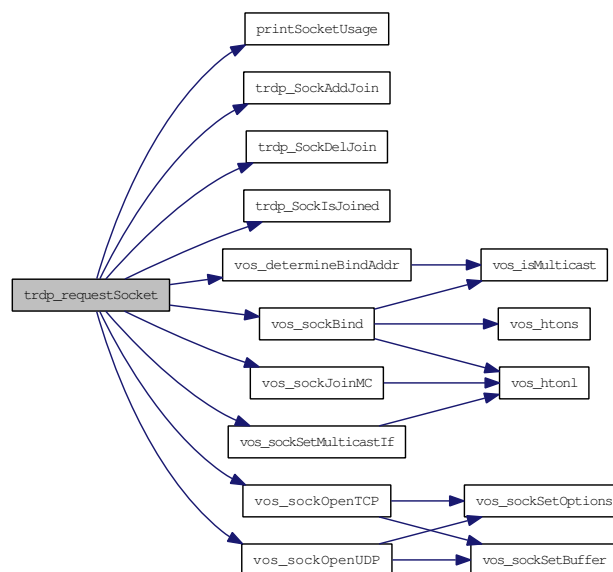
Parameters:

- ↔ *iface* socket pool
- ← *port* port to use
- ← *params* parameters to use
- ← *srcIP* IP to bind to (0 = any address)
- ← *mcGroup* MC group to join (0 = do not join)
- ← *usage* type and port to bind to (PD, MD/UDP, MD/TCP)
- ← *options* blocking/nonblocking
- ← *rcvMostly* primarily used for receiving (tbd: bind on sender, too?)
- *useSocket* socket to use, do not open a new one
- *pIndex* returned index of socket pool
- ← *cornerIp* only used for receiving

Return values:

- TRDP_NO_ERR***
- TRDP_PARAM_ERR***

Here is the call graph for this function:



5.26.2.16 void trdp_resetSequenceCounter (PD_ELE_T * *pElement*, TRDP_IP_ADDR_T *srcIP*, TRDP_MSG_T *msgType*)

remove the sequence counter for the comID/source IP.

The sequence counter should be reset if there was a packet time out.

Parameters:

← *pElement* subscription element

← *srcIP* Source IP address

← *msgType* message type

Return values:

none

5.26.2.17 BOOL8 trdp_SockAddJoin (TRDP_IP_ADDR_T *mcList*[VOS_MAX_MULTICAST_CNT], TRDP_IP_ADDR_T *mcGroup*)

Add mc group to the list.

Parameters:

← *mcList*[] List of multicast groups

← *mcGroup* multicast group

Return values:

1 if added 0 if list is full

5.26.2.18 BOOL8 trdp_SockDelJoin (TRDP_IP_ADDR_T *mcList*[VOS_MAX_MULTICAST_CNT], TRDP_IP_ADDR_T *mcGroup*)

remove mc group from the list

Parameters:

← *mcList*[] List of multicast groups

← *mcGroup* multicast group

Return values:

1 if deleted 0 was not in list

5.26.2.19 BOOL8 trdp_SockIsJoined (const TRDP_IP_ADDR_T *mcList*[VOS_MAX_MULTICAST_CNT], TRDP_IP_ADDR_T *mcGroup*)

Check if a mc group is in the list.

Parameters:

- ← *mcList[]* List of multicast groups
- ← *mcGroup* multicast group

Return values:

- 1* if found 0 if not found

5.26.2.20 BOOL8 trdp_validTopoCounters (UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, UINT32 *etbTopoCntFilter*, UINT32 *opTrnTopoCntFilter*)

Check topography counters The applied conformance pattern follows Table A.5/A.21 (positive match):
Telegram to be sent Locally stored value (appSession) Case etbTopoCnt opTrnTopoCnt etbTopoCntFilter
opTrnTopoCntFilter 1 any any 0 0 2 any equal 0 equal 3 equal any equal 0 4 equal equal equal equal.

Parameters:

- ← *etbTopoCnt* ETB topography counter to be checked
- ← *opTrnTopoCnt* Operational topography counter to be checked
- ← *etbTopoCntFilter* ETB topography counter filter value
- ← *opTrnTopoCntFilter* Operational topography counter filter value

Return values:

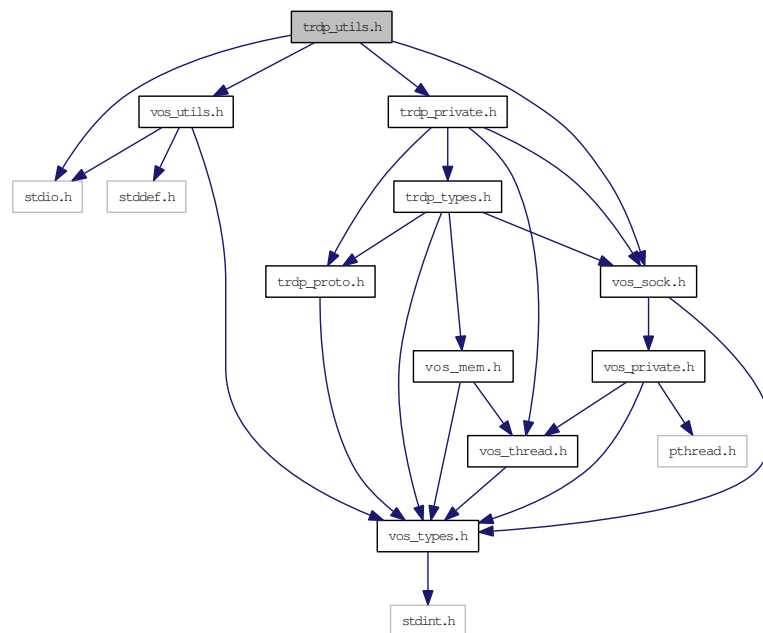
- TRUE* Filter criteria matched *FALSE* Filter criteria not matched

5.27 trdp_utils.h File Reference

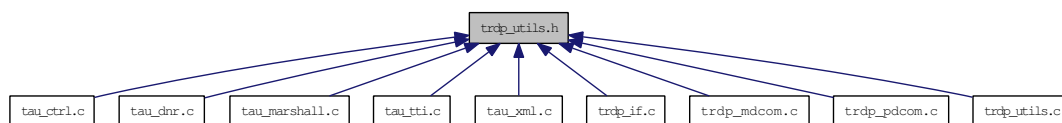
Common utilities for TRDP communication.

```
#include <stdio.h>
#include "trdp_private.h"
#include "vos_utils.h"
#include "vos_sock.h"
```

Include dependency graph for trdp_utils.h:



This graph shows which files directly or indirectly include this file:



Functions

- `PD_ELE_T * trdp_queueFindComId (PD_ELE_T *pHead, UINT32 comId)`
Return the element with same comId.
- `PD_ELE_T * trdp_queueFindSubAddr (PD_ELE_T *pHead, TRDP_ADDRESSES_T *pAddr)`
Return the element with same comId and IP addresses.
- `PD_ELE_T * trdp_queueFindPubAddr (PD_ELE_T *pHead, TRDP_ADDRESSES_T *addr)`
Return the element with same comId and IP addresses.

- void [trdp_queueDelElement](#) ([PD_ELE_T](#) **pHead, [PD_ELE_T](#) *pDelete)
Delete an element.
- void [trdp_queueAppLast](#) ([PD_ELE_T](#) **pHead, [PD_ELE_T](#) *pNew)
Append an element at end of queue.
- void [trdp_queueInsFirst](#) ([PD_ELE_T](#) **pHead, [PD_ELE_T](#) *pNew)
Insert an element at front of queue.
- void [trdp_initSockets](#) ([TRDP_SOCKETS_T](#) iface[])
Handle the socket pool: Initialize it.
- void [trdp_initUncompletedTCP](#) ([TRDP_APP_SESSION_T](#) appHandle)
???
- void [trdp_resetSequenceCounter](#) ([PD_ELE_T](#) *pElement, [TRDP_IP_ADDR_T](#) srcIP, [TRDP_MSG_T](#) msgType)
remove the sequence counter for the comID/source IP.
- [TRDP_ERR_T](#) [trdp_requestSocket](#) ([TRDP_SOCKETS_T](#) iface[], [UINT32](#) port, const [TRDP_SEND_PARAM_T](#) *params, [TRDP_IP_ADDR_T](#) srcIP, [TRDP_IP_ADDR_T](#) mcGroup, [TRDP SOCK_TYPE_T](#) usage, [TRDP_OPTION_T](#) options, [BOOL8](#) rcvMostly, [INT32](#) useSocket, [INT32](#) *pIndex, [TRDP_IP_ADDR_T](#) cornerIp)
Handle the socket pool: Request a socket from our socket pool.
- void [trdp_releaseSocket](#) ([TRDP_SOCKETS_T](#) iface[], [INT32](#) lIndex, [UINT32](#) connectTimeout, [BOOL8](#) checkAll)
Handle the socket pool: Release a socket from our socket pool.
- [UINT32](#) [trdp_packetSizePD](#) ([UINT32](#) dataSize)
Get the packet size from the raw data size.
- [UINT32](#) [trdp_packetSizeMD](#) ([UINT32](#) dataSize)
Get the packet size from the raw data size.
- [UINT32](#) [trdp_getSeqCnt](#) ([UINT32](#) comID, [TRDP_MSG_T](#) msgType, [TRDP_IP_ADDR_T](#) srcIP)
Get the initial sequence counter for the comID/message type and subnet (source IP).
- int [trdp_checkSequenceCounter](#) ([PD_ELE_T](#) *pElement, [UINT32](#) sequenceCounter, [TRDP_IP_ADDR_T](#) srcIP, [TRDP_MSG_T](#) msgType)
check and update the sequence counter for the comID/source IP.
- [BOOL8](#) [trdp_isAddressed](#) (const [TRDP_URI_USER_T](#) listUri, const [TRDP_URI_USER_T](#) destUri)
Check if listener URI is in addressing range of destination URI.
- [BOOL8](#) [trdp_validTopoCounters](#) ([UINT32](#) etbTopoCnt, [UINT32](#) opTrnTopoCnt, [UINT32](#) etbTopoCntFilter, [UINT32](#) opTrnTopoCntFilter)
Check topography counters The applied conformance pattern follows Table A.5/A.21 (positive match): Telegram to be sent Locally stored value (appSession) Case etbTopoCnt opTrnTopoCnt etbTopoCntFilter opTrnTopoCntFilter 1 any any 0 0 2 any equal 0 equal 3 equal any equal 0 4 equal equal equal equal.

5.27.1 Detailed Description

Common utilities for TRDP communication.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[trdp_utils.h](#) 1377 2014-12-01 15:43:03Z ahweiss

5.27.2 Function Documentation

5.27.2.1 `int trdp_checkSequenceCounter (PD_ELE_T * pElement, UINT32 sequenceCounter, TRDP_IP_ADDR_T srcIP, TRDP_MSG_T msgType)`

check and update the sequence counter for the comID/source IP.

If the comID/srcIP is not found, update it and return 0 - else if already received, return 1 On memory error, return -1

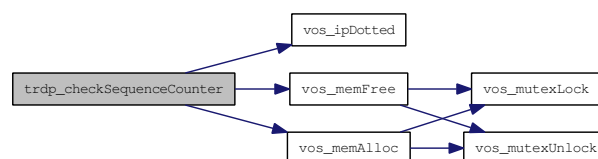
Parameters:

- ← *pElement* subscription element
- ← *sequenceCounter* sequence counter to check
- ← *srcIP* Source IP address
- ← *msgType* type of the message

Return values:

0 - no duplicate 1 - duplicate sequence counter -1 - memory error

Here is the call graph for this function:



5.27.2.2 UINT32 trdp_getSeqCnt (UINT32 *comId*, TRDP_MSG_T *msgType*, TRDP_IP_ADDR_T *srcIpAddr*)

Get the initial sequence counter for the comID/message type and subnet (source IP).

If the comID/srcIP is not found elsewhere, return 0 - else return its current sequence number (the redundant packet needs the same seqNo)

Note: The standard demands that sequenceCounter is managed per comID/msgType at each publisher, but shall be the same for redundant telegrams (subnet/srcIP).

Parameters:

- ← *comId* comID to look for
- ← *msgType* PD/MD type
- ← *srcIpAddr* Source IP address

Return values:

return the sequence number

Here is the call graph for this function:



5.27.2.3 void trdp_initSockets (TRDP_SOCKETS_T *iface*[])

Handle the socket pool: Initialize it.

Parameters:

- ← *iface* pointer to the socket pool

5.27.2.4 void trdp_initUncompletedTCP (TRDP_APP_SESSION_T *appHandle*)

???

Parameters:

- ← *appHandle* session handle

5.27.2.5 BOOL8 trdp_isAddressed (const TRDP_URI_USER_T *listUri*, const TRDP_URI_USER_T *destUri*)

Check if listener URI is in addressing range of destination URI.

Parameters:

- ← *listUri* Null terminated listener URI string to compare

← *destUri* Null terminated destination URI string to compare

Return values:

FALSE - not in addressing range

TRUE - listener URI is in addressing range of destination URI

Here is the call graph for this function:



5.27.2.6 UINT32 trdp_packetSizeMD (UINT32 dataSize)

Get the packet size from the raw data size.

Parameters:

← *dataSize* net data size

Return values:

packet size the size of the complete packet to be sent or received

5.27.2.7 UINT32 trdp_packetSizePD (UINT32 dataSize)

Get the packet size from the raw data size.

Parameters:

← *dataSize* net data size

Return values:

packet size the size of the complete packet to be sent or received

5.27.2.8 void trdp_queueAppLast (PD_ELE_T **ppHead, PD_ELE_T *pNew)

Append an element at end of queue.

Parameters:

← *ppHead* pointer to pointer to head of queue

← *pNew* pointer to element to append

5.27.2.9 void trdp_queueDelElement (PD_ELE_T **ppHead, PD_ELE_T *pDelete)

Delete an element.

Parameters:

← *ppHead* pointer to pointer to head of queue

← *pDelete* pointer to element to delete

5.27.2.10 PD_ELE_T* trdp_queueFindComId (PD_ELE_T * *pHead*, UINT32 *comId*)

Return the element with same comId.

Parameters:

- ← *pHead* pointer to head of queue
- ← *comId* ComID to search for

Return values:

- !=* NULL pointer to PD element
- NULL* No PD element found

5.27.2.11 PD_ELE_T* trdp_queueFindPubAddr (PD_ELE_T * *pHead*, TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters:

- ← *pHead* pointer to head of queue
- ← *addr* Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values:

- !=* NULL pointer to PD element
- NULL* No PD element found

5.27.2.12 PD_ELE_T* trdp_queueFindSubAddr (PD_ELE_T * *pHead*, TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters:

- ← *pHead* pointer to head of queue
- ← *addr* Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values:

- !=* NULL pointer to PD element
- NULL* No PD element found

Here is the call graph for this function:



5.27.2.13 void trdp_queueInsFirst (PD_ELE_T ** *ppHead*, PD_ELE_T * *pNew*)

Insert an element at front of queue.

Parameters:

- ← *ppHead* pointer to pointer to head of queue
- ← *pNew* pointer to element to insert

5.27.2.14 void trdp_releaseSocket (TRDP_SOCKETS_T *iface*[], INT32 *lIndex*, UINT32 *connectTimeout*, BOOL8 *checkAll*)

Handle the socket pool: Release a socket from our socket pool.

Parameters:

- ↔ *iface* socket pool
- ← *lIndex* index of socket to release
- ← *connectTimeout* timeout value
- ← *checkAll* release all TCP pending sockets

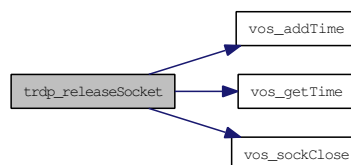
Handle the socket pool: Release a socket from our socket pool.

In Udp, Release a socket from our socket pool

Parameters:

- ↔ *iface* socket pool
- ← *lIndex* index of socket to release
- ← *connectTimeout* time out
- ← *checkAll* release all TCP pending sockets

Here is the call graph for this function:



5.27.2.15 TRDP_ERR_T trdp_requestSocket (TRDP_SOCKETS_T *iface*[], UINT32 *port*, const TRDP_SEND_PARAM_T * *params*, TRDP_IP_ADDR_T *srcIP*, TRDP_IP_ADDR_T *mcGroup*, TRDP SOCK_TYPE_T *usage*, TRDP_OPTION_T *options*, BOOL8 *rcvMostly*, INT32 *useSocket*, INT32 * *pIndex*, TRDP_IP_ADDR_T *cornerIp*)

Handle the socket pool: Request a socket from our socket pool.

Parameters:

- ↔ *iface* socket pool

- ← *port* port to use
- ← *params* parameters to use
- ← *srcIP* IP to bind to (0 = any address)
- ← *mcGroup* MC group to join (0 = do not join)
- ← *usage* type and port to bind to
- ← *options* blocking/nonblocking
- ← *rcvMostly* only used for receiving
- *useSocket* socket to use, do not open a new one
- *pIndex* returned index of socket pool
- ← *cornerIp* only used for receiving

Return values:***TRDP_NO_ERR******TRDP_PARAM_ERR*** Handle the socket pool: Request a socket from our socket pool.

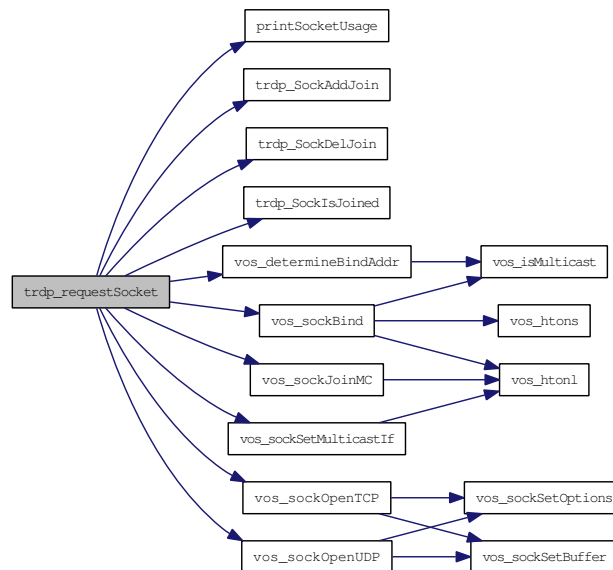
If a multicast group should be joined, we do that on an otherwise suitable socket - up to 20 multicast groups can be joined per socket. If a socket for multicast publishing is requested, we also use the source IP to determine the interface for outgoing multicast traffic.

Parameters:

- ↔ *iface* socket pool
- ← *port* port to use
- ← *params* parameters to use
- ← *srcIP* IP to bind to (0 = any address)
- ← *mcGroup* MC group to join (0 = do not join)
- ← *usage* type and port to bind to (PD, MD/UDP, MD/TCP)
- ← *options* blocking/nonblocking
- ← *rcvMostly* primarily used for receiving (tbd: bind on sender, too?)
- *useSocket* socket to use, do not open a new one
- *pIndex* returned index of socket pool
- ← *cornerIp* only used for receiving

Return values:***TRDP_NO_ERR******TRDP_PARAM_ERR***

Here is the call graph for this function:



5.27.2.16 void trdp_resetSequenceCounter (PD_ELE_T * *pElement*, TRDP_IP_ADDR_T *srcIP*, TRDP_MSG_T *msgType*)

remove the sequence counter for the comID/source IP.

The sequence counter should be reset if there was a packet time out.

Parameters:

- ← *pElement* subscription element
- ← *srcIP* Source IP address
- ← *msgType* message type

Return values:

none

5.27.2.17 BOOL8 trdp_validTopoCounters (UINT32 *etbTopoCnt*, UINT32 *opTrnTopoCnt*, UINT32 *etbTopoCntFilter*, UINT32 *opTrnTopoCntFilter*)

Check topography counters The applied conformance pattern follows Table A.5/A.21 (positive match):
 Telegram to be sent Locally stored value (appSession) Case etbTopoCnt opTrnTopoCnt etbTopoCntFilter opTrnTopoCntFilter
 1 any any 0 2 any equal 0 equal 3 equal any equal 0 4 equal equal equal equal.

Parameters:

- ← *etbTopoCnt* ETB topography counter to be checked
- ← *opTrnTopoCnt* Operational topography counter to be checked
- ← *etbTopoCntFilter* ETB topography counter filter value

← *opTrnTopoCntFilter* Operational topography counter filter value

Return values:

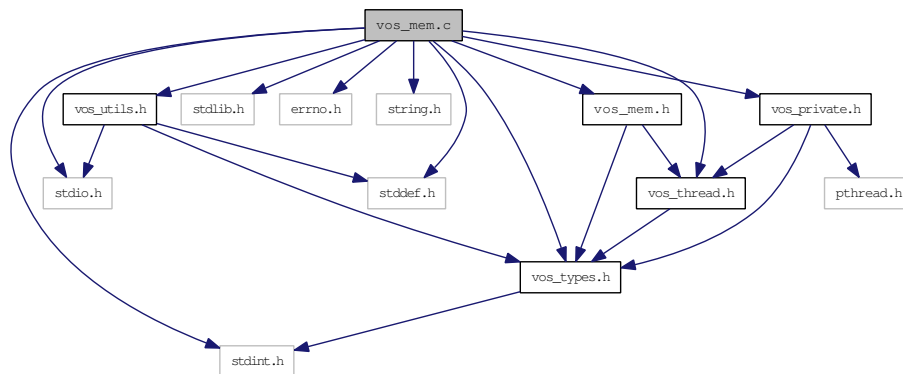
TRUE Filter criteria matched *FALSE* Filter criteria not matched

5.28 vos_mem.c File Reference

Memory functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include "vos_types.h"
#include "vos_utils.h"
#include "vos_mem.h"
#include "vos_thread.h"
#include "vos_private.h"
```

Include dependency graph for vos_mem.c:



Functions

- [VOS_ERR_T vos_mutexLocalCreate](#) (struct VOS_MUTEX *pMutex)
Create a recursive mutex.
- void [vos_mutexLocalDelete](#) (struct VOS_MUTEX *pMutex)
Delete a mutex.
- EXT_DECL [VOS_ERR_T vos_memInit](#) (UINT8 *pMemoryArea, UINT32 size, const UINT32 fragMem[VOS_MEM_NBLOCKSIZES])
Initialize the memory unit.
- EXT_DECL void [vos_memDelete](#) (UINT8 *pMemoryArea)
Delete the memory area.
- EXT_DECL UINT8 * [vos_memAlloc](#) (UINT32 size)

Allocate a block of memory (from memory area above).

- EXT_DECL void [vos_memFree](#) (void *pMemBlock)

Deallocate a block of memory (from memory area above).

- EXT_DECL [VOS_ERR_T](#) [vos_memCount](#) (UINT32 *pAllocatedMemory, UINT32 *pFreeMemory, UINT32 *pMinFree, UINT32 *pNumAllocBlocks, UINT32 *pNumAllocErr, UINT32 *pNumFreeErr, UINT32 blockSize[VOS_MEM_NBLOCKSIZES], UINT32 usedBlockSize[VOS_MEM_NBLOCKSIZES])

Return used and available memory (of memory area above).

- EXT_DECL void [vos_qsort](#) (void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))

Sort an array.

- EXT_DECL void * [vos_bsearch](#) (const void *pKey, const void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))

Binary search in a sorted array.

- EXT_DECL INT32 [vos_strncmp](#) (const CHAR8 *pStr1, const CHAR8 *pStr2, UINT32 count)

Case insensitive string compare.

- EXT_DECL void [vos_strncpy](#) (CHAR8 *pStrDst, const CHAR8 *pStrSrc, UINT32 count)

String copy with length limitation.

- EXT_DECL [VOS_ERR_T](#) [vos_queueCreate](#) ([VOS_QUEUE_POLICY_T](#) queueType, UINT32 maxNoOfMsg, [VOS_QUEUE_T](#) *pQueueHandle)

Initialize a message queue.

- EXT_DECL [VOS_ERR_T](#) [vos_queueSend](#) ([VOS_QUEUE_T](#) queueHandle, UINT8 *pData, UINT32 size)

Send a message.

- EXT_DECL [VOS_ERR_T](#) [vos_queueReceive](#) ([VOS_QUEUE_T](#) queueHandle, UINT8 **ppData, UINT32 *pSize, UINT32 usTimeout)

Get a message.

- EXT_DECL [VOS_ERR_T](#) [vos_queueDestroy](#) ([VOS_QUEUE_T](#) queueHandle)

Destroy a message queue.

5.28.1 Detailed Description

Memory functions.

OS abstraction of memory access and control

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[vos_mem.c](#) 1323 2014-08-29 14:09:08Z bloehr

Changes: BL 2012-12-03: ID 1: "using uninitialized PD_ELE_T.pullIpAddress variable" ID 2: "uninitialized PD_ELE_T newPD → pNext in tlp_subscribe()"

5.28.2 Function Documentation**5.28.2.1 EXT_DECL void* vos_bsearch (const void * *pKey*, const void * *pBuf*, UINT32 *num*, UINT32 *size*, int(*)(const void *, const void *) *compare*)**

Binary search in a sorted array.

This is just a wrapper for the standard bsearch function.

Parameters:

- ← *pKey* Key to search for
- ← *pBuf* Pointer to the array to sort
- ← *num* number of elements
- ← *size* size of one element
- ← *compare* Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values:

Pointer to found element or NULL

5.28.2.2 EXT_DECL UINT8* vos_memAlloc (UINT32 *size*)

Allocate a block of memory (from memory area above).

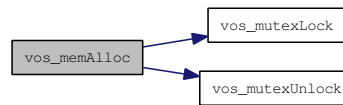
Parameters:

- ← *size* Size of requested block

Return values:

Pointer to memory area
 NULL if no memory available

Here is the call graph for this function:



5.28.2.3 `EXT_DECL VOS_ERR_T vos_memCount (UINT32 * pAllocatedMemory, UINT32 * pFreeMemory, UINT32 * pMinFree, UINT32 * pNumAllocBlocks, UINT32 * pNumAllocErr, UINT32 * pNumFreeErr, UINT32 blockSize[VOS_MEM_NBLOCKSIZES], UINT32 usedBlockSize[VOS_MEM_NBLOCKSIZES])`

Return used and available memory (of memory area above).

Parameters:

- *pAllocatedMemory* Pointer to allocated memory size
- *pFreeMemory* Pointer to free memory size
- *pMinFree* Pointer to minimal free memory size in statistics interval
- *pNumAllocBlocks* Pointer to number of allocated memory blocks
- *pNumAllocErr* Pointer to number of allocation errors
- *pNumFreeErr* Pointer to number of free errors
- *blockSize* Pointer to list of memory block sizes
- *usedBlockSize* Pointer to list of used memory blocks

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised

5.28.2.4 `EXT_DECL void vos_memDelete (UINT8 * pMemoryArea)`

Delete the memory area.

This will eventually invalidate any previously allocated memory blocks! It should be called last before the application quits. No further access to the memory blocks is allowed after this call.

Parameters:

- ← *pMemoryArea* Pointer to memory area used

Here is the call graph for this function:



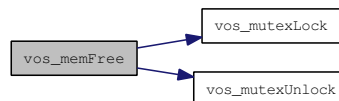
5.28.2.5 EXT_DECL void vos_memFree (void * *pMemBlock*)

Deallocate a block of memory (from memory area above).

Parameters:

← *pMemBlock* Pointer to memory block to be freed

Here is the call graph for this function:



5.28.2.6 EXT_DECL VOS_ERR_T vos_memInit (UINT8 * *pMemoryArea*, UINT32 *size*, const UINT32 *fragMem*[VOS_MEM_NBLOCKSIZES])

Initialize the memory unit.

Init a supplied block of memory and prepare it for use with vos_memAlloc and vos_memFree. The used block sizes can be supplied and will be preallocated. If half of the overall size of the requested memory area would be pre-allocated, either by the default pre-allocation table or a provided one, no pre-allocation takes place.

Parameters:

← *pMemoryArea* Pointer to memory area to use

← *size* Size of provided memory area

← *fragMem* Pointer to list of preallocated block sizes, used to fragment memory for large blocks

Return values:

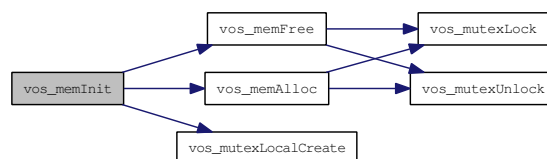
VOS_NO_ERR no error

VOS_PARAM_ERR parameter out of range/invalid

VOS_MEM_ERR no memory available

VOS_MUTEX_ERR no mutex available

Here is the call graph for this function:



5.28.2.7 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters:

→ *pMutex* Pointer to mutex handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR *pMutex* == NULL

VOS_MUTEX_ERR no mutex available

5.28.2.8 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters:

← *pMutex* Pointer to mutex struct

5.28.2.9 EXT_DECL void vos_qsort (void * *pBuf*, UINT32 *num*, UINT32 *size*, int(*)(const void *, const void *) *compare*)

Sort an array.

This is just a wrapper for the standard qsort function.

Parameters:

↔ *pBuf* Pointer to the array to sort

← *num* number of elements

← *size* size of one element

← *compare* Pointer to compare function return -n if *arg1* < *arg2*, return 0 if *arg1* == *arg2*, return +n if *arg1* > *arg2* where n is an integer != 0

Return values:

none

5.28.2.10 EXT_DECL VOS_ERR_T vos_queueCreate (VOS_QUEUE_POLICY_T *queueType*, UINT32 *maxNoOfMsg*, VOS_QUEUE_T * *pQueueHandle*)

Initialize a message queue.

Returns a handle for further calls

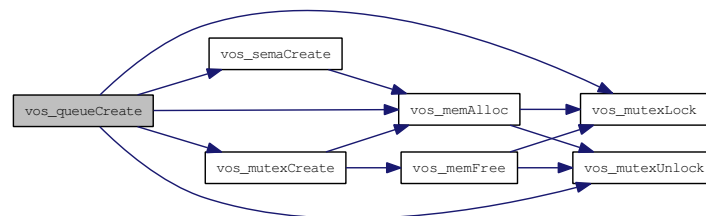
Parameters:

- ← *queueType* Define queue type (1 = FIFO, 2 = LIFO, 3 = PRIO)
- ← *maxNoOfMsg* Maximum number of messages
- *pQueueHandle* Handle of created queue

Return values:

- VOS_NO_ERR** no error
- VOS_INIT_ERR** module not initialised
- VOS_NOINIT_ERR** invalid handle
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_INIT_ERR** not supported
- VOS_QUEUE_ERR** error creating queue

Here is the call graph for this function:



5.28.2.11 EXT_DECL VOS_ERR_T vos_queueDestroy (VOS_QUEUE_T queueHandle)

Destroy a message queue.

Free all resources used by this queue

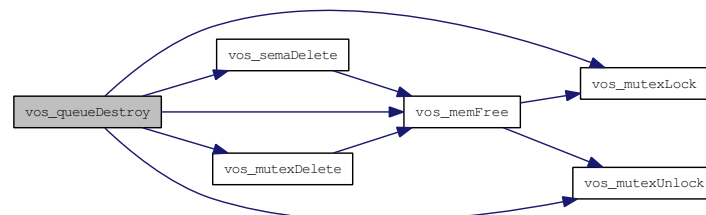
Parameters:

- ← *queueHandle* Queue handle

Return values:

- VOS_NO_ERR** no error
- VOS_INIT_ERR** module not initialised
- VOS_NOINIT_ERR** invalid handle
- VOS_PARAM_ERR** parameter out of range/invalid

Here is the call graph for this function:



5.28.2.12 EXT_DECL VOS_ERR_T vos_queueReceive (VOS_QUEUE_T *queueHandle*, UINT8 ** *ppData*, UINT32 * *pSize*, UINT32 *usTimeout*)

Get a message.

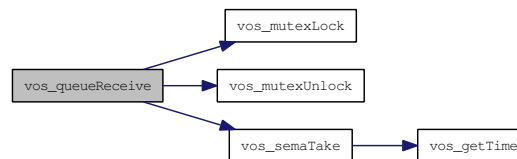
Parameters:

- ← *queueHandle* Queue handle
- *ppData* Pointer to data pointer to be received
- *pSize* Size of receive data
- ← *usTimeout* Maximum time to wait for a message (in usec)

Return values:

- VOSNO_ERR** no error
- VOS_INIT_ERR** module not initialised
- VOS_NOINIT_ERR** invalid handle
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_QUEUE_ERR** queue is empty

Here is the call graph for this function:



5.28.2.13 EXT_DECL VOS_ERR_T vos_queueSend (VOS_QUEUE_T *queueHandle*, UINT8 * *pData*, UINT32 *size*)

Send a message.

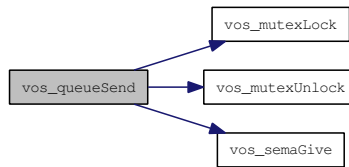
Parameters:

- ← *queueHandle* Queue handle
- ← *pData* Pointer to data to be sent
- ← *size* Size of data to be sent

Return values:

- VOS_NO_ERR** no error
- VOS_INIT_ERR** module not initialised
- VOS_NOINIT_ERR** invalid handle
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_INIT_ERR** not supported
- VOS_QUEUE_ERR** error creating queue

Here is the call graph for this function:



5.28.2.14 EXT_DECL void vos_strncpy (CHAR8 * *pStrDst*, const CHAR8 * *pStrSrc*, UINT32 *count*)

String copy with length limitation.

Parameters:

- ← *pStrDst* Destination string
- ← *pStrSrc* Null terminated string to copy
- ← *count* Maximum number of characters to copy

Return values:

none

5.28.2.15 EXT_DECL INT32 vos_strnicmp (const CHAR8 * *pStr1*, const CHAR8 * *pStr2*, UINT32 *count*)

Case insensitive string compare.

Parameters:

- ← *pStr1* Null terminated string to compare
- ← *pStr2* Null terminated string to compare
- ← *count* Maximum number of characters to compare

Return values:

- 0* - equal
- <*0* - string1 less than string 2
- >*0* - string 1 greater than string 2

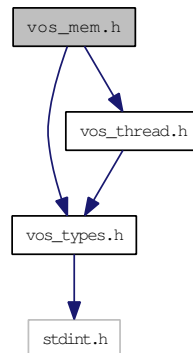
5.29 vos_mem.h File Reference

Memory and queue functions for OS abstraction.

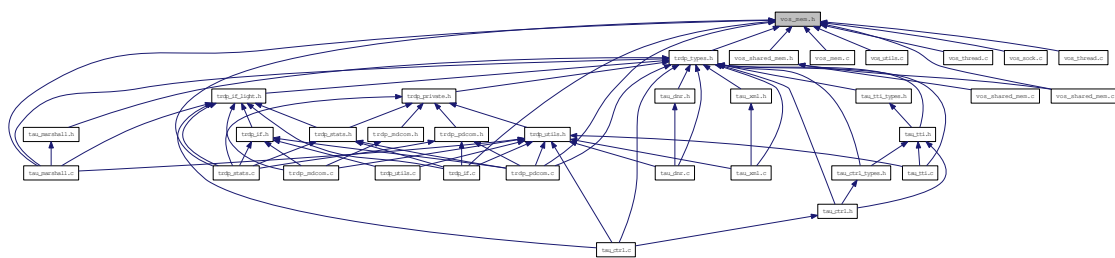
```
#include "vos_types.h"
```

```
#include "vos_thread.h"
```

Include dependency graph for vos_mem.h:



This graph shows which files directly or indirectly include this file:



Defines

- #define [VOS_MEM_BLOCKSIZE](#)

We internally allocate memory always by these block sizes.

- #define [VOS_MEM_PREALLOCATE](#) {0, 0, 0, 0, 0, 0, 0, 8, 0, 0, 1, 0, 0, 0, 0}

Default pre-allocation of free memory blocks.

Typedefs

- typedef struct VOS_QUEUE * [VOS_QUEUE_T](#)

Opaque queue define.

Enumerations

- enum [VOS_QUEUE_POLICY_T](#)
Queue policy matching pthread/Posix defines.

Functions

- EXT_DECL [VOS_ERR_T](#) [vos_memInit](#) (UINT8 *pMemoryArea, UINT32 size, const UINT32 fragMem[VOS_MEM_NBLOCKSIZES])
Initialize the memory unit.
- EXT_DECL void [vos_memDelete](#) (UINT8 *pMemoryArea)
Delete the memory area.
- EXT_DECL UINT8 * [vos_memAlloc](#) (UINT32 size)
Allocate a block of memory (from memory area above).
- EXT_DECL void [vos_memFree](#) (void *pMemBlock)
Deallocate a block of memory (from memory area above).
- EXT_DECL [VOS_ERR_T](#) [vos_memCount](#) (UINT32 *pAllocatedMemory, UINT32 *pFreeMemory, UINT32 *pMinFree, UINT32 *pNumAllocBlocks, UINT32 *pNumAllocErr, UINT32 *pNumFreeErr, UINT32 blockSize[VOS_MEM_NBLOCKSIZES], UINT32 usedBlockSize[VOS_MEM_NBLOCKSIZES])
Return used and available memory (of memory area above).
- EXT_DECL void [vos_qsort](#) (void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))
Sort an array.
- EXT_DECL void * [vos_bsearch](#) (const void *pKey, const void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))
Binary search in a sorted array.
- EXT_DECL INT32 [vos_strnicmp](#) (const CHAR8 *pStr1, const CHAR8 *pStr2, UINT32 count)
Case insensitive string compare.
- EXT_DECL void [vos_strncpy](#) (CHAR8 *pStr1, const CHAR8 *pStr2, UINT32 count)
String copy with length limitation.
- EXT_DECL [VOS_ERR_T](#) [vos_queueCreate](#) ([VOS_QUEUE_POLICY_T](#) queueType, UINT32 maxNoOfMsg, [VOS_QUEUE_T](#) *pQueueHandle)
Initialize a message queue.
- EXT_DECL [VOS_ERR_T](#) [vos_queueSend](#) ([VOS_QUEUE_T](#) queueHandle, UINT8 *pData, UINT32 size)
Send a message.
- EXT_DECL [VOS_ERR_T](#) [vos_queueReceive](#) ([VOS_QUEUE_T](#) queueHandle, UINT8 **ppData, UINT32 *pSize, UINT32 usTimeout)

Get a message.

- EXT_DECL `VOS_ERR_T vos_queueDestroy (VOS_QUEUE_T queueHandle)`

Destroy a message queue.

5.29.1 Detailed Description

Memory and queue functions for OS abstraction.

This module provides memory control supervision

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH Peter Brander (Memory scheme)

Remarks:

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Id

`vos_mem.h` 1323 2014-08-29 14:09:08Z bloehr

5.29.2 Define Documentation

5.29.2.1 #define VOS_MEM_BLOCKSIZEs

Value:

```
{32, 48, 128, 180, 256, 512, 1024, 1480, 2048, \
 4096, 11520, 16384, 32768, 65536, 131072}
```

We internally allocate memory always by these block sizes.

The largest available block is 524288 Bytes, provided the overall size of the used memory allocation area is larger.

5.29.2.2 #define VOS_MEM_PREALLOCATE {0, 0, 0, 0, 0, 0, 0, 8, 0, 0, 1, 0, 0, 0}

Default pre-allocation of free memory blocks.

To avoid problems with too many small blocks and no large one. Specify how many of each block size that should be pre-allocated (and freed!) to pre-segment the memory area.

5.29.3 Function Documentation

5.29.3.1 EXT_DECL void* vos_bsearch (const void * *pKey*, const void * *pBuf*, UINT32 *num*, UINT32 *size*, int(*)(const void *, const void *) *compare*)

Binary search in a sorted array.

This is just a wrapper for the standard bsearch function.

Parameters:

- ← *pKey* Key to search for
- ← *pBuf* Pointer to the array to sort
- ← *num* number of elements
- ← *size* size of one element
- ← *compare* Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values:

Pointer to found element or NULL

5.29.3.2 EXT_DECL UINT8* vos_memAlloc (UINT32 *size*)

Allocate a block of memory (from memory area above).

Parameters:

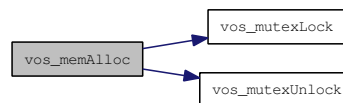
- ← *size* Size of requested block

Return values:

Pointer to memory area

NULL if no memory available

Here is the call graph for this function:



5.29.3.3 EXT_DECL VOS_ERR_T vos_memCount (UINT32 * *pAllocatedMemory*, UINT32 * *pFreeMemory*, UINT32 * *pMinFree*, UINT32 * *pNumAllocBlocks*, UINT32 * *pNumAllocErr*, UINT32 * *pNumFreeErr*, UINT32 *blockSize*[VOS_MEM_- NBLOCKSIZEs], UINT32 *usedBlockSize*[VOS_MEM_-NBLOCKSIZEs])

Return used and available memory (of memory area above).

Parameters:

- *pAllocatedMemory* Pointer to allocated memory size

- ***pFreeMemory*** Pointer to free memory size
- ***pMinFree*** Pointer to minimal free memory size in statistics interval
- ***pNumAllocBlocks*** Pointer to number of allocated memory blocks
- ***pNumAllocErr*** Pointer to number of allocation errors
- ***pNumFreeErr*** Pointer to number of free errors
- ***blockSize*** Pointer to list of memory block sizes
- ***usedBlockSize*** Pointer to list of used memoryblocks

Return values:

- VOS_NO_ERR*** no error
- VOS_INIT_ERR*** module not initialised

5.29.3.4 EXT_DECL void vos_memDelete (UINT8 * *pMemoryArea*)

Delete the memory area.

This will eventually invalidate any previously allocated memory blocks! It should be called last before the application quits. No further access to the memory blocks is allowed after this call.

Parameters:

- ← ***pMemoryArea*** Pointer to memory area to use

This will eventually invalidate any previously allocated memory blocks! It should be called last before the application quits. No further access to the memory blocks is allowed after this call.

Parameters:

- ← ***pMemoryArea*** Pointer to memory area used

Here is the call graph for this function:

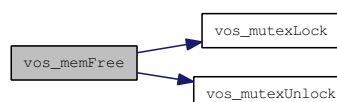
**5.29.3.5 EXT_DECL void vos_memFree (void * *pMemBlock*)**

Deallocate a block of memory (from memory area above).

Parameters:

- ← ***pMemBlock*** Pointer to memory block to be freed
- ← ***pMemBlock*** Pointer to memory block to be freed

Here is the call graph for this function:



5.29.3.6 EXT_DECL VOS_ERR_T vos_memInit (UINT8 * *pMemoryArea*, UINT32 *size*, const UINT32 *fragMem*[VOS_MEM_NBLOCKSIZES])

Initialize the memory unit.

Init a supplied block of memory and prepare it for use with `vos_alloc` and `vos_dealloc`. The used block sizes can be supplied and will be preallocated.

Parameters:

- ← *pMemoryArea* Pointer to memory area to use
- ← *size* Size of provided memory area
- ← *fragMem* Pointer to list of preallocate block sizes, used to fragment memory for large blocks

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_MEM_ERR** no memory available

Init a supplied block of memory and prepare it for use with `vos_memAlloc` and `vos_memFree`. The used block sizes can be supplied and will be preallocated. If half of the overall size of the requested memory area would be pre-allocated, either by the default pre-allocation table or a provided one, no pre-allocation takes place.

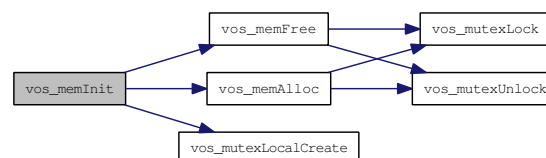
Parameters:

- ← *pMemoryArea* Pointer to memory area to use
- ← *size* Size of provided memory area
- ← *fragMem* Pointer to list of preallocated block sizes, used to fragment memory for large blocks

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_MEM_ERR** no memory available
- VOS_MUTEX_ERR** no mutex available

Here is the call graph for this function:



5.29.3.7 EXT_DECL void vos_qsort (void * *pBuf*, UINT32 *num*, UINT32 *size*, int(*) (const void *, const void *) *compare*)

Sort an array.

This is just a wrapper for the standard `qsort` function.

Parameters:

- ↔ *pBuf* Pointer to the array to sort
- ← *num* number of elements
- ← *size* size of one element
- ← *compare* Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values:

none

5.29.3.8 EXT_DECL VOS_ERR_T vos_queueCreate (VOS_QUEUE_POLICY_T *queueType*, UINT32 *maxNoOfMsg*, VOS_QUEUE_T * *pQueueHandle*)

Initialize a message queue.

Returns a handle for further calls

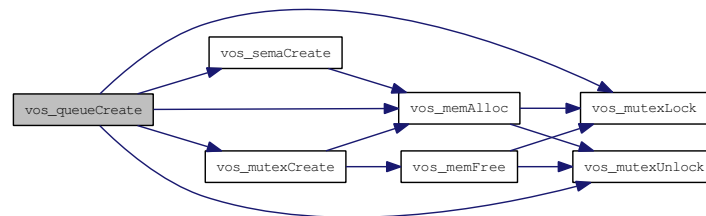
Parameters:

- ← *queueType* Define queue type (1 = FIFO, 2 = LIFO, 3 = PRIO)
- ← *maxNoOfMsg* Maximum number of messages
- *pQueueHandle* Handle of created queue

Return values:

- VOS_NO_ERR** no error
- VOS_INIT_ERR** module not initialised
- VOS_NOINIT_ERR** invalid handle
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_INIT_ERR** not supported
- VOS_QUEUE_ERR** error creating queue

Here is the call graph for this function:



5.29.3.9 EXT_DECL VOS_ERR_T vos_queueDestroy (VOS_QUEUE_T *queueHandle*)

Destroy a message queue.

Free all resources used by this queue

Parameters:

← *queueHandle* Queue handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

Free all resources used by this queue

Parameters:

← *queueHandle* Queue handle

Return values:

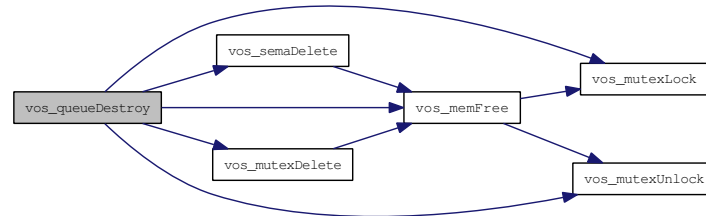
VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

Here is the call graph for this function:



5.29.3.10 EXT_DECL VOS_ERR_T vos_queueReceive (VOS_QUEUE_T *queueHandle*, UINT8 ***ppData*, UINT32 **pSize*, UINT32 *usTimeout*)

Get a message.

Parameters:

← *queueHandle* Queue handle

→ *ppData* Pointer to data pointer to be received

→ *pSize* Size of receive data

← *usTimeout* Maximum time to wait for a message (in usec)

Return values:

VOSNO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle
VOS_PARAM_ERR parameter out of range/invalid
VOS_QUEUE_ERR queue is empty

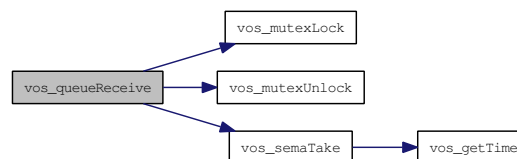
Parameters:

← **queueHandle** Queue handle
→ **ppData** Pointer to data pointer to be received
→ **pSize** Size of receive data
← **usTimeout** Maximum time to wait for a message (in usec)

Return values:

VOSNO_ERR no error
VOS_INIT_ERR module not initialised
VOS_NOINIT_ERR invalid handle
VOS_PARAM_ERR parameter out of range/invalid
VOS_QUEUE_ERR queue is empty

Here is the call graph for this function:



5.29.3.11 EXT_DECL VOS_ERR_T vos_queueSend (VOS_QUEUE_T queueHandle, UINT8 * pData, UINT32 size)

Send a message.

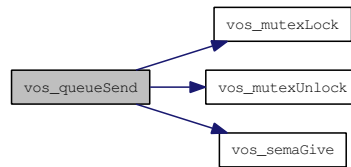
Parameters:

← **queueHandle** Queue handle
← **pData** Pointer to data to be sent
← **size** Size of data to be sent

Return values:

VOS_NO_ERR no error
VOS_INIT_ERR module not initialised
VOS_NOINIT_ERR invalid handle
VOS_PARAM_ERR parameter out of range/invalid
VOS_INIT_ERR not supported
VOS_QUEUE_ERR error creating queue

Here is the call graph for this function:



5.29.3.12 EXT_DECL void vos_strncpy (CHAR8 * *pStrDst*, const CHAR8 * *pStrSrc*, UINT32 *count*)

String copy with length limitation.

Parameters:

- ← *pStrDst* Destination string
- ← *pStrSrc* Null terminated string to copy
- ← *count* Maximum number of characters to copy

Return values:

none

5.29.3.13 EXT_DECL INT32 vos_strnicmp (const CHAR8 * *pStr1*, const CHAR8 * *pStr2*, UINT32 *count*)

Case insensitive string compare.

Parameters:

- ← *pStr1* Null terminated string to compare
- ← *pStr2* Null terminated string to compare
- ← *count* Maximum number of characters to compare

Return values:

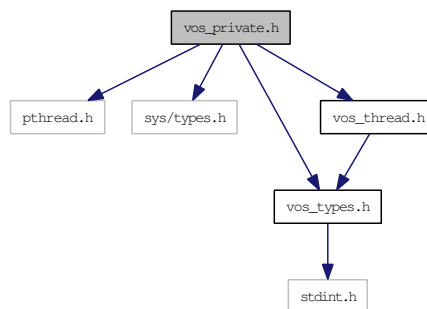
- 0* - equal
- <*0* - string1 less than string 2
- >*0* - string 1 greater than string 2

5.30 vos_private.h File Reference

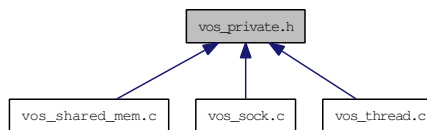
Private definitions for the OS abstraction layer.

```
#include <pthread.h>
#include <sys/types.h>
#include "vos_types.h"
#include "vos_thread.h"
```

Include dependency graph for posix/vos_private.h:



This graph shows which files directly or indirectly include this file:



Functions

- [VOS_ERR_T vos_mutexLocalCreate](#) (struct VOS_MUTEX *pMutex)
Create a recursive mutex.
- void [vos_mutexLocalDelete](#) (struct VOS_MUTEX *pMutex)
Delete a mutex.

5.30.1 Detailed Description

Private definitions for the OS abstraction layer.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

vos_private.h 1133 2013-12-18 08:00:43Z ahweiss

5.30.2 Function Documentation**5.30.2.1 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)**

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters:

→ *pMutex* Pointer to mutex handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR *pMutex* == NULL

VOS_MUTEX_ERR no mutex available

5.30.2.2 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters:

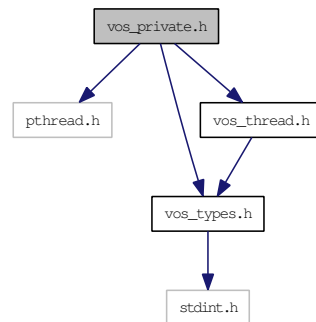
← *pMutex* Pointer to mutex struct

5.31 vos_private.h File Reference

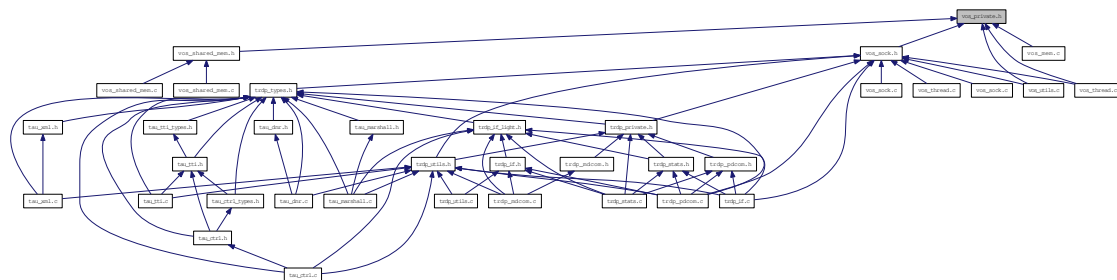
Private definitions for the OS abstraction layer.

```
#include <pthread.h>
#include "vos_types.h"
#include "vos_thread.h"
```

Include dependency graph for windows/vos_private.h:



This graph shows which files directly or indirectly include this file:



Functions

- [VOS_ERR_T vos_mutexLocalCreate](#) (struct VOS_MUTEX *pMutex)
Create a recursive mutex.
- void [vos_mutexLocalDelete](#) (struct VOS_MUTEX *pMutex)
Delete a mutex.

5.31.1 Detailed Description

Private definitions for the OS abstraction layer.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

vos_private.h 1065 2013-09-06 08:12:09Z aweiss

*

5.31.2 Function Documentation

5.31.2.1 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters:

→ *pMutex* Pointer to mutex handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR *pMutex* == NULL

VOS_MUTEX_ERR no mutex available

5.31.2.2 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters:

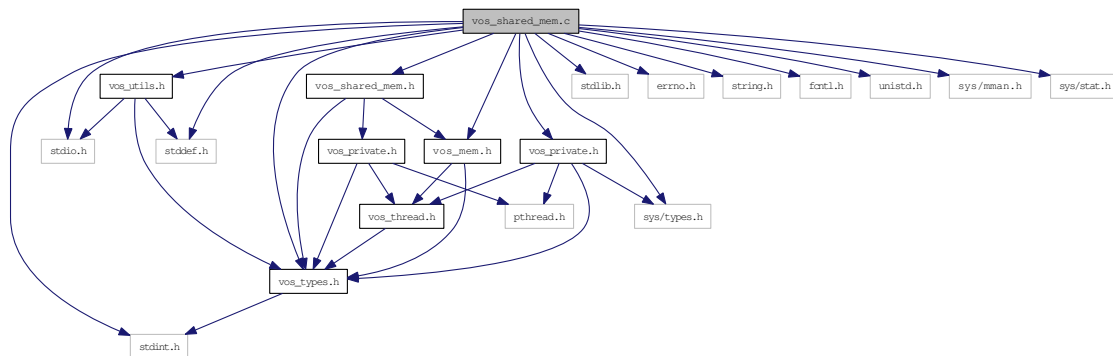
← *pMutex* Pointer to mutex struct

5.32 vos_shared_mem.c File Reference

Shared Memory functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include <unistd.h>
#include <sys/mman.h>
#include <sys/stat.h>
#include <sys/types.h>
#include "vos_types.h"
#include "vos_mem.h"
#include "vos_utils.h"
#include "vos_private.h"
#include "vos_shared_mem.h"
```

Include dependency graph for posix/vos_shared_mem.c:



Functions

- EXT_DECL [VOS_ERR_T vos_sharedOpen](#) (const CHAR8 *pKey, VOS_SHRD_T *pHandle, UINT8 **ppMemoryArea, UINT32 *pSize)
Create a shared memory area or attach to existing one.
- EXT_DECL [VOS_ERR_T vos_sharedClose](#) (VOS_SHRD_T handle, const UINT8 *pMemoryArea)
Close connection to the shared memory area.

5.32.1 Detailed Description

Shared Memory functions.

OS abstraction of Shared memory access and control

Note:

Project: TCNOpen TRDP prototype stack

Author:

Kazumasa Aiba, TOSHIBA

Remarks:

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Id

[vos_mem.h](#) 282 2013-01-11 07:08:44Z 97029

5.32.2 Function Documentation

5.32.2.1 EXT_DECL VOS_ERR_T vos_sharedClose (VOS_SHRD_T *handle*, const UINT8 * *pMemoryArea*)

Close connection to the shared memory area.

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters:

- ← *handle* Returned handle
- ← *pMemoryArea* Pointer to memory area

Return values:

- VOS_NO_ERR* no error
- VOS_MEM_ERR* no memory available

5.32.2.2 EXT_DECL VOS_ERR_T vos_sharedOpen (const CHAR8 * *pKey*, VOS_SHRD_T * *pHandle*, UINT8 ** *ppMemoryArea*, UINT32 * *pSize*)

Create a shared memory area or attach to existing one.

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be attached. This function is not available in each target implementation.

Parameters:

- ← *pKey* Unique identifier (file name)

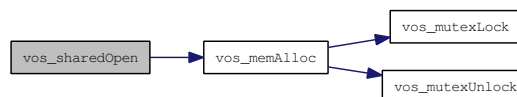
- *pHandle* Pointer to returned handle
- *ppMemoryArea* Pointer to pointer to memory area
- ↔ *pSize* Pointer to size of area to allocate, on return actual size after attach

Return values:

VOS_NO_ERR no error

VOS_MEM_ERR no memory available

Here is the call graph for this function:

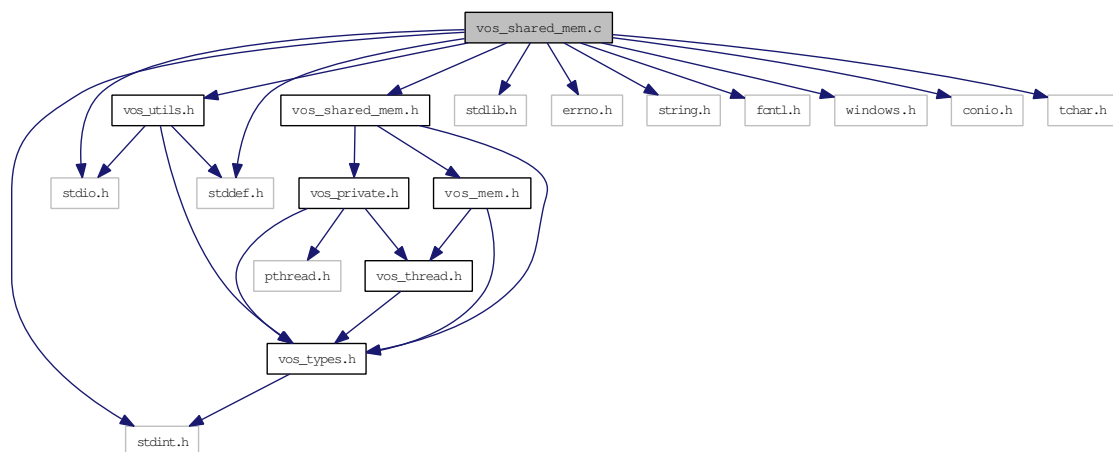


5.33 vos_shared_mem.c File Reference

Shared Memory functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include "vos_shared_mem.h"
#include "vos_utils.h"
#include <windows.h>
#include <conio.h>
#include <tchar.h>
```

Include dependency graph for windows/vos_shared_mem.c:



Functions

- EXT_DECL [VOS_ERR_T vos_sharedOpen](#) (const CHAR8 *pKey, VOS_SHRD_T *pHandle, UINT8 **ppMemoryArea, UINT32 *pSize)

Create a shared memory area or attach to existing one.

- EXT_DECL [VOS_ERR_T vos_sharedClose](#) (VOS_SHRD_T handle, const UINT8 *pMemoryArea)

Close connection to the shared memory area.

5.33.1 Detailed Description

Shared Memory functions.

OS abstraction of Shared memory access and control

Note:

Project: TCNOpen TRDP prototype stack

Author:

Kazumasa Aiba, TOSHIBA

Remarks:

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Id

vos_sock.c 253 2013-01-07 13:48:40Z aweiss

*

5.33.2 Function Documentation

5.33.2.1 EXT_DECL VOS_ERR_T vos_sharedClose (VOS_SHRD_T *handle*, const UINT8 **pMemoryArea*)

Close connection to the shared memory area.

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters:

← *handle* Returned handle

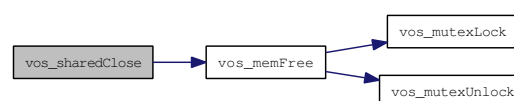
← *pMemoryArea* Pointer to memory area

Return values:

VOS_NO_ERR no error

VOS_MEM_ERR no memory available

Here is the call graph for this function:



5.33.2.2 EXT_DECL VOS_ERR_T vos_sharedOpen (const CHAR8 * *pKey*, VOS_SHRD_T * *pHandle*, UINT8 ** *ppMemoryArea*, UINT32 * *pSize*)

Create a shared memory area or attach to existing one.

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be opened. This function is not available in each target implementation.

Parameters:

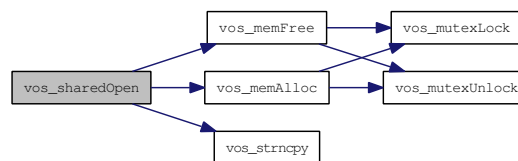
- ← *pKey* Unique identifier (file name)
- *pHandle* Pointer to returned handle
- *ppMemoryArea* Pointer to pointer to memory area
- ↔ *pSize* Pointer to size of area to allocate, on return actual size after attach. Independent from actual value, always multiples of page size (4k) are allocated

Return values:

VOS_NO_ERR no error

VOS_MEM_ERR no memory available

Here is the call graph for this function:

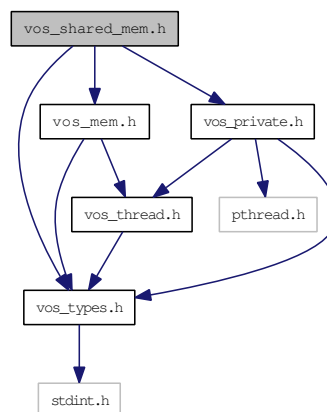


5.34 vos_shared_mem.h File Reference

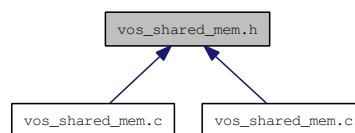
Shared Memory functions for OS abstraction.

```
#include "vos_types.h"
#include "vos_mem.h"
#include "vos_private.h"
```

Include dependency graph for vos_shared_mem.h:



This graph shows which files directly or indirectly include this file:



Functions

- EXT_DECL [VOS_ERR_T vos_sharedOpen](#) (const CHAR8 *pKey, VOS_SHRD_T *pHandle, UINT8 **ppMemoryArea, UINT32 *pSize)

Create a shared memory area or attach to existing one.

- EXT_DECL [VOS_ERR_T vos_sharedClose](#) (VOS_SHRD_T handle, const UINT8 *pMemoryArea)

Close connection to the shared memory area.

5.34.1 Detailed Description

Shared Memory functions for OS abstraction.

This module provides shared memory control supervision

Note:

Project: TCNOpen TRDP prototype stack

Author:

Kazumasa Aiba, TOSHIBA

Remarks:

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Id

[vos_mem.h](#) 282 2013-01-11 07:08:44Z 97029

5.34.2 Function Documentation**5.34.2.1 EXT_DECL VOS_ERR_T vos_sharedClose (VOS_SHRD_T *handle*, const UINT8 **pMemoryArea*)**

Close connection to the shared memory area.

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters:

- ← *handle* Returned handle
- ← *pMemoryArea* Pointer to memory area

Return values:

- VOS_NO_ERR** no error
- VOS_MEM_ERR** no memory available

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters:

- ← *handle* Returned handle
- ← *pMemoryArea* Pointer to memory area

Return values:

- VOS_NO_ERR** no error
- VOS_MEM_ERR** no memory available

Here is the call graph for this function:



5.34.2.2 EXT_DECL VOS_ERR_T vos_sharedOpen (const CHAR8 * *pKey*, VOS_SHRD_T * *pHandle*, UINT8 ** *ppMemoryArea*, UINT32 * *pSize*)

Create a shared memory area or attach to existing one.

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be opened. This function is not available in each target implementation.

Parameters:

- ← *pKey* Unique identifier (file name)
- *pHandle* Pointer to returned handle
- *ppMemoryArea* Pointer to pointer to memory area
- ↔ *pSize* Pointer to size of area to allocate, on return actual size after attach

Return values:

- VOS_NO_ERR* no error
- VOS_MEM_ERR* no memory available

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be attached. This function is not available in each target implementation.

Parameters:

- ← *pKey* Unique identifier (file name)
- *pHandle* Pointer to returned handle
- *ppMemoryArea* Pointer to pointer to memory area
- ↔ *pSize* Pointer to size of area to allocate, on return actual size after attach

Return values:

- VOS_NO_ERR* no error
- VOS_MEM_ERR* no memory available

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be opened. This function is not available in each target implementation.

Parameters:

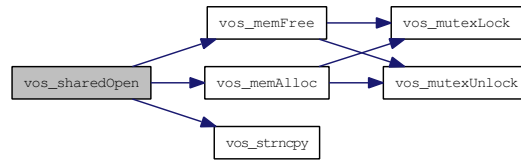
- ← *pKey* Unique identifier (file name)
- *pHandle* Pointer to returned handle
- *ppMemoryArea* Pointer to pointer to memory area
- ↔ *pSize* Pointer to size of area to allocate, on return actual size after attach. Independent from actual value, always multiples of page size (4k) are allocated

Return values:

- VOS_NO_ERR* no error

VOS_MEM_ERR no memory available

Here is the call graph for this function:

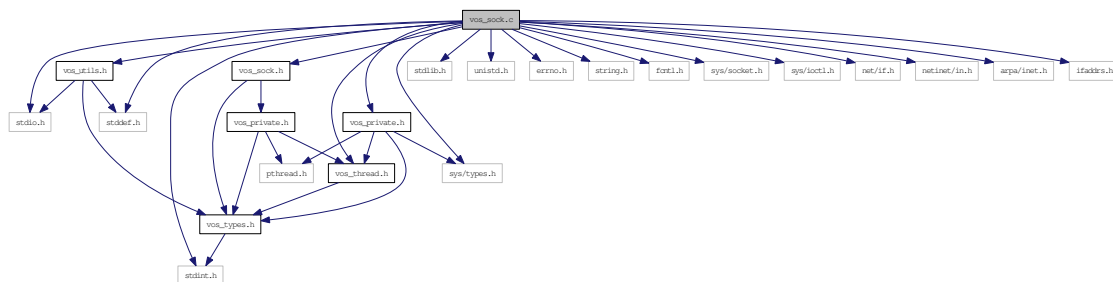


5.35 vos_sock.c File Reference

Socket functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <unistd.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include <sys/socket.h>
#include <sys/ioctl.h>
#include <net/if.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#include <sys/types.h>
#include <ifaddrs.h>
#include "vos_utils.h"
#include "vos_sock.h"
#include "vos_thread.h"
#include "vos_private.h"
```

Include dependency graph for posix/vos_sock.c:



Functions

- **BOOL8** [vos_getMacAddress](#) (UINT8 *pMacAddr, const char *pIfName)
Get the MAC address for a named interface.
- **VOS_ERR_T** [vos_sockSetBuffer](#) (INT32 sock)
Enlarge send and receive buffers to TRDP_SOCKBUF_SIZE if necessary.

- EXT_DECL UINT16 [vos_htons](#) (UINT16 val)
Byte swapping.
- EXT_DECL UINT16 [vos_ntohs](#) (UINT16 val)
Byte swapping 2 Bytes.
- EXT_DECL UINT32 [vos_htonl](#) (UINT32 val)
Byte swapping 4 Bytes.
- EXT_DECL UINT32 [vos_ntohl](#) (UINT32 val)
Byte swapping 4 Bytes.
- EXT_DECL UINT32 [vos_dottedIP](#) (const CHAR8 *pDottedIP)
Convert IP address from dotted dec.
- EXT_DECL const CHAR8 * [vos_ipDotted](#) (UINT32 ipAddress)
Convert IP address to dotted dec.
- EXT_DECL BOOL8 [vos_isMulticast](#) (UINT32 ipAddress)
Check if the supplied address is a multicast group address.
- EXT_DECL INT32 [vos_select](#) (INT32 highDesc, VOS_FDS_T *pReadableFD, VOS_FDS_T *pWritableFD, VOS_FDS_T *pErrorFD, [VOS_TIME_T](#) *pTimeOut)
select function.
- EXT_DECL [VOS_ERR_T](#) [vos_getInterfaces](#) (UINT32 *pAddrCnt, VOS_IF_REC_T ifAddrs[])
 - Get a list of interface addresses The caller has to provide an array of interface records to be filled.*
- EXT_DECL [VOS_ERR_T](#) [vos_sockInit](#) (void)
Initialize the socket library.
- EXT_DECL void [vos_sockTerm](#) (void)
De-Initialize the socket library.
- EXT_DECL [VOS_ERR_T](#) [vos_sockGetMAC](#) (UINT8 pMAC[VOS_MAC_SIZE])
Return the MAC address of the default adapter.
- EXT_DECL [VOS_ERR_T](#) [vos_sockOpenUDP](#) (INT32 *pSock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Create an UDP socket.
- EXT_DECL [VOS_ERR_T](#) [vos_sockOpenTCP](#) (INT32 *pSock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Create a TCP socket.
- EXT_DECL [VOS_ERR_T](#) [vos_sockClose](#) (INT32 sock)
Close a socket.
- EXT_DECL [VOS_ERR_T](#) [vos_sockSetOptions](#) (INT32 sock, const [VOS_SOCKET_OPT_T](#) *pOptions)

Set socket options.

- EXT_DECL [VOS_ERR_T vos_sockJoinMC](#) (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)

Join a multicast group.

- EXT_DECL [VOS_ERR_T vos_sockLeaveMC](#) (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)

Leave a multicast group.

- EXT_DECL [VOS_ERR_T vos_sockSendUDP](#) (INT32 sock, const UINT8 *pBuffer, UINT32 *pSize, UINT32 ipAddress, UINT16 port)

Send UDP data.

- EXT_DECL [VOS_ERR_T vos_sockReceiveUDP](#) (INT32 sock, UINT8 *pBuffer, UINT32 *pSize, UINT32 *pSrcIPAddr, UINT16 *pSrcIPPort, UINT32 *pDstIPAddr, BOOL8 peek)

Receive UDP data.

- EXT_DECL [VOS_ERR_T vos_sockBind](#) (INT32 sock, UINT32 ipAddress, UINT16 port)

Bind a socket to an address and port.

- EXT_DECL [VOS_ERR_T vos_sockListen](#) (INT32 sock, UINT32 backlog)

Listen for incoming connections.

- EXT_DECL [VOS_ERR_T vos_sockAccept](#) (INT32 sock, INT32 *pSock, UINT32 *pIPAddr, UINT16 *pPort)

Accept an incoming TCP connection.

- EXT_DECL [VOS_ERR_T vos_sockConnect](#) (INT32 sock, UINT32 ipAddress, UINT16 port)

Open a TCP connection.

- EXT_DECL [VOS_ERR_T vos_sockSendTCP](#) (INT32 sock, const UINT8 *pBuffer, UINT32 *pSize)

Send TCP data.

- EXT_DECL [VOS_ERR_T vos_sockReceiveTCP](#) (INT32 sock, UINT8 *pBuffer, UINT32 *pSize)

Receive TCP data.

- EXT_DECL [VOS_ERR_T vos_sockSetMulticastIf](#) (INT32 sock, UINT32 mcIfAddress)

Set Using Multicast I/F.

- EXT_DECL [VOS_IP4_ADDR_T vos_determineBindAddr](#) (VOS_IP4_ADDR_T srcIP, VOS_IP4_ADDR_T mcGroup, VOS_IP4_ADDR_T rcvMostly)

Determines the address to bind to since the behaviour in the different OS is different.

5.35.1 Detailed Description

Socket functions.

OS abstraction of IP socket functions for UDP and TCP

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

vos_sock.c 1367 2014-11-25 12:49:11Z ahweiss

BL 2014-08-25: Ticket #51: change underlying function for vos_dottedIP

5.35.2 Function Documentation**5.35.2.1 EXT_DECL VOS_IP4_ADDR_T vos_determineBindAddr (VOS_IP4_ADDR_T *srcIP*, VOS_IP4_ADDR_T *mcGroup*, VOS_IP4_ADDR_T *rcvMostly*)**

Determines the address to bind to since the behaviour in the different OS is different.

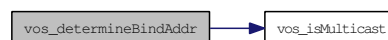
Parameters:

- ← *srcIP* IP to bind to (0 = any address)
- ← *mcGroup* MC group to join (0 = do not join)
- ← *rcvMostly* primarily used for receiving (tbd: bind on sender, too?)

Return values:

Address to bind to

Here is the call graph for this function:

**5.35.2.2 EXT_DECL UINT32 vos_dottedIP (const CHAR8 * *pDottedIP*)**

Convert IP address from dotted dec.

to !host! endianness

Parameters:

- ← *pDottedIP* IP address as dotted decimal.

Return values:

address in UINT32 in host endianness 0 (Zero) if error

Here is the call graph for this function:



5.35.2.3 EXT_DECL VOS_ERR_T vos_getInterfaces (UINT32 *pAddrCnt, VOS_IF_REC_T ifAddrs[])

Get a list of interface addresses The caller has to provide an array of interface records to be filled.

Parameters:

- ↔ *pAddrCnt* in: pointer to array size of interface record out: pointer to number of interface records read
- ↔ *ifAddrs* array of interface records

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* pMAC == NULL

Here is the call graph for this function:



5.35.2.4 BOOL8 vos_getMacAddress (UINT8 *pMacAddr, const char *pIfName)

Get the MAC address for a named interface.

Parameters:

- *pMacAddr* pointer to array of MAC address to return
- ← *pIfName* pointer to interface name

Return values:

- TRUE* if successfull

5.35.2.5 EXT_DECL UINT32 vos_htonl (UINT32 val)

Byte swapping 4 Bytes.

Parameters:

- ← *val* Initial value.

Return values:

- swapped* value

5.35.2.6 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping.

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.35.2.7 EXT_DECL const CHAR8* vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianness.

Parameters:

← *ipAddress* address in UINT32 in host endianness

Return values:

IP address as dotted decimal.

5.35.2.8 EXT_DECL BOOL8 vos_isMulticast (UINT32 *ipAddress*)

Check if the supplied address is a multicast group address.

Parameters:

← *ipAddress* IP address to check.

Return values:

TRUE address is multicast

FALSE address is not a multicast address

5.35.2.9 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.35.2.10 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.35.2.11 EXT_DECL INT32 vos_select (INT32 *highDesc*, VOS_FDS_T * *pReadableFD*, VOS_FDS_T * *pWriteableFD*, VOS_FDS_T * *pErrorFD*, VOS_TIME_T * *pTimeOut*)

select function.

Set the ready sockets in the supplied sets. Note: Some target systems might define this function as NOP.

Parameters:

← *highDesc* max. socket descriptor + 1

↔ *pReadableFD* pointer to readable socket set

↔ *pWriteableFD* pointer to writeable socket set

↔ *pErrorFD* pointer to error socket set

← *pTimeOut* pointer to time out value

Return values:

number of ready file descriptors

5.35.2.12 EXT_DECL VOS_ERR_T vos_sockAccept (INT32 *sock*, INT32 * *pSock*, UINT32 * *pIPAddress*, UINT16 * *pPort*)

Accept an incoming TCP connection.

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

Parameters:

← *sock* Socket descriptor

→ *pSock* Pointer to socket descriptor, on exit new socket

→ *pIPAddress* source IP to receive on, 0 for any

→ *pPort* port to receive on, 20548 for PD

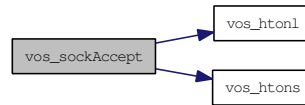
Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR NULL parameter, parameter error

VOS_UNKNOWN_ERR sock descriptor unknown error

Here is the call graph for this function:



5.35.2.13 EXT_DECL VOS_ERR_T vos_sockBind (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Bind a socket to an address and port.

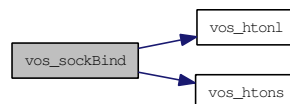
Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* source IP to receive on, 0 for any
- ← *port* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error
- VOS_MEM_ERR** resource error

Here is the call graph for this function:



5.35.2.14 EXT_DECL VOS_ERR_T vos_sockClose (INT32 *sock*)

Close a socket.

Release any resources acquired by this socket

Parameters:

- ← *sock* socket descriptor

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown

5.35.2.15 EXT_DECL VOS_ERR_T vos_sockConnect (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Open a TCP connection.

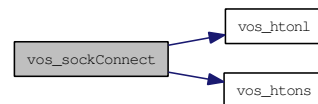
Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error

Here is the call graph for this function:



5.35.2.16 EXT_DECL VOS_ERR_T vos_sockGetMAC (UINT8 *pMAC*[VOS_MAC_SIZE])

Return the MAC address of the default adapter.

Parameters:

- *pMAC* return MAC address.

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** pMAC == NULL
- VOS SOCK_ERR** socket not available or option not supported

Here is the call graph for this function:



5.35.2.17 EXT_DECL VOS_ERR_T vos_sockInit (void)

Initialize the socket library.

Must be called once before any other call

Return values:

- VOS_NO_ERR** no error
- VOS SOCK_ERR** sockets not supported

5.35.2.18 EXT_DECL VOS_ERR_T vos_sockJoinMC (INT32 *sock*, UINT32 *mcAddress*, UINT32 *ipAddress*)

Join a multicast group.

Note: Some targeted systems might not support this option.

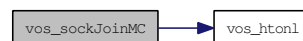
Parameters:

- ← *sock* socket descriptor
- ← *mcAddress* multicast group to join
- ← *ipAddress* depicts interface on which to join, default 0 for any

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS SOCK_ERR** option not supported

Here is the call graph for this function:



5.35.2.19 EXT_DECL VOS_ERR_T vos_sockLeaveMC (INT32 *sock*, UINT32 *mcAddress*, UINT32 *ipAddress*)

Leave a multicast group.

Note: Some targeted systems might not support this option.

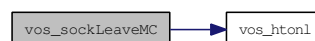
Parameters:

- ← *sock* socket descriptor
- ← *mcAddress* multicast group to join
- ← *ipAddress* depicts interface on which to leave, default 0 for any

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS SOCK_ERR** option not supported

Here is the call graph for this function:



5.35.2.20 EXT_DECL VOS_ERR_T vos_sockListen (INT32 *sock*, UINT32 *backlog*)

Listen for incoming connections.

Listen for incoming TCP connections.

Parameters:

← *sock* socket descriptor

← *backlog* maximum connection attempts if system is busy

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

VOS_IO_ERR Input/Output error

VOS_MEM_ERR resource error

5.35.2.21 EXT_DECL VOS_ERR_T vos_sockOpenTCP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create a TCP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters:

→ *pSock* pointer to socket descriptor returned

← *pOptions* pointer to socket options (optional)

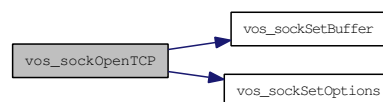
Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pSock == NULL

VOS_SOCK_ERR socket not available or option not supported

Here is the call graph for this function:

**5.35.2.22 EXT_DECL VOS_ERR_T vos_sockOpenUDP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)**

Create an UDP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

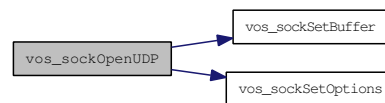
Parameters:

- *pSock* pointer to socket descriptor returned
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** pSock == NULL
- VOS SOCK_ERR** socket not available or option not supported

Here is the call graph for this function:



5.35.2.23 EXT_DECL VOS_ERR_T vos_sockReceiveTCP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*)

Receive TCP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters:

- ← *sock* socket descriptor
- *pBuffer* pointer to applications data buffer
- ↔ *pSize* pointer to the received data size

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be read
- VOS_NODATA_ERR** no data
- VOS_BLOCK_ERR** Call would have blocked in blocking mode

5.35.2.24 EXT_DECL VOS_ERR_T vos_sockReceiveUDP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 * *pSrcIPAddr*, UINT16 * *pSrcIPPort*, UINT32 * *pDstIPAddr*, BOOL8 *peek*)

Receive UDP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If

the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, `VOS_NODATA_ERR` will be returned. If pointers are provided, source IP, source port and destination IP will be reported on return.

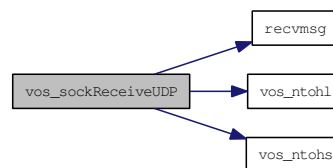
Parameters:

- ← *sock* socket descriptor
- *pBuffer* pointer to applications data buffer
- ↔ *pSize* pointer to the received data size
- *pSrcIPAddr* pointer to source IP
- *pSrcIPPort* pointer to source port
- *pDstIPAddr* pointer to dest IP
- ← *peek* if true, leave data in queue

Return values:

- VOS_NO_ERR*** no error
- VOS_PARAM_ERR*** sock descriptor unknown, parameter error
- VOS_IO_ERR*** data could not be read
- VOS_NODATA_ERR*** no data
- VOS_BLOCK_ERR*** Call would have blocked in blocking mode

Here is the call graph for this function:



5.35.2.25 EXT_DECL VOS_ERR_T vos_sockSendTCP (INT32 sock, const UINT8 * pBuffer, UINT32 * pSize)

Send TCP data.

Send data to the supplied address and port.

Parameters:

- ← *sock* socket descriptor
- ← *pBuffer* pointer to data to send
- ↔ *pSize* In: size of the data to send, Out: no of bytes sent

Return values:

- VOS_NO_ERR*** no error
- VOS_PARAM_ERR*** sock descriptor unknown, parameter error
- VOS_IO_ERR*** data could not be sent
- VOS_NOCONN_ERR*** no TCP connection
- VOS_BLOCK_ERR*** Call would have blocked in blocking mode

5.35.2.26 EXT_DECL VOS_ERR_T vos_sockSendUDP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 *ipAddress*, UINT16 *port*)

Send UDP data.

Send data to the supplied address and port.

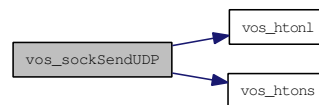
Parameters:

- ← *sock* socket descriptor
- ← *pBuffer* pointer to data to send
- ↔ *pSize* In: size of the data to send, Out: no of bytes sent
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be sent
- VOS_BLOCK_ERR** Call would have blocked in blocking mode

Here is the call graph for this function:



5.35.2.27 VOS_ERR_T vos_sockSetBuffer (INT32 *sock*)

Enlarge send and receive buffers to TRDP_SOCKETBUF_SIZE if necessary.

Parameters:

- ← *sock* socket descriptor

Return values:

- VOS_NO_ERR** no error
- VOS_SOCK_ERR** buffer size can't be set

5.35.2.28 EXT_DECL VOS_ERR_T vos_sockSetMulticastIf (INT32 *sock*, UINT32 *mcIfAddress*)

Set Using Multicast I/F.

Parameters:

- ← *sock* socket descriptor

← *mcIfAddress* using Multicast I/F Address

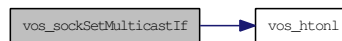
Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

VOS SOCK_ERR option not supported

Here is the call graph for this function:



5.35.2.29 EXT_DECL VOS_ERR_T vos_sockSetOptions (INT32 *sock*, const VOS_SOCK_OPT_T **pOptions*)

Set socket options.

Note: Some targeted systems might not support every option.

Parameters:

← *sock* socket descriptor

← *pOptions* pointer to socket options (optional)

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown

5.35.2.30 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

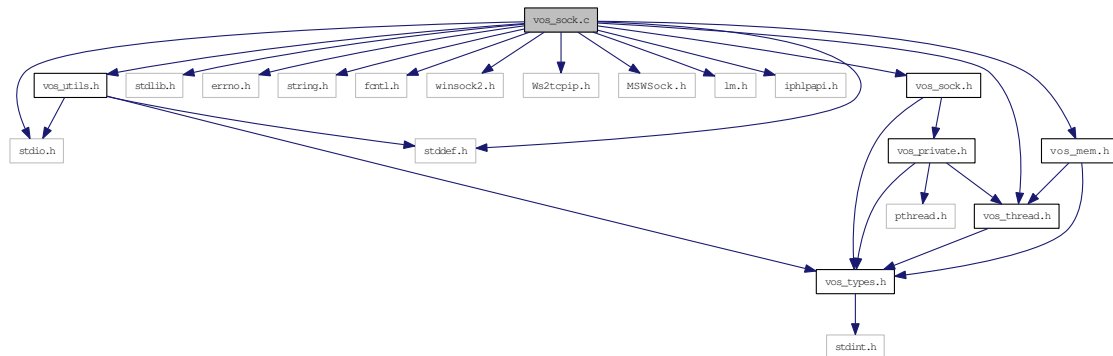
Must be called after last socket call

5.36 vos_sock.c File Reference

Socket functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include <winsock2.h>
#include <Ws2tcpip.h>
#include <MSWSock.h>
#include <lm.h>
#include <iphlpapi.h>
#include "vos_utils.h"
#include "vos_sock.h"
#include "vos_thread.h"
#include "vos_mem.h"
```

Include dependency graph for windows/vos_sock.c:



Functions

- INT32 [recvmsg](#) (int sock, struct msghdr *pMessage, int flags)
Receive a message including sender address information.
- [VOS_ERR_T vos_sockSetBuffer](#) (INT32 sock)
Enlarge send and receive buffers to TRDP_SOCKBUF_SIZE if necessary.
- EXT_DECL UINT16 [vos_htons](#) (UINT16 val)
Byte swapping.

- EXT_DECL UINT16 [vos_ntohs](#) (UINT16 val)
Byte swapping 2 Bytes.
- EXT_DECL UINT32 [vos_htonl](#) (UINT32 val)
Byte swapping 4 Bytes.
- EXT_DECL UINT32 [vos_ntohl](#) (UINT32 val)
Byte swapping 4 Bytes.
- EXT_DECL UINT32 [vos_dottedIP](#) (const CHAR8 *pDottedIP)
Convert IP address from dotted dec.
- EXT_DECL const CHAR8 * [vos_ipDotted](#) (UINT32 ipAddress)
Convert IP address to dotted dec.
- EXT_DECL BOOL8 [vos_isMulticast](#) (UINT32 ipAddress)
Check if the supplied address is a multicast group address.
- EXT_DECL [VOS_ERR_T](#) [vos_getInterfaces](#) (UINT32 *pAddrCnt, [VOS_IF_REC_T](#) ifAddrs[])
 - Get a list of interface addresses The caller has to provide an array of interface records to be filled.*
- EXT_DECL INT32 [vos_select](#) (INT32 highDesc, [VOS_FDS_T](#) *pReadableFD, [VOS_FDS_T](#) *pWritableFD, [VOS_FDS_T](#) *pErrorFD, [VOS_TIME_T](#) *pTimeout)
 - select function.*
- EXT_DECL [VOS_ERR_T](#) [vos_sockInit](#) (void)
Initialize the socket library.
- EXT_DECL void [vos_sockTerm](#) (void)
De-Initialize the socket library.
- EXT_DECL [VOS_ERR_T](#) [vos_sockGetMAC](#) (UINT8 pMAC[VOS_MAC_SIZE])
Return the MAC address of the default adapter.
- EXT_DECL [VOS_ERR_T](#) [vos_sockOpenUDP](#) (INT32 *pSock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Create an UDP socket.
- EXT_DECL [VOS_ERR_T](#) [vos_sockOpenTCP](#) (INT32 *pSock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Create a TCP socket.
- EXT_DECL [VOS_ERR_T](#) [vos_sockClose](#) (INT32 sock)
Close a socket.
- EXT_DECL [VOS_ERR_T](#) [vos_sockSetOptions](#) (INT32 sock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Set socket options.

- EXT_DECL [VOS_ERR_T vos_sockJoinMC](#) (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)
Join a multicast group.
- EXT_DECL [VOS_ERR_T vos_sockLeaveMC](#) (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)
Leave a multicast group.
- EXT_DECL [VOS_ERR_T vos_sockSendUDP](#) (INT32 sock, const UINT8 *pBuffer, UINT32 *pSize, UINT32 ipAddress, UINT16 port)
Send UDP data.
- EXT_DECL [VOS_ERR_T vos_sockReceiveUDP](#) (INT32 sock, UINT8 *pBuffer, UINT32 *pSize, UINT32 *pSrcIPAddr, UINT16 *pSrcIPPort, UINT32 *pDstIPAddr, BOOL8 peek)
Receive UDP data.
- EXT_DECL [VOS_ERR_T vos_sockBind](#) (INT32 sock, UINT32 ipAddress, UINT16 port)
Bind a socket to an address and port.
- EXT_DECL [VOS_ERR_T vos_sockListen](#) (INT32 sock, UINT32 backlog)
Listen for incoming connections.
- EXT_DECL [VOS_ERR_T vos_sockAccept](#) (INT32 sock, INT32 *pSock, UINT32 *pIPAddr, UINT16 *pPort)
Accept an incoming TCP connection.
- EXT_DECL [VOS_ERR_T vos_sockConnect](#) (INT32 sock, UINT32 ipAddress, UINT16 port)
Open a TCP connection.
- EXT_DECL [VOS_ERR_T vos_sockSendTCP](#) (INT32 sock, const UINT8 *pBuffer, UINT32 *pSize)
Send TCP data.
- EXT_DECL [VOS_ERR_T vos_sockReceiveTCP](#) (INT32 sock, UINT8 *pBuffer, UINT32 *pSize)
Receive TCP data.
- EXT_DECL [VOS_ERR_T vos_sockSetMulticastIf](#) (INT32 sock, UINT32 mcIfAddress)
Set Using Multicast I/F.
- EXT_DECL [VOS_IP4_ADDR_T vos_determineBindAddr](#) (VOS_IP4_ADDR_T srcIP, VOS_IP4_ADDR_T mcGroup, VOS_IP4_ADDR_T rcvMostly)
Determines the address to bind to since the behaviour in the different OS is different.

5.36.1 Detailed Description

Socket functions.

OS abstraction of IP socket functions for UDP and TCP

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

vos_sock.c 1367 2014-11-25 12:49:11Z ahweiss

*

5.36.2 Function Documentation

5.36.2.1 INT32 recvmmsg (int *sock*, struct msghdr **pMessage*, int *flags*)

Receive a message including sender address information.

Parameters:

- ← *sock* socket descriptor
- ← *pMessage* Pointer to message header
- ← *flags* Receive flags

Return values:

number of received bytes, -1 for error

5.36.2.2 EXT_DECL VOS_IP4_ADDR_T vos_determineBindAddr (VOS_IP4_ADDR_T *srcIP*, VOS_IP4_ADDR_T *mcGroup*, VOS_IP4_ADDR_T *rcvMostly*)

Determines the address to bind to since the behaviour in the different OS is different.

Parameters:

- ← *srcIP* IP to bind to (0 = any address)
- ← *mcGroup* MC group to join (0 = do not join)
- ← *rcvMostly* primarily used for receiving (tbd: bind on sender, too?)

Return values:

Address to bind to

5.36.2.3 EXT_DECL UINT32 vos_dottedIP (const CHAR8 * *pDottedIP*)

Convert IP address from dotted dec.

to !host! endianness

Parameters:

← *pDottedIP* IP address as dotted decimal.

Return values:

address in UINT32 in host endianness

Here is the call graph for this function:



5.36.2.4 EXT_DECL VOS_ERR_T vos_getInterfaces (UINT32 * *pAddrCnt*, VOS_IF_REC_T *ifAddrs*[]))

Get a list of interface addresses The caller has to provide an array of interface records to be filled.

Parameters:

↔ *pAddrCnt* in: pointer to array size of interface record out: pointer to number of interface records read

↔ *ifAddrs* array of interface records

Return values:

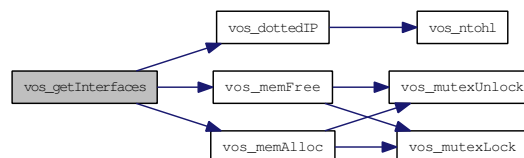
VOS_NO_ERR no error

VOS_PARAM_ERR *pAddrCnt* and/or *ifAddrs* == NULL

VOS_MEM_ERR memory allocation error

VOS SOCK_ERR GetAdaptersInfo() error

Here is the call graph for this function:



5.36.2.5 EXT_DECL UINT32 vos_htonl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.36.2.6 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping.

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.36.2.7 EXT_DECL const CHAR8* vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianness.

Parameters:

← *ipAddress* address in UINT32 in host endianness

Return values:

IP address as dotted decimal.

5.36.2.8 EXT_DECL BOOL8 vos_isMulticast (UINT32 *ipAddress*)

Check if the supplied address is a multicast group address.

Parameters:

← *ipAddress* IP address to check.

Return values:

TRUE address is multicast

FALSE address is not a multicast address

5.36.2.9 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.36.2.10 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.36.2.11 EXT_DECL INT32 vos_select (INT32 *highDesc*, VOS_FDS_T * *pReadableFD*, VOS_FDS_T * *pWriteableFD*, VOS_FDS_T * *pErrorFD*, VOS_TIME_T * *pTimeOut*)

select function.

Set the ready sockets in the supplied sets. Note: Some target systems might define this function as NOP.

Parameters:

- ← *highDesc* max. socket descriptor + 1
- ↔ *pReadableFD* pointer to readable socket set
- ↔ *pWriteableFD* pointer to writeable socket set
- ↔ *pErrorFD* pointer to error socket set
- ← *pTimeOut* pointer to time out value

Return values:

number of ready file descriptors

5.36.2.12 EXT_DECL VOS_ERR_T vos_sockAccept (INT32 *sock*, INT32 * *pSock*, UINT32 * *pIPAddress*, UINT16 * *pPort*)

Accept an incoming TCP connection.

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

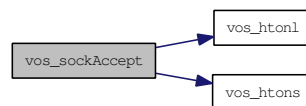
Parameters:

- ← *sock* Socket descriptor
- *pSock* Pointer to socket descriptor, on exit new socket
- *pIPAddress* source IP to receive on, 0 for any
- *pPort* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** NULL parameter, parameter error
- VOS_UNKNOWN_ERR** sock descriptor unknown error

Here is the call graph for this function:



5.36.2.13 EXT_DECL VOS_ERR_T vos_sockBind (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Bind a socket to an address and port.

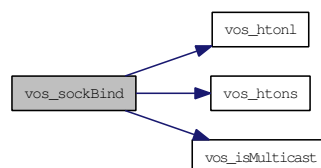
Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* source IP to receive on, 0 for any
- ← *port* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error
- VOS_MEM_ERR** resource error

Here is the call graph for this function:



5.36.2.14 EXT_DECL VOS_ERR_T vos_sockClose (INT32 *sock*)

Close a socket.

Release any resources acquired by this socket

Parameters:

← *sock* socket descriptor

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown

5.36.2.15 EXT_DECL VOS_ERR_T vos_sockConnect (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Open a TCP connection.

Parameters:

← *sock* socket descriptor

← *ipAddress* destination IP

← *port* destination port

Return values:

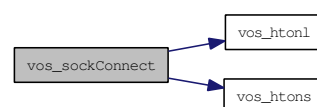
VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

VOS_IO_ERR Input/Output error

VOS_MEM_ERR resource error

Here is the call graph for this function:



5.36.2.16 EXT_DECL VOS_ERR_T vos_sockGetMAC (UINT8 *pMAC*[VOS_MAC_SIZE])

Return the MAC address of the default adapter.

Parameters:

→ *pMAC* return MAC address.

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pMAC == NULL

VOS_SOCK_ERR socket not available or option not supported

5.36.2.17 EXT_DECL VOS_ERR_T vos_sockInit (void)

Initialize the socket library.

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS SOCK_ERR sockets not supported

5.36.2.18 EXT_DECL VOS_ERR_T vos_sockJoinMC (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)

Join a multicast group.

Note: Some targeted systems might not support this option.

Parameters:

← *sock* socket descriptor

← *mcAddress* multicast group to join

← *ipAddress* depicts interface on which to join, default 0 for any

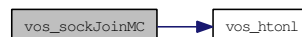
Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

VOS SOCK_ERR option not supported

Here is the call graph for this function:

**5.36.2.19 EXT_DECL VOS_ERR_T vos_sockLeaveMC (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)**

Leave a multicast group.

Note: Some targeted systems might not support this option.

Parameters:

← *sock* socket descriptor

← *mcAddress* multicast group to join

← *ipAddress* depicts interface on which to leave, default 0 for any

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

VOS SOCK_ERR option not supported

Here is the call graph for this function:



5.36.2.20 EXT_DECL VOS_ERR_T vos_sockListen (INT32 sock, UINT32 backlog)

Listen for incoming connections.

Listen for incoming TCP connections.

Parameters:

← **sock** socket descriptor

← **backlog** maximum connection attempts if system is busy

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

VOS_IO_ERR Input/Output error

VOS_MEM_ERR resource error

5.36.2.21 EXT_DECL VOS_ERR_T vos_sockOpenTCP (INT32 * pSock, const VOS SOCK_OPT_T * pOptions)

Create a TCP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters:

→ **pSock** pointer to socket descriptor returned

← **pOptions** pointer to socket options (optional)

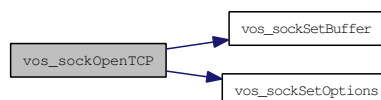
Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pSock == NULL

VOS SOCK_ERR socket not available or option not supported

Here is the call graph for this function:



5.36.2.22 EXT_DECL VOS_ERR_T vos_sockOpenUDP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create an UDP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

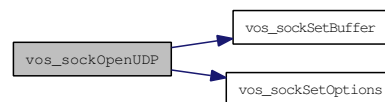
Parameters:

- *pSock* pointer to socket descriptor returned
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** *pSock* == NULL
- VOS_SOCK_ERR** socket not available or option not supported

Here is the call graph for this function:



5.36.2.23 EXT_DECL VOS_ERR_T vos_sockReceiveTCP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*)

Receive TCP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, **pSize* will reflect the number of copied bytes and the call should be repeated until **pSize* is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters:

- ← *sock* socket descriptor
- *pBuffer* pointer to applications data buffer
- ↔ *pSize* pointer to the received data size

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be read
- VOS_NODATA_ERR** no data
- VOS_BLOCK_ERR** call would have blocked in blocking mode

5.36.2.24 EXT_DECL VOS_ERR_T vos_sockReceiveUDP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 * *pSrcIPAddr*, UINT16 * *pSrcIPPort*, UINT32 * *pDstIPAddr*, BOOL8 *peek*)

Receive UDP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned. If pointers are provided, source IP, source port and destination IP will be reported on return.

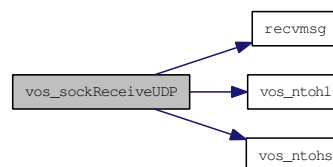
Parameters:

- ← *sock* socket descriptor
- *pBuffer* pointer to applications data buffer
- ↔ *pSize* pointer to the received data size
- *pSrcIPAddr* pointer to source IP
- *pSrcIPPort* pointer to source port
- *pDstIPAddr* pointer to dest IP
- ← *peek* if true, leave data in queue

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* sock descriptor unknown, parameter error
- VOS_IO_ERR* data could not be read
- VOS_NODATA_ERR* no data
- VOS_BLOCK_ERR* Call would have blocked in blocking mode

Here is the call graph for this function:



5.36.2.25 EXT_DECL VOS_ERR_T vos_sockSendTCP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*)

Send TCP data.

Send data to the supplied address and port.

Parameters:

- ← *sock* socket descriptor

← *pBuffer* pointer to data to send
 ↔ *pSize* IN: bytes to send, OUT: bytes sent

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR sock descriptor unknown, parameter error
VOS_IO_ERR data could not be sent
VOS_NOCONN_ERR no TCP connection
VOS_BLOCK_ERR Call would have blocked in blocking mode

5.36.2.26 EXT_DECL VOS_ERR_T vos_sockSendUDP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 *ipAddress*, UINT16 *port*)

Send UDP data.

Send data to the supplied address and port.

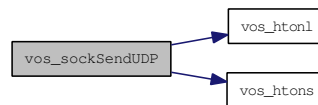
Parameters:

← *sock* socket descriptor
 ← *pBuffer* pointer to data to send
 ↔ *pSize* IN: bytes to send, OUT: bytes sent
 ← *ipAddress* destination IP
 ← *port* destination port

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR sock descriptor unknown, parameter error
VOS_IO_ERR data could not be sent
VOS_BLOCK_ERR Call would have blocked in blocking mode

Here is the call graph for this function:



5.36.2.27 VOS_ERR_T vos_sockSetBuffer (INT32 *sock*)

Enlarge send and receive buffers to TRDP_SOCKETBUF_SIZE if necessary.

Parameters:

← *sock* socket descriptor

Return values:

VOS_NO_ERR no error
VOS SOCK_ERR buffer size can't be set

5.36.2.28 EXT_DECL VOS_ERR_T vos_sockSetMulticastIf (INT32 *sock*, UINT32 *mcIfAddress*)

Set Using Multicast I/F.

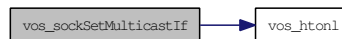
Parameters:

- ← *sock* socket descriptor
- ← *mcIfAddress* using Multicast I/F Address

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error

Here is the call graph for this function:



5.36.2.29 EXT_DECL VOS_ERR_T vos_sockSetOptions (INT32 *sock*, const VOS_SOCK_OPT_T **pOptions*)

Set socket options.

Note: Some targeted systems might not support every option.

Parameters:

- ← *sock* socket descriptor
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown

5.36.2.30 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

Must be called after last socket call

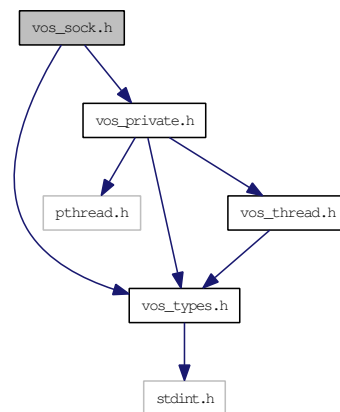
5.37 vos_sock.h File Reference

Typedefs for OS abstraction.

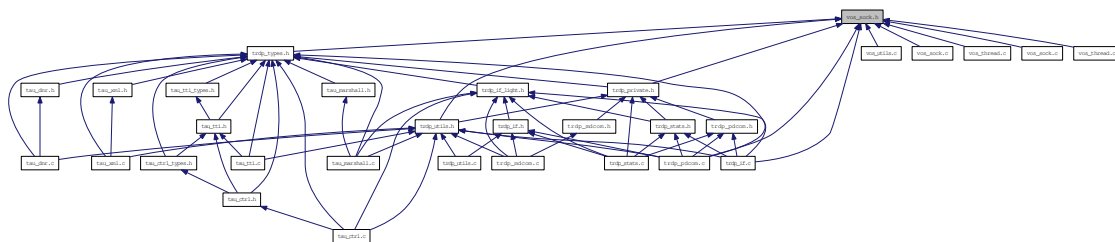
```
#include "vos_types.h"
```

```
#include "vos_private.h"
```

Include dependency graph for vos_sock.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [VOS_SOCKET_OPT_T](#)

Common socket options.

Defines

- #define [VOS_MAX_SOCKET_CNT](#) 4

The maximum number of sockets influences memory usage; for small systems we should define a smaller set.

- #define [VOS_MAX_MULTICAST_CNT](#) 5

The maximum number of multicast groups one socket can join.

- #define [VOS_TTL_MULTICAST](#) 64

The maximum number of hops a multicast packet can take.

- #define [VOS_MAX_IF_NAME_SIZE](#) 16
The maximum number of IP interface adapters that can be handled by VOS.
- #define [VOS_MAX_NUM_IF](#) 8
The maximum number of unicast addresses that can be handled by VOS.
- #define [VOS_MAX_NUM_UNICAST](#) 10
The MAC size supported by VOS.
- #define [VOS_MAC_SIZE](#) 6
Size of socket send and receive buffer.
- #define [VOS_INVALID_SOCKET](#) -1
Invalid socket number.

Functions

- EXT_DECL UINT16 [vos_htons](#) (UINT16 val)
Byte swapping 2 Bytes.
- EXT_DECL UINT16 [vos_ntohs](#) (UINT16 val)
Byte swapping 2 Bytes.
- EXT_DECL UINT32 [vos_htonl](#) (UINT32 val)
Byte swapping 4 Bytes.
- EXT_DECL UINT32 [vos_ntohl](#) (UINT32 val)
Byte swapping 4 Bytes.
- EXT_DECL UINT32 [vos_dottedIP](#) (const CHAR8 *pDottedIP)
Convert IP address from dotted dec.
- EXT_DECL const CHAR8 * [vos_ipDotted](#) (UINT32 ipAddress)
Convert IP address to dotted dec.
- EXT_DECL BOOL8 [vos_isMulticast](#) (UINT32 ipAddress)
Check if the supplied address is a multicast group address.
- EXT_DECL [VOS_ERR_T](#) [vos_getInterfaces](#) (UINT32 *pAddrCnt, [VOS_IF_REC_T](#) ifAddrs[])
 - Get a list of interface addresses The caller has to provide an array of interface records to be filled.*
- EXT_DECL INT32 [vos_select](#) (INT32 highDesc, [VOS_FDS_T](#) *pReadableFD, [VOS_FDS_T](#) *pWriteableFD, [VOS_FDS_T](#) *pErrorFD, [VOS_TIME_T](#) *pTimeOut)
 - select function.*
- EXT_DECL [VOS_ERR_T](#) [vos_sockInit](#) (void)
Initialize the socket library.

- EXT_DECL void [vos_sockTerm](#) (void)
De-Initialize the socket library.
- EXT_DECL [VOS_ERR_T vos_sockGetMAC](#) (UINT8 pMAC[VOS_MAC_SIZE])
Return the MAC address of the default adapter.
- EXT_DECL [VOS_ERR_T vos_sockOpenUDP](#) (INT32 *pSock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Create an UDP socket.
- EXT_DECL [VOS_ERR_T vos_sockOpenTCP](#) (INT32 *pSock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Create a TCP socket.
- EXT_DECL [VOS_ERR_T vos_sockClose](#) (INT32 sock)
Close a socket.
- EXT_DECL [VOS_ERR_T vos_sockSetOptions](#) (INT32 sock, const [VOS_SOCKET_OPT_T](#) *pOptions)
Set socket options.
- EXT_DECL [VOS_ERR_T vos_sockJoinMC](#) (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)
Join a multicast group.
- EXT_DECL [VOS_ERR_T vos_sockLeaveMC](#) (INT32 sock, UINT32 mcAddress, UINT32 ipAddress)
Leave a multicast group.
- EXT_DECL [VOS_ERR_T vos_sockSendUDP](#) (INT32 sock, const UINT8 *pBuffer, UINT32 *pSize, UINT32 ipAddress, UINT16 port)
Send UDP data.
- EXT_DECL [VOS_ERR_T vos_sockReceiveUDP](#) (INT32 sock, UINT8 *pBuffer, UINT32 *pSize, UINT32 *pSrcIPAddr, UINT16 *pSrcIPPort, UINT32 *pDstIPAddr, BOOL8 peek)
Receive UDP data.
- EXT_DECL [VOS_ERR_T vos_sockBind](#) (INT32 sock, UINT32 ipAddress, UINT16 port)
Bind a socket to an address and port.
- EXT_DECL [VOS_ERR_T vos_sockListen](#) (INT32 sock, UINT32 backlog)
Listen for incoming TCP connections.
- EXT_DECL [VOS_ERR_T vos_sockAccept](#) (INT32 sock, INT32 *pSock, UINT32 *pIPAddr, UINT16 *pPort)
Accept an incoming TCP connection.
- EXT_DECL [VOS_ERR_T vos_sockConnect](#) (INT32 sock, UINT32 ipAddress, UINT16 port)
Open a TCP connection.

- EXT_DECL `VOS_ERR_T vos_sockSendTCP` (INT32 sock, const UINT8 *pBuffer, UINT32 *pSize)
Send TCP data.
- EXT_DECL `VOS_ERR_T vos_sockReceiveTCP` (INT32 sock, UINT8 *pBuffer, UINT32 *pSize)
Receive TCP data.
- EXT_DECL `VOS_ERR_T vos_sockSetMulticastIf` (INT32 sock, UINT32 mcIfAddress)
Set Using Multicast I/F.
- EXT_DECL `VOS_IP4_ADDR_T vos_determineBindAddr` (VOS_IP4_ADDR_T srcIP, VOS_IP4_ADDR_T mcGroup, VOS_IP4_ADDR_T rcvMostly)
Determines the address to bind to since the behaviour in the different OS is different.

5.37.1 Detailed Description

Typedefs for OS abstraction.

This is the declaration for the OS independent socket interface

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[vos_sock.h](#) 1367 2014-11-25 12:49:11Z ahweiss

5.37.2 Define Documentation

5.37.2.1 #define VOS_MAX_SOCKET_CNT 4

The maximum number of sockets influences memory usage; for small systems we should define a smaller set.

The maximum number of concurrent usable sockets per application session

5.37.2.2 #define VOS_TTL_MULTICAST 64

The maximum number of hops a multicast packet can take.

The maximum size for the interface name

5.37.3 Function Documentation

5.37.3.1 EXT_DECL VOS_IP4_ADDR_T vos_determineBindAddr (VOS_IP4_ADDR_T *srcIP*, VOS_IP4_ADDR_T *mcGroup*, VOS_IP4_ADDR_T *rcvMostly*)

Determines the address to bind to since the behaviour in the different OS is different.

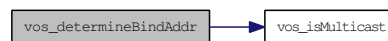
Parameters:

- ← *srcIP* IP to bind to (0 = any address)
- ← *mcGroup* MC group to join (0 = do not join)
- ← *rcvMostly* primarily used for receiving (tbd: bind on sender, too?)

Return values:

Address to bind to

Here is the call graph for this function:



5.37.3.2 EXT_DECL UINT32 vos_dottedIP (const CHAR8 * *pDottedIP*)

Convert IP address from dotted dec.

to !host! endianness

Parameters:

- ← *pDottedIP* IP address as dotted decimal.

Return values:

address in UINT32 in host endianness

to !host! endianness

Parameters:

- ← *pDottedIP* IP address as dotted decimal.

Return values:

address in UINT32 in host endianness 0 (Zero) if error

Here is the call graph for this function:



5.37.3.3 EXT_DECL VOS_ERR_T vos_getInterfaces (UINT32 * *pAddrCnt*, VOS_IF_REC_T *ifAddrs*[])

Get a list of interface addresses The caller has to provide an array of interface records to be filled.

Parameters:

- ↔ *pAddrCnt* in: pointer to array size of interface record out: pointer to number of interface records read
- ↔ *ifAddrs* array of interface records

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** *pAddrCnt* and/or *ifAddrs* == NULL
- VOS_MEM_ERR** memory allocation error
- VOS SOCK_ERR** GetAdaptersInfo() error

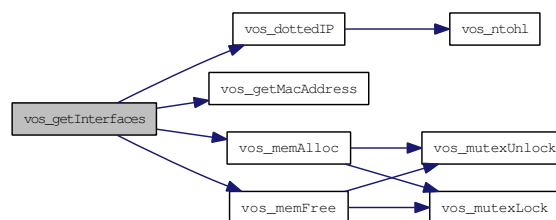
Parameters:

- ↔ *pAddrCnt* in: pointer to array size of interface record out: pointer to number of interface records read
- ↔ *ifAddrs* array of interface records

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** *pMAC* == NULL

Here is the call graph for this function:



5.37.3.4 EXT_DECL UINT32 vos_htonl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

- ← *val* Initial value.

Return values:

- swapped* value

5.37.3.5 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.37.3.6 EXT_DECL const CHAR8* vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianness

Parameters:

← *ipAddress* address in UINT32 in host endianness

Return values:

IP address as dotted decimal.

from !host! endianness.

Parameters:

← *ipAddress* address in UINT32 in host endianness

Return values:

IP address as dotted decimal.

5.37.3.7 EXT_DECL BOOL8 vos_isMulticast (UINT32 *ipAddress*)

Check if the supplied address is a multicast group address.

Parameters:

← *ipAddress* IP address to check.

Return values:

TRUE address is a multicast address

FALSE address is not a multicast address

Parameters:

← *ipAddress* IP address to check.

Return values:

TRUE address is multicast

FALSE address is not a multicast address

5.37.3.8 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.37.3.9 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters:

← *val* Initial value.

Return values:

swapped value

5.37.3.10 EXT_DECL INT32 vos_select (INT32 *highDesc*, VOS_FDS_T * *pReadableFD*, VOS_FDS_T * *pWriteableFD*, VOS_FDS_T * *pErrorFD*, VOS_TIME_T * *pTimeout*)

select function.

Set the ready sockets in the supplied sets. Note: Some target systems might define this function as NOP.

Parameters:

- ← *highDesc* max. socket descriptor + 1
- ↔ *pReadableFD* pointer to readable socket set
- ↔ *pWriteableFD* pointer to writeable socket set
- ↔ *pErrorFD* pointer to error socket set
- ← *pTimeOut* pointer to time out value

Return values:

number of ready file descriptors

5.37.3.11 EXT_DECL VOS_ERR_T vos_sockAccept (INT32 *sock*, INT32 * *pSock*, UINT32 * *pIPAddress*, UINT16 * *pPort*)

Accept an incoming TCP connection.

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

Parameters:

- ← *sock* Socket descriptor
- *pSock* Pointer to socket descriptor, on exit new socket
- *pIPAddress* source IP to receive on, 0 for any
- *pPort* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* NULL parameter, parameter error
- VOS_UNKNOWN_ERR* sock descriptor unknown error

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

Parameters:

- ← *sock* Socket descriptor
- *pSock* Pointer to socket descriptor, on exit new socket
- *pIPAddress* source IP to receive on, 0 for any
- *pPort* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* NULL parameter, parameter error
- VOS_UNKNOWN_ERR* sock descriptor unknown error

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

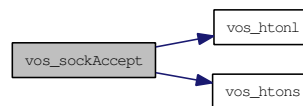
Parameters:

- ← *sock* Socket descriptor
- *pSock* Pointer to socket descriptor, on exit new socket
- *pIPAddress* source IP to receive on, 0 for any
- *pPort* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* NULL parameter, parameter error
- VOS_UNKNOWN_ERR* sock descriptor unknown error

Here is the call graph for this function:



5.37.3.12 EXT_DECL VOS_ERR_T vos_sockBind (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Bind a socket to an address and port.

Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* source IP to receive from, 0 for any
- ← *port* port to receive from

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* parameter out of range/invalid
- VOS_IO_ERR* Input/Output error
- VOS_MEM_ERR* resource error

Parameters:

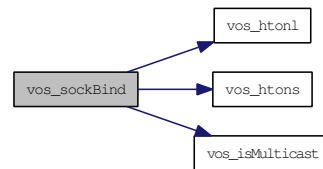
- ← *sock* socket descriptor
- ← *ipAddress* source IP to receive on, 0 for any
- ← *port* port to receive on, 20548 for PD

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* sock descriptor unknown, parameter error
- VOS_IO_ERR* Input/Output error

VOS_MEM_ERR resource error

Here is the call graph for this function:



5.37.3.13 EXT_DECL VOS_ERR_T vos_sockClose (INT32 sock)

Close a socket.

Release any resources aquired by this socket

Parameters:

← *sock* socket descriptor

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pSock == NULL

Release any resources aquired by this socket

Parameters:

← *sock* socket descriptor

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown

Release any resources aquired by this socket

Parameters:

← *sock* socket descriptor

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown

5.37.3.14 EXT_DECL VOS_ERR_T vos_sockConnect (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Open a TCP connection.

Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_IO_ERR** Input/Output error

Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error

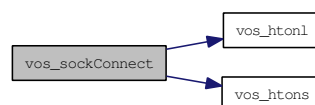
Parameters:

- ← *sock* socket descriptor
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error
- VOS_MEM_ERR** resource error

Here is the call graph for this function:



5.37.3.15 EXT_DECL VOS_ERR_T vos_sockGetMAC (UINT8 *pMAC*[VOS_MAC_SIZE])

Return the MAC address of the default adapter.

Parameters:

→ *pMAC* return MAC address.

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR *pMAC* == NULL

VOS SOCK_ERR socket not available or option not supported

Here is the call graph for this function:

**5.37.3.16** EXT_DECL VOS_ERR_T vos_sockInit (void)

Initialize the socket library.

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS SOCK_ERR sockets not supported

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS SOCK_ERR sockets not supported

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS SOCK_ERR sockets not supported

5.37.3.17 EXT_DECL VOS_ERR_T vos_sockJoinMC (INT32 *sock*, UINT32 *mcAddress*, UINT32 *ipAddress*)

Join a multicast group.

Note: Some target systems might not support this option.

Parameters:

- ← *sock* socket descriptor
- ← *mcAddress* multicast group to join
- ← *ipAddress* depicts interface on which to join, default 0 for any

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS SOCK_ERR** option not supported

Note: Some targeted systems might not support this option.

Parameters:

- ← *sock* socket descriptor
- ← *mcAddress* multicast group to join
- ← *ipAddress* depicts interface on which to join, default 0 for any

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS SOCK_ERR** option not supported

Here is the call graph for this function:



5.37.3.18 EXT_DECL VOS_ERR_T vos_sockLeaveMC (INT32 *sock*, UINT32 *mcAddress*, UINT32 *ipAddress*)

Leave a multicast group.

Note: Some target systems might not support this option.

Parameters:

- ← *sock* socket descriptor
- ← *mcAddress* multicast group to join
- ← *ipAddress* depicts interface on which to leave, default 0 for any

Return values:

- VOS_NO_ERR** no error
- VOS_INIT_ERR** module not initialised
- VOS_NOINIT_ERR** invalid handle
- VOS_PARAM_ERR** parameter out of range/invalid

VOS_SOCK_ERR option not supported

Note: Some targeted systems might not support this option.

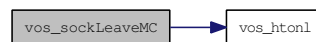
Parameters:

- ← *sock* socket descriptor
- ← *mcAddress* multicast group to join
- ← *ipAddress* depicts interface on which to leave, default 0 for any

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_SOCK_ERR** option not supported

Here is the call graph for this function:



5.37.3.19 EXT_DECL VOS_ERR_T vos_sockListen (INT32 *sock*, UINT32 *backlog*)

Listen for incoming TCP connections.

Parameters:

- ← *sock* socket descriptor
- ← *backlog* maximum connection attempts if system is busy

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** parameter out of range/invalid
- VOS_IO_ERR** Input/Output error
- VOS_MEM_ERR** resource error

Listen for incoming TCP connections.

Parameters:

- ← *sock* socket descriptor
- ← *backlog* maximum connection attempts if system is busy

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error

VOS_MEM_ERR resource error

Listen for incoming TCP connections.

Parameters:

- ← *sock* socket descriptor
- ← *backlog* maximum connection attempts if system is busy

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** Input/Output error
- VOS_MEM_ERR** resource error

5.37.3.20 EXT_DECL VOS_ERR_T vos_sockOpenTCP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create a TCP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters:

- *pSock* pointer to socket descriptor returned
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** *pSock* == NULL
- VOS_SOCK_ERR** socket not available or option not supported

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters:

- *pSock* pointer to socket descriptor returned
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** *pSock* == NULL
- VOS_SOCK_ERR** socket not available or option not supported

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters:

- *pSock* pointer to socket descriptor returned

← *pOptions* pointer to socket options (optional)

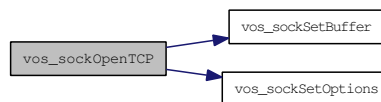
Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pSock == NULL

VOS SOCK_ERR socket not available or option not supported

Here is the call graph for this function:



5.37.3.21 EXT_DECL VOS_ERR_T vos_sockOpenUDP (INT32 * pSock, const VOS SOCK_OPT_T * pOptions)

Create an UDP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some target systems might not support every option.

Parameters:

→ *pSock* pointer to socket descriptor returned

← *pOptions* pointer to socket options (optional)

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pSock == NULL

VOS SOCK_ERR socket not available or option not supported

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

Parameters:

→ *pSock* pointer to socket descriptor returned

← *pOptions* pointer to socket options (optional)

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR pSock == NULL

VOS SOCK_ERR socket not available or option not supported

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

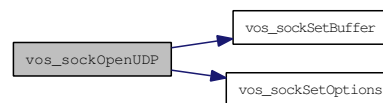
Parameters:

- *pSock* pointer to socket descriptor returned
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** pSock == NULL
- VOS SOCK_ERR** socket not available or option not supported

Here is the call graph for this function:



5.37.3.22 EXT_DECL VOS_ERR_T vos_sockReceiveTCP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*)

Receive TCP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters:

- ← *sock* socket descriptor
- *pBuffer* pointer to applications data buffer
- ↔ *pSize* pointer to the received data size

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be read
- VOS_NODATA_ERR** no data in non-blocking
- VOS_BLOCK_ERR** call would have blocked in blocking mode

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters:

- ← *sock* socket descriptor

→ *pBuffer* pointer to applications data buffer
 ↔ *pSize* pointer to the received data size

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR sock descriptor unknown, parameter error
VOS_IO_ERR data could not be read
VOS_NODATA_ERR no data
VOS_BLOCK_ERR Call would have blocked in blocking mode

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters:

← *sock* socket descriptor
 → *pBuffer* pointer to applications data buffer
 ↔ *pSize* pointer to the received data size

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR sock descriptor unknown, parameter error
VOS_IO_ERR data could not be read
VOS_NODATA_ERR no data
VOS_BLOCK_ERR call would have blocked in blocking mode

5.37.3.23 EXT_DECL VOS_ERR_T vos_sockReceiveUDP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 * *pSrcIPAddr*, UINT16 * *pSrcIPPort*, UINT32 * *pDstIPAddr*, BOOL8 *peek*)

Receive UDP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occurred. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned. If pointers are provided, source IP, source port and destination IP will be reported on return.

Parameters:

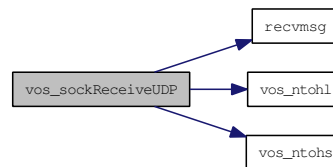
← *sock* socket descriptor
 → *pBuffer* pointer to applications data buffer
 ↔ *pSize* pointer to the received data size
 → *pSrcIPAddr* pointer to source IP

- *pSrcIPPort* pointer to source port
- *pDstIPAddr* pointer to dest IP
- ← *peek* if true, leave data in queue

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be read
- VOS_NODATA_ERR** no data
- VOS_BLOCK_ERR** Call would have blocked in blocking mode

Here is the call graph for this function:



5.37.3.24 EXT_DECL VOS_ERR_T vos_sockSendTCP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*)

Send TCP data.

Send data to the supplied address and port.

Parameters:

- ← *sock* socket descriptor
- ← *pBuffer* pointer to data to send
- ↔ *pSize* In: size of the data to send, Out: no of bytes sent

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be sent
- VOS_NOCONN_ERR** no TCP connection
- VOS_BLOCK_ERR** call would have blocked in blocking mode, data partially sent

Send data to the supplied address and port.

Parameters:

- ← *sock* socket descriptor
- ← *pBuffer* pointer to data to send
- ↔ *pSize* In: size of the data to send, Out: no of bytes sent

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR sock descriptor unknown, parameter error
VOS_IO_ERR data could not be sent
VOS_NOCONN_ERR no TCP connection
VOS_BLOCK_ERR Call would have blocked in blocking mode

Send data to the supplied address and port.

Parameters:

← ***sock*** socket descriptor
 ← ***pBuffer*** pointer to data to send
 ↔ ***pSize*** IN: bytes to send, OUT: bytes sent

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR sock descriptor unknown, parameter error
VOS_IO_ERR data could not be sent
VOS_NOCONN_ERR no TCP connection
VOS_BLOCK_ERR Call would have blocked in blocking mode

5.37.3.25 EXT_DECL VOS_ERR_T vos_sockSendUDP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 *ipAddress*, UINT16 *port*)

Send UDP data.

Send data to the given address and port.

Parameters:

← ***sock*** socket descriptor
 ← ***pBuffer*** pointer to data to send
 ↔ ***pSize*** In: size of the data to send, Out: no of bytes sent
 ← ***ipAddress*** destination IP
 ← ***port*** destination port

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR parameter out of range/invalid
VOS_IO_ERR data could not be sent
VOS_BLOCK_ERR Call would have blocked in blocking mode

Send data to the supplied address and port.

Parameters:

← ***sock*** socket descriptor

- ← *pBuffer* pointer to data to send
- ↔ *pSize* In: size of the data to send, Out: no of bytes sent
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be sent
- VOS_BLOCK_ERR** Call would have blocked in blocking mode

Send data to the supplied address and port.

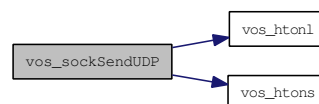
Parameters:

- ← *sock* socket descriptor
- ← *pBuffer* pointer to data to send
- ↔ *pSize* IN: bytes to send, OUT: bytes sent
- ← *ipAddress* destination IP
- ← *port* destination port

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS_IO_ERR** data could not be sent
- VOS_BLOCK_ERR** Call would have blocked in blocking mode

Here is the call graph for this function:



5.37.3.26 EXT_DECL VOS_ERR_T vos_sockSetMulticastIf (INT32 *sock*, UINT32 *mcIfAddress*)

Set Using Multicast I/F.

Parameters:

- ← *sock* socket descriptor
- ← *mcIfAddress* using Multicast I/F Address

Return values:

- VOS_NO_ERR** no error

VOS_PARAM_ERR sock descriptor unknown, parameter error

Parameters:

- ← *sock* socket descriptor
- ← *mcIfAddress* using Multicast I/F Address

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error
- VOS SOCK_ERR** option not supported

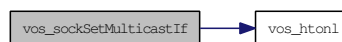
Parameters:

- ← *sock* socket descriptor
- ← *mcIfAddress* using Multicast I/F Address

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** sock descriptor unknown, parameter error

Here is the call graph for this function:



5.37.3.27 EXT_DECL VOS_ERR_T vos_sockSetOptions (INT32 *sock*, const VOS_SOCK_OPT_T **pOptions*)

Set socket options.

Note: Some target systems might not support each option.

Parameters:

- ← *sock* socket descriptor
- ← *pOptions* pointer to socket options (optional)

Return values:

- VOS_NO_ERR** no error
- VOS_PARAM_ERR** parameter out of range/invalid

Note: Some targeted systems might not support every option.

Parameters:

- ← *sock* socket descriptor
- ← *pOptions* pointer to socket options (optional)

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown

Note: Some targeted systems might not support every option.

Parameters:

← ***sock*** socket descriptor

← ***pOptions*** pointer to socket options (optional)

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR sock descriptor unknown

5.37.3.28 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

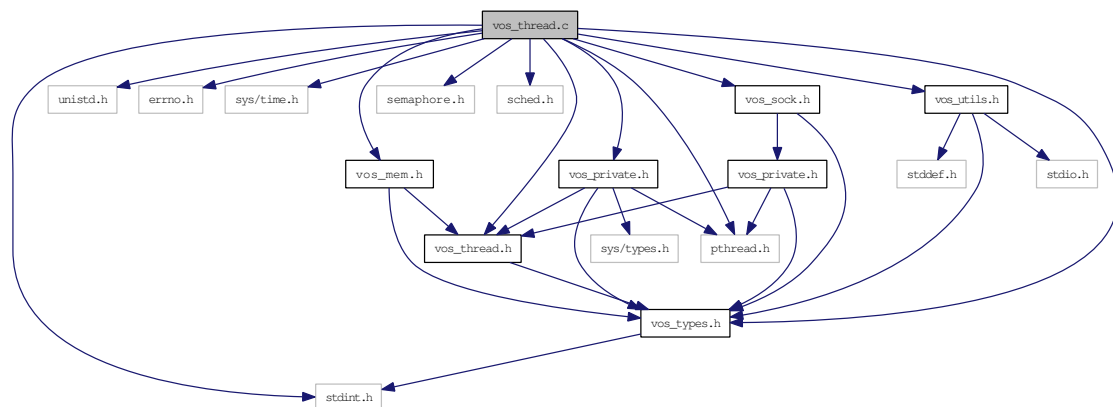
Must be called after last socket call

5.38 vos_thread.c File Reference

Multitasking functions.

```
#include <stdint.h>
#include <unistd.h>
#include <errno.h>
#include <sys/time.h>
#include <pthread.h>
#include <semaphore.h>
#include <sched.h>
#include "vos_sock.h"
#include "vos_types.h"
#include "vos_thread.h"
#include "vos_mem.h"
#include "vos_utils.h"
#include "vos_private.h"
```

Include dependency graph for posix/vos_thread.c:



Defines

- #define [NSECS_PER_USEC](#) 1000
Cyclic thread functions.

Functions

- EXT_DECL void [vos_cyclicThread](#) (UINT32 interval, [VOS_THREAD_FUNC_T](#) pFunction, void *pArguments)
Cyclic thread functions.

- EXT_DECL [VOS_ERR_T vos_threadInit](#) (void)
Initialize the thread library.
- EXT_DECL void [vos_threadTerm](#) (void)
De-Initialize the thread library.
- EXT_DECL [VOS_ERR_T vos_threadCreate](#) ([VOS_THREAD_T](#) *pThread, const CHAR8 *pName, [VOS_THREAD_POLICY_T](#) policy, [VOS_THREAD_PRIORITY_T](#) priority, UINT32 interval, UINT32 stackSize, [VOS_THREAD_FUNC_T](#) pFunction, void *pArguments)
Create a thread.
- EXT_DECL [VOS_ERR_T vos_threadTerminate](#) ([VOS_THREAD_T](#) thread)
Terminate a thread.
- EXT_DECL [VOS_ERR_T vos_threadIsActive](#) ([VOS_THREAD_T](#) thread)
Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.
- EXT_DECL [VOS_ERR_T vos_threadDelay](#) (UINT32 delay)
Delay the execution of the current thread by the given delay in us.
- EXT_DECL void [vos_getTime](#) ([VOS_TIME_T](#) *pTime)
Return the current time in sec and us.
- EXT_DECL const CHAR8 * [vos_getTimeStamp](#) (void)
Get a time-stamp string.
- EXT_DECL void [vos_clearTime](#) ([VOS_TIME_T](#) *pTime)
Clear the time stamp.
- EXT_DECL void [vos_addTime](#) ([VOS_TIME_T](#) *pTime, const [VOS_TIME_T](#) *pAdd)
Add the second to the first time stamp, return sum in first.
- EXT_DECL void [vos_subTime](#) ([VOS_TIME_T](#) *pTime, const [VOS_TIME_T](#) *pSub)
Subtract the second from the first time stamp, return diff in first.
- EXT_DECL void [vos_divTime](#) ([VOS_TIME_T](#) *pTime, UINT32 divisor)
Divide the first time value by the second, return quotient in first.
- EXT_DECL void [vos_mulTime](#) ([VOS_TIME_T](#) *pTime, UINT32 mul)
Multiply the first time by the second, return product in first.
- EXT_DECL INT32 [vos_cmpTime](#) (const [VOS_TIME_T](#) *pTime, const [VOS_TIME_T](#) *pCmp)
Compare the second to the first time stamp.
- EXT_DECL void [vos_getUuid](#) ([VOS_UUID_T](#) pUUID)
Get a universal unique identifier according to RFC 4122 time based version.
- EXT_DECL [VOS_ERR_T vos_mutexCreate](#) ([VOS_MUTEX_T](#) *pMutex)
Create a recursive mutex.

- EXT_DECL [VOS_ERR_T vos_mutexLocalCreate](#) (struct VOS_MUTEX *pMutex)
Create a recursive mutex.
- EXT_DECL void [vos_mutexDelete](#) (VOS_MUTEX_T pMutex)
Delete a mutex.
- EXT_DECL void [vos_mutexLocalDelete](#) (struct VOS_MUTEX *pMutex)
Delete a mutex.
- EXT_DECL [VOS_ERR_T vos_mutexLock](#) (VOS_MUTEX_T pMutex)
Take a mutex.
- EXT_DECL [VOS_ERR_T vos_mutexTryLock](#) (VOS_MUTEX_T pMutex)
Try to take a mutex.
- EXT_DECL [VOS_ERR_T vos_mutexUnlock](#) (VOS_MUTEX_T pMutex)
Release a mutex.
- EXT_DECL [VOS_ERR_T vos_semaCreate](#) (VOS_SEMA_T *pSema, [VOS_SEMA_STATE_T](#) initialState)
Create a semaphore.
- EXT_DECL void [vos_semaDelete](#) (VOS_SEMA_T sema)
Delete a semaphore.
- EXT_DECL [VOS_ERR_T vos_semaTake](#) (VOS_SEMA_T sema, UINT32 timeout)
Take a semaphore.
- EXT_DECL void [vos_semaGive](#) (VOS_SEMA_T sema)
Give a semaphore.

5.38.1 Detailed Description

Multitasking functions.

OS abstraction of thread-handling functions

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

vos_thread.c 1334 2014-09-23 09:27:40Z railroad-mike

5.38.2 Define Documentation**5.38.2.1 #define NSECS_PER_USEC 1000**

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters:

- ← *interval* Interval for cyclic threads in us (incl. runtime)
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

void

5.38.3 Function Documentation**5.38.3.1 EXT_DECL void vos_addTime (VOS_TIME_T **pTime*, const VOS_TIME_T **pAdd*)**

Add the second to the first time stamp, return sum in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pAdd* Pointer to time value

5.38.3.2 EXT_DECL void vos_clearTime (VOS_TIME_T **pTime*)

Clear the time stamp.

Parameters:

- *pTime* Pointer to time value

5.38.3.3 EXT_DECL INT32 vos_cmpTime (const VOS_TIME_T **pTime*, const VOS_TIME_T **pCmp*)

Compare the second to the first time stamp.

Compare the second from the first time stamp, return diff in first.

Parameters:

- ↔ *pTime* Pointer to time value

← *pCmp* Pointer to time value to compare

Return values:

0 *pTime* == *pCmp*

-1 *pTime* < *pCmp*

1 *pTime* > *pCmp*

5.38.3.4 EXT_DECL void vos_cyclicThread (UINT32 *interval*, VOS_THREAD_FUNC_T *pFunction*, void **pArguments*)

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters:

← *interval* Interval for cyclic threads in us (incl. runtime)

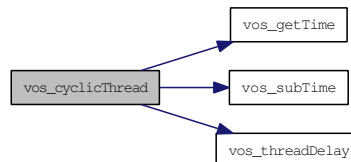
← *pFunction* Pointer to the thread function

← *pArguments* Pointer to the thread function parameters

Return values:

void

Here is the call graph for this function:



5.38.3.5 EXT_DECL void vos_divTime (VOS_TIME_T **pTime*, UINT32 *divisor*)

Divide the first time value by the second, return quotient in first.

Divide the first time by the second, return quotient in first.

Parameters:

↔ *pTime* Pointer to time value

← *divisor* Divisor

5.38.3.6 EXT_DECL void vos_getTime (VOS_TIME_T **pTime*)

Return the current time in sec and us.

Parameters:

→ *pTime* Pointer to time value

5.38.3.7 EXT_DECL const CHAR8* vos_getTimeStamp (void)

Get a time-stamp string.

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values:

timestamp "yyyymmdd-hh:mm:ss.ms"

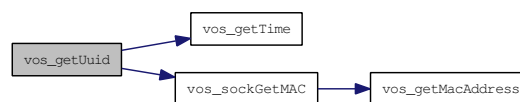
5.38.3.8 EXT_DECL void vos_getUuid (VOS_UUID_T pUuid)

Get a universal unique identifier according to RFC 4122 time based version.

Parameters:

→ *pUuid* Pointer to a universal unique identifier

Here is the call graph for this function:



5.38.3.9 EXT_DECL void vos_mulTime (VOS_TIME_T *pTime, UINT32 mul)

Multiply the first time by the second, return product in first.

Parameters:

↔ *pTime* Pointer to time value

← *mul* Factor

5.38.3.10 EXT_DECL VOS_ERR_T vos_mutexCreate (VOS_MUTEX_T *pMutex)

Create a recursive mutex.

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters:

→ *pMutex* Pointer to mutex handle

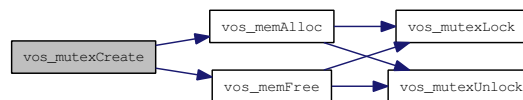
Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR pMutex == NULL
VOS_MUTEX_ERR no mutex available

Here is the call graph for this function:



5.38.3.11 EXT_DECL void vos_mutexDelete (VOS_MUTEX_T pMutex)

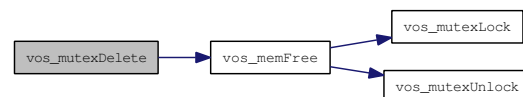
Delete a mutex.

Release the resources taken by the mutex.

Parameters:

← **pMutex** mutex handle

Here is the call graph for this function:



5.38.3.12 EXT_DECL VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * pMutex)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters:

→ **pMutex** Pointer to mutex handle

Return values:

VOS_NO_ERR no error
VOS_INIT_ERR module not initialised
VOS_PARAM_ERR pMutex == NULL
VOS_MUTEX_ERR no mutex available

5.38.3.13 EXT_DECL void vos_mutexLocalDelete (struct VOS_MUTEX * pMutex)

Delete a mutex.

Release the resources taken by the mutex.

Parameters:

← **pMutex** Pointer to mutex struct

5.38.3.14 EXT_DECL VOS_ERR_T vos_mutexLock (VOS_MUTEX_T *pMutex*)

Take a mutex.

Wait for the mutex to become available (lock).

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR *pMutex* == NULL or wrong type

VOS_MUTEX_ERR no such mutex

5.38.3.15 EXT_DECL VOS_ERR_T vos_mutexTryLock (VOS_MUTEX_T *pMutex*)

Try to take a mutex.

If mutex is can't be taken *VOS_MUTEX_ERR* is returned.

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR *pMutex* == NULL or wrong type

VOS_MUTEX_ERR mutex not locked

5.38.3.16 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T *pMutex*)

Release a mutex.

Unlock the mutex.

Parameters:

← *pMutex* mutex handle

**5.38.3.17 EXT_DECL VOS_ERR_T vos_semaCreate (VOS_SEMA_T * *pSema*,
VOS_SEMA_STATE_T *initialState*)**

Create a semaphore.

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters:

→ *pSema* Pointer to semaphore handle

← *initialState* The initial state of the semaphore

Return values:

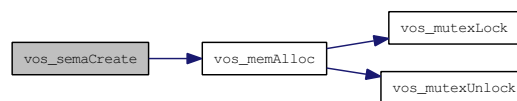
VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR parameter out of range/invalid

VOS_SEMA_ERR no semaphore available

Here is the call graph for this function:



5.38.3.18 EXT_DECL void vos_semaDelete (VOS_SEMA_T *sema*)

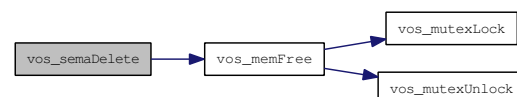
Delete a semaphore.

This will eventually release any processes waiting for the semaphore.

Parameters:

← *sema* semaphore handle

Here is the call graph for this function:



5.38.3.19 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters:

← *sema* semaphore handle

5.38.3.20 EXT_DECL VOS_ERR_T vos_semaTake (VOS_SEMA_T *sema*, UINT32 *timeout*)

Take a semaphore.

Try to get (decrease) a semaphore.

Parameters:

- ← *sema* semaphore handle
- ← *timeout* Max. time in us to wait, 0 means no wait

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised
- VOS_NOINIT_ERR* invalid handle
- VOS_PARAM_ERR* parameter out of range/invalid
- VOS_SEMA_ERR* could not get semaphore in time

Here is the call graph for this function:



5.38.3.21 EXT_DECL void vos_subTime (VOS_TIME_T * *pTime*, const VOS_TIME_T * *pSub*)

Subtract the second from the first time stamp, return diff in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pSub* Pointer to time value

5.38.3.22 EXT_DECL VOS_ERR_T vos_threadCreate (VOS_THREAD_T * *pThread*, const CHAR8 * *pName*, VOS_THREAD_POLICY_T *policy*, VOS_THREAD_PRIORITY_T *priority*, UINT32 *interval*, UINT32 *stackSize*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Create a thread.

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters:

- *pThread* Pointer to returned thread handle
- ← *pName* Pointer to name of the thread (optional)
- ← *policy* Scheduling policy (FIFO, Round Robin or other)
- ← *priority* Scheduling priority (1...255 (highest), default 0)
- ← *interval* Interval for cyclic threads in us (optional)
- ← *stackSize* Minimum stacksize, default 0: 16kB
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

VOS_NO_ERR no error
VOS_INIT_ERR module not initialised
VOS_NOINIT_ERR invalid handle
VOS_PARAM_ERR parameter out of range/invalid
VOS_THREAD_ERR thread creation error

5.38.3.23 EXT_DECL VOS_ERR_T vos_threadDelay (UINT32 *delay*)

Delay the execution of the current thread by the given delay in us.

Parameters:

← ***delay*** Delay in us

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR parameter out of range/invalid

5.38.3.24 EXT_DECL VOS_ERR_T vos_threadInit (void)

Initialize the thread library.

Must be called once before any other call

Return values:

VOS_NO_ERR no error
VOS_INIT_ERR threading not supported

5.38.3.25 EXT_DECL VOS_ERR_T vos_threadIsActive (VOS_THREAD_T *thread*)

Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.

Parameters:

← ***thread*** Thread handle

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR parameter out of range/invalid

5.38.3.26 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.38.3.27 EXT_DECL VOS_ERR_T vos_threadTerminate (VOS_THREAD_T *thread*)

Terminate a thread.

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters:

← *thread* Thread handle (or NULL if current thread)

Return values:

VOS_NO_ERR no error

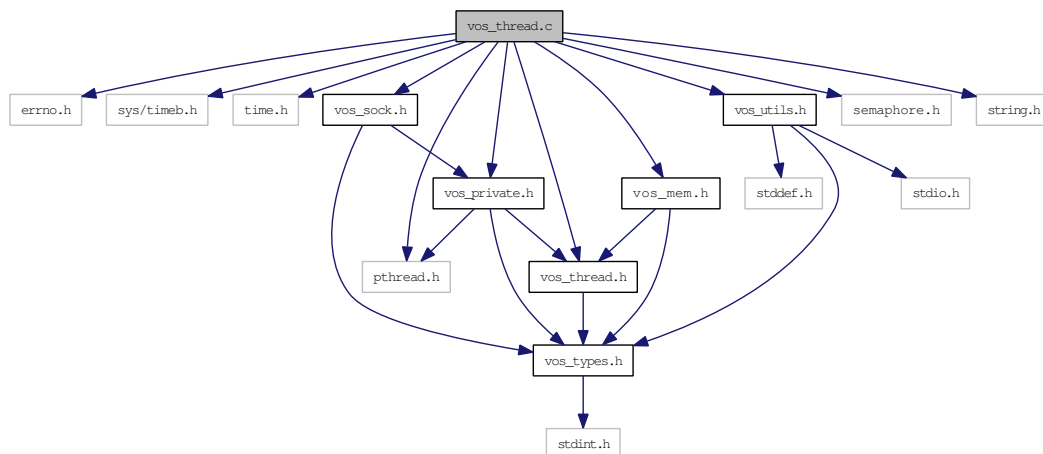
VOS_THREAD_ERR cancel failed

5.39 vos_thread.c File Reference

Multitasking functions.

```
#include <errno.h>
#include <sys/timeb.h>
#include <time.h>
#include <pthread.h>
#include <semaphore.h>
#include <string.h>
#include "vos_thread.h"
#include "vos_sock.h"
#include "vos_mem.h"
#include "vos_utils.h"
#include "vos_private.h"
```

Include dependency graph for windows/vos_thread.c:



Defines

- #define `NSECS_PER_USEC` 1000
Cyclic thread functions.
- #define `NSECS_PER_USEC` 1000
Cyclic thread functions.

Functions

- void `vos_cyclicThread` (UINT32 interval, `VOS_THREAD_FUNC_T` pFunction, void *pArguments)

Cyclic thread functions.

- EXT_DECL [VOS_ERR_T vos_threadInit](#) (void)
Initialize the thread library.
- EXT_DECL void [vos_threadTerm](#) (void)
De-Initialize the thread library.
- pthread_t * [vos_getFreeThreadHandle](#) (void)
Search a free Handle place in the thread handle list.
- EXT_DECL [VOS_ERR_T vos_threadCreate](#) ([VOS_THREAD_T](#) *pThread, const CHAR8 *pName, [VOS_THREAD_POLICY_T](#) policy, [VOS_THREAD_PRIORITY_T](#) priority, UINT32 interval, UINT32 stackSize, [VOS_THREAD_FUNC_T](#) pFunction, void *pArguments)
Create a thread.
- EXT_DECL [VOS_ERR_T vos_threadTerminate](#) ([VOS_THREAD_T](#) thread)
Terminate a thread.
- EXT_DECL [VOS_ERR_T vos_threadIsActive](#) ([VOS_THREAD_T](#) thread)
Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.
- EXT_DECL [VOS_ERR_T vos_threadDelay](#) (UINT32 delay)
Delay the execution of the current thread by the given delay in us.
- EXT_DECL void [vos_getTime](#) ([VOS_TIME_T](#) *pTime)
Return the current time in sec and us.
- EXT_DECL const CHAR8 * [vos_getTimeStamp](#) (void)
Get a time-stamp string.
- EXT_DECL void [vos_clearTime](#) ([VOS_TIME_T](#) *pTime)
Clear the time stamp.
- EXT_DECL void [vos_addTime](#) ([VOS_TIME_T](#) *pTime, const [VOS_TIME_T](#) *pAdd)
Add the second to the first time stamp, return sum in first.
- EXT_DECL void [vos_subTime](#) ([VOS_TIME_T](#) *pTime, const [VOS_TIME_T](#) *pSub)
Subtract the second from the first time stamp, return diff in first.
- EXT_DECL void [vos_divTime](#) ([VOS_TIME_T](#) *pTime, UINT32 divisor)
Divide the first time value by the second, return quotient in first.
- EXT_DECL void [vos_mulTime](#) ([VOS_TIME_T](#) *pTime, UINT32 mul)
Multiply the first time by the second, return product in first.
- EXT_DECL INT32 [vos_cmpTime](#) (const [VOS_TIME_T](#) *pTime, const [VOS_TIME_T](#) *pCmp)
Compare the second from the first time stamp, return diff in first.

- EXT_DECL void [vos_getUuid](#) (VOS_UUID_T pUuid)
Get a universal unique identifier according to RFC 4122 time based version.
- EXT_DECL [VOS_ERR_T vos_mutexCreate](#) (VOS_MUTEX_T *pMutex)
Create a recursive mutex.
- [VOS_ERR_T vos_mutexLocalCreate](#) (struct VOS_MUTEX *pMutex)
Create a recursive mutex.
- EXT_DECL void [vos_mutexDelete](#) (VOS_MUTEX_T pMutex)
Delete a mutex.
- void [vos_mutexLocalDelete](#) (struct VOS_MUTEX *pMutex)
Delete a mutex.
- EXT_DECL [VOS_ERR_T vos_mutexLock](#) (VOS_MUTEX_T pMutex)
Take a mutex.
- EXT_DECL [VOS_ERR_T vos_mutexTryLock](#) (VOS_MUTEX_T pMutex)
Try to take a mutex.
- EXT_DECL [VOS_ERR_T vos_mutexUnlock](#) (VOS_MUTEX_T pMutex)
Release a mutex.
- EXT_DECL [VOS_ERR_T vos_semaCreate](#) (VOS_SEMA_T *pSema, VOS_SEMA_STATE_T initialState)
Create a semaphore.
- EXT_DECL void [vos_semaDelete](#) (VOS_SEMA_T sema)
Delete a semaphore.
- EXT_DECL [VOS_ERR_T vos_semaTake](#) (VOS_SEMA_T sema, UINT32 timeout)
Take a semaphore.
- EXT_DECL void [vos_semaGive](#) (VOS_SEMA_T sema)
Give a semaphore.

5.39.1 Detailed Description

Multitasking functions.

OS abstraction of thread-handling functions

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

vos_thread.c 1334 2014-09-23 09:27:40Z railroad-mike

5.39.2 Define Documentation**5.39.2.1 #define NSECS_PER_USEC 1000**

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters:

- ← *interval* Interval for cyclic threads in us (incl. runtime)
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

void

5.39.2.2 #define NSECS_PER_USEC 1000

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters:

- ← *interval* Interval for cyclic threads in us (incl. runtime)
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

void

5.39.3 Function Documentation**5.39.3.1 EXT_DECL void vos_addTime (VOS_TIME_T *pTime, const VOS_TIME_T *pAdd)**

Add the second to the first time stamp, return sum in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pAdd* Pointer to time value

5.39.3.2 EXT_DECL void vos_clearTime (VOS_TIME_T * *pTime*)

Clear the time stamp.

Parameters:

→ *pTime* Pointer to time value

5.39.3.3 EXT_DECL INT32 vos_cmpTime (const VOS_TIME_T * *pTime*, const VOS_TIME_T * *pCmp*)

Compare the second from the first time stamp, return diff in first.

Parameters:

↔ *pTime* Pointer to time value

← *pCmp* Pointer to time value to compare

Return values:

0 *pTime* == *pCmp*

-1 *pTime* < *pCmp*

1 *pTime* > *pCmp*

5.39.3.4 void vos_cyclicThread (UINT32 *interval*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters:

← *interval* Interval for cyclic threads in us (incl. runtime)

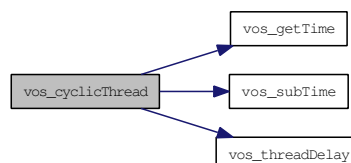
← *pFunction* Pointer to the thread function

← *pArguments* Pointer to the thread function parameters

Return values:

void

Here is the call graph for this function:



5.39.3.5 EXT_DECL void vos_divTime (VOS_TIME_T * *pTime*, UINT32 *divisor*)

Divide the first time value by the second, return quotient in first.

Divide the first time by the second, return quotient in first.

Parameters:

↔ *pTime* Pointer to time value

← *divisor* Divisor

5.39.3.6 pthread_t* vos_getFreeThreadHandle (void)

Search a free Handle place in the thread handle list.

Return values:

pointer to a free thread handle or NULL if not available

5.39.3.7 EXT_DECL void vos_getTime (VOS_TIME_T * *pTime*)

Return the current time in sec and us.

Parameters:

→ *pTime* Pointer to time value

5.39.3.8 EXT_DECL const CHAR8* vos_getTimeStamp (void)

Get a time-stamp string.

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values:

timestamp "yyyymmdd-hh:mm:ss.ms"

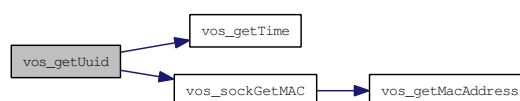
5.39.3.9 EXT_DECL void vos_getUuid (VOS_UUID_T *pUUID*)

Get a universal unique identifier according to RFC 4122 time based version.

Parameters:

→ *pUUID* Pointer to a universal unique identifier

Here is the call graph for this function:



5.39.3.10 EXT_DECL void vos_mulTime (VOS_TIME_T * *pTime*, UINT32 *mul*)

Multiply the first time by the second, return product in first.

Parameters:

- ↔ *pTime* Pointer to time value
 ← *mul* Factor

5.39.3.11 EXT_DECL VOS_ERR_T vos_mutexCreate (VOS_MUTEX_T * *pMutex*)

Create a recursive mutex.

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

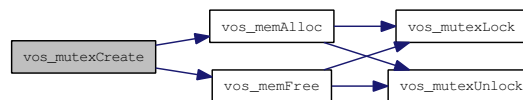
Parameters:

- *pMutex* Pointer to mutex handle

Return values:

- VOS_NO_ERR** no error
VOS_INIT_ERR module not initialised
VOS_PARAM_ERR *pMutex* == NULL
VOS_MUTEX_ERR no mutex available

Here is the call graph for this function:

**5.39.3.12 EXT_DECL void vos_mutexDelete (VOS_MUTEX_T *pMutex*)**

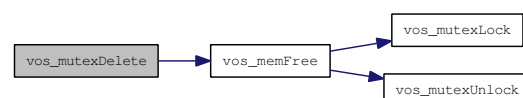
Delete a mutex.

Release the resources taken by the mutex.

Parameters:

- ← *pMutex* mutex handle

Here is the call graph for this function:



5.39.3.13 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters:

→ *pMutex* Pointer to mutex handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR *pMutex* == NULL

VOS_MUTEX_ERR no mutex available

5.39.3.14 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters:

← *pMutex* Pointer to mutex struct

5.39.3.15 EXT_DECL VOS_ERR_T vos_mutexLock (VOS_MUTEX_T *pMutex*)

Take a mutex.

Wait for the mutex to become available (lock).

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR *pMutex* == NULL or wrong type

VOS_MUTEX_ERR no such mutex

5.39.3.16 EXT_DECL VOS_ERR_T vos_mutexTryLock (VOS_MUTEX_T *pMutex*)

Try to take a mutex.

If mutex is can't be taken *VOS_MUTEX_ERR* is returned.

Parameters:

← *pMutex* mutex handle

Return values:*VOS_NO_ERR* no error*VOS_PARAM_ERR* pMutex == NULL or wrong type*VOS_MUTEX_ERR* mutex not locked**5.39.3.17 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T pMutex)**

Release a mutex.

Unlock the mutex.

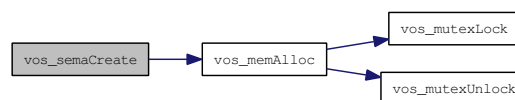
Parameters:← *pMutex* mutex handle**5.39.3.18 EXT_DECL VOS_ERR_T vos_semaCreate (VOS_SEMA_T * pSema, VOS_SEMA_STATE_T initialState)**

Create a semaphore.

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters:→ *pSema* Pointer to semaphore handle← *initialState* The initial state of the semaphore**Return values:***VOS_NO_ERR* no error*VOS_INIT_ERR* module not initialised*VOS_PARAM_ERR* parameter out of range/invalid*VOS_SEMA_ERR* no semaphore available

Here is the call graph for this function:

**5.39.3.19 EXT_DECL void vos_semaDelete (VOS_SEMA_T sema)**

Delete a semaphore.

This will eventually release any processes waiting for the semaphore.

Parameters:← *sema* semaphore handle

Here is the call graph for this function:



5.39.3.20 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters:

← *sema* semaphore handle

5.39.3.21 EXT_DECL VOS_ERR_T vos_semaTake (VOS_SEMA_T *sema*, UINT32 *timeout*)

Take a semaphore.

Try to get (decrease) a semaphore.

Parameters:

← *sema* semaphore handle

← *timeout* Max. time in us to wait, 0 means no wait

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

VOS_SEMA_ERR could not get semaphore in time

Here is the call graph for this function:



5.39.3.22 EXT_DECL void vos_subTime (VOS_TIME_T **pTime*, const VOS_TIME_T **pSub*)

Subtract the second from the first time stamp, return diff in first.

Parameters:

↔ *pTime* Pointer to time value

← *pSub* Pointer to time value

5.39.3.23 `EXT_DECL VOS_ERR_T vos_threadCreate (VOS_THREAD_T * pThread, const CHAR8 * pName, VOS_THREAD_POLICY_T policy, VOS_THREAD_PRIORITY_T priority, UINT32 interval, UINT32 stackSize, VOS_THREAD_FUNC_T pFunction, void * pArguments)`

Create a thread.

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters:

- *pThread* Pointer to returned thread handle
- ← *pName* Pointer to name of the thread (optional)
- ← *policy* Scheduling policy (FIFO, Round Robin or other)
- ← *priority* Scheduling priority (1...255 (highest), default 0)
- ← *interval* Interval for cyclic threads in us (optional)
- ← *stackSize* Minimum stacksize, default 0: 16kB
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised
- VOS_NOINIT_ERR* invalid handle
- VOS_PARAM_ERR* parameter out of range/invalid
- VOS_THREAD_ERR* thread creation error
- VOS_INIT_ERR* no threads available

Here is the call graph for this function:



5.39.3.24 `EXT_DECL VOS_ERR_T vos_threadDelay (UINT32 delay)`

Delay the execution of the current thread by the given delay in us.

Parameters:

- ← *delay* Delay in us

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* parameter out of range/invalid

5.39.3.25 EXT_DECL VOS_ERR_T vos_threadInit (void)

Initialize the thread library.

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR threading not supported

5.39.3.26 EXT_DECL VOS_ERR_T vos_threadIsActive (VOS_THREAD_T *thread*)

Is the thread still active? This call will return *VOS_NO_ERR* if the thread is still active, *VOS_PARAM_ERR* in case it ran out.

Parameters:

← *thread* Thread handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR parameter out of range/invalid

5.39.3.27 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.39.3.28 EXT_DECL VOS_ERR_T vos_threadTerminate (VOS_THREAD_T *thread*)

Terminate a thread.

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters:

← *thread* Thread handle (or NULL if current thread)

Return values:

VOS_NO_ERR no error

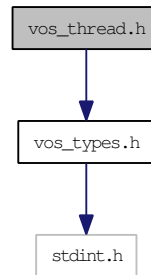
VOS_THREAD_ERR cancel failed

5.40 vos_thread.h File Reference

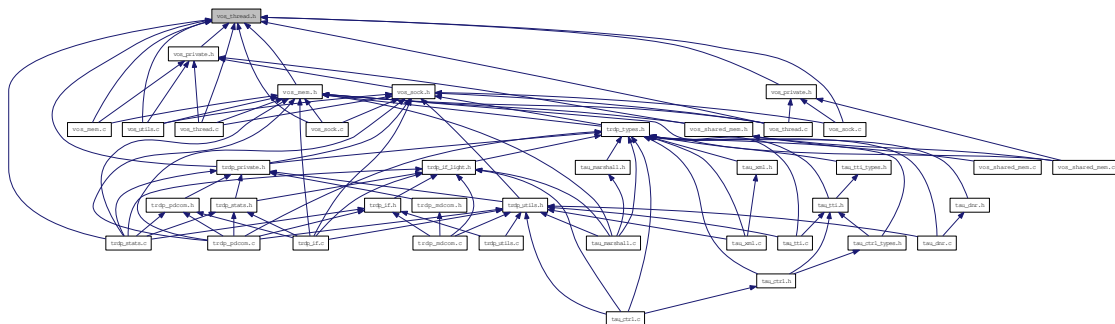
Threading functions for OS abstraction.

```
#include "vos_types.h"
```

Include dependency graph for vos_thread.h:



This graph shows which files directly or indirectly include this file:



Defines

- `#define VOS_MAX_THREAD_CNT 100`
The maximum number of concurrent usable threads.
- `#define VOS_SEMA_WAIT_FOREVER 0xFFFFFFFFU`
Timeout value to wait forever for a semaphore.

Typedefs

- `typedef uint8_t VOS_THREAD_PRIORITY_T`
Thread priority range from 1 (highest) to 255 (lowest), 0 default of the target system.
- `typedef void(__cdecl * VOS_THREAD_FUNC_T)(void *pArg)`
Thread function definition.
- `typedef struct VOS_MUTEX * VOS_MUTEX_T`

Hidden mutex handle definition.

- typedef struct VOS_SEMA * [VOS_SEMA_T](#)

Hidden semaphore handle definition.

- typedef void * [VOS_THREAD_T](#)

Hidden thread handle definition.

Enumerations

- enum [VOS_THREAD_POLICY_T](#)

Thread policy matching pthread/Posix defines.

- enum [VOS_SEMA_STATE_T](#)

State of the semaphore.

Functions

- EXT_DECL [VOS_ERR_T](#) [vos_threadInit](#) (void)

Initialize the thread library.

- EXT_DECL void [vos_threadTerm](#) (void)

De-Initialize the thread library.

- EXT_DECL [VOS_ERR_T](#) [vos_threadCreate](#) ([VOS_THREAD_T](#) *pThread, const CHAR8 *pName, [VOS_THREAD_POLICY_T](#) policy, [VOS_THREAD_PRIORITY_T](#) priority, UINT32 interval, UINT32 stackSize, [VOS_THREAD_FUNC_T](#) pFunction, void *pArguments)

Create a thread.

- EXT_DECL void [vos_cyclicThread](#) (UINT32 interval, [VOS_THREAD_FUNC_T](#) pFunction, void *pArguments)

Cyclic thread functions.

- EXT_DECL [VOS_ERR_T](#) [vos_threadTerminate](#) ([VOS_THREAD_T](#) thread)

Terminate a thread.

- EXT_DECL [VOS_ERR_T](#) [vos_threadIsActive](#) ([VOS_THREAD_T](#) thread)

Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.

- EXT_DECL [VOS_ERR_T](#) [vos_threadDelay](#) (UINT32 delay)

Delay the execution of the current thread by the given delay in us.

- EXT_DECL void [vos_getTime](#) ([VOS_TIME_T](#) *pTime)

Return the current time in sec and us.

- EXT_DECL const CHAR8 * [vos_getTimeStamp](#) (void)

Get a time-stamp string.

- EXT_DECL void [vos_clearTime](#) (VOS_TIME_T *pTime)
Clear the time stamp.
- EXT_DECL void [vos_addTime](#) (VOS_TIME_T *pTime, const VOS_TIME_T *pAdd)
Add the second to the first time stamp, return sum in first.
- EXT_DECL void [vos_subTime](#) (VOS_TIME_T *pTime, const VOS_TIME_T *pSub)
Subtract the second from the first time stamp, return diff in first.
- EXT_DECL INT32 [vos_cmpTime](#) (const VOS_TIME_T *pTime, const VOS_TIME_T *pCmp)
Compare the second from the first time stamp, return diff in first.
- EXT_DECL void [vos_divTime](#) (VOS_TIME_T *pTime, UINT32 divisor)
Divide the first time by the second, return quotient in first.
- EXT_DECL void [vos_mulTime](#) (VOS_TIME_T *pTime, UINT32 mul)
Multiply the first time by the second, return product in first.
- EXT_DECL void [vos_getUuid](#) (VOS_UUID_T pUUID)
Get a universal unique identifier according to RFC 4122 time based version.
- EXT_DECL VOS_ERR_T [vos_mutexCreate](#) (VOS_MUTEX_T *pMutex)
Create a mutex.
- EXT_DECL void [vos_mutexDelete](#) (VOS_MUTEX_T pMutex)
Delete a mutex.
- EXT_DECL VOS_ERR_T [vos_mutexLock](#) (VOS_MUTEX_T pMutex)
Take a mutex.
- EXT_DECL VOS_ERR_T [vos_mutexTryLock](#) (VOS_MUTEX_T pMutex)
Try to take a mutex.
- EXT_DECL VOS_ERR_T [vos_mutexUnlock](#) (VOS_MUTEX_T pMutex)
Release a mutex.
- EXT_DECL VOS_ERR_T [vos_semaCreate](#) (VOS_SEMA_T *pSema, VOS_SEMA_STATE_T initialState)
Create a semaphore.
- EXT_DECL void [vos_semaDelete](#) (VOS_SEMA_T sema)
Delete a semaphore.
- EXT_DECL VOS_ERR_T [vos_semaTake](#) (VOS_SEMA_T sema, UINT32 timeout)
Take a semaphore.
- EXT_DECL void [vos_semaGive](#) (VOS_SEMA_T sema)
Give a semaphore.

5.40.1 Detailed Description

Threading functions for OS abstraction.

Thread-, semaphore- and time-handling functions

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[vos_thread.h](#) 1334 2014-09-23 09:27:40Z railroad-mike

5.40.2 Function Documentation

5.40.2.1 EXT_DECL void vos_addTime (VOS_TIME_T **pTime*, const VOS_TIME_T **pAdd*)

Add the second to the first time stamp, return sum in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pAdd* Pointer to time value
- ↔ *pTime* Pointer to time value
- ← *pAdd* Pointer to time value

5.40.2.2 EXT_DECL void vos_clearTime (VOS_TIME_T **pTime*)

Clear the time stamp.

Parameters:

- *pTime* Pointer to time value
- *pTime* Pointer to time value

5.40.2.3 EXT_DECL INT32 vos_cmpTime (const VOS_TIME_T **pTime*, const VOS_TIME_T **pCmp*)

Compare the second from the first time stamp, return diff in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pCmp* Pointer to time value to compare

Return values:

- 0* *pTime* == *pCmp*
- 1* *pTime* < *pCmp*
- 1* *pTime* > *pCmp*

Compare the second from the first time stamp, return diff in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pCmp* Pointer to time value to compare

Return values:

- 0* *pTime* == *pCmp*
- 1* *pTime* < *pCmp*
- 1* *pTime* > *pCmp*

Parameters:

- ↔ *pTime* Pointer to time value
- ← *pCmp* Pointer to time value to compare

Return values:

- 0* *pTime* == *pCmp*
- 1* *pTime* < *pCmp*
- 1* *pTime* > *pCmp*

5.40.2.4 EXT_DECL void vos_cyclicThread (UINT32 *interval*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

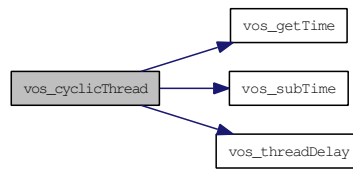
Parameters:

- ← *interval* Interval for cyclic threads in us (incl. runtime)
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

void

Here is the call graph for this function:



5.40.2.5 EXT_DECL void vos_divTime (VOS_TIME_T * *pTime*, UINT32 *divisor*)

Divide the first time by the second, return quotient in first.

Parameters:

↔ *pTime* Pointer to time value

← *divisor* Divisor

Divide the first time by the second, return quotient in first.

Parameters:

↔ *pTime* Pointer to time value

← *divisor* Divisor

5.40.2.6 EXT_DECL void vos_getTime (VOS_TIME_T * *pTime*)

Return the current time in sec and us.

Parameters:

→ *pTime* Pointer to time value

→ *pTime* Pointer to time value

5.40.2.7 EXT_DECL const CHAR8* vos_getTimeStamp (void)

Get a time-stamp string.

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values:

timestamp "yyyymmdd-hh:mm:ss.ms"

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values:

timestamp "yyyymmdd-hh:mm:ss.ms"

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values:

timestamp "yyyymmdd-hh:mm:ss.ms"

5.40.2.8 EXT_DECL void vos_getUuid (VOS_UUID_T *pUuid*)

Get a universal unique identifier according to RFC 4122 time based version.

Parameters:

- *pUuid* Pointer to a universal unique identifier
- *pUuid* Pointer to a universal unique identifier

Here is the call graph for this function:



5.40.2.9 EXT_DECL void vos_mulTime (VOS_TIME_T * *pTime*, UINT32 *mul*)

Multiply the first time by the second, return product in first.

Parameters:

- ↔ *pTime* Pointer to time value
- ← *mul* Factor

5.40.2.10 EXT_DECL VOS_ERR_T vos_mutexCreate (VOS_MUTEX_T * *pMutex*)

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters:

- *pMutex* Pointer to mutex handle

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised
- VOS_PARAM_ERR* *pMutex* == NULL
- VOS_MUTEX_ERR* no mutex available

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters:

→ *pMutex* Pointer to mutex handle

Return values:

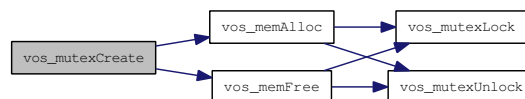
VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR pMutex == NULL

VOS_MUTEX_ERR no mutex available

Here is the call graph for this function:



5.40.2.11 EXT_DECL void vos_mutexDelete (VOS_MUTEX_T pMutex)

Delete a mutex.

Release the resources taken by the mutex.

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

Release the resources taken by the mutex.

Parameters:

← *pMutex* mutex handle

Here is the call graph for this function:



5.40.2.12 EXT_DECL VOS_ERR_T vos_mutexLock (VOS_MUTEX_T *pMutex*)

Take a mutex.

Wait for the mutex to become available (lock).

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

Wait for the mutex to become available (lock).

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR *pMutex* == NULL or wrong type

VOS_MUTEX_ERR no such mutex

5.40.2.13 EXT_DECL VOS_ERR_T vos_mutexTryLock (VOS_MUTEX_T *pMutex*)

Try to take a mutex.

If mutex is can't be taken *VOS_MUTEX_ERR* is returned.

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_MUTEX_ERR no mutex available

If mutex is can't be taken *VOS_MUTEX_ERR* is returned.

Parameters:

← *pMutex* mutex handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR *pMutex* == NULL or wrong type

VOS_MUTEX_ERR mutex not locked

5.40.2.14 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T *pMutex*)

Release a mutex.

Unlock the mutex.

Parameters:

← *pMutex* mutex handle

Unlock the mutex.

Parameters:

← *pMutex* mutex handle

Unlock the mutex.

Parameters:

← *pMutex* mutex handle

5.40.2.15 EXT_DECL VOS_ERR_T vos_semaCreate (VOS_SEMA_T * *pSema*, VOS_SEMA_STATE_T *initialState*)

Create a semaphore.

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters:

→ *pSema* Pointer to semaphore handle

← *initialState* The initial state of the semaphore

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR parameter out of range/invalid

VOS_SEMA_ERR no semaphore available

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters:

→ *pSema* Pointer to semaphore handle

← *initialState* The initial state of the semaphore

Return values:

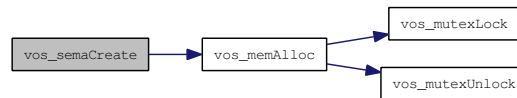
VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_PARAM_ERR parameter out of range/invalid

VOS_SEMA_ERR no semaphore available

Here is the call graph for this function:



5.40.2.16 EXT_DECL void vos_semaDelete (VOS_SEMA_T *sema*)

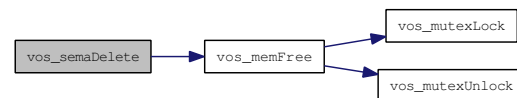
Delete a semaphore.

This will eventually release any processes waiting for the semaphore.

Parameters:

← *sema* semaphore handle

Here is the call graph for this function:



5.40.2.17 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters:

← *sema* semaphore handle

5.40.2.18 EXT_DECL VOS_ERR_T vos_semaTake (VOS_SEMA_T *sema*, UINT32 *timeout*)

Take a semaphore.

Try to get (decrease) a semaphore.

Parameters:

← *sema* semaphore handle

← *timeout* Max. time in us to wait, 0 means no wait

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised
VOS_NOINIT_ERR invalid handle
VOS_PARAM_ERR parameter out of range/invalid
VOS_SEMA_ERR could not get semaphore in time

Try to get (decrease) a semaphore.

Parameters:

← **sema** semaphore handle
 ← **timeout** Max. time in us to wait, 0 means no wait

Return values:

VOS_NO_ERR no error
VOS_INIT_ERR module not initialised
VOS_NOINIT_ERR invalid handle
VOS_PARAM_ERR parameter out of range/invalid
VOS_SEMA_ERR could not get semaphore in time

Here is the call graph for this function:



5.40.2.19 EXT_DECL void vos_subTime (VOS_TIME_T * *pTime*, const VOS_TIME_T * *pSub*)

Subtract the second from the first time stamp, return diff in first.

Parameters:

↔ **pTime** Pointer to time value
 ← **pSub** Pointer to time value
 ↔ **pTime** Pointer to time value
 ← **pSub** Pointer to time value

5.40.2.20 EXT_DECL VOS_ERR_T vos_threadCreate (VOS_THREAD_T * *pThread*, const CHAR8 * *pName*, VOS_THREAD_POLICY_T *policy*, VOS_THREAD_PRIORITY_T *priority*, UINT32 *interval*, UINT32 *stackSize*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Create a thread.

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters:

→ **pThread** Pointer to returned thread handle

- ← *pName* Pointer to name of the thread (optional)
- ← *policy* Scheduling policy (FIFO, Round Robin or other)
- ← *priority* Scheduling priority (1...255 (highest), default 0)
- ← *interval* Interval for cyclic threads in us (optional)
- ← *stackSize* Minimum stacksize, default 0: 16kB
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised
- VOS_NOINIT_ERR* invalid handle
- VOS_PARAM_ERR* parameter out of range/invalid

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters:

- *pThread* Pointer to returned thread handle
- ← *pName* Pointer to name of the thread (optional)
- ← *policy* Scheduling policy (FIFO, Round Robin or other)
- ← *priority* Scheduling priority (1...255 (highest), default 0)
- ← *interval* Interval for cyclic threads in us (optional)
- ← *stackSize* Minimum stacksize, default 0: 16kB
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised
- VOS_NOINIT_ERR* invalid handle
- VOS_PARAM_ERR* parameter out of range/invalid
- VOS_THREAD_ERR* thread creation error

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters:

- *pThread* Pointer to returned thread handle
- ← *pName* Pointer to name of the thread (optional)
- ← *policy* Scheduling policy (FIFO, Round Robin or other)
- ← *priority* Scheduling priority (1...255 (highest), default 0)
- ← *interval* Interval for cyclic threads in us (optional)

- ← *stackSize* Minimum stacksize, default 0: 16kB
- ← *pFunction* Pointer to the thread function
- ← *pArguments* Pointer to the thread function parameters

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised
- VOS_NOINIT_ERR* invalid handle
- VOS_PARAM_ERR* parameter out of range/invalid
- VOS_THREAD_ERR* thread creation error
- VOS_INIT_ERR* no threads available

Here is the call graph for this function:



5.40.2.21 EXT_DECL VOS_ERR_T vos_threadDelay (UINT32 *delay*)

Delay the execution of the current thread by the given delay in us.

Parameters:

- ← *delay* Delay in us

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* module not initialised

Parameters:

- ← *delay* Delay in us

Return values:

- VOS_NO_ERR* no error
- VOS_PARAM_ERR* parameter out of range/invalid

5.40.2.22 EXT_DECL VOS_ERR_T vos_threadInit (void)

Initialize the thread library.

Must be called once before any other call

Return values:

- VOS_NO_ERR* no error
- VOS_INIT_ERR* threading not supported

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR threading not supported

Must be called once before any other call

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR threading not supported

5.40.2.23 EXT_DECL VOS_ERR_T vos_threadIsActive (VOS_THREAD_T *thread*)

Is the thread still active? This call will return *VOS_NO_ERR* if the thread is still active, *VOS_PARAM_ERR* in case it ran out.

Parameters:

← *thread* Thread handle

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

Parameters:

← *thread* Thread handle

Return values:

VOS_NO_ERR no error

VOS_PARAM_ERR parameter out of range/invalid

5.40.2.24 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.40.2.25 EXT_DECL VOS_ERR_T vos_threadTerminate (VOS_THREAD_T *thread*)

Terminate a thread.

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters:

← *thread* Thread handle (or NULL if current thread)

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters:

← *thread* Thread handle (or NULL if current thread)

Return values:

VOS_NO_ERR no error

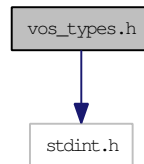
VOS_THREAD_ERR cancel failed

5.41 vos_types.h File Reference

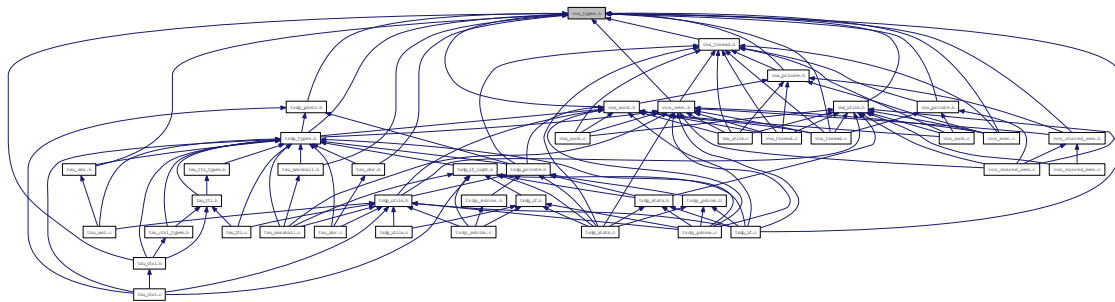
Typedefs for OS abstraction.

```
#include <stdint.h>
```

Include dependency graph for vos_types.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct [VOS_TIME_T](#)
Timer value compatible with timeval / select.

Defines

- #define [INLINE](#) inline
inline macros
- #define [AV_ERROR](#) 0x00
ANTIVALENT8 values.
- #define [TR_DIR1](#) 0x01
Directions/Orientations.

Typedefs

- typedef UINT8 [VOS_UUID_T](#) [16]
universal unique identifier according to RFC 4122, time based version

- typedef void(* [VOS_PRINT_DBG_T](#))(void *pRefCon, [VOS_LOG_T](#) category, const CHAR8 *pTime, const CHAR8 *pFile, UINT16 LineNumber, const CHAR8 *pMsgStr)

Function definition for error/debug output.

Enumerations

- enum [VOS_ERR_T](#) {
 [VOS_NO_ERR](#) = 0,
 [VOS_PARAM_ERR](#) = -1,
 [VOS_INIT_ERR](#) = -2,
 [VOS_NOINIT_ERR](#) = -3,
 [VOS_TIMEOUT_ERR](#) = -4,
 [VOS_NODATA_ERR](#) = -5,
 [VOS_SOCKET_ERR](#) = -6,
 [VOS_IO_ERR](#) = -7,
 [VOS_MEM_ERR](#) = -8,
 [VOS_SEMA_ERR](#) = -9,
 [VOS_QUEUE_ERR](#) = -10,
 [VOS_QUEUE_FULL_ERR](#) = -11,
 [VOS_MUTEX_ERR](#) = -12,
 [VOS_THREAD_ERR](#) = -13,
 [VOS_BLOCK_ERR](#) = -14,
 [VOS_INTEGRATION_ERR](#) = -15,
 [VOS_NOCONN_ERR](#) = -16,
 [VOS_UNKNOWN_ERR](#) = -99 }

Return codes for all VOS API functions.

- enum [VOS_LOG_T](#) {
 [VOS_LOG_ERROR](#) = 0,
 [VOS_LOG_WARNING](#) = 1,
 [VOS_LOG_INFO](#) = 2,
 [VOS_LOG_DBG](#) = 3 }

Categories for logging.

5.41.1 Detailed Description

Typedefs for OS abstraction.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[vos_types.h](#) 1262 2014-07-14 13:03:58Z bloehr

5.41.2 Typedef Documentation**5.41.2.1 typedef void(* VOS_PRINT_DBG_T)(void *pRefCon, VOS_LOG_T category, const CHAR8 *pTime, const CHAR8 *pFile, UINT16 LineNumber, const CHAR8 *pMsgStr)**

Function definition for error/debug output.

The function will be called for logging and error message output. The user can decide, what kind of info will be logged by filtering the category.

Parameters:

- ← *pRefCon* pointer to user context
- ← *category* Log category (Error, Warning, Info etc.)
- ← *pTime* pointer to NULL-terminated string of time stamp
- ← *pFile* pointer to NULL-terminated string of source module
- ← *LineNumber* Line number
- ← *pMsgStr* pointer to NULL-terminated string

Return values:

none

5.41.3 Enumeration Type Documentation**5.41.3.1 enum VOS_ERR_T**

Return codes for all VOS API functions.

Enumerator:

- VOS_NO_ERR** No error.
- VOS_PARAM_ERR** Necessary parameter missing or out of range.
- VOS_INIT_ERR** Call without valid initialization.
- VOS_NOINIT_ERR** The supplied handle/reference is not valid.
- VOS_TIMEOUT_ERR** Timeout.
- VOS_NODATA_ERR** Non blocking mode: no data received.
- VOS SOCK_ERR** Socket option not supported.

VOS_IO_ERR Socket IO error, data can't be received/sent.
VOS_MEM_ERR No more memory available.
VOS_SEMA_ERR Semaphore not available.
VOS_QUEUE_ERR Queue empty.
VOS_QUEUE_FULL_ERR Queue full.
VOS_MUTEX_ERR Mutex not available.
VOS_THREAD_ERR Thread creation error.
VOS_BLOCK_ERR System call would have blocked in blocking mode.
VOS_INTEGRATION_ERR Alignment or endianness for selected target wrong.
VOS_NOCONN_ERR No TCP connection.
VOS_UNKNOWN_ERR Unknown error.

5.41.3.2 enum VOS_LOG_T

Categories for logging.

Enumerator:

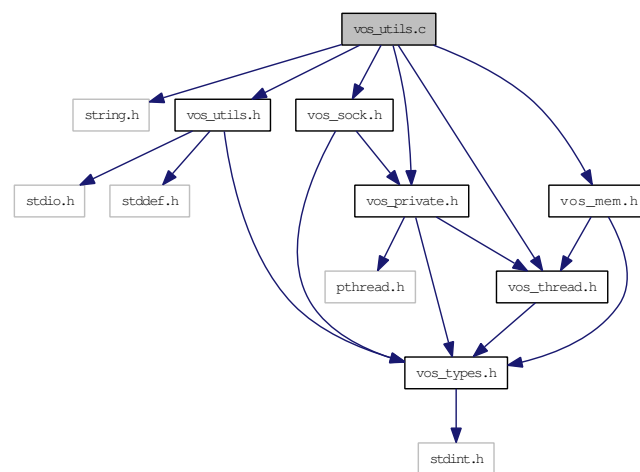
VOS_LOG_ERROR This is a critical error.
VOS_LOG_WARNING This is a warning.
VOS_LOG_INFO This is an info.
VOS_LOG_DBG This is a debug info.

5.42 vos_utils.c File Reference

Common functions for VOS.

```
#include <string.h>
#include "vos_utils.h"
#include "vos_sock.h"
#include "vos_thread.h"
#include "vos_mem.h"
#include "vos_private.h"
```

Include dependency graph for vos_utils.c:



Functions

- **VOS_ERR_T** [vos_initRuntimeConsts](#) (void)
Pre-compute alignment and endianness.
- **VOS_ERR_T** [vos_init](#) (void *pRefCon, **VOS_PRINT_DBG_T** pDebugOutput)
Initialize the virtual operating system.
- EXT_DECL void [vos_terminate](#) ()
DeInitialize the vos library.
- **UINT32** [vos_crc32](#) (**UINT32** crc, const **UINT8** *pData, **UINT32** dataLen)
Compute crc32 according to IEEE802.3.
- **INLINE BOOL8** [vos_isBigEndian](#) (void)
Return endianness.

5.42.1 Detailed Description

Common functions for VOS.

Common functions of the abstraction layer. Mainly debugging support.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[vos_utils.c](#) 1353 2014-11-11 15:11:13Z ahweiss

BL 2014-02-28: Ticket #25: CRC32 calculation is not according IEEE802.3

5.42.2 Function Documentation

5.42.2.1 `UINT32 vos_crc32 (UINT32 crc, const UINT8 *pData, UINT32 dataLen)`

Compute crc32 according to IEEE802.3.

Calculate CRC for the given buffer and length.

Note: Returned CRC is inverted

Parameters:

← *crc* Initial value.

↔ *pData* Pointer to data.

← *dataLen* length in bytes of data.

Return values:

crc32 according to IEEE802.3

5.42.2.2 `VOS_ERR_T vos_init (void *pRefCon, VOS_PRINT_DBG_T pDebugOutput)`

Initialize the virtual operating system.

Initialize the vos library.

Parameters:

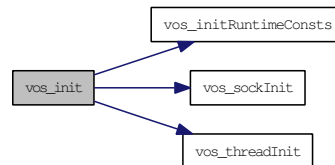
← *pRefCon* context for debug output function

← *pDebugOutput* Pointer to debug output function.

Return values:

VOS_NO_ERR no error **VOS_INTEGRATION_ERR** if endianness/alignment mismatch **VOS_SOCK_ERR** sockets not supported **VOS_UNKNOWN_ERR** initialisation error

Here is the call graph for this function:



5.42.2.3 VOS_ERR_T vos_initRuntimeConsts (void)

Pre-compute alignment and endianness.

Return values:

VOS_INTEGRATION_ERR or **VOS_NO_ERR**

5.42.2.4 INLINE BOOL8 vos_isBigEndian (void)

Return endianness.

Return values:

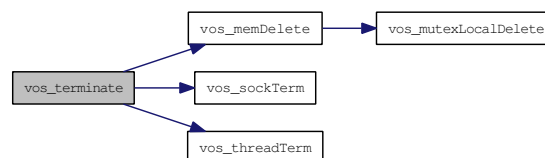
TRUE if big endian

5.42.2.5 EXT_DECL void vos_terminate ()

DeInitialize the vos library.

Should be called last after TRDP stack/application does not use any VOS function anymore.

Here is the call graph for this function:



- #define INITFCS 0xffffffff
CRC/FCS constants.
- #define SIZE_OF_FCS 4
for better understanding of address calculations

Functions

- EXT_DECL UINT32 vos_crc32 (UINT32 crc, const UINT8 *pData, UINT32 dataLen)
Calculate CRC for the given buffer and length.
- EXT_DECL VOS_ERR_T vos_init (void *pRefCon, VOS_PRINT_DBG_T pDebugOutput)
Initialize the vos library.
- EXT_DECL void vos_terminate ()
DeInitialize the vos library.

5.43.1 Detailed Description

Typedefs for OS abstraction.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

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Id

[vos_utils.h](#) 1181 2014-02-28 15:55:27Z bloehr

BL 2014-02-28: Ticket #25: CRC32 calculation is not according IEEE802.3

5.43.2 Define Documentation

5.43.2.1 #define INITFCS 0xffffffff

CRC/FCS constants.

Initial FCS value

5.43.2.2 **#define VOS_MAX_ERR_STR_SIZE (VOS_MAX_PRNT_STR_SIZE - VOS_MAX_FRMT_SIZE)**

Max.

size of the error part

5.43.2.3 **#define VOS_MAX_FRMT_SIZE 64**

Max.

size of the 'format' part

5.43.2.4 **#define VOS_MAX_PRNT_STR_SIZE 256**

String size definitions for the debug output functions.

Max. size of the debug/error string of debug function

5.43.3 Function Documentation

5.43.3.1 **EXT_DECL UINT32 vos_crc32 (UINT32 *crc*, const UINT8 * *pData*, UINT32 *dataLen*)**

Calculate CRC for the given buffer and length.

For TRDP FCS CRC calculation the CRC32 according to IEEE802.3 with start value 0xffffffff is used.

Parameters:

← *crc* Initial value.

↔ *pData* Pointer to data.

← *dataLen* length in bytes of data.

Return values:

crc32 according to IEEE802.3

Calculate CRC for the given buffer and length.

Note: Returned CRC is inverted

Parameters:

← *crc* Initial value.

↔ *pData* Pointer to data.

← *dataLen* length in bytes of data.

Return values:

crc32 according to IEEE802.3

5.43.3.2 EXT_DECL VOS_ERR_T vos_init (void * *pRefCon*, VOS_PRINT_DBG_T *pDebugOutput*)

Initialize the vos library.

This is used to set the output function for all VOS error and debug output.

Parameters:

- ← **pRefCon* user context
- ← **pDebugOutput* pointer to debug output function

Return values:

- VOS_NO_ERR** no error
- VOS_INIT_ERR** unsupported

Initialize the vos library.

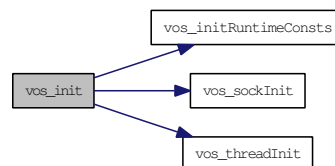
Parameters:

- ← *pRefCon* context for debug output function
- ← *pDebugOutput* Pointer to debug output function.

Return values:

- VOS_NO_ERR** no error
- VOS_INTEGRATION_ERR** if endianness/alignment mismatch
- VOS_SOCKET_ERR** sockets not supported
- VOS_UNKNOWN_ERR** initialisation error

Here is the call graph for this function:

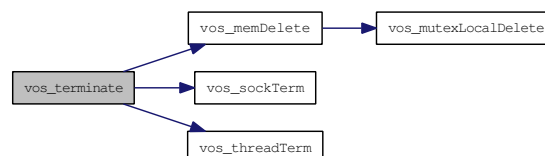


5.43.3.3 EXT_DECL void vos_terminate ()

DeInitialize the vos library.

Should be called last after TRDP stack/application does not use any VOS function anymore.

Here is the call graph for this function:



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