TCNOpen TRDP

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Contents

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 wihtin 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.

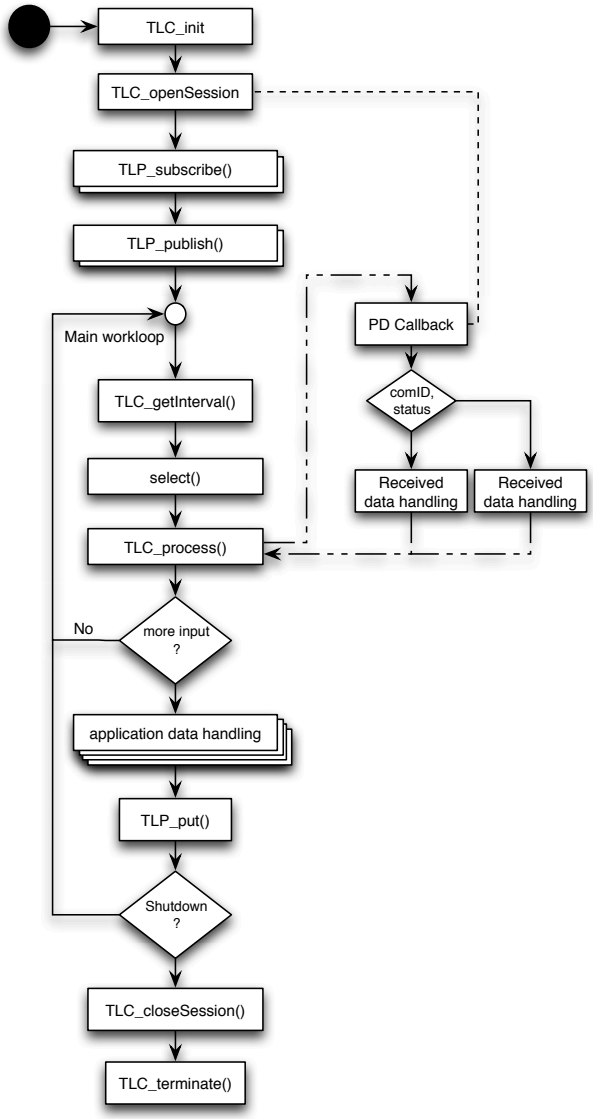


Figure 1.1: Sample client workflow

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.

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 4

Data Structure Documentation

4.1 GNU_PACKED Struct Reference

Types for ETB control.

`#include <trdp_proto.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.

- UINT8 reserved01

  reserved (=0)

- 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

- 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

- UINT8 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.

- TRDP_OP_TRAIN_DIR_STATE_T state

  operational state of the train

- 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

- TRDP_OP_TRAIN_DIR_T opTrnDir

  operational directory

- TRDP_TRAIN_DIR_T trnDir

  train 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.

4.1.1 Detailed Description

Types for ETB control.

TRDP message data header - network order and alignment.

TRDP process data header - network order and alignment.

Complete TTDB structure.

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 UINT16 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.

position of leading vehicle in consist range 0.

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

..32 0 = not defined 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 UINT8 GNU_PACKED::reserved01

reserved (=0)

reserved for future use (= 0)

4.1.2.17 TRDP_LABEL_T GNU_PACKED::deviceName

function device of ECSC which sends the telegram

function device of ED which sends the telegram

4.1.2.18 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.

4.1.2.19 UINT16 GNU_PACKED::lifesign

wrap-around counter, incremented with each produced datagram.

4.1.2.20 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

4.1.2.21 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

4.1.2.22 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

4.1.2.23 UINT16 GNU_PACKED::reserved02

reserved (=0)

reserved (= 0)

4.1.2.24 UINT8 GNU_PACKED::trnDirState

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

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

4.1.2.25 UINT8 GNU_PACKED::opTrnDirState

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

Operational train directory status: '01'B == invalid, '10'B == valid, '100'B == shared.

4.1.2.26 UINT8 GNU_PACKED::sleepReqCnt

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

.63, not used = 0

4.1.2.27 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

4.1.2.28 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_TRAIN_NET_DIR_T GNU_PACKED::trnNetDir

dynamic train info

network directory

4.1.2.32 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)

4.1.2.33 UINT8 GNU_PACKED::cstCnt

number of consists in train; range: 1.

.63

.63

4.1.2.34 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.

4.1.2.35 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)

4.1.2.36 UINT8 GNU_PACKED::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)

identification of the ETB the TTDB is computed for 0: ETB0 (operational network) 1: ETB1 (multimedia network) 2: ETB2 (other network) 3: ETB3 (other network)

4.1.2.37 TRDP_LABEL_T GNU_PACKED::vehId

Unique vehicle identifier, application defined (e.g.

UIC Identifier)

4.1.2.38 UINT8 GNU_PACKED::opVehNo

operational vehicle sequence number in train value range 1.

.63

4.1.2.39 UINT8 GNU_PACKED::opCstNo

operational consist number in train (1.

.63)

4.1.2.40 TRDP_LABEL_T GNU_PACKED::trnId

train identifier, application defined (e.g.

'ICE75', 'IC346'), informal

4.1.2.41 TRDP_LABEL_T GNU_PACKED::trnOperator

train operator, e.g.

'trenitalia.it', informal

4.1.2.42 UINT8 GNU_PACKED::opCstCnt

number of consists in train (1.

.63)

4.1.2.43 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

4.1.2.44 UINT8 GNU_PACKED::opVehCnt

number of vehicles in train (1.

.63)

4.1.2.45 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

4.1.2.46 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

4.1.2.47 UINT16 GNU_PACKED::protocolVersion

fix value for compatibility (set by the API)

fix value for compatibility

4.1.2.48 UINT16 GNU_PACKED::msgType

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

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

4.1.2.49 UINT32 GNU_PACKED::datasetLength

length of the data to transmit 0.

defined by user: length of data to transmit

..1432

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

- tau_ctrl_types.h
- tau_tti_types.h
- trdp_proto.h

4.2 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)

4.2.1 Detailed Description

Closed train consists information.

4.2.2 Field Documentation

4.2.2.1 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

4.3 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

4.3.1 Detailed Description

ComId - data set mapping element definition.

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

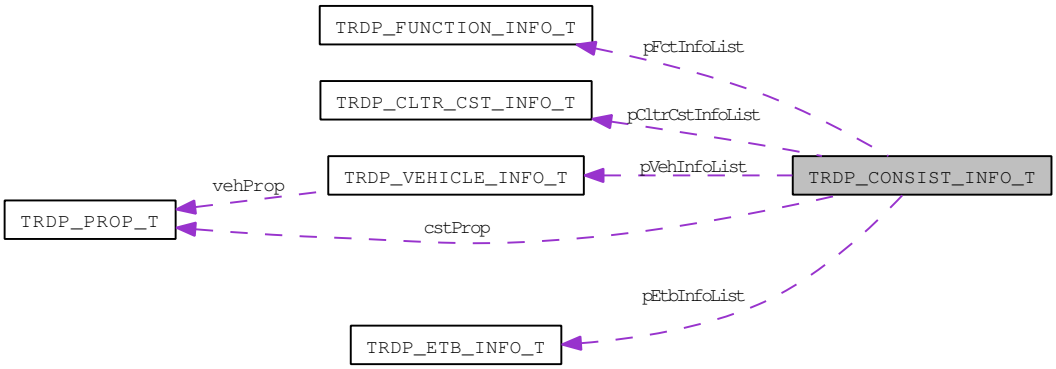
- trdp_types.h

4.4 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 1 = (single) consist 2 = closed train 3 = 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

4.4.1 Detailed Description

consist information structure

4.4.2 Field Documentation

4.4.2.1 TRDP_LABEL_T TRDP_CONSIST_INFO_T::cstId

application defined consist identifier, e.g.
UIC identifier

4.4.2.2 TRDP_LABEL_T TRDP_CONSIST_INFO_T::cstOwner

consist owner, e.g.

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

4.4.2.3 UINT16 TRDP_CONSIST_INFO_T::etbCnt

number of ETB's, range: 1.

.4

4.4.2.4 UINT16 TRDP_CONSIST_INFO_T::vehCnt

number of vehicles in consist 1.

.32

4.4.2.5 UINT16 TRDP_CONSIST_INFO_T::fctCnt

number of consist functions value range 0.

.1024

4.4.2.6 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:

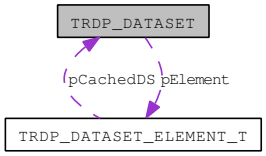
- tau_tti_types.h

4.5 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.

4.5.1 Detailed Description

Dataset definition.

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

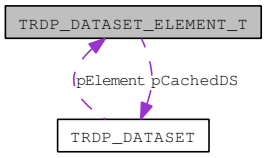
- trdp_types.h

4.6 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).
- CHAR8 * unit
  Unit text for visualisation.
- REAL32 scale
  Factor for visualisation.
- INT32 offset
  *Offset for visualisation (val = scale * x + offset).*
- struct TRDP_DATASET * pCachedDS
  Used internally for marshalling speed-up.

4.6.1 Detailed Description

Dataset element definition.

4.6.2 Field Documentation

4.6.2.1 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

4.7 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.

4.7.1 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

4.8 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)

4.8.1 Detailed Description

Types for train configuration information.

ETB information

4.8.2 Field Documentation

4.8.2.1 UINT8 TRDP_ETB_INFO_T::etbId

identification of train backbone; value range: 0.

.3

4.8.2.2 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

4.9 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)

4.9.1 Detailed Description

function/device information structure

4.9.2 Field Documentation

4.9.2.1 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)

4.9.2.2 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

4.9.2.3 UINT8 TRDP_FUNCTION_INFO_T::etbId

number of connected train backbone.

Value range: 0..3

4.9.2.4 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

4.10 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.

4.10.1 Detailed Description

Information about a particular MD listener.

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

- trdp_types.h

4.11 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.

4.11.1 Detailed Description

Marshaling/unmarshalling configuration.

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

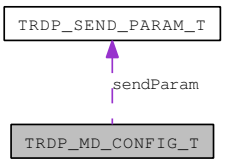
- trdp_types.h

4.12 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.

4.12.1 Detailed Description

Default MD configuration.

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

- trdp_types.h

4.13 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 srcUserURI
  source URI user part from MD header
- TRDP_URI_HOST_T srcHostURI
  source URI host part (unused)
- TRDP_URI_USER_T destUserURI
  destination URI user part from MD header
- TRDP_URI_HOST_T destHostURI
  destination URI host part (unused)
- 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

4.13.1 Detailed Description

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

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

4.13.2 Field Documentation

4.13.2.1 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

4.14 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

4.14.1 Detailed Description

Structure containing all general MD statistics information.

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

- trdp_types.h

4.15 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

4.15.1 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

4.16 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

4.16.1 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?, timout, 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:

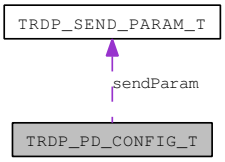
- trdp_types.h

4.17 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.

4.17.1 Detailed Description

Default PD configuration.

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

- trdp_types.h

4.18 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
- TRDP_URI_HOST_T srcHostURI
  source URI host part (unused)
- TRDP_URI_HOST_T destHostURI
  destination URI host part (unused)

4.18.1 Detailed Description

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

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

4.18.2 Field Documentation

4.18.2.1 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

4.19 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
- UINT32 numMissed
  number of packets skipped

4.19.1 Detailed Description

Structure containing all general PD statistics information.

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

- trdp_types.h

4.20 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.

4.20.1 Detailed Description

Various flags/general TRDP options for library initialization.

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

- trdp_types.h

4.21 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

4.21.1 Detailed Description

Application defined properties.

4.21.2 Field Documentation

4.21.2.1 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

4.22 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.

4.22.1 Detailed Description

Table containing particular PD publishing information.

4.22.2 Field Documentation

4.22.2.1 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

4.23 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.

4.23.1 Detailed Description

A table containing PD redundant group information.

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

- trdp_types.h

4.24 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
  Timout cycles.
- UINT8 reserved1
  Reserved for future use.
- UINT16 reserved2
  Reserved for future use.

4.24.1 Detailed Description

Types to read out the XML configuration.

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

- tau_xml.h

4.25 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).

4.25.1 Detailed Description

Quality/type of service and time to live.

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

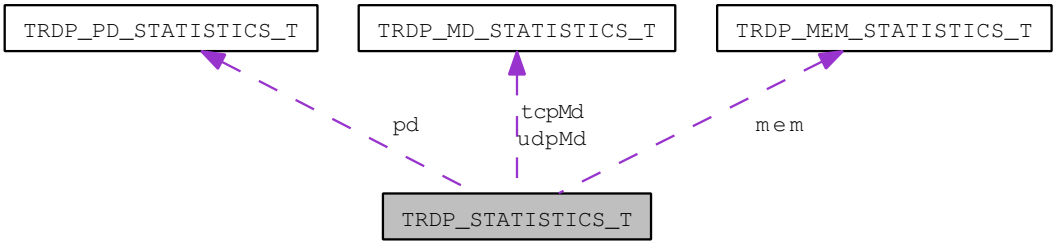
- trdp_types.h

4.26 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.

4.26.1 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

4.27 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.
- UINT32 numMissed
  number of packets skipped for this subscription

4.27.1 Detailed Description

Table containing particular PD subscription information.

4.27.2 Field Documentation

4.27.2.1 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.

4.27.2.2 UINT32 TRDP_SUBS_STATISTICS_T::timeout

Time-out value in us.

0 = No time-out supervision

4.27.2.3 TRDP_TO_BEHAVIOR_T TRDP_SUBS_STATISTICS_T::toBehav

Behavior at time-out.

Set data to zero / keep last value

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

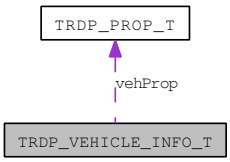
- trdp_types.h

4.28 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

4.28.1 Detailed Description

vehicle information structure

4.28.2 Field Documentation

4.28.2.1 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

4.28.2.2 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

4.29 TRDP_XML_DOC_HANDLE_T Struct Reference

Parsed XML document handle.

`#include <tau_xml.h>`

Data Fields

- struct XML_HANDLE * pXmlDocument
  XML document context.

4.29.1 Detailed Description

Parsed XML document handle.

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

- tau_xml.h

4.30 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

4.30.1 Detailed Description

Common socket options.

4.30.2 Field Documentation

4.30.2.1 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

4.31 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.

4.31.1 Detailed Description

Timer value compatible with timeval / select.

Relative or absolute date, depending on usage

4.31.2 Field Documentation

4.31.2.1 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

4.32 VOS_VERSION_T Struct Reference

Version information.

`#include <vos_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.

4.32.1 Detailed Description

Version information.

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

- vos_types.h

Chapter 5

File Documentation

5.1 iec61375-2-3.h File Reference

TTDB, CSTINFO Frame typedefs, Telegram definitions.

Defines

- #define ETB_CTRL_COMID 1
  ETB Control telegram.
- #define ETB_CTRL_CYC 500
  0.5s
- #define ETB_CTRL_TO 3000
  3s
- #define CSTINFO_COMID 2
  Consist Info telegram (Message data notification 'Mn').
- #define CSTINFOCTRL_COMID 3
  Consist Info control/request telegram (Message data notification 'Mn').
- #define TTDB_STATUS_COMID 100
  TTDB manager telegram PD.
- #define TTDB_STATUS_CYC 1000
  Push.
- #define TTDB_STATUS_TO 5000
  5s
- #define TTDB_OP_DIR_INFO_COMID 101
  TTDB manager telegram MD: Push the OP_TRAIN_DIRECTORY.
- #define TTDB_OP_DIR_INFO_DS "TTDB_OP_TRAIN_DIR_INFO"

OP_TRAIN_DIRECTORY.

- #define TTDB_TRN_DIR_REQ_COMID 102
  TTDB manager telegram MD: Get the TRAIN_DIRECTORY.
- #define TTDB_TRN_DIR_REQ_TO 3000
  3s timeout
- #define TTDB_TRN_DIR_REP_COMID 103
  MD reply.
- #define TTDB_TRN_DIR_REP_DS "TTDB_TRAIN_DIRECTORY_INFO_REPLY"
  TRAIN_DIRECTORY.
- #define TTDB_STAT_CST_REQ_COMID 104
  TTDB manager telegram MD: Get the static consist information.
- #define TTDB_STAT_CST_REQ_TO 3000
  3s timeout
- #define TTDB_STAT_CST_REP_DS "TTDB_STATIC_CONSIST_INFO_REPLY"
  CONSIST_INFO.
- #define TTDB_NET_DIR_REQ_COMID 106
  TTDB manager telegram MD: Get the NETWORK_TRAIN_DIRECTORY.
- #define TTDB_NET_DIR_REQ_TO 3000
  3s timeout
- #define TTDB_NET_DIR_REP_COMID 107
  MD reply.
- #define TTDB_NET_DIR_REP_DS "TTDB_TRAIN_NETWORK_DIRECTORY_INFO_REPLY"

  TRAIN_NETWORK_DIRECTORY.
- #define TTDB_OP_DIR_INFO_REQ_COMID 108
  TTDB manager telegram MD: Get the OP_TRAIN_DIRECTORY.
- #define TTDB_OP_DIR_INFO_REQ_TO 3000
  3s timeout
- #define TTDB_OP_DIR_INFO_REP_DS "TTDB_OP_TRAIN_DIR_INFO"
  OP_TRAIN_DIRECTORY.
- #define TTDB_READ_CMPLT_REQ_COMID 110
  TTDB manager telegram MD: Get the TTDB.
- #define TTDB_READ_CMPLT_REQ_DS "TTDB_READ_COMPLETE_REQUEST"
  ETBx.

- #define TTDB_READ_CMPLT_REQ_TO 3000
  3s timeout
- #define TTDB_READ_CMPLT_REP_COMID 111
  MD reply.
- #define TTDB_READ_CMPLT_REP_DS "TTDB_READ_COMPLETE_REPLY"
  TRDP_READ_COMPLETE_REPLY_T.
- #define ECSP_CTRL_COMID 120
  ECSP Control telegram.
- #define ECSP_CTRL_CYC 1000
  1s
- #define ECSP_CTRL_TO 5000
  5s
- #define ECSP_CTRL_DEST_URI "devECSP.anyVeh.lCst"
  10.0.0.1
- #define ECSP_STATUS_COMID 121
  ECSP status telegram.
- #define ECSP_STATUS_CYC 1000
  1s
- #define ECSP_STATUS_TO 5000
  5s
- #define ECSP_STATUS_DEST_URI "devECSC.anyVeh.lCst"
  10.0.0.100
- #define ETBN_STATUS_COMID 122
  ETBN STATUS Telegram PD.
- #define ETBN_STATUS_CYC 1000
  1s cycle time
- #define ETBN_STATUS_TO 5000
  5s timeout
- #define ETBN_CTRL_REQ_COMID 130
  ETBN Control Telegram MD.
- #define ETBN_CTRL_REQ_DS "ETBN_CTRL"
  ETBx.
- #define ETBN_CTRL_REQ_TO 3000

3s timeout

- #define ETBN_CTRL_REP_DS "ETBN_STATUS"

  ETBN status reply.

- #define ETBN_TRN_NET_DIR_REQ_COMID 132

  ETBN Control Telegram MD.

- #define ETBN_TRN_NET_DIR_REQ_TO 3000

  3s timeout

- #define ETBN_TRN_NET_DIR_REP_DS "ETBN_TRAIN_NETWORK_DIRECTORY_INFO_REPLY"

  ETBx.

5.1.1 Detailed Description

TTDB, CSTINFO Frame typedefs, Telegram definitions.

Note:

Project: TCNOpen TRDP

Author:

Bernd Loehr, NewTec GmbH, 2015-09-11

Remarks:

Id

iec61375-2-3.h 1522 2016-03-01 10:17:09Z bloehr

5.1.2 Define Documentation

5.1.2.1 #define ETBN_STATUS_COMID 122

ETBN STATUS Telegram PD.

tbd!

5.1.2.2 #define TTDB_NET_DIR_REQ_COMID 106

TTDB manager telegram MD: Get the NETWORK_TRAIN_DIRECTORY.

MD request

5.1.2.3 #define TTDB_OP_DIR_INFO_COMID 101

TTDB manager telegram MD: Push the OP_TRAIN_DIRECTORY.

MD notification

5.1.2.4 #define TTDB_STAT_CST_REQ_COMID 104

TTDB manager telegram MD: Get the static consist information.

MD request

5.1.2.5 #define TTDB_TRN_DIR_REQ_COMID 102

TTDB manager telegram MD: Get the TRAIN_DIRECTORY.

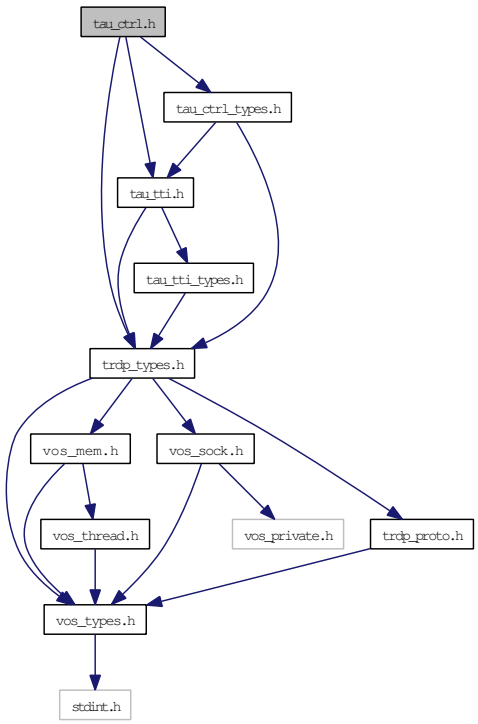
MD request

5.2 tau_ctrl.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_ctrl.h:



Functions

- EXT_DECL TRDP_ERR_T tau_initEcspCtrl (TRDP_APP_SESSION_T appHandle, TRDP_IP_ADDR_T ecspIpAddr)

  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:

Id

tau_ctrl.h 1483 2015-12-16 14:43:30Z bloehr

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

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

Function to init ECSP control interface.

Parameters:

← ***appHandle*** Application handle

← ***ecspIpAddr*** ECSP address

Return values:

TRDP_NO_ERR no error

TRDP_INIT_ERR initialisation error

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

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

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

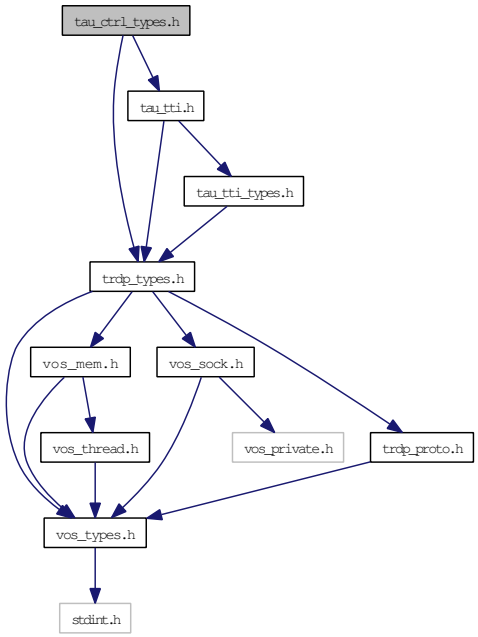
TRDP_UNKNOWN_ERR undefined error

5.3 tau_ctrl_types.h File Reference

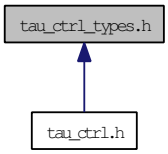
TRDP utility interface definitions.

```
#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:

Id

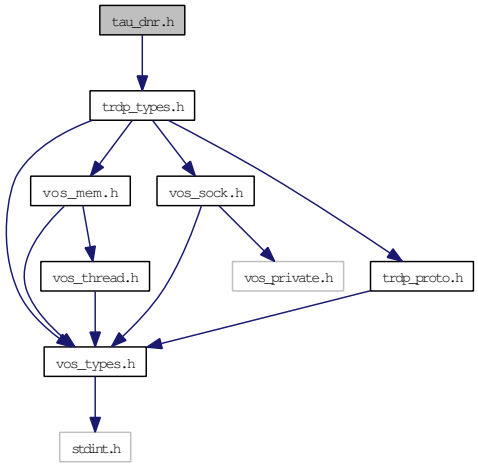
tau_ctrl_types.h 1510 2016-02-17 14:03:45Z bloehr

5.4 tau_dnr.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_dnr.h:



Functions

- EXT_DECL TRDP_ERR_T tau_initDnr (TRDP_APP_SESSION_T appHandle, TRDP_IP_ADDR_T dnsIpAddr, UINT16 dnsPort, const CHAR8 *hostsFileName)

  Function to init DNR.

- EXT_DECL void tau_deInitDnr (TRDP_APP_SESSION_T appHandle)

  Release any resources allocated by DNR.

- EXT_DECL TRDP_DNR_STATE_T tau_DNRstatus (TRDP_APP_SESSION_T appHandle)

  Function to get the status of DNR.

- EXT_DECL TRDP_ERR_T tau_getOwnIds (TRDP_APP_SESSION_T appHandle, TRDP_LABEL_T devId, TRDP_LABEL_T vehId, TRDP_LABEL_T cstId)

  Who am I ?.

- EXT_DECL TRDP_IP_ADDR_T tau_getOwnAddr (TRDP_APP_SESSION_T appHandle)

  Function to get the own IP address.

- EXT_DECL TRDP_ERR_T tau_uri2Addr (TRDP_APP_SESSION_T appHandle, TRDP_IP_ADDR_T *pAddr, const TRDP_URI_T pUri)

  Function to convert a URI to an IP address.

- EXT_DECL TRDP_ERR_T tau_addr2Uri (TRDP_APP_SESSION_T appHandle, TRDP_URI_HOST_T pUri, TRDP_IP_ADDR_T addr)

  Function to convert an IP address to a URI.

5.4.1 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:

Id

tau_dnr.h 1522 2016-03-01 10:17:09Z bloehr

BL 2015-12-14: Ticket #8: DNR client

5.4.2 Function Documentation

5.4.2.1 EXT_DECL TRDP_ERR_T tau_addr2Uri (TRDP_APP_SESSION_T *appHandle*, TRDP_URI_HOST_T *pUri*, 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:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pUri*** Pointer to a string to return the URI host part

← ***addr*** IP address, 0==own address

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.4.2.2 EXT_DECL void tau_deInitDnr (TRDP_APP_SESSION_T *appHandle*)

Release any resources allocated by DNR.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

Return values:

none

5.4.2.3 EXT_DECL TRDP_DNR_STATE_T tau_DNRstatus (TRDP_APP_SESSION_T *appHandle*)

Function to get the status of DNR.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession()

Return values:

TRDP_DNR_NOT_AVAILABLE no error

TRDP_DNR_UNKNOWN enabled, but cache is empty

TRDP_DNR_ACTIVE enabled, cache has values

TRDP_DNR_HOSTSFILE enabled, hostsfile used (static mode)

5.4.2.4 EXT_DECL TRDP_IP_ADDR_T tau_getOwnAddr (TRDP_APP_SESSION_T *appHandle*)

Function to get the own IP address.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

Return values:

own IP address

5.4.2.5 EXT_DECL TRDP_ERR_T tau_getOwnIds (TRDP_APP_SESSION_T *appHandle*, 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:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***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

5.4.2.6 EXT_DECL TRDP_ERR_T tau_initDnr (TRDP_APP_SESSION_T *appHandle*, TRDP_IP_ADDR_T *dnsIpAddr*, UINT16 *dnsPort*, const CHAR8 * *hostsFileName*)

Function to init DNR.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

← ***dnsIpAddr*** DNS/ECSP IP address.

← ***dnsPort*** DNS port number.

← ***hostsFileName*** Optional host file name as ECSP replacement/addition.

Return values:

TRDP_NO_ERR no error

TRDP_INIT_ERR initialisation error

5.4.2.7 EXT_DECL TRDP_ERR_T tau_uri2Addr (TRDP_APP_SESSION_T *appHandle*, TRDP_IP_ADDR_T * *pAddr*, const TRDP_URI_T *pUri*)

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:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pAddr*** Pointer to return the IP address

← ***pUri*** Pointer to a URI or an IP Address string, NULL==own URI

Return values:

TRDP_NO_ERR no error

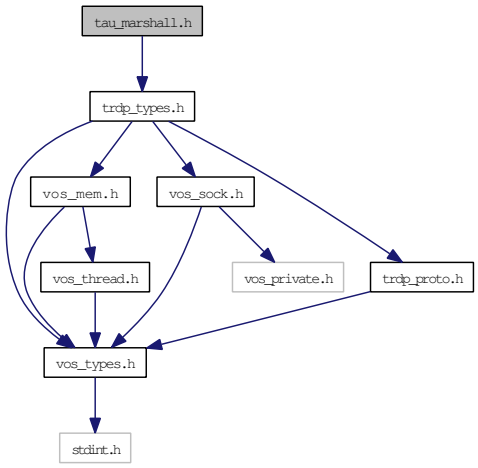
TRDP_PARAM_ERR Parameter error

5.5 tau_marshall.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_marshall.h:



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 / unmarshalling.

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

  marshall function.

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

  unmarshall function.

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

  Calculate data set size by given ComId.

5.5.1 Detailed Description

TRDP utility interface definitions.

This module provides the interface to the following utilities

- marshalling/unmarshalling

Note:

Project: TCNOpen TRDP prototype stack

Author:

Armin-H. Weiss

Remarks:

Id

tau_marshall.h 1479 2015-12-14 14:53:45Z bloehr

BL 2015-12-14: Ticket #33: source size check for marshalling

5.5.2 Function Documentation

5.5.2.1 EXT_DECL TRDP_ERR_T tau_calcDatasetSize (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT32 *srcSize*, 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

← ***srcSize*** size of the source buffer

→ ***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

5.5.2.2 EXT_DECL TRDP_ERR_T tau_calcDatasetSizeByComId (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT32 *srcSize*, 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

← ***srcSize*** size of the source buffer

→ ***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

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

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

← ***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

5.5.2.4 EXT_DECL TRDP_ERR_T tau_marshall (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT32 *srcSize*, 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

← ***srcSize*** size of the source buffer

← ***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

5.5.2.5 EXT_DECL TRDP_ERR_T tau_marshallDs (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT32 *srcSize*, 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

← ***srcSize*** size of the source buffer

← ***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

5.5.2.6 EXT_DECL TRDP_ERR_T tau_unmarshall (void * *pRefCon*, UINT32 *comId*, UINT8 * *pSrc*, UINT32 *srcSize*, 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

← ***srcSize*** size of the source buffer

← ***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

5.5.2.7 EXT_DECL TRDP_ERR_T tau_unmarshallDs (void * *pRefCon*, UINT32 *dsId*, UINT8 * *pSrc*, UINT32 *srcSize*, 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

← ***srcSize*** size of the source buffer

← ***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

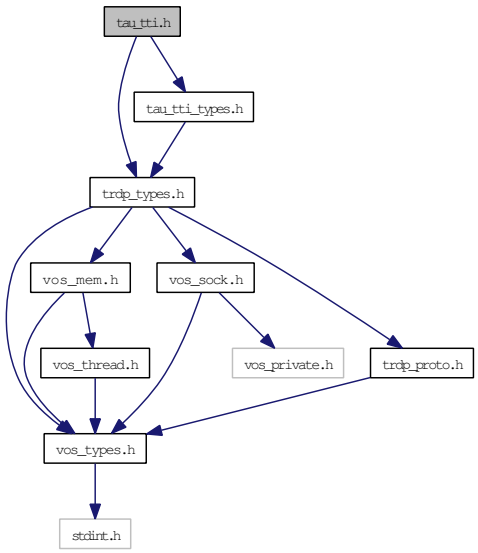
TRDP_COMID_ERR comid not existing

5.6 tau_tti.h File Reference

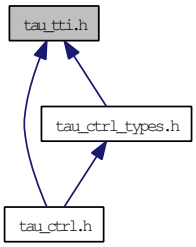
TRDP utility interface definitions.

```
#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 (TRDP_APP_SESSION_T appHandle, VOS_SEMA_T userAction, TRDP_IP_ADDR_T ecspIpAddr, CHAR8 *hostsFileName)

  Function to init TTI access.

- EXT_DECL void tau_deInitTTI (TRDP_APP_SESSION_T appHandle)

  Function to terminate TTI access.

- EXT_DECL TRDP_ERR_T tau_getOpTrDirectory (TRDP_APP_SESSION_T appHandle, TRDP_OP_TRAIN_DIR_STATE_T *pOpTrDirState, TRDP_OP_TRAIN_DIR_T *pOpTrDir)

  Function to retrieve the operational train directory state.

- EXT_DECL TRDP_ERR_T tau_getTrDirectory (TRDP_APP_SESSION_T appHandle, TRDP_TRAIN_DIR_T *pTrDir)

  Function to retrieve the operational train directory.

- EXT_DECL TRDP_ERR_T tau_getStaticCstInfo (TRDP_APP_SESSION_T appHandle, 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_APP_SESSION_T appHandle, TRDP_OP_TRAIN_DIR_STATE_T *pOpTrDirState, TRDP_OP_TRAIN_DIR_T *pOpTrDir, TRDP_TRAIN_DIR_T *pTrDir, TRDP_TRAIN_NET_DIR_T *pTrNetDir)

  Function to retrieve the operational train directory.

- EXT_DECL TRDP_ERR_T tau_getTrnCstCnt (TRDP_APP_SESSION_T appHandle, UINT16 *pTrnCstCnt)

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

- EXT_DECL TRDP_ERR_T tau_getTrnVehCnt (TRDP_APP_SESSION_T appHandle, UINT16 *pTrnVehCnt)

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

- EXT_DECL TRDP_ERR_T tau_getCstVehCnt (TRDP_APP_SESSION_T appHandle, UINT16 *pCstVehCnt, const TRDP_LABEL_T pCstLabel)

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

- EXT_DECL TRDP_ERR_T tau_getCstFctCnt (TRDP_APP_SESSION_T appHandle, UINT16 *pCstFctCnt, const TRDP_LABEL_T pCstLabel)

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

- EXT_DECL TRDP_ERR_T tau_getCstFctInfo (TRDP_APP_SESSION_T appHandle, TRDP_FUNCTION_INFO_T *pFctInfo, const TRDP_LABEL_T pCstLabel, UINT16 maxFctCnt)

  Function to retrieve the function information of the consist.

- EXT_DECL TRDP_ERR_T tau_getVehInfo (TRDP_APP_SESSION_T appHandle, TRDP_VEHICLE_INFO_T *pVehInfo, const TRDP_LABEL_T pVehLabel, const TRDP_LABEL_T pCstLabel)

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

- EXT_DECL TRDP_ERR_T tau_getCstInfo (TRDP_APP_SESSION_T appHandle, TRDP_CONSIST_INFO_T *pCstInfo, const TRDP_LABEL_T pCstLabel)

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

- EXT_DECL TRDP_ERR_T tau_getVehOrient (TRDP_APP_SESSION_T appHandle, UINT8 *pVehOrient, UINT8 *pCstOrient, TRDP_LABEL_T pVehLabel, TRDP_LABEL_T pCstLabel)

  Function to retrieve the orientation of the given vehicle.

5.6.1 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:

Id

tau_tti.h 1512 2016-02-18 11:05:20Z bloehr

BL 2016-02-18: Ticket #7: Add train topology information support

5.6.2 Function Documentation

5.6.2.1 EXT_DECL void tau_deInitTTI (TRDP_APP_SESSION_T *appHandle*)

Function to terminate TTI access.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

Return values:

none

5.6.2.2 EXT_DECL TRDP_ERR_T tau_getCstFctCnt (TRDP_APP_SESSION_T *appHandle*, UINT16 * *pCstFctCnt*, const TRDP_LABEL_T *pCstLabel*)

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

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().
→ ***pCstFctCnt*** Pointer to the number of functions to be returned
← ***pCstLabel*** Pointer to a consist label. NULL means own consist.

Return values:

TRDP_NO_ERR no error
TRDP_PARAM_ERR Parameter error

5.6.2.3 EXT_DECL TRDP_ERR_T tau_getCstFctInfo (TRDP_APP_SESSION_T *appHandle*, TRDP_FUNCTION_INFO_T * *pFctInfo*, const TRDP_LABEL_T *pCstLabel*, UINT16 *maxFctCnt*)

Function to retrieve the function information of the consist.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pFctInfo*** Pointer to function info list to be returned. Memory needs to be provided by application. Set NULL if not used.

← ***pCstLabel*** 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

5.6.2.4 EXT_DECL TRDP_ERR_T tau_getCstInfo (TRDP_APP_SESSION_T *appHandle*, TRDP_CONSIST_INFO_T * *pCstInfo*, const TRDP_LABEL_T *pCstLabel*)

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

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pCstInfo*** Pointer to the consist info to be returned.

← ***pCstLabel*** Pointer to a consist label. NULL means own consist.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.5 EXT_DECL TRDP_ERR_T tau_getCstVehCnt (TRDP_APP_SESSION_T *appHandle*, UINT16 * *pCstVehCnt*, const TRDP_LABEL_T *pCstLabel*)

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

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pCstVehCnt*** Pointer to the number of vehicles to be returned

← ***pCstLabel*** Pointer to a consist label. NULL means own consist.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.6 EXT_DECL TRDP_ERR_T tau_getOpTrDirectory (TRDP_APP_SESSION_T *appHandle*, TRDP_OP_TRAIN_DIR_STATE_T * *pOpTrDirState*, TRDP_OP_TRAIN_DIR_T * *pOpTrDir*)

Function to retrieve the operational train directory state.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pOpTrDirState*** Pointer to an operational train directory state structure to be returned.

→ ***pOpTrDir*** Pointer to an operational train directory structure to be returned.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.7 EXT_DECL TRDP_ERR_T tau_getStaticCstInfo (TRDP_APP_SESSION_T *appHandle*, TRDP_CONSIST_INFO_T * *pCstInfo*, TRDP_UUID_T const *cstUUID*)

Function to retrieve the operational train directory.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pCstInfo*** Pointer to a consist info structure to be returned.

← ***cstUUID*** UUID of the consist the consist info is rquested for.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.8 EXT_DECL TRDP_ERR_T tau_getTrDirectory (TRDP_APP_SESSION_T *appHandle*, TRDP_TRAIN_DIR_T * *pTrDir*)

Function to retrieve the operational train directory.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pTrDir*** Pointer to a train directory structure to be returned.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.9 EXT_DECL TRDP_ERR_T tau_getTrnCstCnt (TRDP_APP_SESSION_T *appHandle*, UINT16 * *pTrnCstCnt*)

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

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pTrnCstCnt*** Pointer to the number of consists to be returned

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.10 EXT_DECL TRDP_ERR_T tau_getTrnVehCnt (TRDP_APP_SESSION_T *appHandle*, UINT16 * *pTrnVehCnt*)

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

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pTrnVehCnt*** Pointer to the number of vehicles to be returned

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.11 EXT_DECL TRDP_ERR_T tau_getTTI (TRDP_APP_SESSION_T *appHandle*, TRDP_OP_TRAIN_DIR_STATE_T * *pOpTrDirState*, TRDP_OP_TRAIN_DIR_T * *pOpTrDir*, TRDP_TRAIN_DIR_T * *pTrDir*, TRDP_TRAIN_NET_DIR_T * *pTrNetDir*)

Function to retrieve the operational train directory.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***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.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.12 EXT_DECL TRDP_ERR_T tau_getVehInfo (TRDP_APP_SESSION_T *appHandle*, TRDP_VEHICLE_INFO_T * *pVehInfo*, const TRDP_LABEL_T *pVehLabel*, const TRDP_LABEL_T *pCstLabel*)

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

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pVehInfo*** Pointer to the vehicle info to be returned.

← ***pVehLabel*** Pointer to a vehicle label. NULL means own vehicle if cstLabel refers to own consist.

← ***pCstLabel*** Pointer to a consist label. NULL means own consist.

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.13 EXT_DECL TRDP_ERR_T tau_getVehOrient (TRDP_APP_SESSION_T *appHandle*, UINT8 * *pVehOrient*, UINT8 * *pCstOrient*, TRDP_LABEL_T *pVehLabel*, TRDP_LABEL_T *pCstLabel*)

Function to retrieve the orientation of the given vehicle.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

→ ***pVehOrient*** Pointer to the vehicle orientation to be returned '00'B = not known (corrected vehicle) '01'B = same as operational train direction '10'B = inverse to operational train direction

→ ***pCstOrient*** Pointer to the consist orientation to be returned '00'B = not known (corrected vehicle) '01'B = same as operational train direction '10'B = inverse to operational train direction

← ***pVehLabel*** vehLabel = NULL means own vehicle if cstLabel == NULL

← ***pCstLabel*** cstLabel = NULL means own consist

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR Parameter error

5.6.2.14 EXT_DECL TRDP_ERR_T tau_initTTIaccess (TRDP_APP_SESSION_T *appHandle*, VOS_SEMA_T *userAction*, TRDP_IP_ADDR_T *ecspIpAddr*, CHAR8 * *hostsFileName*)

Function to init TTI access.

Parameters:

← ***appHandle*** Handle returned by tlc_openSession().

← ***userAction*** Semaphore to fire if inauguration took place.

← ***ecspIpAddr*** ECSP IP address.

← ***hostsFileName*** Optional host file name as ECSP replacement.

Return values:

TRDP_NO_ERR no error

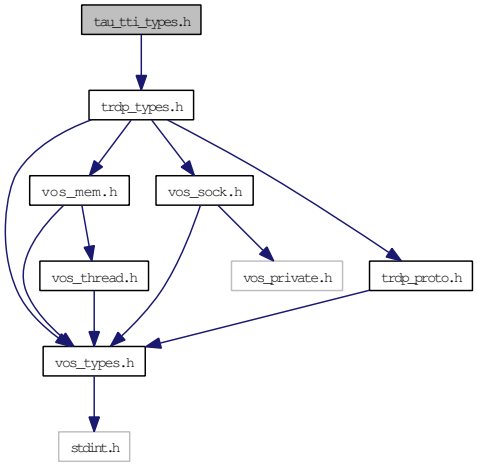
TRDP_INIT_ERR initialisation error

5.7 tau_tti_types.h File Reference

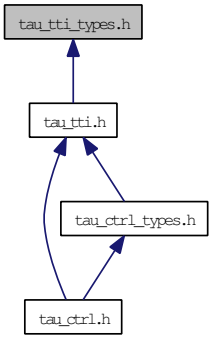
TRDP utility interface definitions.

```
#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.

- 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.

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

5.7.1 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:

Id

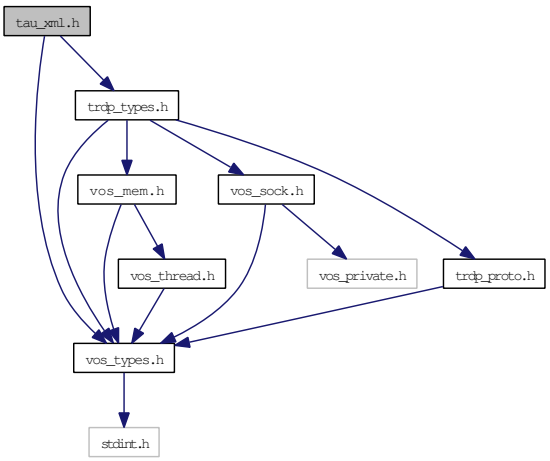
tau_tti_types.h 1511 2016-02-17 17:30:14Z bloehr

5.8 tau_xml.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_xml.h:



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_EXCHG_OPTION_T {
  TRDP_EXCHG_UNSET = 0,
  TRDP_EXCHG_SOURCE = 1,
  TRDP_EXCHG_SINK = 2,
  TRDP_EXCHG_SOURCESINK = 3 }

  Type attribute for telegrams.

- 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_freeXmlDatasetConfig (UINT32 numComId, TRDP_COMID_DSID_MAP_T *pComIdDsIdMap, UINT32 numDataset, TRDP_DATASET_T **pNumDataset)

  Function to free the memory for the DataSet configuration.

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

  Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

5.8.1 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:

Id

tau_xml.h 1509 2016-02-11 14:29:05Z bloehr

BL 2016-02-11: Ticket #102: Custom XML parser, libxml2 not needed anymore

5.8.2 Enumeration Type Documentation

5.8.2.1 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).

5.8.2.2 enum TRDP_EXCHG_OPTION_T

Type attribute for telegrams.

Enumerator:

TRDP_EXCHG_UNSET default, direction is not defined

TRDP_EXCHG_SOURCE telegram shall be published

TRDP_EXCHG_SINK telegram shall be subscribed

TRDP_EXCHG_SOURCESINK telegram shall be published and subscribed

5.8.3 Function Documentation

5.8.3.1 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

5.8.3.2 EXT_DECL void tau_freeXmlDatasetConfig (UINT32 *numComId*, TRDP_COMID_DSID_MAP_T * *pComIdDsIdMap*, UINT32 *numDataset*, TRDP_DATASET_T ** *pNumDataset*)

Function to free the memory for the DataSet configuration.

Free the memory for the DataSet configuration which was allocated when parsing the XML configuration file.

Parameters:

← ***numComId*** The number of entries in the ComId DatasetId mapping list

← ***pComIdDsIdMap*** Pointer to an array of structures of type TRDP_COMID_DSID_MAP_T

← ***numDataset*** The number of datasets found in the configuration

← ***pNumDataset*** Pointer to an array of pointers to a structures of type TRDP_DATASET_T

Return values:

none

5.8.3.3 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

5.8.3.4 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

5.8.3.5 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.

Parameters:

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

→ ***pNumComId*** Pointer to the number of entries in the ComId DatasetId mapping list

→ ***ppComIdDsIdMap*** 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

5.8.3.6 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

5.8.3.7 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

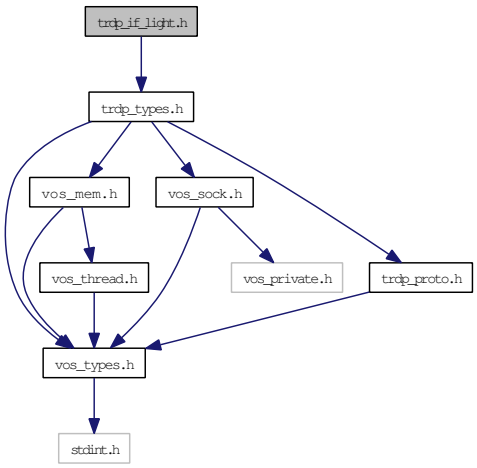
TRDP_PARAM_ERR File not existing

5.9 trdp_if_light.h File Reference

TRDP Light interface functions (API).

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

Include dependency graph for trdp_if_light.h:



Functions

- EXT_DECL TRDP_ERR_T tlc_init (const TRDP_PRINT_DBG_T pPrintDebugString, void *pRefCon, const TRDP_MEM_CONFIG_T *pMemConfig)

  Support for message data can only be excluded during compile time!

- 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_configSession (TRDP_APP_SESSION_T appHandle, const TRDP_MARSHALL_CONFIG_T *pMarshall, const TRDP_PD_CONFIG_T *pPdDefault, const TRDP_MD_CONFIG_T *pMdDefault, const TRDP_PROCESS_CONFIG_T *pProcessConfig)

  (Re-)configure a session.

- 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_IP_ADDR_T tlc_getOwnIpAddress (TRDP_APP_SESSION_T appHandle)

  Get the interface address.

- 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)

  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_readdListener (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, UINT32 comId, 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_getUdpListStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumList, TRDP_LIST_STATISTICS_T *pStatistics)

  Return UDP MD listener statistics.

- EXT_DECL TRDP_ERR_T tlc_getTcpListStatistics (TRDP_APP_SESSION_T appHandle, UINT16 *pNumList, TRDP_LIST_STATISTICS_T *pStatistics)

  Return TCP 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.

5.9.1 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 1526 2016-03-02 13:45:31Z newtecbosse

BL 2015-11-24: Accessor for IP address of session BL 2015-09-04: Ticket #99: refCon for tlc_init()

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

5.9.2 Function Documentation

5.9.2.1 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

5.9.2.2 EXT_DECL TRDP_ERR_T tlc_configSession (TRDP_APP_SESSION_T *appHandle*, const TRDP_MARSHALL_CONFIG_T * *pMarshall*, const TRDP_PD_CONFIG_T * *pPdDefault*, const TRDP_MD_CONFIG_T * *pMdDefault*, const TRDP_PROCESS_CONFIG_T * *pProcessConfig*)

(Re-)configure a session.

tlc_configSession is called by openSession, but may also be called later on to change the defaults.

Parameters:

← ***appHandle*** A handle for further calls to the trdp stack

← ***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 inited

TRDP_PARAM_ERR parameter error

5.9.2.3 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_openSession

← ***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

5.9.2.4 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 used descriptors (for select())

Return values:

TRDP_NO_ERR no error

TRDP_NOINIT_ERR handle invalid

5.9.2.5 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 implicitely.

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

5.9.2.6 EXT_DECL TRDP_IP_ADDR_T tlc_getOwnIpAddress (TRDP_APP_SESSION_T *appHandle*)

Get the interface address.

Parameters:

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

Return values:

realIP

5.9.2.7 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 implicitely.

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

5.9.2.8 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 implicitely.

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

5.9.2.9 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_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

5.9.2.10 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 implicitely.

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

5.9.2.11 EXT_DECL TRDP_ERR_T tlc_getTcpListStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 * *pNumList*, TRDP_LIST_STATISTICS_T * *pStatistics*)

Return TCP MD listener statistics.

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

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

5.9.2.12 EXT_DECL TRDP_ERR_T tlc_getUdpListStatistics (TRDP_APP_SESSION_T *appHandle*, UINT16 * *pNumList*, TRDP_LIST_STATISTICS_T * *pStatistics*)

Return UDP MD listener statistics.

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

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

5.9.2.13 EXT_DECL const TRDP_VERSION_T* tlc_getVersion (void)

Return version.

Return pointer to version structure

Return values:

const TRDP_VERSION_T

5.9.2.14 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

5.9.2.15 EXT_DECL TRDP_ERR_T tlc_init (const TRDP_PRINT_DBG_T *pPrintDebugString*, void * *pRefCon*, const TRDP_MEM_CONFIG_T * *pMemConfig*)

Support for message data can only be excluded during compile time!

Initialize the TRDP stack.

tlc_init initializes the memory subsystem and takes a function pointer to an output function for logging.

Parameters:

← ***pPrintDebugString*** Pointer to debug print function

← ***pRefCon*** user context

← ***pMemConfig*** Pointer to memory configuration

Return values:

TRDP_NO_ERR no error

TRDP_MEM_ERR memory allocation failed

TRDP_PARAM_ERR initialization error

5.9.2.16 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 inited

TRDP_PARAM_ERR parameter error

TRDP_SOCK_ERR socket error

5.9.2.17 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

5.9.2.18 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 occured 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

5.9.2.19 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

5.9.2.20 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 topocount value

5.9.2.21 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_openSession
← ***opTrnTopoCnt*** New operational topocount value

5.9.2.22 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

5.9.2.23 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_openSession

← ***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

5.9.2.24 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_openSession

→ ***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_PLAGS_-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

5.9.2.25 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_openSession

← ***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

5.9.2.26 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_openSession

→ ***listenHandle*** Handle for this listener

Return values:

TRDP_NO_ERR no error

TRDP_PARAM_ERR parameter error

TRDP_NOINIT_ERR handle invalid

5.9.2.27 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_openSession

← ***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_-PLAGS_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

5.9.2.28 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_openSession

→ ***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

5.9.2.29 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_openSession

← ***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

5.9.2.30 TRDP_ERR_T tlm_replyErr (TRDP_APP_SESSION_T *appHandle*, const TRDP_UUID_T * *pSessionId*, UINT32 *comId*, 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_openSession

← ***pSessionId*** Session ID returned by indication

← ***comId*** ComId for reply

← ***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

5.9.2.31 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_openSession

← ***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

5.9.2.32 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_openSession

← ***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_-PLAGS_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

5.9.2.33 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_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

5.9.2.34 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_openSession

← ***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

5.9.2.35 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 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 data packet / dataset, NULL if sending starts later with tlp_put()

← ***dataSize*** size of data packet >= 0 and <= TRDP_MAX_PD_DATA_SIZE

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

5.9.2.36 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_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_PUB_ERR not published

TRDP_NOINIT_ERR handle invalid

TRDP_COMID_ERR ComID not found when marshalling

5.9.2.37 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*)

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_openSession

← ***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

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

5.9.2.38 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*** OPTIONS: TTRDP_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

5.9.2.39 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_openSession
← ***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

5.9.2.40 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_openSession
← ***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

5.9.2.41 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 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

5.9.2.42 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_openSession

← ***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

5.9.2.43 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_SUB_ERR not subscribed

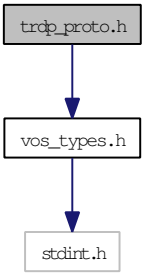
TRDP_NOINIT_ERR handle invalid

5.10 trdp_proto.h File Reference

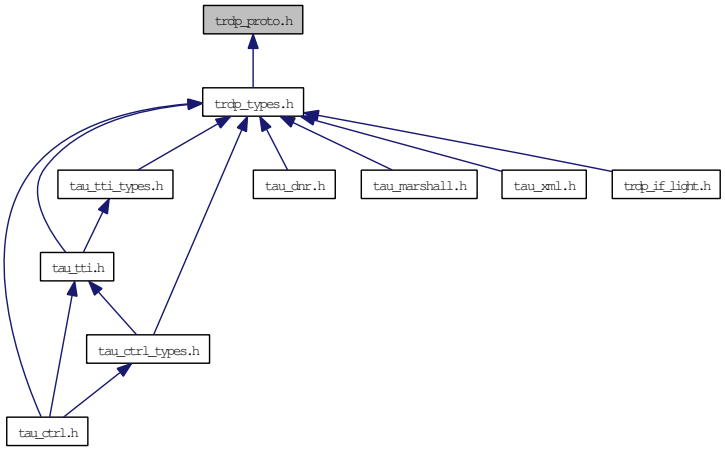
Definitions for the TRDP protocol.

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

Include dependency graph for trdp_proto.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.

Defines

- #define TRDP_PD_UDP_PORT 17224
  process data UDP port
- #define TRDP_MD_UDP_PORT 17225

message data UDP port

- #define TRDP_MD_TCP_PORT 17225

  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.

5.10.1 Detailed Description

Definitions for the TRDP protocol.

TRDP internal type definitions

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

This Source Code Form is subject to the terms of the Mozilla Public License, v. 2.0. If a copy of the MPL was not distributed with this file, You can obtain one at http://mozilla.org/MPL/2.0/.

Id

trdp_proto.h 1454 2015-10-16 16:14:02Z bloehr

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

5.10.2 Define Documentation

5.10.2.1 #define TRDP_DEST_URI_SIZE 32

max.

Dest URI size in MD header

5.10.2.2 #define TRDP_ETBCTRL_COMID 1

TRDP reserved COMIDs in the range 1 .

.. 1000

5.10.2.3 #define TRDP_ETBCTRL_DSID 1

TRDP reserved data set ids in the range 1 .

.. 1000

5.10.2.4 #define TRDP_MAX_FILE_NAME_LEN 128

path and file name length incl.

terminating '0'

5.10.2.5 #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 ∗ (sizeof (separator)) + 1(terminating 0) to facilitate alignment the size will be increased by 1 byte label length incl. terminating '0'

5.10.2.6 #define TRDP_MAX_URI_HOST_LEN (4 ∗ TRDP_MAX_LABEL_LEN)

URI host part length incl.

terminating '0'

5.10.2.7 #define TRDP_MAX_URI_LEN ((6 ∗ TRDP_MAX_LABEL_LEN) + 8)

URI length incl.

terminating '0' and 1 padding byte

5.10.2.8 #define TRDP_MAX_URI_USER_LEN (2 ∗ TRDP_MAX_LABEL_LEN)

URI user part incl.

terminating '0'

5.10.3 Enumeration Type Documentation

5.10.3.1 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

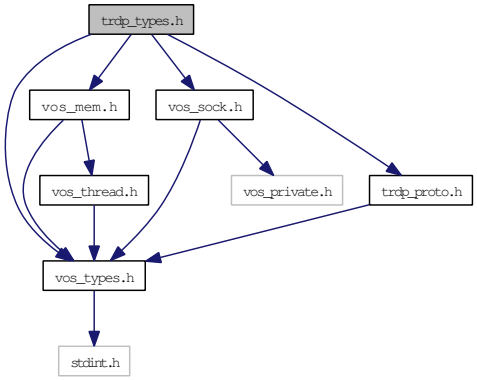
TRDP_MSG_ME 'Me' MD Error

5.11 trdp_types.h File Reference

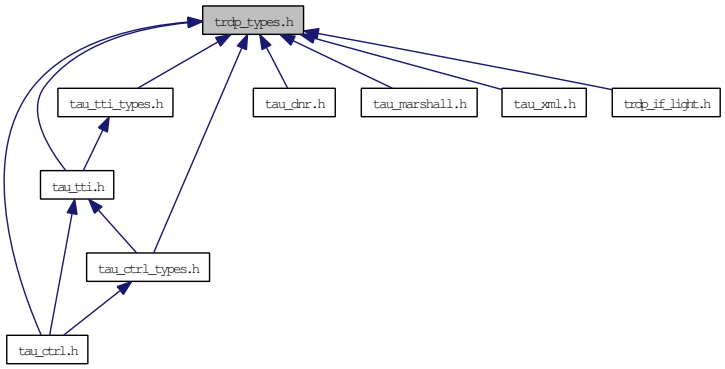
Typedefs for TRDP communication.

```
#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_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 = errror, 0x01 = false, 0x02 = true, 0x03 undefined)

Typedefs

- typedef VOS_IP4_ADDR_T TRDP_IP_ADDR_T

  TRDP general type definitions.

- typedef VOS_VERSION_T TRDP_VERSION_T

  Version information.

- 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, UINT32 srcSize, 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, UINT32 srcSize, 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_SOCK_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_UNRESOLVED_ERR = -47,
TRDP_XML_PARSER_ERR = -48,
TRDP_INUSE_ERR = -49,
TRDP_MARSHALLING_ERR = -50,
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,
  TRDP_FLAGS_FORCE_CB = 0x10 }

  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.

5.11.1 Detailed Description

Typedefs for TRDP communication.

F

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

BL 2016-02-11: Ticket #111: 'unit', 'scale', 'offset' attributes added to TRDP_DATASET_ELEMENT BL 2016-01-25: Ticket #106: User needs to be informed on every received PD packet BL 2015-12-14: Ticket #33: source size check for marshalling BL 2015-08-05: Ticket #81: Counts for packet loss BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed BL 2014-02-27: Ticket #17: tlp_subscribe() returns wrong *pSubHandle

5.11.2 Typedef Documentation

5.11.2.1 typedef VOS_IP4_ADDR_T TRDP_IP_ADDR_T

TRDP general type definitions.

5.11.2.2 typedef TRDP_ERR_T(∗ TRDP_MARSHALL_T)(void ∗pRefCon, UINT32 comId, UINT8 ∗pSrc, UINT32 srcSize, 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
← ***srcSize*** size of the source buffer
← ∗***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

5.11.2.3 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

5.11.2.4 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

5.11.2.5 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.

5.11.2.6 typedef VOS_TIME_T TRDP_TIME_T

Timer value compatible with timeval / select.

Relative or absolute date, depending on usage

5.11.2.7 typedef TRDP_ERR_T(∗ TRDP_UNMARSHALL_T)(void ∗pRefCon, UINT32 comId, UINT8 ∗pSrc, UINT32 srcSize, 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

← ***srcSize*** data length from TRDP packet header

← ∗***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

5.11.3 Enumeration Type Documentation

5.11.3.1 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.

5.11.3.2 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 Timout.

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 endianess 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_UNRESOLVED_ERR DNR: address could not be resolved.
TRDP_XML_PARSER_ERR Returned by the tau_xml subsystem.
TRDP_INUSE_ERR Resource is still in use.
TRDP_MARSHALLING_ERR Source size exceeded, dataset mismatch.
TRDP_UNKNOWN_ERR Unspecified error.

5.11.3.3 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.
TRDP_FLAGS_FORCE_CB Force a callback for every received packet.

5.11.3.4 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.

5.11.3.5 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.

5.11.3.6 enum TRDP_REPLY_STATUS_T

TRDP data transfer type definitions.

Reply status messages

5.11.3.7 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.

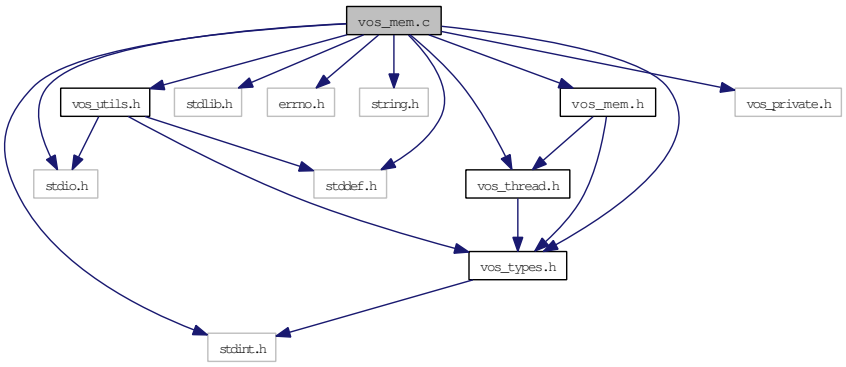
TRDP_TO_KEEP_LAST_VALUE If set, last received values will be returned.

5.12 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

- 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 *pStrDst, const CHAR8 *pStrSrc, UINT32 count)

  String copy with length limitation.

- EXT_DECL void vos_strncat (CHAR8 *pStrDst, UINT32 count, const CHAR8 *pStrSrc)

  String concatenation 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.

5.12.1 Detailed Description

Memory functions.

OS abstraction of memory access and control

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

This Source Code Form is subject to the terms of the Mozilla Public License, v. 2.0. If a copy of the MPL was not distributed with this file, You can obtain one at http://mozilla.org/MPL/2.0/.

Id

vos_mem.c 1519 2016-02-26 16:18:39Z bloehr

Changes: BL 2016-02-10: Debug print: tabs before size output BL 2012-12-03: ID 1: "using uninitialized PD_ELE_T.pullIpAddress variable" ID 2: "uninitialized PD_ELE_T newPD → pNext in tlp_subscribe()"

5.12.2 Function Documentation

5.12.2.1 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 search

← ***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

5.12.2.2 EXT_DECL UINT8* vos_memAlloc (UINT32 *size*)

Allocate a block of memory (from memory area above).

Parameters:

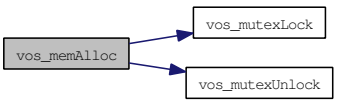
← ***size*** Size of requested block

Return values:

Pointer to memory area

NULL if no memory available

Here is the call graph for this function:



5.12.2.3 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 memoryblocks

Return values:

VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

5.12.2.4 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

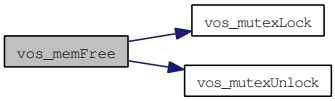
5.12.2.5 EXT_DECL void vos_memFree (void * *pMemBlock*)

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:



5.12.2.6 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:

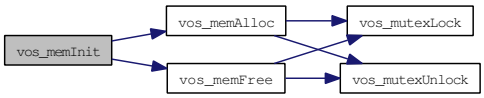
VOS_NO_ERR no error

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:



5.12.2.7 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

5.12.2.8 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

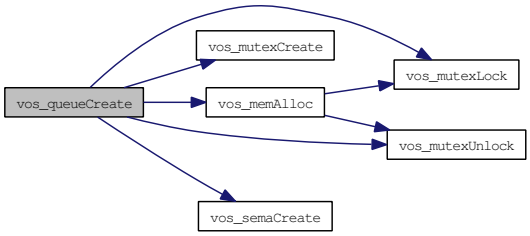
VOS_NOINIT_ERR invalid handle

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:



5.12.2.9 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:

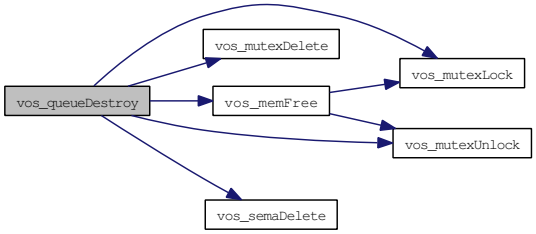
VOS_NO_ERR no error

VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

Here is the call graph for this function:



5.12.2.10 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

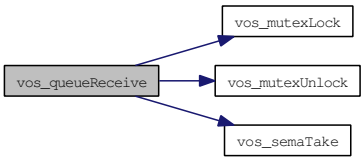
VOS_INIT_ERR module not initialised

VOS_NOINIT_ERR invalid handle

VOS_PARAM_ERR parameter out of range/invalid

VOS_QUEUE_ERR queue is empty

Here is the call graph for this function:



5.12.2.11 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

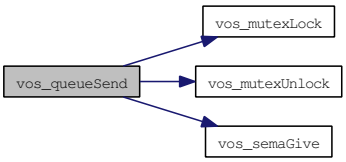
VOS_NOINIT_ERR invalid handle

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:



5.12.2.12 EXT_DECL void vos_strncat (CHAR8 * *pStrDst*, UINT32 *count*, const CHAR8 * *pStrSrc*)

String concatenation with length limitation.

Parameters:

← ***pStrDst*** Destination string

← ***count*** Size of destination buffer

← ***pStrSrc*** Null terminated string to append

Return values:

none

5.12.2.13 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

5.12.2.14 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

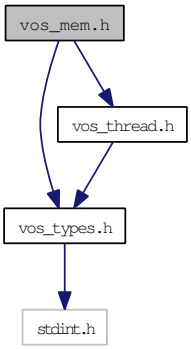
$>$***0*** - string 1 greater than string 2

5.13 vos_mem.h File Reference

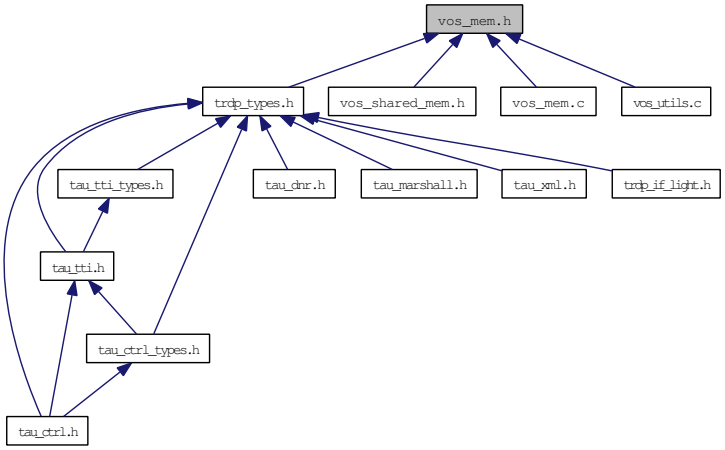
Memory and queue functions for OS abstraction.

```
#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_BLOCKSIZES

  We internally allocate memory always by these block sizes.

- #define VOS_MEM_PREALLOCATE {0, 0, 0, 0, 0, 0, 0, 4, 0, 0, 0, 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 void vos_strncat (CHAR8 *pStrDst, UINT32 count, const CHAR8 *pStrSrc)

  String concatenation 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.

5.13.1 Detailed Description

Memory and queue functions for OS abstraction.

This module provides memory control supervison

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH Peter Brander (Memory scheme)

Remarks:

Id

vos_mem.h 1519 2016-02-26 16:18:39Z bloehr

5.13.2 Define Documentation

5.13.2.1 #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 overal size of the used memory allocation area is larger.

5.13.2.2 #define VOS_MEM_PREALLOCATE {0, 0, 0, 0, 0, 0, 0, 4, 0, 0, 0, 0, 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.

5.13.3 Function Documentation

5.13.3.1 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 search

← ***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

5.13.3.2 EXT_DECL UINT8* vos_memAlloc (UINT32 *size*)

Allocate a block of memory (from memory area above).

Parameters:

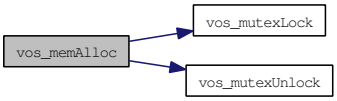
← ***size*** Size of requested block

Return values:

Pointer to memory area

NULL if no memory available

Here is the call graph for this function:



5.13.3.3 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

5.13.3.4 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

5.13.3.5 EXT_DECL void vos_memFree (void * *pMemBlock*)

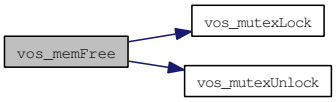
Deallocate a block of memory (from memory area above).

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:



5.13.3.6 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:

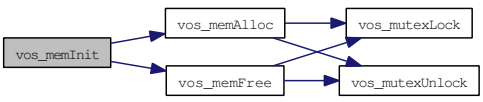
VOS_NO_ERR no error

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:



5.13.3.7 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

5.13.3.8 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

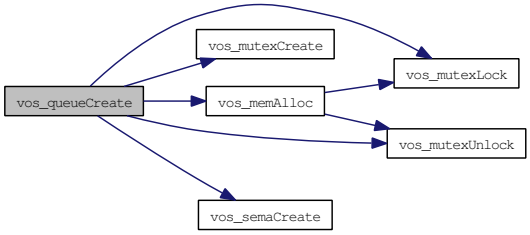
VOS_NOINIT_ERR invalid handle

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:



5.13.3.9 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:

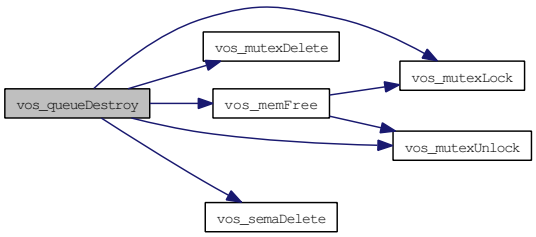
VOS_NO_ERR no error

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:



5.13.3.10 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

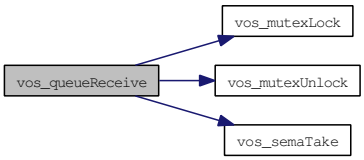
VOS_INIT_ERR module not initialised

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:



5.13.3.11 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

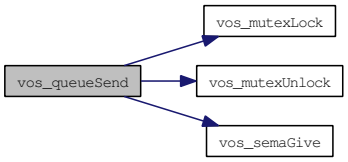
VOS_NOINIT_ERR invalid handle

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:



5.13.3.12 EXT_DECL void vos_strncat (CHAR8 * *pStrDst*, UINT32 *count*, const CHAR8 * *pStrSrc*)

String concatenation with length limitation.

Parameters:

← ***pStrDst*** Destination string

← ***count*** Size of destination buffer

← ***pStrSrc*** Null terminated string to append

Return values:

none

5.13.3.13 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

5.13.3.14 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

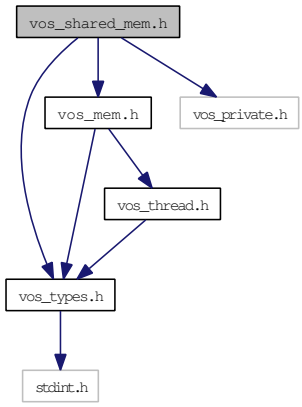
$>$***0*** - string 1 greater than string 2

5.14 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:



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.

5.14.1 Detailed Description

Shared Memory functions for OS abstraction.

This module provides shared memory control supervison

Note:

Project: TCNOpen TRDP prototype stack

Author:

Kazumasa Aiba, TOSHIBA

Remarks:

This Source Code Form is subject to the terms of the Mozilla Public License, v. 2.0. If a copy of the MPL was not distributed with this file, You can obtain one at http://mozilla.org/MPL/2.0/.
Copyright TOSHIBA, Japan, 2013.

Id

vos_mem.h 282 2013-01-11 07:08:44Z 97029

5.14.2 Function Documentation

5.14.2.1 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

5.14.2.2 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

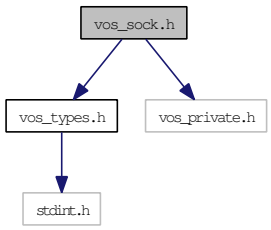
VOS_MEM_ERR no memory available

5.15 vos_sock.h File Reference

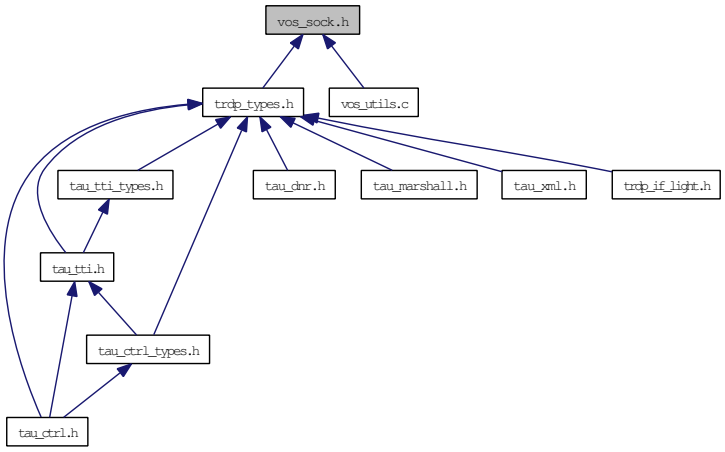
Typedefs for OS abstraction.

```
#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_SOCK_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 BOOL8 vos_netIfUp (VOS_IP4_ADDR_T ifAddress)

  Get the state of an interface.

- 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_SOCK_OPT_T *pOptions)

  Create an UDP socket.

- EXT_DECL VOS_ERR_T vos_sockOpenTCP (INT32 *pSock, const VOS_SOCK_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_SOCK_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 *pIPAddress, 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.

5.15.1 Detailed Description

Typedefs for OS abstraction.

This is the declaration for the OS independend socket interface

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

Id

vos_sock.h 1477 2015-12-11 17:36:53Z bloehr

5.15.2 Define Documentation

5.15.2.1 #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

5.15.2.2 #define VOS_TTL_MULTICAST 64

The maximum number of hops a multicast packet can take.

The maximum size for the interface name

5.15.3 Function Documentation

5.15.3.1 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

5.15.3.2 EXT_DECL UINT32 vos_dottedIP (const CHAR8 * *pDottedIP*)

Convert IP address from dotted dec.

to !host! endianess

Parameters:

← ***pDottedIP*** IP address as dotted decimal.

Return values:

address in UINT32 in host endianess

5.15.3.3 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

5.15.3.4 EXT_DECL UINT32 vos_htonl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

← ***val*** Initial value.

Return values:

swapped value

5.15.3.5 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters:

← ***val*** Initial value.

Return values:

swapped value

5.15.3.6 EXT_DECL const CHAR8∗ vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianess

Parameters:

← ***ipAddress*** address in UINT32 in host endianess

Return values:

IP address as dotted decimal.

5.15.3.7 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

5.15.3.8 EXT_DECL BOOL8 vos_netIfUp (VOS_IP4_ADDR_T *ifAddress*)

Get the state of an interface.

Parameters:

← ***ifAddress*** address of interface to check

Return values:

TRUE interface is up and ready FALSE interface is down / not ready

5.15.3.9 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters:

← ***val*** Initial value.

Return values:

swapped value

5.15.3.10 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters:

← ***val*** Initial value.

Return values:

swapped value

5.15.3.11 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

5.15.3.12 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, 17224 for PD

Return values:

VOS_NO_ERR no error
VOS_PARAM_ERR NULL parameter, parameter error
VOS_UNKNOWN_ERR sock descriptor unknown error

5.15.3.13 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 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

5.15.3.14 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

5.15.3.15 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 parameter out of range/invalid

VOS_IO_ERR Input/Output error

5.15.3.16 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

5.15.3.17 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

5.15.3.18 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

5.15.3.19 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

5.15.3.20 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

5.15.3.21 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

5.15.3.22 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 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

5.15.3.23 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 occured. 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

5.15.3.24 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 occured. 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

5.15.3.25 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, data partially sent

5.15.3.26 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 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

5.15.3.27 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

5.15.3.28 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

5.15.3.29 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

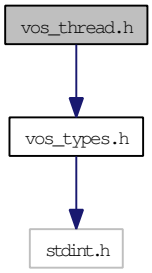
Must be called after last socket call

5.16 vos_thread.h File Reference

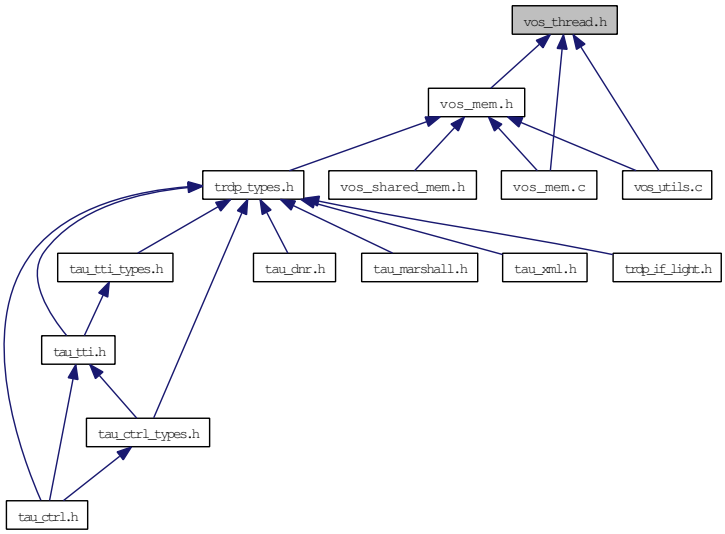
Threading functions for OS abstraction.

`#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 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.

5.16.1 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:

Id

vos_thread.h 1394 2015-03-27 13:58:54Z ahweiss

5.16.2 Function Documentation

5.16.2.1 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

5.16.2.2 EXT_DECL void vos_clearTime (VOS_TIME_T * *pTime*)

Clear the time stamp.

Parameters:

→ ***pTime*** Pointer to time value

5.16.2.3 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

5.16.2.4 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

5.16.2.5 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

5.16.2.6 EXT_DECL void vos_getTime (VOS_TIME_T * *pTime*)

Return the current time in sec and us.

Parameters:

→ ***pTime*** Pointer to time value

5.16.2.7 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"

5.16.2.8 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

5.16.2.9 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

5.16.2.10 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

5.16.2.11 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

5.16.2.12 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

5.16.2.13 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

5.16.2.14 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T *pMutex*)

Release a mutex.

Unlock the mutex.

Parameters:

← ***pMutex*** mutex handle

5.16.2.15 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 sempahore

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

5.16.2.16 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

5.16.2.17 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters:

← ***sema*** semaphore handle

5.16.2.18 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

5.16.2.19 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

5.16.2.20 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

5.16.2.21 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

5.16.2.22 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

5.16.2.23 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

5.16.2.24 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.16.2.25 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

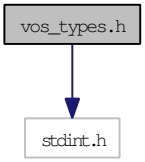
VOS_PARAM_ERR parameter out of range/invalid

5.17 vos_types.h File Reference

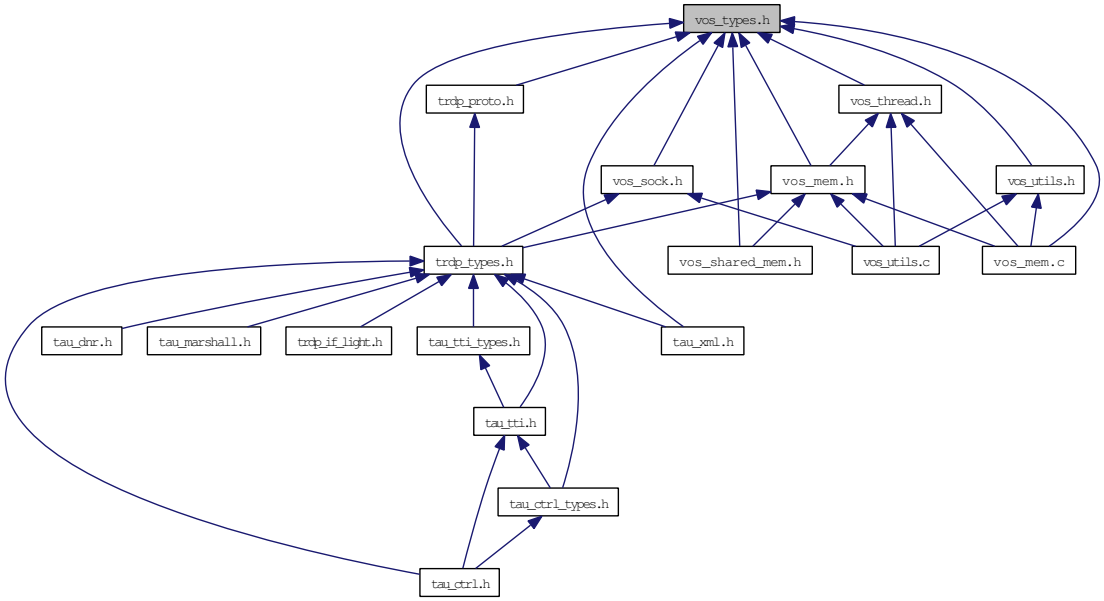
Typedefs for OS abstraction.

`#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_VERSION_T

  Version information.

- 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_SOCK_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.

5.17.1 Detailed Description

Typedefs for OS abstraction.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

Id

vos_types.h 1424 2015-08-06 11:56:31Z bloehr

5.17.2 Typedef Documentation

5.17.2.1 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

5.17.3 Enumeration Type Documentation

5.17.3.1 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 Timout.

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 endianess for selected target wrong.

VOS_NOCONN_ERR No TCP connection.

VOS_UNKNOWN_ERR Unknown error.

5.17.3.2 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.

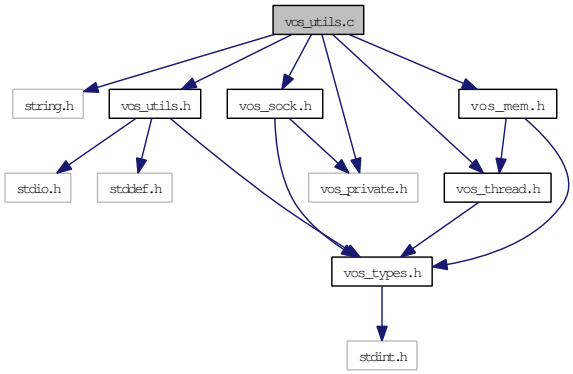
VOS_LOG_DBG This is a debug info.

5.18 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 endianess.

- 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.

- const char * vos_getVersionString (void)

  Return a human readable version representation.

- EXT_DECL const VOS_VERSION_T * vos_getVersion (void)

  Return version.

5.18.1 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:

Id

vos_utils.c 1509 2016-02-11 14:29:05Z bloehr

BL 2016-02-10: ifdef DEBUG for some functions BL 2014-02-28: Ticket #25: CRC32 calculation is not according IEEE802.3

5.18.2 Function Documentation

5.18.2.1 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

5.18.2.2 EXT_DECL const VOS_VERSION_T* vos_getVersion (void)

Return version.

Return pointer to version structure

Return values:

VOS_VERSION_T

5.18.2.3 const char* vos_getVersionString (void)

Return a human readable version representation.

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

Return values:

const string

5.18.2.4 VOS_ERR_T vos_init (void * *pRefCon*, VOS_PRINT_DBG_T *pDebugOutput*)

Initialize the virtual operating system.

Initialize the vos library.

Parameters:

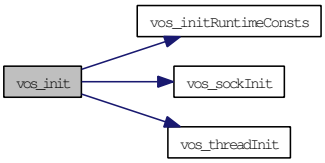
← ***pRefCon*** context for debug output function

← ***pDebugOutput*** Pointer to debug output function.

Return values:

VOS_NO_ERR no error VOS_INTEGRATION_ERR if endianess/alignment mismatch VOS_SOCK_ERR sockets not supported VOS_UNKNOWN_ERR initialisation error

Here is the call graph for this function:



5.18.2.5 VOS_ERR_T vos_initRuntimeConsts (void)

Pre-compute alignment and endianess.

Return values:

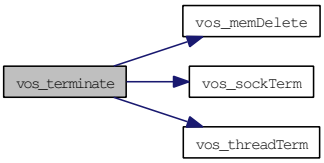
VOS_INTEGRATION_ERR or VOS_NO_ERR

5.18.2.6 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:

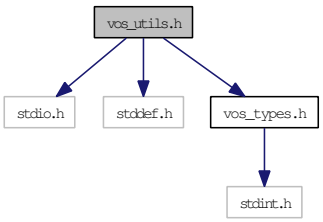


5.19 vos_utils.h File Reference

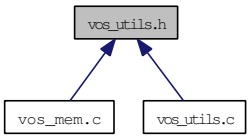
Typedefs for OS abstraction.

```
#include <stdio.h>
#include <stddef.h>
#include "vos_types.h"
```

Include dependency graph for vos_utils.h:



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



Defines

- #define VOS_MAX_PRNT_STR_SIZE 256

  String size definitions for the debug output functions.

- #define VOS_MAX_FRMT_SIZE 64

  Max.

- #define VOS_MAX_ERR_STR_SIZE (VOS_MAX_PRNT_STR_SIZE - VOS_MAX_FRMT_SIZE)

  Max.

- #define vos_snprintf(str, size, format, args...) snprintf(str, size, format, ## args)

  Safe printf function.

- #define vos_printLogStr(level, string)

  Debug output macro without formatting options.

- #define vos_printLog(level, format, args...)

  Debug output macro with formatting options.

- #define ALIGNOF(type) ((UINT32)offsetof(struct { char c; type member; }, member))

  Alignment macros.

- #define INITFCS 0xffffffff
  CRC/FCS constants.
- #define SIZE_OF_FCS 4
  for better understanding of address calculations
- #define L_ENDIAN
  Define endianess if not already done by compiler.

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.
- EXT_DECL const CHAR8 * vos_getVersionString (void)
  Return a human readable version representation.
- EXT_DECL const VOS_VERSION_T * vos_getVersion (void)
  Return version.

5.19.1 Detailed Description

Typedefs for OS abstraction.

Note:

Project: TCNOpen TRDP prototype stack

Author:

Bernd Loehr, NewTec GmbH

Remarks:

Id

vos_utils.h 1487 2015-12-21 14:33:26Z bloehr

BL 2014-02-28: Ticket #25: CRC32 calculation is not according IEEE802.3

5.19.2 Define Documentation

5.19.2.1 #define INITFCS 0xffffffff

CRC/FCS constants.

Initial FCS value

5.19.2.2 #define VOS_MAX_ERR_STR_SIZE (VOS_MAX_PRNT_STR_SIZE - VOS_MAX_FRMT_SIZE)

Max.

size of the error part

5.19.2.3 #define VOS_MAX_FRMT_SIZE 64

Max.

size of the 'format' part

5.19.2.4 #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

5.19.3 Function Documentation

5.19.3.1 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

5.19.3.2 EXT_DECL const VOS_VERSION_T* vos_getVersion (void)

Return version.

Return pointer to version structure

Return values:

const VOS_VERSION_T

Return pointer to version structure

Return values:

VOS_VERSION_T

5.19.3.3 EXT_DECL const CHAR8* vos_getVersionString (void)

Return a human readable version representation.

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

Return values:

const string

5.19.3.4 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:

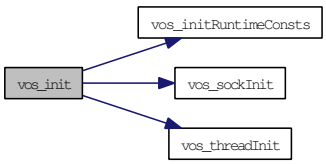
← ***pRefCon*** context for debug output function

← ***pDebugOutput*** Pointer to debug output function.

Return values:

VOS_NO_ERR no error VOS_INTEGRATION_ERR if endianess/alignment mismatch VOS_-SOCK_ERR sockets not supported VOS_UNKNOWN_ERR initialisation error

Here is the call graph for this function:

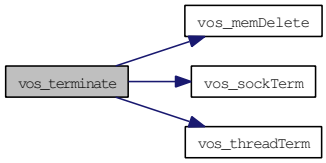


5.19.3.5 EXT_DECL void vos_terminate ()

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:



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