TCNOpen TRDP

1.2

Generated by Doxygen 1.8.4

Tue Nov 11 2014 16:28:51

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

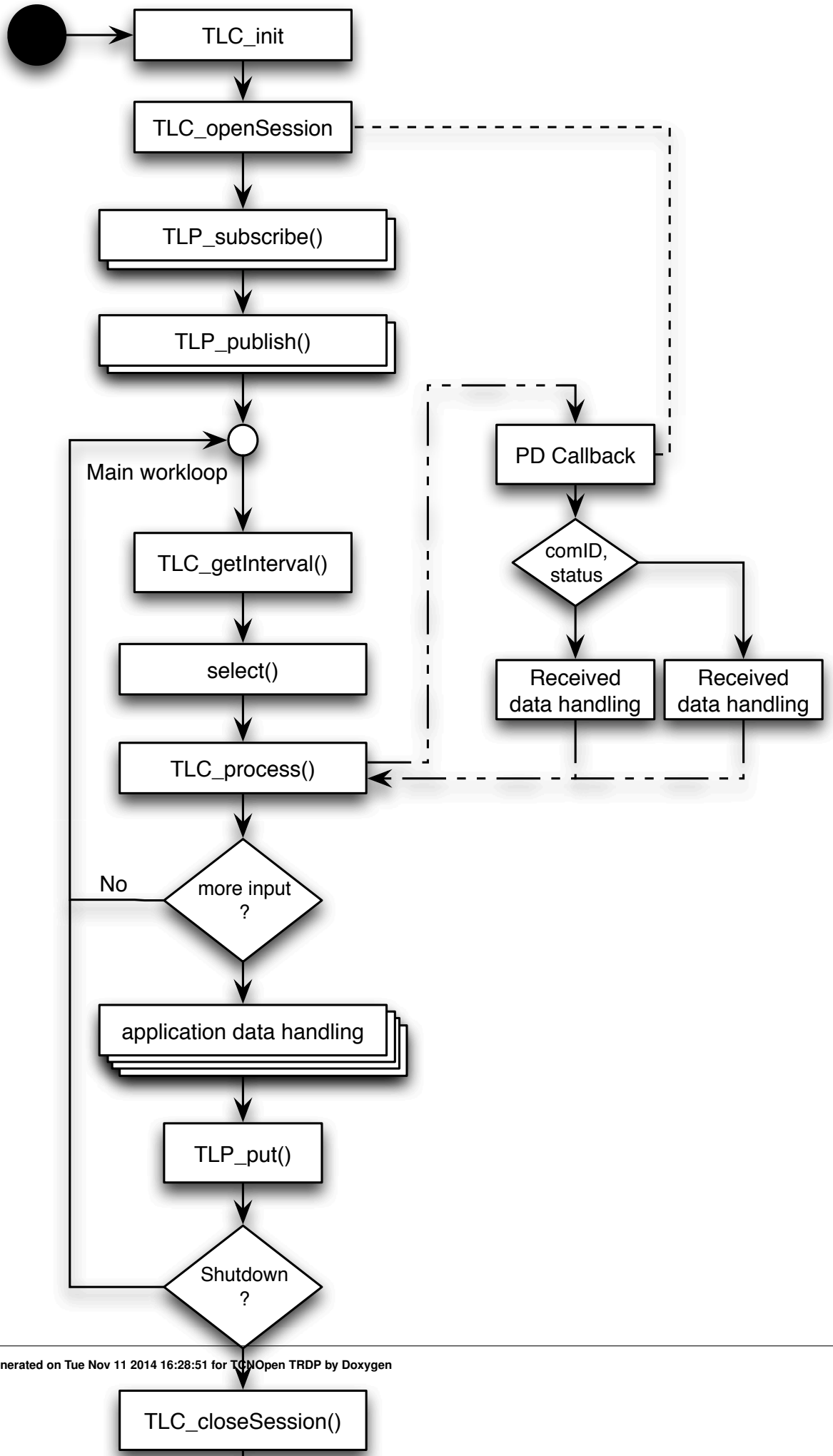
The API documented here is mainly concerned with three bodies of code:

- *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.


TLC_init
TLC_openSession
TLP_subscribe()
TLP_publish()
Main workloop
PD Callback
comID,
status
TLC_getInterval()
select()
Received
data handling
Received
data handling
TLC_process()
No
more input
?
application data handling
TLP_put()
Shutdown
?
TLC_closeSession()

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_private.h>`

Data Fields

- UINT8 **trnVehNo**

  vehicle sequence number within the train with vehicle 01 being the first vehicle in ETB reference direction 1 as defined in IEC61375-2-5 value range: 0..63 a value of 0 indicates that this vehicle has been inserted by correction
- 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..32)
- UINT8 **reserved02**

  reserved (=0)
- UINT8 **ownOpCstNo**

  own operational address (= 1..32) = 0 if unknown (e.g.
- 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..31 (1: first vehicle in consist in Direction 1, 2: second vehicle, etc.)
- UINT8 **reserved04**

  reserved (=0)
- UINT16 **reserved05**

  reserved (=0)
- UINT8 **reserved06**

  reserved (=0)
- UINT8 **confVehCnt**

  number of confirmed vehicles in train (1..63)
- TRDP_CONF_VEHICLE_T **confVehList** [**TRDP_MAX_VEH_CNT**]

  dynamic ordered list of confirmed vehicles in train, starting with vehicle at train head, see sub-clause 5.3.3.2.6
- TRDP_ETB_CTRL_VDP_T **safetyTrail**

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

  function device of ECSC which sends the telegram
- UINT8 **inhibit**

  inauguration inhibit 0 = no inhibit request 1 = inhibit request
- UINT8 **leadingReq**

  leading request 0 = no leading request 1 = leading request
- UINT8 **leadingDir**

  leading direction 0 = no leading request 1 = leading request direction 1 2 = leading request direction 2
- UINT8 **sleepReq**

  sleep request 0 = no sleep request 1 = sleep request
- UINT16 **lifesign**

  wrap-around counter, incremented with each produced datagram.
- UINT8 **ecspState**

  ECSP state indication 0 = ECSP not operational(initial value) 1 = ECSP in operation.
- UINT8 **etbInhibit**

  inauguration inhibit indication 0 = n/a (default) 1 = inhibit not requested on ETB 2 = inhibit set on local ETBN 3 = inhibit set on remote ETBN 4 = inhibit set on local and remote ETBN
- UINT8 **etbLength**

  indicates train lengthening in case train inauguration is inhibit 0 = no lengthening (default) 1 = lengthening detected
- UINT8 **etbShort**

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

- UINT16 **reserved02**

  reserved (=0)

- UINT8 **etbLeadState**

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

- UINT8 **etbLeadDir**

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

- UINT8 **ttdbSrvState**

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

- UINT8 **dnsSrvState**

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

- UINT8 **trnDirState**

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

- UINT8 **opTrnDirState**

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

- UINT8 **sleepCtrlState**

  sleep control state (option) 0 = option not available 1 = RegularOperation 2 = WaitForSleepMode 3 = PrepareFor-SleepMode

- UINT8 **sleepReqCnt**

  number of sleep requests (option) value range: 0..63, not used = 0

- UINT32 **opTrnTopoCnt**

  operational train topology counter

- UINT8 **command**

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

- UINT8 **reserved01**

  reserved (=0)

- UINT16 **confVehCnt**

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

- 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..63
- TRDP_CONSIST_T **cstList** [**TRDP_MAX_CST_CNT**]

  consist list.
- UINT32 **trnTopoCnt**

  trnTopoCnt value ctrlType == 0: actual value ctrlType == 1: set to 0
- BITSET8 **etbId**

  identification of the ETB the TTDB is computed for bit0: ETB0 (operational network) bit1: ETB1 (multimedia network) bit2: ETB2 (other network) bit3: ETB3 (other network)
- TRDP_LABEL_T **vehId**

  Unique vehicle identifier, application defined (e.g.
- UINT8 **opVehNo**

  operational vehicle sequence number in train value range 1..63
- UINT8 **opCstNo**

  operational consist number in train (1..63)
- 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..63)
- 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..63)
- TRDP_OP_VEHICLE_T **opVehList** [**TRDP_MAX_CST_CNT**]

  operational vehicle list starting with op.
- UINT32 **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
- UINT16 **entryCnt**

  number of entries in train network directory
- TRDP_TRAIN_NET_DIR_ENTRY_T **trnNetDir** [**TRDP_MAX_CST_CNT**]

  train network directory
- UINT32 **sequenceCounter**

  Unique counter (autom incremented)
- UINT16 **protocolVersion**

  fix value for compatibility (set by the API)
- UINT16 **msgType**

  of datagram: PD Request (0x5072) or PD_MSG (0x5064)
- UINT32 **comId**

  set by user: unique id
- UINT32 **datasetLength**

  length of the data to transmit 0...1436
- UINT32 **reserved**

  before used for ladder support
- UINT32 **replyComId**

  used in PD request
- UINT32 **replyIpAddress**

  used for PD request
- UINT32 **frameCheckSum**

  CRC32 of header.
- INT32 **replyStatus**

  0 = OK
- UINT8 **sessionID** [16]

  UUID as a byte stream.
- UINT32 **replyTimeout**

  in us

- UINT8 **sourceURI** [32]

  User part of URI.
- UINT8 **destinationURI** [32]

  User part of URI.
- PD_HEADER_T **frameHead**

  Packet header in network byte order.
- UINT8 **data** [**TRDP_MAX_PD_DATA_SIZE**]

  data ready to be sent or received (with CRCs)

4.1.1 Detailed Description

Types for ETB control.

TRDP PD packet.

TRDP message data header - network order and alignment.

TRDP process data header - network order and alignment.

Train network directory structure.

Train network directory entry structure acc.

Operational Train directory status info structure.

Operational train structure.

Operational train directory state.

Operational consist structure.

Operational vehicle structure.

TCN train directory.

CSTINFO Control telegram.

TCN consist structure.

Version information for communication buffers.

to IEC61375-2-5

4.1.2 Field Documentation

4.1.2.1 UINT16 GNU_PACKED::confVehCnt

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

4.1.2.2 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

4.1.2.3 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.

4.1.2.4 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)

4.1.2.5 UINT32 GNU_PACKED::datasetLength

length of the data to transmit 0...1436

defined by user: length of data to transmit

4.1.2.6 TRDP_LABEL_T GNU_PACKED::deviceName

function device of ECSC which sends the telegram

function device of ED which sends the telegram

4.1.2.7 UINT32 GNU_PACKED::etbTopoCnt

ETB topography counter.

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

train network directory CRC

4.1.2.8 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.

4.1.2.9 ANTIVALENT8 GNU_PACKED::isLead

vehicle is leading

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

4.1.2.10 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

4.1.2.11 UINT16 GNU_PACKED::lifesign

wrap-around counter, incremented with each produced datagram.

4.1.2.12 UINT16 GNU_PACKED::msgType

of datagram: PD Request (0x5072) or PD_MSG (0x5064)
of datagram: Mn, Mr, Mp, Mq, Mc or Me

4.1.2.13 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

4.1.2.14 UINT8 GNU_PACKED::opTrnDirState

train directory state 1 = INVALID 2 = VALID 4 = SHARED other values are not allowed
Operatiobal train directory status: '01'B == inalid, '10'B == valid.

4.1.2.15 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

4.1.2.16 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

4.1.2.17 UINT8 GNU_PACKED::ownOpCstNo

own operational address (= 1..32) = 0 if unknown (e.g.
operational consist number the vehicle belongs to
after Inauguration)

4.1.2.18 UINT16 GNU_PACKED::protocolVersion

fix value for compatibility (set by the API)
fix value for compatibility

4.1.2.19 UINT16 GNU_PACKED::reserved01

reserved (=0)
reserved for future use (= 0)

4.1.2.20 UINT8 GNU_PACKED::reserved01

reserved (=0)

reserved for future use (= 0)

4.1.2.21 UINT8 GNU_PACKED::reserved02

reserved (=0)

reserved (= 0)

reserved for future use (= 0)

4.1.2.22 UINT16 GNU_PACKED::reserved02

reserved (=0)

reserved (= 0)

4.1.2.23 UINT8 GNU_PACKED::reserved03

reserved (=0)

reserved for future use (= 0)

4.1.2.24 UINT8 GNU_PACKED::reserved04

reserved (=0)

reserved for future use (= 0)

4.1.2.25 UINT8 GNU_PACKED::reserved06

reserved (=0)

reserved for future use (= 0)

4.1.2.26 TRDP_ETB_CTRL_VDP_T GNU_PACKED::safetyTrail

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

```
ETBCTRL-VDP trailer, parameter ësafeSequCountí == 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.

4.1.2.27 UINT8 GNU_PACKED::trnCstNo

own TCN consist number (= 1..32)

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

Sequence number of consist in train (1..63)

4.1.2.28 UINT8 GNU_PACKED::trnDirState

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

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

4.1.2.29 TRDP_LABEL_T GNU_PACKED::trnId

train identifier, application defined (e.g.

ICE75, IC346), informal

4.1.2.30 TRDP_LABEL_T GNU_PACKED::trnOperator

train operator, e.g.

trenitalia.it, informal

4.1.2.31 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)

4.1.2.32 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..63 a value of 0 indicates that this vehicle has been inserted by correction

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

4.1.2.33 TRDP_LABEL_T GNU_PACKED::vehId

Unique vehicle identifier, application defined (e.g.

UIC Identifier)

4.1.2.34 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

4.1.2.35 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.

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

- **tau_ctrl_types.h**
- **tau_tti_types.h**
- **trdp_proto.h**
- **trdp_private.h**

4.2 PD_ELE Struct Reference

Queue element for PD packets to send or receive.

`#include <trdp_private.h>`

Collaboration diagram for PD_ELE:

Data Fields

- struct **PD_ELE** * **pNext**

  pointer to next element or NULL
- UINT32 **magic**

  prevent acces through dangeling pointer
- **TRDP_ADDRESSES_T addr**

  handle of publisher/subscriber
- **TRDP_IP_ADDR_T lastSrcIP**

  last source IP a subscribed packet was received from
- **TRDP_IP_ADDR_T pullIpAddress**

  In case of pulling a PD this is the requested Ip.
- UINT32 **redId**

  Redundancy group ID or zero.
- UINT32 **curSeqCnt**

  the last sent or received sequence counter
- UINT32 **curSeqCnt4Pull**

  the last sent sequence counter for PULL
- TRDP_SEQ_CNT_LIST_T * **pSeqCntList**

  pointer to list of received sequence numbers per comId
- UINT32 **numRxTx**

  Counter for received packets (statistics)
- UINT32 **updPkts**

  Counter for updated packets (statistics)
- UINT32 **getPkts**

  Counter for read packets (statistics)
- **TRDP_ERR_T lastErr**

  Last error (timeout)
- **TRDP_PRIV_FLAGS_T privFlags**

  private flags
- **TRDP_FLAGS_T pktFlags**

  flags
- **TRDP_TIME_T interval**

  time out value for received packets or interval for packets to send (set from ms)
- **TRDP_TIME_T timeToGo**

  next time this packet must be sent/rcv

- **TRDP_TO_BEHAVIOR_T toBehavior**

  timeout behavior for packets
- UINT32 **dataSize**

  net data size
- UINT32 **grossSize**

  complete packet size (header, data)
- UINT32 **sendSize**

  data size sent out
- **TRDP_DATASET_T** * **pCachedDS**

  Pointer to dataset element if known.
- INT32 **socketIdx**

  index into the socket list
- const void * **pUserRef**

  from subscribe()
- **TRDP_PD_CALLBACK_T pfCbFunction**

  Pointer to PD callback function.
- PD_PACKET_T * **pFrame**

  header ...

4.2.1 Detailed Description

Queue element for PD packets to send or receive.

4.2.2 Field Documentation

4.2.2.1 PD_PACKET_T* PD_ELE::pFrame

header ...

data + FCS...

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

- **trdp_private.h**

4.3 TAU_MARSHALL_INFO_T Struct Reference

Marshalling info, used to and from wire.

Data Fields

- INT32 **level**

  track recursive level
- UINT8 * **pSrc**

  source pointer
- UINT8 * **pDst**

  destination pointer
- UINT8 * **pDstEnd**

  last destination

4.3.1 Detailed Description

Marshalling info, used to and from wire.

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

- **tau_marshall.c**

4.4 TRDP_CLTR_CST_INFO_T Struct Reference

Closed train consists information.

`#include <tau_tti_types.h>`

Data Fields

- **TRDP_UUID_T cltrCstUUID**
  closed train consist UUID
- UINT8 **cltrCstOrient**
  closed train consist orientation '01'B = same as closed train direction '10'B = inverse to closed train direction
- UINT8 **cltrCstNo**
  sequence number of the consist within the closed train, value range 1..32
- UINT16 **reserved01**
  reserved for future use (= 0)

4.4.1 Detailed Description

Closed train consists information.

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

- **tau_tti_types.h**

4.5 TRDP_COMID_DSID_MAP_T Struct Reference

ComId - data set mapping element definition.

`#include <trdp_types.h>`

Data Fields

- UINT32 **comId**
  comId
- UINT32 **datasetId**
  corresponding dataset Id

4.5.1 Detailed Description

ComId - data set mapping element definition.

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

- **trdp_types.h**

4.6 TRDP_CONSIST_INFO_T Struct Reference

consist information structure

`#include <tau_tti_types.h>`

Collaboration diagram for TRDP_CONSIST_INFO_T:

Data Fields

- TRDP_SHORT_VERSION_T **version**
  ConsistInfo data structure version, application defined mainVersion = 1, subVersion = 0.
- UINT8 **cstClass**
  consist info classification 0 = (single) consist 1 = closed train 2 = closed train consist
- UINT8 **reserved01**
  reserved for future use (= 0)
- TRDP_LABEL_T **cstId**
  application defined consist identifier, e.g.
- TRDP_LABEL_T **cstType**
  consist type, application defined
- TRDP_LABEL_T **cstOwner**
  consist owner, e.g.
- **TRDP_UUID_T cstUUID**
  consist UUID
- UINT32 **reserved02**
  reserved for future use (= 0)
- **TRDP_PROP_T cstProp**
  static consist properties
- UINT16 **reserved03**
  reserved for future use (= 0)
- UINT16 **etbCnt**
  number of ETB's, range: 1..4
- **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..32
- **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..1024
- **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..32, 0 = consist is no closed train
- **TRDP_CLTR_CST_INFO_T** * **pCltrCstInfoList**
  info on closed train composition Ordered list starting with cltrCstNo == 1
- UINT32 **cstTopoCnt**
  consist topology counter computed as defined in 5.3.3.2.16, seed value: 'FFFFFFFF'H

4.6.1 Detailed Description

consist information structure

4.6.2 Field Documentation

4.6.2.1 TRDP_LABEL_T TRDP_CONSIST_INFO_T::cstId

application defined consist identifier, e.g.

UIC identifier

4.6.2.2 TRDP_LABEL_T TRDP_CONSIST_INFO_T::cstOwner

consist owner, e.g.

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

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

- **tau_tti_types.h**

4.7 TRDP_DATASET Struct Reference

Dataset definition.

`#include <trdp_types.h>`

Collaboration diagram for TRDP_DATASET:

Data Fields

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

4.7.1 Detailed Description

Dataset definition.

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

- **trdp_types.h**

4.8 TRDP_DATASET_ELEMENT_T Struct Reference

Dataset element definition.

`#include <trdp_types.h>`

Collaboration diagram for TRDP_DATASET_ELEMENT_T:

Data Fields

- UINT32 **type**

  Data type (TRDP_DATA_TYPE_T 1...99) or dataset id > 1000.
- UINT32 **size**

  Number of items or TDRP_VAR_SIZE (0)
- struct **TRDP_DATASET** * **pCachedDS**

  Used internally for marshalling speed-up.

4.8.1 Detailed Description

Dataset element definition.

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

- **trdp_types.h**

4.9 TRDP_DBG_CONFIG_T Struct Reference

Control for debug output device/file on application level.

`#include <tau_xml.h>`

Data Fields

- **TRDP_DBG_OPTION_T option**

  Debug printout options for application use.
- UINT32 **maxFileSize**

  Maximal file size.
- TRDP_FILE_NAME_T **fileName**

  Debug file name and path.

4.9.1 Detailed Description

Control for debug output device/file on application level.

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

- **tau_xml.h**

4.10 TRDP_ETB_INFO_T Struct Reference

Types for train configuration information.

`#include <tau_tti_types.h>`

Data Fields

- UINT8 **etbId**

  identification of train backbone; value range: 0..3
- UINT8 **cnCnt**

number of CNs within consist connected to this ETB value range 1..16 referring to cnId 0..15 acc.

- UINT16 **reserved01**

  reserved for future use (= 0)

4.10.1 Detailed Description

Types for train configuration information.

ETB information

4.10.2 Field Documentation

4.10.2.1 UINT8 TRDP_ETB_INFO_T::cnCnt

number of CNs within consist connected to this ETB value range 1..16 referring to cnId 0..15 acc.

IEC61375-2-5

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

- **tau_tti_types.h**

4.11 TRDP_FUNCTION_INFO_T Struct Reference

function/device information structure

`#include <tau_tti_types.h>`

Data Fields

- TRDP_LABEL_T **fctName**

  function device or group label
- UINT16 **fctId**

  host identification of the function device or group as defined in IEC 61375-2-5, application defined.
- BOOL8 **grp**

  is a function group and will be resolved as IP multicast address
- UINT8 **reserved01**

  reserved for future use (= 0)
- UINT8 **cstVehNo**

  Sequence number of the vehicle in the consist the function belongs to.
- UINT8 **etbId**

  number of connected train backbone.
- UINT8 **cnId**

  identifier of connected consist network in the consist, related to the etbId.
- UINT8 **reserved02**

  reserved for future use (= 0)

4.11.1 Detailed Description

function/device information structure

4.11.2 Field Documentation

4.11.2.1 UINT8 TRDP_FUNCTION_INFO_T::cnId

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

Value range: 0..31

4.11.2.2 UINT8 TRDP_FUNCTION_INFO_T::cstVehNo

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

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

4.11.2.3 UINT8 TRDP_FUNCTION_INFO_T::etbId

number of connected train backbone.

Value range: 0..3

4.11.2.4 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)

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

- **tau_tti_types.h**

4.12 TRDP_HANDLE Struct Reference

Hidden handle definition, used as unique addressing item.

`#include <trdp_private.h>`

Data Fields

- UINT32 **comId**

  comId for packets to send/receive
- **TRDP_IP_ADDR_T srcIpAddr**

  source IP for PD
- **TRDP_IP_ADDR_T destIpAddr**

  destination IP for PD
- **TRDP_IP_ADDR_T mcGroup**

  multicast group to join for PD
- UINT32 **etbTopoCnt**

  etb topocount belongs to addressing item
- UINT32 **opTrnTopoCnt**

  opTrn topocount belongs to addressing item

4.12.1 Detailed Description

Hidden handle definition, used as unique addressing item.

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

- **trdp_private.h**

4.13 TRDP_LIST_STATISTICS_T Struct Reference

Information about a particular MD listener.

`#include <trdp_types.h>`

Data Fields

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

4.13.1 Detailed Description

Information about a particular MD listener.

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

- **trdp_types.h**

4.14 TRDP_MARSHALL_CONFIG_T Struct Reference

Marshaling/unmarshalling configuration.

`#include <trdp_types.h>`

Collaboration diagram for TRDP_MARSHALL_CONFIG_T:

Data Fields

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

4.14.1 Detailed Description

Marshaling/unmarshalling configuration.

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

- **trdp_types.h**

4.15 TRDP_MD_CONFIG_T Struct Reference

Default MD configuration.

`#include <trdp_types.h>`

Collaboration diagram for TRDP_MD_CONFIG_T:

Data Fields

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

4.15.1 Detailed Description

Default MD configuration.

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

- **trdp_types.h**

4.16 TRDP_MD_INFO_T Struct Reference

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

`#include <trdp_types.h>`

Data Fields

- **TRDP_IP_ADDR_T srcIpAddr**

  source IP address for filtering
- **TRDP_IP_ADDR_T destIpAddr**

  destination IP address for filtering
- UINT32 **seqCount**

  sequence counter
- UINT16 **protVersion**

  Protocol version.
- **TRDP_MSG_T msgType**

  Protocol ('PD', 'MD', ...)
- UINT32 **comId**

  ComID.
- UINT32 **etbTopoCnt**

  received topocount
- UINT32 **opTrnTopoCnt**

  received topocount
- BOOL8 **aboutToDie**

  session is about to die
- UINT32 **numRepliesQuery**

  number of ReplyQuery received
- UINT32 **numConfirmSent**

  number of Confirm sent
- UINT32 **numConfirmTimeout**

  number of Confirm Timeouts (incremented by listeners
- UINT16 **userStatus**

  error code, user stat
- **TRDP_REPLY_STATUS_T replyStatus**

  reply status
- **TRDP_UUID_T sessionId**

  for response
- UINT32 **replyTimeout**

  reply timeout in us given with the request
- TRDP_URI_USER_T **destURI**

  destination URI user part from MD header
- TRDP_URI_USER_T **srcURI**

  source URI user part from MD header
- UINT32 **numExpReplies**

  number of expected replies, 0 if unknown
- UINT32 **numReplies**

  actual number of replies for the request
- const void * **pUserRef**

  User reference given with the local call.
- **TRDP_ERR_T resultCode**

  error code

4.16.1 Detailed Description

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

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

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

- **trdp_types.h**

4.17 TRDP_MD_STATISTICS_T Struct Reference

Structure containing all general MD statistics information.

`#include <trdp_types.h>`

Data Fields

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

4.17.1 Detailed Description

Structure containing all general MD statistics information.

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

- **trdp_types.h**

4.18 TRDP_MEM_CONFIG_T Struct Reference

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

`#include <trdp_types.h>`

Data Fields

- UINT8 * **p**

  pointer to static or allocated memory
- UINT32 **size**

  size of static or allocated memory
- UINT32 **prealloc** [VOS_MEM_NBLOCKSIZES]

  memory block structure

4.18.1 Detailed Description

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

Structure describing memory (and its pre-fragmentation)

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

- **trdp_types.h**

4.19 TRDP_MEM_STATISTICS_T Struct Reference

TRDP statistics type definitions.

`#include <trdp_types.h>`

Data Fields

- UINT32 **total**

  total memory size
- UINT32 **free**

  free memory size
- UINT32 **minFree**

  minimal free memory size in statistics interval
- UINT32 **numAllocBlocks**

  allocated memory blocks
- UINT32 **numAllocErr**

  allocation errors
- UINT32 **numFreeErr**

  free errors
- UINT32 **blockSize** [VOS_MEM_NBLOCKSIZES]

  preallocated memory blocks
- UINT32 **usedBlockSize** [VOS_MEM_NBLOCKSIZES]

  used memory blocks

4.19.1 Detailed Description

TRDP statistics type definitions.

```
                                                    Statistical data
```

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

- PD subscr table: ComId, sourceIpAddr, destIpAddr, cbFct?, 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 usageStructure containing all general memory statistics information.

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

- **trdp_types.h**

4.20 TRDP_PD_CONFIG_T Struct Reference

Default PD configuration.

`#include <trdp_types.h>`

Collaboration diagram for TRDP_PD_CONFIG_T:

Data Fields

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

4.20.1 Detailed Description

Default PD configuration.

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

- **trdp_types.h**

4.21 TRDP_PD_INFO_T Struct Reference

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

`#include <trdp_types.h>`

Data Fields

- **TRDP_IP_ADDR_T srcIpAddr**

  source IP address for filtering
- **TRDP_IP_ADDR_T destIpAddr**

  destination IP address for filtering
- UINT32 **seqCount**

  sequence counter
- UINT16 **protVersion**

  Protocol version.
- **TRDP_MSG_T msgType**

  Protocol ('PD', 'MD', ...)
- UINT32 **comId**

  ComID.
- UINT32 **etbTopoCnt**

  received ETB topocount
- UINT32 **opTrnTopoCnt**

  received operational train directory topocount
- UINT32 **replyComId**

  ComID for reply (request only)
- **TRDP_IP_ADDR_T replyIpAddr**

  IP address for reply (request only)
- const void * **pUserRef**

  User reference given with the local subscribe.
- **TRDP_ERR_T resultCode**

  error code

4.21.1 Detailed Description

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

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

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

- **trdp_types.h**

4.22 TRDP_PD_STATISTICS_T Struct Reference

Structure containing all general PD statistics information.

`#include <trdp_types.h>`

Data Fields

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

4.22.1 Detailed Description

Structure containing all general PD statistics information.

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

- **trdp_types.h**

4.23 TRDP_PROCESS_CONFIG_T Struct Reference

Various flags/general TRDP options for library initialization.

`#include <trdp_types.h>`

Data Fields

- TRDP_LABEL_T **hostName**
  Host name.
- TRDP_LABEL_T **leaderName**
  Leader name dependant on redundancy concept.
- UINT32 **cycleTime**
  TRDP main process cycle time in us.

- UINT32 **priority**

  TRDP main process cycle time (0-255, 0=default, 255=highest)
- **TRDP_OPTION_T options**

  TRDP options.

4.23.1 Detailed Description

Various flags/general TRDP options for library initialization.

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

- **trdp_types.h**

4.24 TRDP_PROP_T Struct Reference

Application defined properties.

`#include <tau_tti_types.h>`

Data Fields

- TRDP_SHORT_VERSION_T **ver**

  properties version information, application defined
- UINT16 **len**

  properties length in number of octets, application defined, must be a multiple of 4 octets for alignment reasons value range: 0..32768
- UINT8 **prop** [1]

  properties, application defined

4.24.1 Detailed Description

Application defined properties.

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

- **tau_tti_types.h**

4.25 TRDP_PUB_STATISTICS_T Struct Reference

Table containing particular PD publishing information.

`#include <trdp_types.h>`

Data Fields

- UINT32 **comId**

  Published ComId.
- **TRDP_IP_ADDR_T destAddr**

  IP address of destination for this publishing.
- UINT32 **cycle**

  Publishing cycle in us.

- UINT32 **redId**

  Redundancy group id.
- UINT32 **redState**

  Redundant state.Leader or Follower.
- UINT32 **numPut**

  Number of packet updates.
- UINT32 **numSend**

  Number of packets sent out.

4.25.1 Detailed Description

Table containing particular PD publishing information.

4.25.2 Field Documentation

4.25.2.1 TRDP_IP_ADDR_T TRDP_PUB_STATISTICS_T::destAddr

IP address of destination for this publishing.

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

- **trdp_types.h**

4.26 TRDP_RED_STATISTICS_T Struct Reference

A table containing PD redundant group information.

`#include <trdp_types.h>`

Data Fields

- UINT32 **id**

  Redundant Id.
- **TRDP_RED_STATE_T state**

  Redundant state.Leader or Follower.

4.26.1 Detailed Description

A table containing PD redundant group information.

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

- **trdp_types.h**

4.27 TRDP_SDT_PAR_T Struct Reference

Types to read out the XML configuration.

`#include <tau_xml.h>`

Data Fields

- UINT32 **smi1**

  Safe message identifier - unique for this message at consist level.
- UINT32 **smi2**

  Safe message identifier - unique for this message at consist level.
- UINT32 **cmThr**

  Channel monitoring threshold.
- UINT16 **udv**

  User data version.
- UINT16 **rxPeriod**

  Sink cycle time.
- UINT16 **txPeriod**

  Source cycle time.
- UINT16 **nGuard**

  Initial timeout cycles.
- UINT8 **nrxSafe**

  Timout cycles.
- UINT8 **reserved1**

  Reserved for future use.
- UINT16 **reserved2**

  Reserved for future use.

4.27.1 Detailed Description

Types to read out the XML configuration.

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

- **tau_xml.h**

4.28 TRDP_SEND_PARAM_T Struct Reference

Quality/type of service and time to live.

`#include <trdp_types.h>`

Data Fields

- UINT8 **qos**

  Quality of service (default should be 5 for PD and 3 for MD)
- UINT8 **ttl**

  Time to live (default should be 64)

4.28.1 Detailed Description

Quality/type of service and time to live.

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

- **trdp_types.h**

4.29 TRDP_SEQ_CNT_ENTRY_T Struct Reference

Tuples of last received sequence counter per comId.

`#include <trdp_private.h>`

Data Fields

- UINT32 **lastSeqCnt**
  Sequence counter value for comId.
- **TRDP_IP_ADDR_T srcIpAddr**
  Source IP address.
- **TRDP_MSG_T msgType**
  message type

4.29.1 Detailed Description

Tuples of last received sequence counter per comId.

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

- **trdp_private.h**

4.30 TRDP_SESSION Struct Reference

Session/application variables store.

`#include <trdp_private.h>`

Collaboration diagram for TRDP_SESSION:

Data Fields

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

Pointer to function to print debug information.

- **TRDP_MARSHALL_CONFIG_T marshall**

  Marshalling(unMarshalling configuration.
- **TRDP_PD_CONFIG_T pdDefault**

  Default configuration for process data.
- **TRDP_MEM_CONFIG_T memConfig**

  Internal memory handling configuration.
- **TRDP_OPTION_T option**

  Stack behavior options.
- **TRDP_SOCKETS_T iface** [**VOS_MAX_SOCKET_CNT**]

  Collection of sockets to use.
- **PD_ELE_T** * **pSndQueue**

  pointer to first element of send queue
- **PD_ELE_T** * **pRcvQueue**

  pointer to first element of rcv queue
- **TRDP_TIME_T initTime**

  initialization time of session
- **TRDP_STATISTICS_T stats**

  statistics of this session

4.30.1 Detailed Description

Session/application variables store.

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

- **trdp_private.h**

4.31 TRDP_SOCKET_TCP Struct Reference

TCP parameters.

`#include <trdp_private.h>`

Collaboration diagram for TRDP_SOCKET_TCP:

Data Fields

- **TRDP_IP_ADDR_T cornerIp**

  The other TCP corner Ip.
- BOOL8 **notSend**

  If the message has been sent uncompleted.
- **TRDP_TIME_T connectionTimeout**

  TCP socket connection Timeout.
- BOOL8 **sendNotOk**

  The sending timeout will be start.
- **TRDP_TIME_T sendingTimeout**

  The timeout sending the message.
- BOOL8 **addFileDesc**

  Ready to add the socket in the fd.
- BOOL8 **morituri**

  about to die

4.31.1 Detailed Description

TCP parameters.

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

- **trdp_private.h**

4.32 TRDP_SOCKETS Struct Reference

Socket item.

`#include <trdp_private.h>`

Collaboration diagram for TRDP_SOCKETS:

Data Fields

- INT32 **sock**

  vos socket descriptor to use
- **TRDP_IP_ADDR_T bindAddr**

  Defines the interface to use.
- **TRDP_SEND_PARAM_T sendParam**

  Send parameters.
- **TRDP_SOCK_TYPE_T type**

  Usage of this socket.
- BOOL8 **rcvMostly**

  Used for receiving.
- INT16 **usage**

  No.
- **TRDP_SOCKET_TCP_T tcpParams**

  Params used for TCP.
- **TRDP_IP_ADDR_T mcGroups** [**VOS_MAX_MULTICAST_CNT**]

  List of multicast addresses for this socket.

4.32.1 Detailed Description

Socket item.

4.32.2 Field Documentation

4.32.2.1 INT16 TRDP_SOCKETS::usage

No.

of current users of this socket

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

- **trdp_private.h**

4.33 TRDP_STATISTICS_T Struct Reference

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

`#include <trdp_types.h>`

Collaboration diagram for TRDP_STATISTICS_T:

Data Fields

- UINT32 **version**
  TRDP version.
- TIMEDATE64 **timeStamp**
  actual time stamp
- TIMEDATE32 **upTime**
  time in sec since last initialisation
- TIMEDATE32 **statisticTime**
  time in sec since last reset of statistics
- TRDP_LABEL_T **hostName**
  host name
- TRDP_LABEL_T **leaderName**
  leader host name
- **TRDP_IP_ADDR_T ownIpAddr**
  own IP address
- **TRDP_IP_ADDR_T leaderIpAddr**
  leader IP address
- UINT32 **processPrio**
  priority of TRDP process
- UINT32 **processCycle**
  cycle time of TRDP process in microseconds
- UINT32 **numJoin**
  number of joins
- UINT32 **numRed**
  number of redundancy groups
- **TRDP_MEM_STATISTICS_T mem**
  memory statistics
- **TRDP_PD_STATISTICS_T pd**
  pd statistics
- **TRDP_MD_STATISTICS_T udpMd**
  UDP md statistics.
- **TRDP_MD_STATISTICS_T tcpMd**
  TCP md statistics.

4.33.1 Detailed Description

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

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

- **trdp_types.h**

4.34 TRDP_SUBS_STATISTICS_T Struct Reference

Table containing particular PD subscription information.

`#include <trdp_types.h>`

Data Fields

- UINT32 **comId**

  Subscribed ComId.
- **TRDP_IP_ADDR_T joinedAddr**

  Joined IP address.
- **TRDP_IP_ADDR_T filterAddr**

  Filter IP address, i.e IP address of the sender for this subscription, 0.0.0.0 in case all senders.
- UINT32 **callBack**

  call back function if used
- UINT32 **userRef**

  User reference if used.
- UINT32 **timeout**

  Time-out value in us.
- **TRDP_ERR_T status**

  Receive status information TRDP_NO_ERR, TRDP_TIMEOUT_ERR.
- **TRDP_TO_BEHAVIOR_T toBehav**

  Behavior at time-out.
- UINT32 **numRecv**

  Number of packets received for this subscription.

4.34.1 Detailed Description

Table containing particular PD subscription information.

4.34.2 Field Documentation

4.34.2.1 TRDP_IP_ADDR_T TRDP_SUBS_STATISTICS_T::filterAddr

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

4.34.2.2 UINT32 TRDP_SUBS_STATISTICS_T::numRecv

Number of packets received for this subscription.

4.34.2.3 UINT32 TRDP_SUBS_STATISTICS_T::timeout

Time-out value in us.

0 = No time-out supervision

4.34.2.4 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**

4.35 TRDP_VEHICLE_INFO_T Struct Reference

vehicle information structure

`#include <tau_tti_types.h>`

Collaboration diagram for TRDP_VEHICLE_INFO_T:

Data Fields

- TRDP_LABEL_T **vehId**

  vehicle identifier label,application defined (e.g.
- TRDP_LABEL_T **vehType**

  vehicle type,application defined
- UINT8 **vehOrient**

  vehicle orientation '01'B = same as consist direction '10'B = inverse to consist direction
- UINT8 **cstVehNo**

  Sequence number of vehicle in consist(1..16)
- ANTIVALENT8 **tractVeh**

  vehicle is a traction vehicle '01'B = vehicle is not a traction vehicle '10'B = vehicle is a traction vehicle
- UINT8 **reserved01**

  for future use (= 0)
- **TRDP_PROP_T vehProp**

  static vehicle properties

4.35.1 Detailed Description

vehicle information structure

4.35.2 Field Documentation

4.35.2.1 TRDP_LABEL_T TRDP_VEHICLE_INFO_T::vehId

vehicle identifier label,application defined (e.g.

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

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

- **tau_tti_types.h**

4.36 TRDP_VERSION_T Struct Reference

Version information.

`#include <trdp_types.h>`

Data Fields

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

4.36.1 Detailed Description

Version information.

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

- **trdp_types.h**

4.37 TRDP_XML_DOC_HANDLE_T Struct Reference

Parsed XML document handle.

`#include <tau_xml.h>`

Data Fields

- void * **pXmlDocument**
  Pointer to parsed XML document.
- void * **pRootElement**
  Pointer to the document root element.
- void * **pXPathContext**
  Pointer to prepared XPath context.

4.37.1 Detailed Description

Parsed XML document handle.

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

- **tau_xml.h**

4.38 VOS_SOCK_OPT_T Struct Reference

Common socket options.

`#include <vos_sock.h>`

Data Fields

- UINT8 **qos**
  quality/type of service 0...7
- UINT8 **ttl**
  time to live for unicast (default 64)
- UINT8 **ttl_multicast**
  time to live for multicast
- BOOL8 **reuseAddrPort**
  allow reuse of address and port
- BOOL8 **nonBlocking**
  use non blocking calls
- BOOL8 **no_mc_loop**
  no multicast loop back
- BOOL8 **no_udp_crc**
  supress udp crc computation

4.38.1 Detailed Description

Common socket options.

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

- **vos_sock.h**

4.39 VOS_TIME_T Struct Reference

Timer value compatible with timeval / select.

`#include <vos_types.h>`

Data Fields

- UINT32 **tv_sec**
  full seconds
- INT32 **tv_usec**
  Micro seconds (max.

4.39.1 Detailed Description

Timer value compatible with timeval / select.

Relative or absolute date, depending on usage

4.39.2 Field Documentation

4.39.2.1 INT32 VOS_TIME_T::tv_usec

Micro seconds (max.

value 999999)

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

- **vos_types.h**

Chapter 5

File Documentation

5.1 tau_ctrl.c File Reference

Functions for train switch control.

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

Include dependency graph for tau_ctrl.c:

Functions

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

  Function to init ECSP control interface.
- EXT_DECL **TRDP_ERR_T tau_terminateEcspCtrl** (**TRDP_APP_SESSION_T** appHandle)

  Function to close ECSP control interface.
- EXT_DECL **TRDP_ERR_T tau_setEcspCtrl** (**TRDP_APP_SESSION_T** appHandle, TRDP_ECSP_CTRL_T ∗pEcspCtrl)

  Function to set ECSP control information.
- EXT_DECL **TRDP_ERR_T tau_getEcspStat** (**TRDP_APP_SESSION_T** appHandle, TRDP_ECSP_STAT_-T ∗pEcspStat, **TRDP_PD_INFO_T** ∗pPdInfo)

  Function to get ECSP status information.
- EXT_DECL **TRDP_ERR_T tau_requestEcspConfirm** (**TRDP_APP_SESSION_T** appHandle, const void ∗pUserRef, **TRDP_MD_CALLBACK_T** pfCbFunction, TRDP_ECSP_CONF_REQUEST_T ∗pEcspConf-Request)

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

5.1.1 Detailed Description

Functions for train switch control.

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

tau_ctrl.c (p. 47) 1354 2014-11-11 15:22:13Z ahweiss

5.1.2 Function Documentation

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

Function to get ECSP status information.

Parameters

in	*appHandle*	Application handle
in,out	*pEcspStat*	Pointer to the ECSP status structure
in,out	*pPdInfo*	Pointer to PD status information

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

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

Function to init ECSP control interface.

Parameters

in	*appHandle*	Application handle
in	*ecspIpAddr*	ECSP address
in	*ecscIpAddr*	ECSC address

Return values

TRDP_NO_ERR	no error
TRDP_INIT_ERR	initialisation error

Here is the call graph for this function:

5.1.2.3 EXT_DECL TRDP_ERR_T tau_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

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

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

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

Function to set ECSP control information.

Parameters

in	*appHandle*	Application handle
in	*pEcspCtrl*	Pointer to the ECSP control structure

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

5.1.2.5 EXT_DECL TRDP_ERR_T tau_terminateEcspCtrl (TRDP_APP_SESSION_T *appHandle*)

Function to close ECSP control interface.

Parameters

in	*appHandle*	Application handle

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_UNKNOWN_ERR	undefined error

Here is the call graph for this function:

5.2 tau_ctrl.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_ctrl.h: This graph shows which files directly or indirectly include this file:

Functions

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

  Function to init ECSP control interface.
- EXT_DECL **TRDP_ERR_T tau_terminateEcspCtrl** (**TRDP_APP_SESSION_T** appHandle)

  Function to close ECSP control interface.
- EXT_DECL **TRDP_ERR_T tau_setEcspCtrl** (**TRDP_APP_SESSION_T** appHandle, TRDP_ECSP_CTRL_T ∗pEcspCtrl)

  Function to set ECSP control information.
- EXT_DECL **TRDP_ERR_T tau_getEcspStat** (**TRDP_APP_SESSION_T** appHandle, TRDP_ECSP_STAT_-T ∗pEcspStat, **TRDP_PD_INFO_T** ∗pPdInfo)

  Function to get ECSP status information.
- EXT_DECL **TRDP_ERR_T tau_requestEcspConfirm** (**TRDP_APP_SESSION_T** appHandle, const void ∗pUserRef, **TRDP_MD_CALLBACK_T** pfCbFunction, TRDP_ECSP_CONF_REQUEST_T ∗pEcspConf-Request)

  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 (p. 49) 1349 2014-11-04 11:40:43Z ahweiss

5.2.2 Function Documentation

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

Function to get ECSP status information.

Parameters

in	*appHandle*	Application Handle
in,out	*pEcspStat*	Pointer to the ECSP status structure
in,out	*pPdInfo*	Pointer to PD status information

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Parameters

in	*appHandle*	Application handle
in,out	*pEcspStat*	Pointer to the ECSP status structure
in,out	*pPdInfo*	Pointer to PD status information

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

5.2.2.2 EXT_DECL TRDP_ERR_T tau_initEcspCtrl (TRDP_APP_SESSION_T *appHandle,* TRDP_IP_ADDR_T *ecsplpAddr,* TRDP_IP_ADDR_T *ecsclpAddr*)

Function to init ECSP control interface.

Parameters

in	*appHandle*	Application handle
in	*ecsplpAddr*	ECSP address
in	*ecsclpAddr*	ECSC address

Return values

TRDP_NO_ERR	no error
TRDP_INIT_ERR	initialisation error

Here is the call graph for this function:

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

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

Function to set ECSP control information.

Parameters

in	*appHandle*	Application handle
in	*pEcspCtrl*	Pointer to the ECSP control structure

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

5.2.2.5 EXT_DECL TRDP_ERR_T tau_terminateEcspCtrl (TRDP_APP_SESSION_T *appHandle*)

Function to close ECSP control interface.

Parameters

in	*appHandle*	Application handle

Return values

TRDP_NO_ERR	no error
TRDP_UNKNOWN_ERR	undefined error

Parameters

in	*appHandle*	Application handle

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	module not initialised
TRDP_UNKNOWN_ERR	undefined error

Here is the call graph for this function:

5.3 tau_ctrl_types.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_ctrl_types.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.

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

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

tau_ctrl_types.h (p. 52) 1349 2014-11-04 11:40:43Z ahweiss

5.4 tau_dnr.c File Reference

Functions for domain name resolution.

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

Include dependency graph for tau_dnr.c:

5.4.1 Detailed Description

Functions for domain name resolution.

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

tau_dnr.c (p. 53) 1279 2014-08-07 06:18:07Z ahweiss

5.5 tau_dnr.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_dnr.h: This graph shows which files directly or indirectly include this file:

Functions

- EXT_DECL **TRDP_ERR_T tau_initDnr** (void)

  Function to init DNR.
- EXT_DECL **TRDP_ERR_T tau_getOwnIds** (TRDP_LABEL_T devId, TRDP_LABEL_T vehId, TRDP_LABEL_T cstId)

  Who am I ?.
- EXT_DECL **TRDP_IP_ADDR_T tau_getOwnAddr** (void)

  Function to get the own IP address.
- EXT_DECL **TRDP_ERR_T tau_uri2Addr** (**TRDP_IP_ADDR_T** ∗pAddr, UINT32 ∗pTopoCnt, const TRDP_URI_T uri)

  Function to convert a URI to an IP address.
- EXT_DECL **TRDP_ERR_T tau_addr2Uri** (TRDP_URI_HOST_T uri, UINT32 ∗pTopoCnt, **TRDP_IP_ADDR_T** addr)

  Function to convert an IP address to a URI.
- EXT_DECL **TRDP_ERR_T tau_label2VehId** (TRDP_LABEL_T vehId, UINT32 ∗pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

  Function to retrieve the vehId of the car with label vehLabel in the consist with cstLabel.
- EXT_DECL **TRDP_ERR_T tau_label2TcnVehNo** (UINT8 ∗pTcnVehNo, UINT32 ∗pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

  Function The function delivers the TCN vehicle number to the given label.
- EXT_DECL **TRDP_ERR_T tau_label2OpVehNo** (UINT8 ∗pOpVehNo, UINT32 ∗pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

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

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

  Function to retrieve the car and consist id of the car given with carNo and trnCstNo.
- EXT_DECL **TRDP_ERR_T tau_opVehNo2Ids** (TRDP_LABEL_T vehId, TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 opVehNo)

  Function to retrieve the vehicle and consist id from a given operational vehicle sequence number.
- EXT_DECL **TRDP_ERR_T tau_addr2VehId** (TRDP_LABEL_T vehId, UINT32 *pTopoCnt, **TRDP_IP_ADDR_T** ipAddr)

  Function to retrieve the vehId of the car hosting a device with the IPAddress ipAddr.
- EXT_DECL **TRDP_ERR_T tau_addr2TcnVehNo** (UINT8 *pTcnVehNo, UINT8 *pTopoCnt, **TRDP_IP_ADDR_T** ipAddr)

  Function to retrieve the TCN vehicle number in consist of the car hosting the device with the given IP address.
- EXT_DECL **TRDP_ERR_T tau_addr2OpVehNo** (UINT8 *pOpVehNo, UINT8 *pTopoCnt, **TRDP_IP_ADDR_T** ipAddr)

  Function to retrieve the operational vehicle number of the vehicle hosting the device with the given IP address.
- EXT_DECL **TRDP_ERR_T tau_tcnCstNo2CstId** (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 tcnCstNo)

  Function to retrieve the consist identifier of the consist with train consist sequence number cstNo.
- EXT_DECL **TRDP_ERR_T tau_iecCstNo2CstId** (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, UINT8 opCstNo)

  Function to retrieve the consist identifier of the consist with IEC sequence consist number iecCstNo.
- EXT_DECL **TRDP_ERR_T tau_label2CstId** (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel, const TRDP_LABEL_T cstLabel)

  Function to retrieve the consist identifier of the consist hosting a car with label vehLabel.
- EXT_DECL **TRDP_ERR_T tau_label2TcnCstNo** (UINT8 *pTcnCstNo, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel)

  Function to retrieve the TCN consist sequence number of the consist hosting a vehicle with label vehLabel.
- EXT_DECL **TRDP_ERR_T tau_label2OpCstNo** (UINT8 *pOpCstNo, UINT32 *pTopoCnt, const TRDP_LABEL_T vehLabel)

  Function to retrieve the operational consist sequence number of the consist hosting a vehicle with label vehLabel.
- EXT_DECL **TRDP_ERR_T tau_addr2CstId** (TRDP_LABEL_T cstId, UINT32 *pTopoCnt, **TRDP_IP_ADDR_T** ipAddr)

  Function to retrieve the consist identifier of the consist hosting the device with the IP-Address ipAddr.
- EXT_DECL **TRDP_ERR_T tau_addr2TcnCstNo** (UINT8 *pTcnCstNo, UINT32 *pTopoCnt, **TRDP_IP_ADDR_T** ipAddr)

  Function to retrieve the TCN consist number of the consist hosting the device with the IP-Address ipAddr.
- EXT_DECL **TRDP_ERR_T tau_addr2OpCstNo** (UINT8 *pOpCstNo, UINT32 *pTopoCnt, **TRDP_IP_ADDR_T** ipAddr)

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

5.5.1 Detailed Description

TRDP utility interface definitions. This module provides the interface to the following utilities

- IP - URI address translation

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

Id:

tau_dnr.h (p. 54) 1323 2014-08-29 14:09:08Z bloehr

5.5.2 Function Documentation

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to convert an IP address to a URI.

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

5.5.2.8 EXT_DECL TRDP_IP_ADDR_T tau_getOwnAddr (void)

Function to get the own IP address.

Return values

own	IP address

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

Who am I ?.

Realizes a kind of ëWho am Ií 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

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

out	*cstId*	Pointer to the consist id to be returned
in,out	*pTopoCnt*	Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
in	*opCstNo*	Operational consist sequence number based on the leading car. 0 means own consist.

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

5.5.2.11 EXT_DECL TRDP_ERR_T tau_initDnr (void)

Function to init DNR.

Return values

TRDP_NO_ERR	no error
TRDP_INIT_ERR	initialisation error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to convert a URI to an IP address.

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

5.6 tau_marshall.c File Reference

Marshalling functions for TRDP.

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

Include dependency graph for tau_marshall.c:

Data Structures

- struct **TAU_MARSHALL_INFO_T**

  Marshalling info, used to and from wire.

Functions

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

  Function to initialise the marshalling/unmarshalling.
- EXT_DECL **TRDP_ERR_T tau_marshall** (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  marshall function.
- EXT_DECL **TRDP_ERR_T tau_unmarshall** (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

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

  marshall data set function.
- EXT_DECL **TRDP_ERR_T tau_unmarshallDs** (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  unmarshall data set function.
- EXT_DECL **TRDP_ERR_T tau_calcDatasetSize** (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  Calculate data set size by given data set id.
- EXT_DECL **TRDP_ERR_T tau_calcDatasetSizeByComId** (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  Calculate data set size by given ComId.

5.6.1 Detailed Description

Marshalling functions for TRDP.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

tau_marshall.c (p. 62) 1190 2014-03-12 13:15:17Z ahweiss

5.6.2 Function Documentation

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

Calculate data set size by given data set id.

Parameters

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

Return values

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

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

Calculate data set size by given ComId.

Parameters

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

Return values

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

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

Function to initialise the marshalling/unmarshalling.

Types for marshalling / unmarshalling.

The supplied array must be sorted by ComIds. The array must exist during the use of the marshalling functions (until **tlc_terminate()** (p. 110)).

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	provided buffer to small
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

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

marshall function.

Parameters

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

Return values

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

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

marshall data set function.

Parameters

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

Return values

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

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

unmarshall function.

Parameters

in	*pRefCon*	pointer to user context
in	*comId*	ComId to identify the structure out of a configuration
in	*pSrc*	pointer to received original message
in	*pDest*	pointer to a buffer for the treated message
in,out	*pDestSize*	size of the provide buffer / size of the treated message
in,out	*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

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

unmarshall data set function.

Parameters

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

Return values

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

5.7 tau_marshall.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_marshall.h: This graph shows which files directly or indirectly include this file:

Functions

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

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

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

  marshall data set function.
- EXT_DECL **TRDP_ERR_T tau_unmarshall** (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  unmarshall function.
- EXT_DECL **TRDP_ERR_T tau_unmarshallDs** (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT8 *pDest, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  unmarshall data set function.
- EXT_DECL **TRDP_ERR_T tau_calcDatasetSize** (void *pRefCon, UINT32 dsId, UINT8 *pSrc, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  Calculate data set size by given data set id.
- EXT_DECL **TRDP_ERR_T tau_calcDatasetSizeByComId** (void *pRefCon, UINT32 comId, UINT8 *pSrc, UINT32 *pDestSize, **TRDP_DATASET_T** **ppDSPointer)

  Calculate data set size by given ComId.

5.7.1 Detailed Description

TRDP utility interface definitions. This module provides the interface to the following utilities

- marshalling/unmarshalling

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss

Remarks

Id:

tau_marshall.h (p. 66) 1279 2014-08-07 06:18:07Z ahweiss

5.7.2 Function Documentation

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

Calculate data set size by given data set id.

Parameters

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

Return values

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

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

Calculate data set size by given ComId.

Parameters

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

Return values

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

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

Types for marshalling / unmarshalling.

Function to initialise the marshalling/unmarshalling.

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	provided buffer to small
TRDP_PARAM_ERR	Parameter error

Types for marshalling / unmarshalling.

The supplied array must be sorted by ComIds. The array must exist during the use of the marshalling functions

(until **tlc_terminate()** (p. 110)).

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	provided buffer to small
TRDP_PARAM_ERR	Parameter error

Here is the call graph for this function:

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

marshall function.

Parameters

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

Return values

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

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

marshall data set function.

Parameters

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

Return values

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

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

unmarshall function.

Parameters

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

Return values

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

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

unmarshall data set function.

Parameters

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

Return values

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

5.8 tau_tti.c File Reference

Functions for train topology information access.

```
#include <string.h>
#include <stdio.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "tau_tti.h"
```
Include dependency graph for tau_tti.c:

5.8.1 Detailed Description

Functions for train topology information access.

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

tau_tti.c (p. 70) 1279 2014-08-07 06:18:07Z ahweiss

5.9 tau_tti.h File Reference

TRDP utility interface definitions.

```
#include "trdp_types.h"
#include "tau_tti_types.h"
```
Include dependency graph for tau_tti.h: This graph shows which files directly or indirectly include this file:

Functions

- EXT_DECL **TRDP_ERR_T tau_initTtiAccess** (void)

  Function to init TTI access.
- EXT_DECL **TRDP_ERR_T tau_getOpTrDirectory** (TRDP_OP_TRAIN_DIR_STATE_T *pOpTrDirState, TRDP_OP_TRAIN_DIR_T *pOpTrDir, UINT8 const etbId)

  Function to retrieve the operational train directory state.
- EXT_DECL **TRDP_ERR_T tau_getTrDirectory** (TRDP_TRAIN_DIR_T *pTrDir, UINT8 const etbId)

  Function to retrieve the operational train directory.
- EXT_DECL **TRDP_ERR_T tau_getStaticCstInfo** (**TRDP_CONSIST_INFO_T** *pCstInfo, **TRDP_UUID_T** const cstUUID)

  Function to retrieve the operational train directory.
- EXT_DECL **TRDP_ERR_T tau_getTTI** (TRDP_OP_TRAIN_DIR_STATE_T *pOpTrDirState, TRDP_OP_TRAIN_DIR_T *pOpTrDir, TRDP_TRAIN_DIR_T *pTrDir, TRDP_TRAIN_NET_DIR_T *pTrNetDir, UINT8 const etbId)

  Function to retrieve the operational train directory.
- EXT_DECL **TRDP_ERR_T tau_getTrnCstCnt** (UINT16 *pTrnCstCnt, UINT32 *pOpTrTopoCnt)

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

- EXT_DECL **TRDP_ERR_T tau_getTrnCarCnt** (UINT16 ∗pTrnCarCnt, UINT32 ∗pOpTrTopoCnt)

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

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

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

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

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

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

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

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

  Function to retrieve the function information of the consist.

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

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

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

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

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

  Function to retrieve the orientation of the given vehicle.

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

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

5.9.1 Detailed Description

TRDP utility interface definitions. This module provides the interface to the following utilities

- train topology information access

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

Id:

tau_tti.h (p. 71) 1323 2014-08-29 14:09:08Z bloehr

5.9.2 Function Documentation

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to retrieve the function information of the consist.

Parameters

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

in,out	*pOpTrTopoCnt*	Pointer to the actual topo count. If !=0 will be checked. Returns the actual one.
in	*cstLabel*	Pointer to a consist label. NULL means own consist.
in	*maxFctCnt*	Maximal number of functions to be returned in provided buffer.

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to retrieve the operational train directory state.

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to retrieve the operational train directory.

Parameters

out	*pCstInfo*	Pointer to a consist info structure to be returned.
in	*cstUUID*	UUID of the consist the consist info is rquested for.

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to retrieve the operational train directory.

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to retrieve the operational train directory.

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

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

Function to retrieve the orientation of the given vehicle.

Parameters

out	*pCarOrient*	Pointer to the vehicle orientation to be returned

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	Parameter error

5.9.2.15 EXT_DECL TRDP_ERR_T tau_initTtiAccess (void)

Function to init TTI access.

Return values

TRDP_NO_ERR	no error
TRDP_INIT_ERR	initialisation error

5.10 tau_tti_types.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_tti_types.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **GNU_PACKED**
  Types for ETB control.
- struct **TRDP_ETB_INFO_T**
  Types for train configuration information.
- struct **TRDP_CLTR_CST_INFO_T**
  Closed train consists information.
- struct **TRDP_PROP_T**
  Application defined properties.
- struct **TRDP_FUNCTION_INFO_T**
  function/device information structure
- struct **TRDP_VEHICLE_INFO_T**
  vehicle information structure
- struct **TRDP_CONSIST_INFO_T**
  consist information structure
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.
- struct **GNU_PACKED**
  Types for ETB control.

- struct **GNU_PACKED**
  Types for ETB control.
- 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.

Macros

- #define **TRDP_MAX_CST_CNT** 63
  max number of consists per train
- #define **TRDP_MAX_VEH_CNT** 63
  max number of vehicles per train

5.10.1 Detailed Description

TRDP utility interface definitions. This module provides the interface to the following utilities

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

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2014. All rights reserved.

Id:

tau_tti_types.h (p. 78) 1335 2014-09-30 07:11:05Z ahweiss

5.11 tau_xml.c File Reference

Functions for XML file parsing.

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

Include dependency graph for tau_xml.c:

Macros

- #define **TRDP_SDT_DEFAULT_SMI2** 0

  Default SDT safe message identifier.
- #define **TRDP_SDT_DEFAULT_NRXSAFE** 3

  Default SDT timeout cycles.
- #define **TRDP_SDT_DEFAULT_NGUARD** 100

  Default SDT initial timeout cycles.
- #define **TRDP_SDT_DEFAULT_CMTHR** 10

  Default SDT chan.

Functions

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

  Load XML file into DOM tree, prepare XPath context.
- EXT_DECL void **tau_freeXmlDoc** (**TRDP_XML_DOC_HANDLE_T** ∗pDocHnd)

  Free all the memory allocated by tau_prepareXmlDoc.
- EXT_DECL **TRDP_ERR_T tau_readXmlDeviceConfig** (const **TRDP_XML_DOC_HANDLE_T** ∗pDocHnd, **TRDP_MEM_CONFIG_T** ∗pMemConfig, **TRDP_DBG_CONFIG_T** ∗pDbgConfig, UINT32 ∗pNumComPar, TRDP_COM_PAR_T ∗∗ppComPar, UINT32 ∗pNumIfConfig, TRDP_IF_CONFIG_T ∗∗ppIfConfig)

  Function to read the TRDP device configuration parameters out of the XML configuration file.
- EXT_DECL **TRDP_ERR_T tau_readXmlDatasetConfig** (const **TRDP_XML_DOC_HANDLE_T** ∗pDocHnd, UINT32 ∗pNumComId, **TRDP_COMID_DSID_MAP_T** ∗∗ppComIdDsIdMap, UINT32 ∗pNumDataset, **papTRDP_DATASET_T** papDataset)

  Function to read the DataSet configuration out of the XML configuration file.
- EXT_DECL **TRDP_ERR_T tau_readXmlInterfaceConfig** (const **TRDP_XML_DOC_HANDLE_T** ∗pDocHnd, const CHAR8 ∗pIfName, **TRDP_PROCESS_CONFIG_T** ∗pProcessConfig, **TRDP_PD_CONFIG_T** ∗pPdConfig, **TRDP_MD_CONFIG_T** ∗pMdConfig, UINT32 ∗pNumExchgPar, TRDP_EXCHG_PAR_T ∗∗ppExchgPar)

  Read the interface relevant telegram parameters (except data set configuration) out of the configuration file .
- EXT_DECL void **tau_freeTelegrams** (UINT32 numExchgPar, TRDP_EXCHG_PAR_T ∗pExchgPar)

  Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

5.11.1 Detailed Description

Functions for XML file parsing.

Note

Project: TCNOpen TRDP prototype stack

Author

Tomas Svoboda, UniContorls a.s.

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

tau_xml.c (p. 79) 1265 2014-07-14 16:11:53Z bloehr

5.11.2 Macro Definition Documentation

5.11.2.1 #define TRDP_SDT_DEFAULT_CMTHR 10

Default SDT chan.

monitoring threshold

5.11.3 Function Documentation

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

Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

Parameters

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

Here is the call graph for this function:

5.11.3.2 EXT_DECL void tau_freeXmlDoc (TRDP_XML_DOC_HANDLE_T * *pDocHnd*)

Free all the memory allocated by tau_prepareXmlDoc.

Parameters

in	*pDocHnd*	Handle of the parsed XML file

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

Load XML file into DOM tree, prepare XPath context.

Parameters

in	*pFileName*	Path and filename of the xml configuration file
out	*pDocHnd*	Handle of the parsed XML file

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	File does not exist

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

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

Parameters

in	*pDocHnd*	Handle of the XML document prepared by tau_prepareXmlDoc
out	*pNumComId*	Pointer to the number of entries in the ComId DatasetId mapping list

out	*ppComIdDsId-Map*	Pointer to an array of a structures of type **TRDP_COMID_DSID_MAP_T** (p. 21)
out	*pNumDataset*	Pointer to the number of datasets found in the configuration
out	*papDataset*	Pointer to an array of pointers to a structures of type TRDP_DATASET_T

Return values

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

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

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

Parameters

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

Return values

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

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error

TRDP_MEM_ERR	provided buffer to small
TRDP_PARAM_ERR	File not existing

Here is the call graph for this function:

5.12 tau_xml.h File Reference

TRDP utility interface definitions.

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

Include dependency graph for tau_xml.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **TRDP_SDT_PAR_T**

  Types to read out the XML configuration.
- struct **TRDP_DBG_CONFIG_T**

  Control for debug output device/file on application level.
- struct **TRDP_XML_DOC_HANDLE_T**

  Parsed XML document handle.

Enumerations

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

  Control for debug output format on application level.

Functions

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

  Load XML file into DOM tree, prepare XPath context.
- EXT_DECL void **tau_freeXmlDoc** (**TRDP_XML_DOC_HANDLE_T** *pDocHnd)

  Free all the memory allocated by tau_prepareXmlDoc.
- EXT_DECL **TRDP_ERR_T tau_readXmlDeviceConfig** (const **TRDP_XML_DOC_HANDLE_T** *pDocHnd, **TRDP_MEM_CONFIG_T** *pMemConfig, **TRDP_DBG_CONFIG_T** *pDbgConfig, UINT32 *pNumComPar, TRDP_COM_PAR_T **ppComPar, UINT32 *pNumIfConfig, TRDP_IF_CONFIG_T **ppIfConfig)

  Function to read the TRDP device configuration parameters out of the XML configuration file.
- EXT_DECL **TRDP_ERR_T tau_readXmlInterfaceConfig** (const **TRDP_XML_DOC_HANDLE_T** *pDocHnd, const CHAR8 *pIfName, **TRDP_PROCESS_CONFIG_T** *pProcessConfig, **TRDP_PD_CONFIG_T** *pPdConfig, **TRDP_MD_CONFIG_T** *pMdConfig, UINT32 *pNumExchgPar, TRDP_EXCHG_PAR_T **ppExchgPar)

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

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

  Function to read the DataSet configuration out of the XML configuration file.
- EXT_DECL void **tau_freeTelegrams** (UINT32 numExchgPar, TRDP_EXCHG_PAR_T *pExchgPar)

  Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

5.12.1 Detailed Description

TRDP utility interface definitions. This module provides the interface to the following utilities

- read xml configuration interpreter

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss (initial version)

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

tau_xml.h (p. 83) 1298 2014-08-25 14:58:54Z bloehr

5.12.2 Enumeration Type Documentation

5.12.2.1 enum TRDP_DBG_OPTION_T

Control for debug output format on application level.

Enumerator

TRDP_DBG_DEFAULT Printout default.
TRDP_DBG_OFF Printout off.
TRDP_DBG_ERR Printout error.
TRDP_DBG_WARN Printout warning and error.
TRDP_DBG_INFO Printout info, warning and error.
TRDP_DBG_DBG Printout debug, info, warning and error.
TRDP_DBG_TIME Printout timestamp.
TRDP_DBG_LOC Printout file name and line.
TRDP_DBG_CAT Printout category (DBG, INFO, WARN, ERR)

5.12.3 Function Documentation

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

Free array of telegram configurations allocated by tau_readXmlInterfaceConfig.

Parameters

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

Here is the call graph for this function:

5.12.3.2 EXT_DECL void tau_freeXmlDoc (TRDP_XML_DOC_HANDLE_T * *pDocHnd*)

Free all the memory allocated by tau_prepareXmlDoc.

Parameters

in	*pDocHnd*	Handle of the parsed XML file

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

Load XML file into DOM tree, prepare XPath context.

Parameters

in	*pFileName*	Path and filename of the xml configuration file
out	*pDocHnd*	Handle of the parsed XML file

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	File does not exist

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

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

Parameters

in	*pDocHnd*	Handle of the XML document prepared by tau_prepareXmlDoc
out	*pNumComId*	Pointer to the number of entries in the ComId DatasetId mapping list
out	*ppComIdDsId-Map*	Pointer to an array of a structures of type **TRDP_COMID_DSID_MAP_T** (p. 21)
out	*pNumDataset*	Pointer to the number of datasets found in the configuration
out	*papDataset*	Pointer to an array of pointers to a structures of type TRDP_DATASET_T

Return values

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

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

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

Parameters

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

Return values

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

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

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

Parameters

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

Return values

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

Here is the call graph for this function:

5.13 trdp_dllmain.c File Reference

Windows DLL main function.

5.13.1 Detailed Description

Windows DLL main function.

Note

Project: TCNOpen TRDP prototype stack

Author

Armin-H. Weiss, Bombardier

Remarks

Id:

trdp_dllmain.c (p. 86) 1065 2013-09-06 08:12:09Z aweiss

5.14 trdp_if.c File Reference

Functions for ECN communication.

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

Include dependency graph for trdp_if.c:

Functions

- BOOL8 **trdp_isValidSession** (**TRDP_APP_SESSION_T** pSessionHandle)

  Check if the session handle is valid.
- **TRDP_APP_SESSION_T** * **trdp_sessionQueue** (void)

  Get the session queue head pointer.
- EXT_DECL **TRDP_ERR_T tlc_init** (const **TRDP_PRINT_DBG_T** pPrintDebugString, const **TRDP_MEM_CONFIG_T** *pMemConfig)

  Initialize the TRDP stack.
- EXT_DECL **TRDP_ERR_T tlc_openSession** (**TRDP_APP_SESSION_T** *pAppHandle, **TRDP_IP_ADDR_T** ownIpAddr, **TRDP_IP_ADDR_T** leaderIpAddr, const **TRDP_MARSHALL_CONFIG_T** *pMarshall, const **TRDP_PD_CONFIG_T** *pPdDefault, const **TRDP_MD_CONFIG_T** *pMdDefault, const **TRDP_PROCESS_CONFIG_T** *pProcessConfig)

  Open a session with the TRDP stack.
- EXT_DECL **TRDP_ERR_T tlc_closeSession** (**TRDP_APP_SESSION_T** appHandle)

  Close a session.
- EXT_DECL **TRDP_ERR_T tlc_terminate** (void)

  Un-Initialize.
- EXT_DECL **TRDP_ERR_T tlc_reinitSession** (**TRDP_APP_SESSION_T** appHandle)

  Re-Initialize.
- const char * **tlc_getVersionString** (void)

  Return a human readable version representation.
- EXT_DECL const **TRDP_VERSION_T** * **tlc_getVersion** (void)

  Return version.
- **TRDP_ERR_T tlp_setRedundant** (**TRDP_APP_SESSION_T** appHandle, UINT32 redId, BOOL8 leader)

  Do not send non-redundant PDs when we are follower.
- EXT_DECL **TRDP_ERR_T tlp_getRedundant** (**TRDP_APP_SESSION_T** appHandle, UINT32 redId, BOOL8 *pLeader)

  Get status of redundant ComIds.
- EXT_DECL **TRDP_ERR_T tlc_setETBTopoCount** (**TRDP_APP_SESSION_T** appHandle, UINT32 etbTopoCnt)

Set new topocount for trainwide communication.

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

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

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

  Prepare for sending PD messages.

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

  Prepare for sending PD messages.

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

  Stop sending PD messages.

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

  Update the process data to send.

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

  Get the lowest time interval for PDs.

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

  Work loop of the TRDP handler.

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

  Initiate sending PD messages (PULL).

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

  Prepare for receiving PD messages.

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

  Stop receiving PD messages.

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

  Reprepare for receiving PD messages.

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

  Get the last valid PD message.

5.14.1 Detailed Description

Functions for ECN communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_if.c (p. 87) 1354 2014-11-11 15:22:13Z ahweiss

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

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

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

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

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

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

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

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

5.14.2 Function Documentation

5.14.2.1 EXT_DECL TRDP_ERR_T tlc_closeSession (TRDP_APP_SESSION_T *appHandle*)

Close a session.

Clean up and release all resources of that session

Parameters

in	*appHandle*	The handle returned by tlc_openSession

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	handle NULL

Here is the call graph for this function:

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

Get the lowest time interval for PDs.

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

5.14.2.3 EXT_DECL const TRDP_VERSION_T* tlc_getVersion (void)

Return version.

Return pointer to version structure

Return values

TRDP_VERSION_T *(p. 44)*	

5.14.2.4 const char* tlc_getVersionString (void)

Return a human readable version representation.

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

Return values

const	string

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

Initialize the TRDP stack.

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

Parameters

in	*pPrintDebug-String*	Pointer to debug print function
in	*pMemConfig*	Pointer to memory configuration

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	memory allocation failed
TRDP_PARAM_ERR	initialization error

Here is the call graph for this function:

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

Open a session with the TRDP stack.

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

Parameters

out	*pAppHandle*	A handle for further calls to the trdp stack
in	*ownIpAddr*	Own IP address, can be different for each process in multihoming systems, if zero, the default interface / IP will be used.
in	*leaderIpAddr*	IP address of redundancy leader
in	*pMarshall*	Pointer to marshalling configuration
in	*pPdDefault*	Pointer to default PD configuration
in	*pMdDefault*	Pointer to default MD configuration
in	*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

Here is the call graph for this function:

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

Work loop of the TRDP handler.

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

Parameters

in	*appHandle*	The handle returned by tlc_openSession
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

5.14.2.8 EXT_DECL TRDP_ERR_T tlc_reinitSession (TRDP_APP_SESSION_T *appHandle*)

Re-Initialize.

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

Parameters

in	*appHandle*	The handle returned by tlc_openSession

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	handle NULL

Here is the call graph for this function:

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

Set new topocount for trainwide communication.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*etbTopoCnt*	New etbTopoCnt value

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

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

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

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

Parameters

in	*appHandle*	The handle returned by tlc_init
in	*opTrnTopoCnt*	New operational topocount value

Here is the call graph for this function:

5.14.2.11 EXT_DECL TRDP_ERR_T tlc_terminate (void)

Un-Initialize.

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

Return values

TRDP_NO_ERR	no error
TRDP_INIT_ERR	no error
TRDP_MEM_ERR	TrafficStore nothing
TRDP_MUTEX_ERR	TrafficStore mutex err

Here is the call graph for this function:

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

Get the last valid PD message.

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Get status of redundant ComIds.

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Prepare for sending PD messages.

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Update the process data to send.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*pubHandle*	the handle returned by publish
in,out	*pData*	pointer to application's data buffer
in,out	*dataSize*	size of data

Return values

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

Here is the call graph for this function:

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

Prepare for sending PD messages.

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Initiate sending PD messages (PULL).

Send a PD request message

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*subHandle*	handle from related subscribe
in	*comId*	comId of packet to be sent
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	own IP address, 0 - srcIP will be set by the stack
in	*destIpAddr*	where to send the packet to
in	*redId*	0 - Non-redundant, > 0 valid redundancy group
in	*pktFlags*	OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS-_MARSHALL, TRDP_FLAGS_CALLBACK
in	*pSendParam*	optional pointer to send parameter, NULL - default parameters are used
in	*pData*	pointer to packet data / dataset
in	*dataSize*	size of packet data
in	*replyComId*	comId of reply
in	*replyIpAddr*	IP for reply

Return values

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

Here is the call graph for this function:

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

Reprepare for receiving PD messages.

Resubscribe to a specific PD ComID and source IP

Parameters

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

Return values

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

Here is the call graph for this function:

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

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

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Prepare for receiving PD messages.

Subscribe to a specific PD ComID and source IP.

Parameters

in	*appHandle*	the handle returned by tlc_openSession

out	*pSubHandle*	return a handle for this subscription
in	*pUserRef*	user supplied value returned within the info structure
in	*pfCbFunction*	Pointer to subscriber specific callback function, NULL to use default function
in	*comId*	comId of packet to receive
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	IP for source filtering, set 0 if not used
in	*pktFlags*	OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS-_MARSHALL, TRDP_FLAGS_CALLBACK
in	*destIpAddr*	IP address to join
in	*timeout*	timeout (>= 10ms) in usec
in	*toBehavior*	timeout behavior

Return values

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

Here is the call graph for this function:

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

Stop sending PD messages.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*pubHandle*	the handle returned by prepare

Return values

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

Here is the call graph for this function:

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

Stop receiving PD messages.

Unsubscribe to a specific PD ComID

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*subHandle*	the handle for this subscription

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error

TRDP_NOSUB_ERR	not subscribed
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

5.14.2.23 BOOL8 trdp_isValidSession (TRDP_APP_SESSION_T *pSessionHandle*)

Check if the session handle is valid.

Parameters

in	*pSessionHandle*	pointer to packet data (dataset)

Return values

TRUE	is valid
FALSE	is invalid

Here is the call graph for this function:

5.14.2.24 TRDP_APP_SESSION_T* trdp_sessionQueue (void)

Get the session queue head pointer.

Return values

&sSession	

5.15 trdp_if.h File Reference

Typedefs for TRDP communication.

`#include "trdp_if_light.h"`
Include dependency graph for trdp_if.h: This graph shows which files directly or indirectly include this file:

Functions

- BOOL8 **trdp_isValidSession** (**TRDP_APP_SESSION_T** pSessionHandle)

  Check if the session handle is valid.
- **TRDP_APP_SESSION_T** * **trdp_sessionQueue** (void)

  Get the session queue head pointer.

5.15.1 Detailed Description

Typedefs for TRDP communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_if.h (p. 98) 1264 2014-07-14 15:54:26Z bloehr

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

5.15.2 Function Documentation

5.15.2.1 BOOL8 trdp_isValidSession (TRDP_APP_SESSION_T *pSessionHandle*)

Check if the session handle is valid.

Parameters

in	*pSessionHandle*	pointer to packet data (dataset)

Return values

TRUE	is valid
FALSE	is invalid

Here is the call graph for this function:

5.15.2.2 TRDP_APP_SESSION_T* trdp_sessionQueue (void)

Get the session queue head pointer.

Return values

&sSession	

5.16 trdp_if_light.h File Reference

TRDP Light interface functions (API)

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

Include dependency graph for trdp_if_light.h: This graph shows which files directly or indirectly include this file:

Macros

- #define **MD_SUPPORT** 1

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

Functions

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

  Initialize the TRDP stack.

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

  Open a session with the TRDP stack.
- EXT_DECL **TRDP_ERR_T tlc_reinitSession** (**TRDP_APP_SESSION_T** appHandle)

  Re-Initialize.
- EXT_DECL **TRDP_ERR_T tlc_closeSession** (**TRDP_APP_SESSION_T** appHandle)

  Close a session.
- EXT_DECL **TRDP_ERR_T tlc_terminate** (void)

  Un-Initialize.
- EXT_DECL **TRDP_ERR_T tlc_setETBTopoCount** (**TRDP_APP_SESSION_T** appHandle, UINT32 etbTopoCnt)

  Set new topocount for trainwide communication.
- EXT_DECL **TRDP_ERR_T tlc_setOpTrainTopoCount** (**TRDP_APP_SESSION_T** appHandle, UINT32 opTrnTopoCnt)

  Set new operational train topocount for direction/orientation sensitive communication.
- EXT_DECL **TRDP_ERR_T tlc_freeBuf** (**TRDP_APP_SESSION_T** appHandle, char ∗pBuf)

  Frees the buffer reserved by the TRDP layer.
- EXT_DECL **TRDP_ERR_T tlc_getInterval** (**TRDP_APP_SESSION_T** appHandle, **TRDP_TIME_T** ∗pInterval, **TRDP_FDS_T** ∗pFileDesc, INT32 ∗pNoDesc)

  Get the lowest time interval for PDs.
- EXT_DECL **TRDP_ERR_T tlc_process** (**TRDP_APP_SESSION_T** appHandle, **TRDP_FDS_T** ∗pRfds, INT32 ∗pCount)

  Work loop of the TRDP handler.
- EXT_DECL **TRDP_ERR_T tlp_publish** (**TRDP_APP_SESSION_T** appHandle, **TRDP_PUB_T** ∗pPubHandle, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, **TRDP_IP_ADDR_T** srcIpAddr, **TRDP_IP_ADDR_T** destIpAddr, UINT32 interval, UINT32 redId, **TRDP_FLAGS_T** pktFlags, const **TRDP_SEND_PARAM_T** ∗pSendParam, const UINT8 ∗pData, UINT32 dataSize)

  Prepare for sending PD messages.
- EXT_DECL **TRDP_ERR_T tlp_republish** (**TRDP_APP_SESSION_T** appHandle, **TRDP_PUB_T** pubHandle, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, **TRDP_IP_ADDR_T** srcIpAddr, **TRDP_IP_ADDR_T** destIpAddr, const UINT8 ∗pData, UINT32 dataSize)

  Prepare for sending PD messages.
- EXT_DECL **TRDP_ERR_T tlp_unpublish** (**TRDP_APP_SESSION_T** appHandle, **TRDP_PUB_T** pubHandle)

  Stop sending PD messages.
- EXT_DECL **TRDP_ERR_T tlp_put** (**TRDP_APP_SESSION_T** appHandle, **TRDP_PUB_T** pubHandle, const UINT8 ∗pData, UINT32 dataSize)

  Update the process data to send.
- EXT_DECL **TRDP_ERR_T tlp_setRedundant** (**TRDP_APP_SESSION_T** appHandle, UINT32 redId, BOOL8 leader)

  Do not send redundant PD's when we are follower.
- EXT_DECL **TRDP_ERR_T tlp_getRedundant** (**TRDP_APP_SESSION_T** appHandle, UINT32 redId, BOOL8 ∗pLeader)

  Get status of redundant ComIds.
- EXT_DECL **TRDP_ERR_T tlp_request** (**TRDP_APP_SESSION_T** appHandle, **TRDP_SUB_T** subHandle, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, **TRDP_IP_ADDR_T** srcIpAddr, **TRDP_IP_ADDR_T** destIpAddr, UINT32 redId, **TRDP_FLAGS_T** pktFlags, const **TRDP_SEND_PARAM_T** ∗pSendParam, const UINT8 ∗pData, UINT32 dataSize, UINT32 replyComId, **TRDP_IP_ADDR_T** replyIpAddr)

  Initiate sending PD messages (PULL).

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

  Prepare for receiving PD messages.
- EXT_DECL **TRDP_ERR_T tlp_resubscribe** (**TRDP_APP_SESSION_T** appHandle, **TRDP_SUB_T** subHandle, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, **TRDP_IP_ADDR_T** srcIpAddr, **TRDP_IP_ADDR_T** destIpAddr)

  Reprepare for receiving PD messages.
- EXT_DECL **TRDP_ERR_T tlp_unsubscribe** (**TRDP_APP_SESSION_T** appHandle, **TRDP_SUB_T** subHandle)

  Stop receiving PD messages.
- EXT_DECL **TRDP_ERR_T tlp_get** (**TRDP_APP_SESSION_T** appHandle, **TRDP_SUB_T** subHandle, **TRDP_PD_INFO_T** *pPdInfo, UINT8 *pData, UINT32 *pDataSize)

  Get the last valid PD message.
- EXT_DECL **TRDP_ERR_T tlm_notify** (**TRDP_APP_SESSION_T** appHandle, const void *pUserRef, **TRDP_MD_CALLBACK_T** pfCbFunction, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, **TRDP_IP_ADDR_T** srcIpAddr, **TRDP_IP_ADDR_T** destIpAddr, **TRDP_FLAGS_T** pktFlags, const **TRDP_SEND_PARAM_T** *pSendParam, const UINT8 *pData, UINT32 dataSize, const TRDP_URI_USER_T sourceURI, const TRDP_URI_USER_T destURI)

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

  Initiate sending MD request message.
- EXT_DECL **TRDP_ERR_T tlm_confirm** (**TRDP_APP_SESSION_T** appHandle, const **TRDP_UUID_T** *pSessionId, UINT16 userStatus, const **TRDP_SEND_PARAM_T** *pSendParam)

  Initiate sending MD confirm message.
- EXT_DECL **TRDP_ERR_T tlm_abortSession** (**TRDP_APP_SESSION_T** appHandle, const **TRDP_UUID_T** *pSessionId)

  Cancel an open session.
- EXT_DECL **TRDP_ERR_T tlm_addListener** (**TRDP_APP_SESSION_T** appHandle, TRDP_LIS_T *pListenHandle, const void *pUserRef, **TRDP_MD_CALLBACK_T** pfCbFunction, UINT32 comId, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, **TRDP_IP_ADDR_T** mcDestIpAddr, **TRDP_FLAGS_T** pktFlags, const TRDP_URI_USER_T destURI)

  Subscribe to MD messages.
- EXT_DECL **TRDP_ERR_T tlm_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, **TRDP_REPLY_STATUS_T** replyStatus, const **TRDP_SEND_PARAM_T** *pSendParam)

Send a MD reply message.

- EXT_DECL const CHAR8 * **tlc_getVersionString** (void)

  Return a human readable version representation.
- EXT_DECL const **TRDP_VERSION_T** * **tlc_getVersion** (void)

  Return version.
- EXT_DECL **TRDP_ERR_T tlc_getStatistics** (**TRDP_APP_SESSION_T** appHandle, **TRDP_STATISTICS_T** *pStatistics)

  Return statistics.
- EXT_DECL **TRDP_ERR_T tlc_getSubsStatistics** (**TRDP_APP_SESSION_T** appHandle, UINT16 *pNumSubs, **TRDP_SUBS_STATISTICS_T** *pStatistics)

  Return PD subscription statistics.
- EXT_DECL **TRDP_ERR_T tlc_getPubStatistics** (**TRDP_APP_SESSION_T** appHandle, UINT16 *pNumPub, **TRDP_PUB_STATISTICS_T** *pStatistics)

  Return PD publish statistics.
- EXT_DECL **TRDP_ERR_T tlc_getListStatistics** (**TRDP_APP_SESSION_T** appHandle, UINT16 *pNumList, **TRDP_LIST_STATISTICS_T** *pStatistics)

  Return MD listener statistics.
- EXT_DECL **TRDP_ERR_T tlc_getRedStatistics** (**TRDP_APP_SESSION_T** appHandle, UINT16 *pNumRed, **TRDP_RED_STATISTICS_T** *pStatistics)

  Return redundancy group statistics.
- EXT_DECL **TRDP_ERR_T tlc_getJoinStatistics** (**TRDP_APP_SESSION_T** appHandle, UINT16 *pNumJoin, UINT32 *pIpAddr)

  Return join statistics.
- EXT_DECL **TRDP_ERR_T tlc_resetStatistics** (**TRDP_APP_SESSION_T** appHandle)

  Reset statistics.

5.16.1 Detailed Description

TRDP Light interface functions (API) Low level functions for communicating using the TRDP protocol

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_if_light.h (p. 99) 1341 2014-10-14 16:05:53Z bloehr

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

5.16.2 Function Documentation

5.16.2.1 EXT_DECL TRDP_ERR_T tlc_closeSession (TRDP_APP_SESSION_T *appHandle*)

Close a session.

Clean up and release all resources of that session

Parameters

in	*appHandle*	The handle returned by tlc_openSession

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	handle NULL

Here is the call graph for this function:

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

Frees the buffer reserved by the TRDP layer.

Parameters

in	*appHandle*	The handle returned by tlc_init
in	*pBuf*	pointer to the buffer to be freed

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	buffer pointer invalid

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

Get the lowest time interval for PDs.

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

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

Return join statistics.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumJoin*	Pointer to the number of joined IP Adresses
out	*pIpAddr*	Pointer to a list with the joined IP adresses

Return values

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

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumJoin*	Pointer to the number of joined IP Adresses
out	*pIpAddr*	Pointer to a list with the joined IP adresses

Return values

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

Here is the call graph for this function:

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

Return MD listener statistics.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumList*	Pointer to the number of listeners
out	*pStatistics*	Pointer to a list with the listener statistics information

Return values

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

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

Return PD publish statistics.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumPub*	Pointer to the number of publishers
out	*pStatistics*	pointer to a list with the publish statistics information

Return values

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

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumPub*	Pointer to the number of publishers
out	*pStatistics*	Pointer to a list with the publish statistics information

Return values

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

Here is the call graph for this function:

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

Return redundancy group statistics.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumRed*	Pointer to the number of redundancy groups

out	*pStatistics*	Pointer to a list with the redundancy group information

Return values

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

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumRed*	Pointer to the number of redundancy groups
out	*pStatistics*	Pointer to a list with the redundancy group information

Return values

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

Here is the call graph for this function:

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

Return statistics.

Memory for statistics information must be preserved by the user.

Parameters

in	*appHandle*	the handle returned by tlc_init
out	*pStatistics*	Pointer to statistics for this application session

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	parameter error

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
out	*pStatistics*	Pointer to statistics for this application session

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	parameter error

Here is the call graph for this function:

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

Return PD subscription statistics.

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumSubs*	In: The number of subscriptions requested Out: Number of subscriptions returned
in,out	*pStatistics*	Pointer to an array with the subscription statistics information

Return values

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

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumSubs*	In: The number of subscriptions requested Out: Number of subscriptions returned
in,out	*pStatistics*	Pointer to an array with the subscription statistics information

Return values

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

Here is the call graph for this function:

5.16.2.10 EXT_DECL const TRDP_VERSION_T* tlc_getVersion (void)

Return version.

Return pointer to version structure

Return values

const	**TRDP_VERSION_T** (p. 44)

Return pointer to version structure

Return values

TRDP_VERSION_T *(p. 44)*	

5.16.2.11 EXT_DECL const CHAR8* tlc_getVersionString (void)

Return a human readable version representation.

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

Return values

const	string

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

Initialize the TRDP stack.

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

Parameters

in	*pPrintDebug-String*	Pointer to debug print function
in	*pMemConfig*	Pointer to memory configuration

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	memory allocation failed
TRDP_PARAM_ERR	initialization error

Here is the call graph for this function:

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

Open a session with the TRDP stack.

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

Parameters

out	*pAppHandle*	A handle for further calls to the trdp stack
in	*ownIpAddr*	Own IP address, can be different for each process in multihoming systems, if zero, the default interface / IP will be used.
in	*leaderIpAddr*	IP address of redundancy leader
in	*pMarshall*	Pointer to marshalling configuration
in	*pPdDefault*	Pointer to default PD configuration
in	*pMdDefault*	Pointer to default MD configuration
in	*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

Here is the call graph for this function:

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

Work loop of the TRDP handler.

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

Parameters

in	*appHandle*	The handle returned by tlc_init
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

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

Parameters

in	*appHandle*	The handle returned by tlc_openSession
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

5.16.2.15 EXT_DECL TRDP_ERR_T tlc_reinitSession (TRDP_APP_SESSION_T *appHandle*)

Re-Initialize.

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

Parameters

in	*appHandle*	The handle returned by tlc_openSession

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	handle NULL

Here is the call graph for this function:

5.16.2.16 EXT_DECL TRDP_ERR_T tlc_resetStatistics (TRDP_APP_SESSION_T *appHandle*)

Reset statistics.

Parameters

in	*appHandle*	the handle returned by tlc_init

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	parameter error

Parameters

in	*appHandle*	the handle returned by tlc_openSession

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	parameter error

Here is the call graph for this function:

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

Set new topocount for trainwide communication.

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

Parameters

in	*appHandle*	The handle returned by tlc_init
in	*etbTopoCnt*	New topocount value

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*etbTopoCnt*	New etbTopoCnt value

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

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

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

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

Parameters

in	*appHandle*	The handle returned by tlc_init
in	*opTrnTopoCnt*	New operational topocount value

Here is the call graph for this function:

5.16.2.19 EXT_DECL TRDP_ERR_T tlc_terminate (void)

Un-Initialize.

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

Return values

TRDP_NO_ERR	no error

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

Return values

TRDP_NO_ERR	no error
TRDP_INIT_ERR	no error
TRDP_MEM_ERR	TrafficStore nothing
TRDP_MUTEX_ERR	TrafficStore mutex err

Here is the call graph for this function:

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

Cancel an open session.

Abort an open session; any pending messages will be dropped

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*pSessionId*	Session ID returned by request

Return values

TRDP_NO_ERR	no error
TRDP_NO_SESSION_ERR	no such session
TRDP_NOINIT_ERR	handle invalid

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

Subscribe to MD messages.

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

Parameters

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

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error
TRDP_MEM_ERR	out of memory

TRDP_NOINIT_ERR	handle invalid

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

Initiate sending MD confirm message.

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

Parameters

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

Return values

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

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

Remove Listener.

Parameters

in	*appHandle*	the handle returned by tlc_init
out	*listenHandle*	Handle for this listener

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error
TRDP_NOINIT_ERR	handle invalid

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

Initiate sending MD notification message.

Send a MD notification message

Parameters

in	*appHandle*	the handle returned by tlc_init

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

Return values

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

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

Resubscribe to MD messages.

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

Parameters

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

Return values

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

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

Send a MD reply message.

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

Parameters

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

Return values

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

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

Send a MD reply message.

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

Parameters

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

Return values

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

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

Send a MD reply query message.

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

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*pSessionId*	Session ID returned by indication
in	*comId*	comId of packet to be sent
in	*userStatus*	Info for requester about application errors

in	*confirmTimeout*	timeout for confirmation
in	*pSendParam*	Pointer to send parameters, NULL to use default send parameters
in	*pData*	pointer to packet data / dataset
in	*dataSize*	size of packet data

Return values

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

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

Initiate sending MD request message.

Send a MD request message

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*pUserRef*	user supplied value returned with reply
in	*pfCbFunction*	Pointer to listener specific callback function, NULL to use default function
out	*pSessionId*	return session ID
in	*comId*	comId of packet to be sent
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	own IP address, 0 - srcIP will be set by the stack
in	*destIpAddr*	where to send the packet to
in	*pktFlags*	OPTIONS: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_MARSHALL, TRDP_-PLAGS_TCP
in	*numReplies*	number of expected replies, 0 if unknown
in	*replyTimeout*	timeout for reply
in	*maxNumRetries*	maximum number of retries (0 2)
in	*pSendParam*	Pointer to send parameters, NULL to use default send parameters
in	*pData*	pointer to packet data / dataset
in	*dataSize*	size of packet data
in	*sourceURI*	only functional group of source URI
in	*destURI*	only functional group of destination URI

Return values

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

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

Get the last valid PD message.

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

Parameters

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

Return values

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

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Get status of redundant ComIds.

Parameters

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

Return values

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

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Prepare for sending PD messages.

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

Parameters

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

Return values

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

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
out	*pPubHandle*	returned handle for related unprepare
in	*comId*	comId of packet to send
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	own IP address, 0 - srcIP will be set by the stack
in	*destIpAddr*	where to send the packet to

in	*interval*	frequency of PD packet (>= 10ms) in usec, 0 if PD PULL
in	*redId*	0 - Non-redundant, > 0 valid redundancy group
in	*pktFlags*	OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK
in	*pSendParam*	optional pointer to send parameter, NULL - default parameters are used
in	*pData*	pointer to packet data / dataset
in	*dataSize*	size of packet data <= 1436 without FCS

Return values

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

Here is the call graph for this function:

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

Update the process data to send.

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

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*pubHandle*	the handle returned by publish
in,out	*pData*	pointer to application's data buffer
in,out	*dataSize*	size of data

Return values

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

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*pubHandle*	the handle returned by publish
in,out	*pData*	pointer to application's data buffer
in,out	*dataSize*	size of data

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error on uninitialized parameter or changed dataSize compared to published one
TRDP_NOPUB_ERR	not published
TRDP_NOINIT_ERR	handle invalid

TRDP_COMID_ERR	ComID not found when marshalling

Here is the call graph for this function:

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

Prepare for sending PD messages.

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

Parameters

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

Return values

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

Here is the call graph for this function:

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

Initiate sending PD messages (PULL).

Send a PD request message

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*subHandle*	handle from related subscribe
in	*comId*	comId of packet to be sent
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	own IP address, 0 - srcIP will be set by the stack
in	*destIpAddr*	where to send the packet to
in	*redId*	0 - Non-redundant, > 0 valid redundancy group
in	*pktFlags*	OPTIONS: TTRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK

in	*pSendParam*	optional pointer to send parameter, NULL - default parameters are used
in	*pData*	pointer to packet data / dataset
in	*dataSize*	size of packet data
in	*replyComId*	comId of reply
in	*replyIpAddr*	IP for reply

Return values

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

Send a PD request message

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*subHandle*	handle from related subscribe
in	*comId*	comId of packet to be sent
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	own IP address, 0 - srcIP will be set by the stack
in	*destIpAddr*	where to send the packet to
in	*redId*	0 - Non-redundant, $>$ 0 valid redundancy group
in	*pktFlags*	OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS-_MARSHALL, TRDP_FLAGS_CALLBACK
in	*pSendParam*	optional pointer to send parameter, NULL - default parameters are used
in	*pData*	pointer to packet data / dataset
in	*dataSize*	size of packet data
in	*replyComId*	comId of reply
in	*replyIpAddr*	IP for reply

Return values

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

Here is the call graph for this function:

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

Reprepare for receiving PD messages.

Resubscribe to a specific PD ComID and source IP

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*subHandle*	handle for this subscription
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication

in	*srcIpAddr*	IP for source filtering, set 0 if not used
in	*destIpAddr*	IP address to join

Return values

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

Resubscribe to a specific PD ComID and source IP

Parameters

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

Return values

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

Here is the call graph for this function:

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

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

Parameters

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

Return values

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

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

Parameters

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

Return values

TRDP_NO_ERR	no error

TRDP_PARAM_ERR	parameter error / redId not existing
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

5.16.2.38 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

in	*appHandle*	the handle returned by tlc_init
out	*pSubHandle*	return a handle for this subscription
in	*pUserRef*	user supplied value returned within the info structure
in	*pfCbFunction*	Pointer to subscriber specific callback function, NULL to use default function
in	*comId*	comId of packet to receive
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	IP for source filtering, set 0 if not used Used e.g. for source filtering of redundant devices.
in	*destIpAddr*	IP address to join
in	*pktFlags*	OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK
in	*timeout*	timeout (>= 10ms) in usec
in	*toBehavior*	OPTION: TRDP_TO_DEFAULT, TRDP_TO_SET_TO_ZERO, TRDP_TO_KEEP_LAST_VALUE

Return values

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

Subscribe to a specific PD ComID and source IP.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
out	*pSubHandle*	return a handle for this subscription
in	*pUserRef*	user supplied value returned within the info structure
in	*pfCbFunction*	Pointer to subscriber specific callback function, NULL to use default function
in	*comId*	comId of packet to receive
in	*etbTopoCnt*	ETB topocount to use, 0 if consist local communication
in	*opTrnTopoCnt*	operational topocount, != 0 for orientation/direction sensitive communication
in	*srcIpAddr*	IP for source filtering, set 0 if not used
in	*pktFlags*	OPTION: TRDP_FLAGS_DEFAULT, TRDP_FLAGS_NONE, TRDP_FLAGS_MARSHALL, TRDP_FLAGS_CALLBACK
in	*destIpAddr*	IP address to join
in	*timeout*	timeout (>= 10ms) in usec

in	*toBehavior*	timeout behavior

Return values

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

Here is the call graph for this function:

5.16.2.39 EXT_DECL TRDP_ERR_T tlp_unpublish (TRDP_APP_SESSION_T *appHandle,* TRDP_PUB_T *pubHandle*)

Stop sending PD messages.

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*pubHandle*	the handle returned by publish

Return values

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

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*pubHandle*	the handle returned by prepare

Return values

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

Here is the call graph for this function:

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

Stop receiving PD messages.

Unsubscribe to a specific PD ComID

Parameters

in	*appHandle*	the handle returned by tlc_init
in	*subHandle*	the handle for this subscription

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error

TRDP_SUB_ERR	not subscribed
TRDP_NOINIT_ERR	handle invalid

Unsubscribe to a specific PD ComID

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in	*subHandle*	the handle for this subscription

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error
TRDP_NOSUB_ERR	not subscribed
TRDP_NOINIT_ERR	handle invalid

Here is the call graph for this function:

5.17 trdp_mdcom.c File Reference

Functions for MD communication.

```
#include <string.h>
#include "trdp_if_light.h"
#include "trdp_if.h"
#include "trdp_utils.h"
#include "trdp_mdcom.h"
```

Include dependency graph for trdp_mdcom.c:

Functions

- **TRDP_ERR_T trdp_mdGetTCPSocket** (**TRDP_SESSION_PT** pSession)

  Initialize the specific parameters for message data Open a listening socket.
- void **trdp_mdFreeSession** (MD_ELE_T *pMDSession)

  Free memory of session.
- **TRDP_ERR_T trdp_mdSend** (**TRDP_SESSION_PT** appHandle)

  Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.
- void **trdp_mdCheckPending** (**TRDP_APP_SESSION_T** appHandle, **TRDP_FDS_T** *pFileDesc, INT32 *pNoDesc)

  Check for pending packets, set FD if non blocking.
- void **trdp_mdCheckListenSocks** (const **TRDP_SESSION_PT** appHandle, **TRDP_FDS_T** *pRfds, INT32 *pCount)

  Checking receive connection requests and data Call user's callback if needed.
- void **trdp_mdCheckTimeouts** (**TRDP_SESSION_PT** appHandle)

  Checking message data timeouts Call user's callback if needed.

5.17.1 Detailed Description

Functions for MD communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Simone Pachera, FARsystems Gari Oiarbide, CAF Bernd Loehr, NewTec

Remarks

Id:

trdp_mdcom.c (p. 125) 1354 2014-11-11 15:22:13Z ahweiss

```
BL 2014-08-28: Ticket #62: Failing TCP communication fixed,
                           Do not read if there's nothing to read ('Mc' has no data!)
BL 2014-08-25: Ticket #57+58: Padding / zero bytes trailing MD & PD packets fixed
BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed
               Ticket #47: Protocol change: no FCS for data part of telegrams
BL 2014-02-28: Ticket #25: CRC32 calculation is not according to IEEE802.3
```

5.17.2 Function Documentation

5.17.2.1 void trdp_mdCheckListenSocks (const TRDP_SESSION_PT *appHandle,* TRDP_FDS_T * *pRfds,* INT32 * *pCount*)

Checking receive connection requests and data Call user's callback if needed.

Parameters

in	*appHandle*	session pointer
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Here is the call graph for this function:

5.17.2.2 void trdp_mdCheckPending (TRDP_APP_SESSION_T *appHandle,* TRDP_FDS_T * *pFileDesc,* INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters

in	*appHandle*	session pointer
in,out	*pFileDesc*	pointer to set of ready descriptors
in,out	*pNoDesc*	pointer to number of ready descriptors

5.17.2.3 void trdp_mdCheckTimeouts (TRDP_SESSION_PT *appHandle*)

Checking message data timeouts Call user's callback if needed.

Parameters

in	*appHandle*	session pointer

Here is the call graph for this function:

5.17.2.4 void trdp_mdFreeSession (MD_ELE_T * *pMDSession*)

Free memory of session.

Parameters

in	*pMDSession*	session pointer

Here is the call graph for this function:

5.17.2.5 TRDP_ERR_T trdp_mdGetTCPSocket (TRDP_SESSION_PT *pSession*)

Initialize the specific parameters for message data Open a listening socket.

Parameters

in	*pSession*	session parameters

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	initialization error

Here is the call graph for this function:

5.17.2.6 TRDP_ERR_T trdp_mdSend (TRDP_SESSION_PT *appHandle*)

Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.

Parameters

in	*appHandle*	session pointer

Here is the call graph for this function:

5.18 trdp_mdcom.h File Reference

Functions for MD communication.

```
#include "trdp_private.h"
```

Include dependency graph for trdp_mdcom.h: This graph shows which files directly or indirectly include this file:

Functions

- **TRDP_ERR_T trdp_mdGetTCPSocket** (**TRDP_SESSION_PT** pSession)

  Initialize the specific parameters for message data Open a listening socket.
- void **trdp_mdFreeSession** (MD_ELE_T ∗pMDSession)

  Free memory of session.
- **TRDP_ERR_T trdp_mdSend** (**TRDP_SESSION_PT** appHandle)

  Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.
- void **trdp_mdCheckPending** (**TRDP_APP_SESSION_T** appHandle, **TRDP_FDS_T** ∗pFileDesc, INT32 ∗pNoDesc)

  Check for pending packets, set FD if non blocking.
- void **trdp_mdCheckListenSocks** (const **TRDP_SESSION_PT** appHandle, **TRDP_FDS_T** ∗pRfds, INT32 ∗pCount)

  Checking receive connection requests and data Call user's callback if needed.
- void **trdp_mdCheckTimeouts** (**TRDP_SESSION_PT** appHandle)

  Checking message data timeouts Call user's callback if needed.

5.18.1 Detailed Description

Functions for MD communication.

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/`. Copyright Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

trdp_mdcom.h (p. 127) 1345 2014-10-16 13:43:05Z railroad-mike

```
BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed
               Ticket #47: Protocol change: no FCS for data part of telegrams
```

5.18.2 Function Documentation

5.18.2.1 void trdp_mdCheckListenSocks (const TRDP_SESSION_PT *appHandle,* TRDP_FDS_T * *pRfds,* INT32 * *pCount*)

Checking receive connection requests and data Call user's callback if needed.

Parameters

in	*appHandle*	session pointer
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Here is the call graph for this function:

5.18.2.2 void trdp_mdCheckPending (TRDP_APP_SESSION_T *appHandle,* TRDP_FDS_T * *pFileDesc,* INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters

in	*appHandle*	session pointer
in,out	*pFileDesc*	pointer to set of ready descriptors
in,out	*pNoDesc*	pointer to number of ready descriptors

5.18.2.3 void trdp_mdCheckTimeouts (TRDP_SESSION_PT *appHandle*)

Checking message data timeouts Call user's callback if needed.

Parameters

in	*appHandle*	session pointer

Here is the call graph for this function:

5.18.2.4 void trdp_mdFreeSession (MD_ELE_T * *pMDSession*)

Free memory of session.

Parameters

in	*pMDSession*	session pointer

Here is the call graph for this function:

5.18.2.5 TRDP_ERR_T trdp_mdGetTCPSocket (TRDP_SESSION_PT *pSession*)

Initialize the specific parameters for message data Open a listening socket.

Parameters

in	*pSession*	session parameters

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	initialization error

Here is the call graph for this function:

5.18.2.6 TRDP_ERR_T trdp_mdSend (TRDP_SESSION_PT *appHandle*)

Sending MD messages Send the messages stored in the sendQueue Call user's callback if needed.

Parameters

in	*appHandle*	session pointer

Here is the call graph for this function:

5.19 trdp_pdcom.c File Reference

Functions for PD communication.

```
#include <string.h>
#include "trdp_types.h"
#include "trdp_utils.h"
#include "trdp_pdcom.h"
#include "trdp_if.h"
#include "trdp_stats.h"
#include "vos_sock.h"
#include "vos_mem.h"
```

Include dependency graph for trdp_pdcom.c:

Functions

- void **trdp_pdInit** (**PD_ELE_T** *pPacket, **TRDP_MSG_T** type, UINT32 etbTopoCnt, UINT32 opTrnTopoCnt, UINT32 replyComId, UINT32 replyIpAddress)

Initialize/construct the packet Set the header infos.

- **TRDP_ERR_T trdp_pdPut** (**PD_ELE_T** ∗pPacket, **TRDP_MARSHALL_T** marshall, void ∗refCon, const UINT8 ∗pData, UINT32 dataSize)

  Copy data Set the header infos.
- **TRDP_ERR_T trdp_pdGet** (**PD_ELE_T** ∗pPacket, **TRDP_UNMARSHALL_T** unmarshall, void ∗refCon, const UINT8 ∗pData, UINT32 ∗pDataSize)

  Copy data Set the header infos.
- **TRDP_ERR_T trdp_pdSendQueued** (**TRDP_SESSION_PT** appHandle)

  Send all due PD messages.
- **TRDP_ERR_T trdp_pdReceive** (**TRDP_SESSION_PT** appHandle, INT32 sock)

  Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T Check for protocol errors and compare the received data to the data in our receive queue.
- void **trdp_pdCheckPending** (**TRDP_APP_SESSION_T** appHandle, **TRDP_FDS_T** ∗pFileDesc, INT32 ∗pNoDesc)

  Check for pending packets, set FD if non blocking.
- void **trdp_pdHandleTimeOuts** (**TRDP_SESSION_PT** appHandle)

  Check for time outs.
- **TRDP_ERR_T trdp_pdCheckListenSocks** (**TRDP_SESSION_PT** appHandle, **TRDP_FDS_T** ∗pRfds, INT32 ∗pCount)

  Checking receive connection requests and data Call user's callback if needed.
- void **trdp_pdUpdate** (**PD_ELE_T** ∗pPacket)

  Update the header values.
- **TRDP_ERR_T trdp_pdCheckAppTopoCounts** (**TRDP_SESSION_PT** appHandle, PD_HEADER_T ∗pFrame)

  Check if the PD header topocounts are correct compared to the session values.
- **TRDP_ERR_T trdp_pdCheck** (PD_HEADER_T ∗pPacket, UINT32 packetSize)

  Check if the PD header values and the CRCs are sane.
- **TRDP_ERR_T trdp_pdSend** (INT32 pdSock, **PD_ELE_T** ∗pPacket, UINT16 port)

  Send one PD packet.
- **TRDP_ERR_T trdp_pdDistribute** (**PD_ELE_T** ∗pSndQueue)

  Distribute send time of PD packets over time.

5.19.1 Detailed Description

Functions for PD communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_pdcom.c (p. 129) 1354 2014-11-11 15:22:13Z ahweiss

```
BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed
               Ticket #47: Protocol change: no FCS for data part of telegrams
               Ticket #43: Usage of memset() in the trdp_pdReceive() function
BL 2014-06-02: Ticket #41: Sequence counter handling fixed
               Ticket #42: memcmp only if callback enabled
BL 2014-02-28: Ticket #25: CRC32 calculation is not according IEEE802.3
BL 2014-02-27: Ticket #23: tlc_getInterval() always returning 10ms
BL 2014-01-09: Ticket #14: Wrong error return in trdp_pdDistribute()
BL 2013-06-24: ID 125: Time-out handling and ready descriptors fixed
BL 2013-04-09: ID 92: Pull request led to reset of push message type
BL 2013-01-25: ID 20: Redundancy handling fixed
```

5.19.2 Function Documentation

5.19.2.1 TRDP_ERR_T trdp_pdCheck (PD_HEADER_T * *pPacket*, UINT32 *packetSize*)

Check if the PD header values and the CRCs are sane.

Parameters

in	*pPacket*	pointer to the packet to check
in	*packetSize*	max size to check

Return values

TRDP_NO_ERR	
TRDP_CRC_ERR	

Here is the call graph for this function:

5.19.2.2 TRDP_ERR_T trdp_pdCheckAppTopoCounts (TRDP_SESSION_PT *appHandle*, PD_HEADER_T * *pFrame*)

Check if the PD header topocounts are correct compared to the session values.

Parameters

in	*appHandle*	session pointer
in	*pFrame*	pointer to the packet to check

Return values

TRDP_NO_ERR	
TRDP_TOPO_ERR	

Here is the call graph for this function:

5.19.2.3 TRDP_ERR_T trdp_pdCheckListenSocks (TRDP_SESSION_PT *appHandle*, TRDP_FDS_T * *pRfds*, INT32 * *pCount*)

Checking receive connection requests and data Call user's callback if needed.

Parameters

in	*appHandle*	session pointer
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Here is the call graph for this function:

5.19.2.4 void trdp_pdCheckPending (TRDP_APP_SESSION_T *appHandle,* TRDP_FDS_T * *pFileDesc,* INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters

in	*appHandle*	session pointer
in,out	*pFileDesc*	pointer to set of ready descriptors
in,out	*pNoDesc*	pointer to number of ready descriptors

5.19.2.5 TRDP_ERR_T trdp_pdDistribute (PD_ELE_T * *pSndQueue*)

Distribute send time of PD packets over time.

The duration of PD packets on a 100MBit/s network ranges from 3us to 150us max. Because a cyclic thread scheduling below 5ms would put a too heavy load on the system, and PD packets cannot get larger than 1436 (+ UDP header), we will not account for differences in packet size. Another factor is the differences in intervals for different packets: We should only change the starting times of the packets within 1/2 the interval time. Otherwise a late addition of packets could lead to timeouts of already queued packets. Scheduling will be computed based on the smallest interval time.

Parameters

in	*pSndQueue*	pointer to send queue

Return values

TRDP_NO_ERR	

Here is the call graph for this function:

5.19.2.6 void trdp_pdHandleTimeOuts (TRDP_SESSION_PT *appHandle*)

Check for time outs.

Parameters

in	*appHandle*	application handle

Here is the call graph for this function:

5.19.2.7 void trdp_pdInit (PD_ELE_T * *pPacket,* TRDP_MSG_T *type,* UINT32 *etbTopoCnt,* UINT32 *opTrnTopoCnt,* UINT32 *replyComId,* UINT32 *replyIpAddress*)

Initialize/construct the packet Set the header infos.

Parameters

in	*pPacket*	pointer to the packet element to init
in	*type*	type the packet
in	*etbTopoCnt*	topocount to use for PD frame
in	*opTrnTopoCnt*	topocount to use for PD frame
in	*replyComId*	Pull request comId
in	*replyIpAddress*	Pull request Ip

Here is the call graph for this function:

5.19.2.8 TRDP_ERR_T trdp_pdReceive (TRDP_SESSION_PT *appHandle,* INT32 *sock*)

Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T Check for protocol errors and compare the received data to the data in our receive queue.

If it is a new packet, check if it is a PD Request (PULL). If it is an update, exchange the existing entry with the new one Call user's callback if needed

Parameters

in	*appHandle*	session pointer
in	*sock*	the socket to read from

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error
TRDP_WIRE_ERR	protocol error (late packet, version mismatch)
TRDP_QUEUE_ERR	not in queue
TRDP_CRC_ERR	header checksum
TRDP_TOPOCOUNT_ERR	invalid topocount

Here is the call graph for this function:

5.19.2.9 TRDP_ERR_T trdp_pdSend (INT32 *pdSock*, PD_ELE_T * *pPacket*, UINT16 *port*)

Send one PD packet.

Parameters

in	*pdSock*	socket descriptor
in	*pPacket*	pointer to packet to be sent
in	*port*	port on which to send

Return values

TRDP_NO_ERR	
TRDP_IO_ERR	

Here is the call graph for this function:

5.19.2.10 TRDP_ERR_T trdp_pdSendQueued (TRDP_SESSION_PT *appHandle*)

Send all due PD messages.

Parameters

in	*appHandle*	session pointer

Return values

TRDP_NO_ERR	no error
TRDP_IO_ERR	socket I/O error

Here is the call graph for this function:

5.19.2.11 void trdp_pdUpdate (PD_ELE_T * *pPacket*)

Update the header values.

Parameters

in	*pPacket*	pointer to the packet to update

Here is the call graph for this function:

5.20 trdp_pdcom.h File Reference

Functions for PD communication.

```
#include "trdp_private.h"
```

Include dependency graph for trdp_pdcom.h: This graph shows which files directly or indirectly include this file:

Functions

- void **trdp_pdInit** (**PD_ELE_T** ∗, **TRDP_MSG_T**, UINT32 topoCount, UINT32 optopoCount, UINT32 replyComId, UINT32 replyIpAddress)

  Initialize/construct the packet Set the header infos.
- void **trdp_pdUpdate** (**PD_ELE_T** ∗)

  Update the header values.
- **TRDP_ERR_T trdp_pdPut** (**PD_ELE_T** ∗, **TRDP_MARSHALL_T** func, void ∗refCon, const UINT8 ∗pData, UINT32 dataSize)

  Copy data Set the header infos.
- **TRDP_ERR_T trdp_pdCheck** (PD_HEADER_T ∗pPacket, UINT32 packetSize)

  Check if the PD header values and the CRCs are sane.
- **TRDP_ERR_T trdp_pdCheckAppTopoCounts** (**TRDP_SESSION_PT** appHandle, PD_HEADER_T ∗pFrame)

  Check if the PD header topocounts are correct compared to the session values.
- **TRDP_ERR_T trdp_pdSend** (INT32 pdSock, **PD_ELE_T** ∗pPacket, UINT16 port)

  Send one PD packet.
- **TRDP_ERR_T trdp_pdGet** (**PD_ELE_T** ∗pPacket, **TRDP_UNMARSHALL_T** unmarshall, void ∗refCon, const UINT8 ∗pData, UINT32 ∗pDataSize)

  Copy data Set the header infos.
- **TRDP_ERR_T trdp_pdSendQueued** (**TRDP_SESSION_PT** appHandle)

  Send all due PD messages.
- **TRDP_ERR_T trdp_pdReceive** (**TRDP_SESSION_PT** pSessionHandle, INT32 sock)

  Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T Check for protocol errors and compare the received data to the data in our receive queue.
- void **trdp_pdCheckPending** (**TRDP_APP_SESSION_T** appHandle, **TRDP_FDS_T** ∗pFileDesc, INT32 ∗pNoDesc)

  Check for pending packets, set FD if non blocking.
- void **trdp_pdHandleTimeOuts** (**TRDP_SESSION_PT** appHandle)

  Check for time outs.
- **TRDP_ERR_T trdp_pdCheckListenSocks** (**TRDP_SESSION_PT** appHandle, **TRDP_FDS_T** ∗pRfds, INT32 ∗pCount)

  Checking receive connection requests and data Call user's callback if needed.
- **TRDP_ERR_T trdp_pdDistribute** (**PD_ELE_T** ∗pSndQueue)

  Distribute send time of PD packets over time.

5.20.1 Detailed Description

Functions for PD communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_pdcom.h (p. 135) 1327 2014-09-04 09:21:51Z bloehr

```
BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed
               Ticket #47: Protocol change: no FCS for data part of telegrams
```

5.20.2 Function Documentation

5.20.2.1 TRDP_ERR_T trdp_pdCheck (PD_HEADER_T * *pPacket*, UINT32 *packetSize*)

Check if the PD header values and the CRCs are sane.

Parameters

in	*pPacket*	pointer to the packet to check
in	*packetSize*	max size to check

Return values

TRDP_NO_ERR	
TRDP_CRC_ERR	

Here is the call graph for this function:

5.20.2.2 TRDP_ERR_T trdp_pdCheckAppTopoCounts (TRDP_SESSION_PT *appHandle*, PD_HEADER_T * *pFrame*)

Check if the PD header topocounts are correct compared to the session values.

Parameters

in	*appHandle*	session pointer
in	*pFrame*	pointer to the packet to check

Return values

TRDP_NO_ERR	
TRDP_TOPO_ERR	

Here is the call graph for this function:

5.20.2.3 TRDP_ERR_T trdp_pdCheckListenSocks (TRDP_SESSION_PT *appHandle*, TRDP_FDS_T * *pRfds*, INT32 * *pCount*)

Checking receive connection requests and data Call user's callback if needed.

Parameters

in	*appHandle*	session pointer
in	*pRfds*	pointer to set of ready descriptors
in,out	*pCount*	pointer to number of ready descriptors

Here is the call graph for this function:

5.20.2.4 void trdp_pdCheckPending (TRDP_APP_SESSION_T *appHandle,* TRDP_FDS_T * *pFileDesc,* INT32 * *pNoDesc*)

Check for pending packets, set FD if non blocking.

Parameters

in	*appHandle*	session pointer
in,out	*pFileDesc*	pointer to set of ready descriptors
in,out	*pNoDesc*	pointer to number of ready descriptors

5.20.2.5 TRDP_ERR_T trdp_pdDistribute (PD_ELE_T * *pSndQueue*)

Distribute send time of PD packets over time.

The duration of PD packets on a 100MBit/s network ranges from 3us to 150us max. Because a cyclic thread scheduling below 5ms would put a too heavy load on the system, and PD packets cannot get larger than 1436 (+ UDP header), we will not account for differences in packet size. Another factor is the differences in intervals for different packets: We should only change the starting times of the packets within 1/2 the interval time. Otherwise a late addition of packets could lead to timeouts of already queued packets. Scheduling will be computed based on the smallest interval time.

Parameters

in	*pSndQueue*	pointer to send queue

Return values

TRDP_NO_ERR	

Here is the call graph for this function:

5.20.2.6 void trdp_pdHandleTimeOuts (TRDP_SESSION_PT *appHandle*)

Check for time outs.

Parameters

in	*appHandle*	application handle

Here is the call graph for this function:

5.20.2.7 void trdp_pdInit (PD_ELE_T * *pPacket,* TRDP_MSG_T *type,* UINT32 *etbTopoCnt,* UINT32 *opTrnTopoCnt,* UINT32 *replyComId,* UINT32 *replyIpAddress*)

Initialize/construct the packet Set the header infos.

Parameters

in	*pPacket*	pointer to the packet element to init
in	*type*	type the packet
in	*etbTopoCnt*	topocount to use for PD frame
in	*opTrnTopoCnt*	topocount to use for PD frame
in	*replyComId*	Pull request comId
in	*replyIpAddress*	Pull request Ip

Here is the call graph for this function:

5.20.2.8 TRDP_ERR_T trdp_pdReceive (TRDP_SESSION_PT *appHandle,* INT32 *sock*)

Receiving PD messages Read the receive socket for arriving PDs, copy the packet to a new PD_ELE_T Check for protocol errors and compare the received data to the data in our receive queue.

If it is a new packet, check if it is a PD Request (PULL). If it is an update, exchange the existing entry with the new one Call user's callback if needed

Parameters

in	*appHandle*	session pointer
in	*sock*	the socket to read from

Return values

TRDP_NO_ERR	no error
TRDP_PARAM_ERR	parameter error
TRDP_WIRE_ERR	protocol error (late packet, version mismatch)
TRDP_QUEUE_ERR	not in queue
TRDP_CRC_ERR	header checksum
TRDP_TOPOCOUNT_ERR	invalid topocount

Here is the call graph for this function:

5.20.2.9 TRDP_ERR_T trdp_pdSend (INT32 *pdSock,* PD_ELE_T * *pPacket,* UINT16 *port*)

Send one PD packet.

Parameters

in	*pdSock*	socket descriptor
in	*pPacket*	pointer to packet to be sent
in	*port*	port on which to send

Return values

TRDP_NO_ERR	
TRDP_IO_ERR	

Here is the call graph for this function:

5.20.2.10 TRDP_ERR_T trdp_pdSendQueued (TRDP_SESSION_PT *appHandle*)

Send all due PD messages.

Parameters

in	*appHandle*	session pointer

Return values

TRDP_NO_ERR	no error
TRDP_IO_ERR	socket I/O error

Here is the call graph for this function:

5.20.2.11 void trdp_pdUpdate (PD_ELE_T * *pPacket*)

Update the header values.

Parameters

in	*pPacket*	pointer to the packet to update

Here is the call graph for this function:

5.21 trdp_private.h File Reference

Typedefs for TRDP communication.

```
#include "trdp_types.h"
#include "trdp_proto.h"
#include "vos_thread.h"
#include "vos_sock.h"
```

Include dependency graph for trdp_private.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **TRDP_HANDLE**

  Hidden handle definition, used as unique addressing item.
- struct **TRDP_SEQ_CNT_ENTRY_T**

  Tuples of last received sequence counter per comId.
- struct **TRDP_SOCKET_TCP**

  TCP parameters.
- struct **TRDP_SOCKETS**

  Socket item.
- struct **GNU_PACKED**

  Types for ETB control.
- struct **PD_ELE**

  Queue element for PD packets to send or receive.
- struct **TRDP_SESSION**

  Session/application variables store.

Macros

- #define **TRDP_TIMER_GRANULARITY** 10000

  granularity in us
- #define **TRDP_TIMER_FOREVER** 0xffffffff

  granularity in us
- #define **TRDP_MD_DEFAULT_REPLY_TIMEOUT** 5000000

default reply time out 5s

- #define **TRDP_MD_DEFAULT_CONFIRM_TIMEOUT** 1000000

  default confirm time out 1s

- #define **TRDP_MD_DEFAULT_CONNECTION_TIMEOUT** 60000000

  Socket connection time out 1 minute.

- #define **TRDP_MD_DEFAULT_SENDING_TIMEOUT** 5000000

  Socket sending time out 5s.

- #define **TRDP_PROCESS_DEFAULT_CYCLE_TIME** 10000

  Default cycle time for TRDP process.

- #define **TRDP_PROCESS_DEFAULT_PRIORITY** 64

  Default priority of TRDP process.

- #define **TRDP_PROCESS_DEFAULT_OPTIONS TRDP_OPTION_TRAFFIC_SHAPING**

  Default options for TRDP process.

- #define **TRDP_DEBUG_DEFAULT_FILE_SIZE** 65536

  Default maximum size of log file.

- #define **TRDP_SEQ_CNT_START_ARRAY_SIZE** 64

  This should be enough for the start.

Typedefs

- typedef struct **TRDP_HANDLE TRDP_ADDRESSES_T**

  Hidden handle definition, used as unique addressing item.

- typedef struct **TRDP_SOCKET_TCP TRDP_SOCKET_TCP_T**

  TCP parameters.

- typedef struct **TRDP_SOCKETS TRDP_SOCKETS_T**

  Socket item.

- typedef struct **PD_ELE PD_ELE_T**

  Queue element for PD packets to send or receive.

- typedef struct **TRDP_SESSION TRDP_SESSION_T**

  Session/application variables store.

Enumerations

- enum **TRDP_MD_ELE_ST_T** {
  TRDP_ST_NONE = 0,
  TRDP_ST_TX_NOTIFY_ARM = 1,
  TRDP_ST_TX_REQUEST_ARM = 2,
  TRDP_ST_TX_REPLY_ARM = 3,
  TRDP_ST_TX_REPLYQUERY_ARM = 4,
  TRDP_ST_TX_CONFIRM_ARM = 5,
  TRDP_ST_RX_READY = 6,
  TRDP_ST_TX_REQUEST_W4REPLY = 7,
  TRDP_ST_RX_REPLYQUERY_W4C = 8,
  TRDP_ST_RX_REQ_W4AP_REPLY = 9,
  TRDP_ST_TX_REQ_W4AP_CONFIRM = 10,
  TRDP_ST_RX_REPLY_SENT = 11,
  TRDP_ST_RX_NOTIFY_RECEIVED = 12,
  TRDP_ST_TX_REPLY_RECEIVED = 13,
  TRDP_ST_RX_CONF_RECEIVED = 14 }

  Internal MD state.

- enum **TRDP_PRIV_FLAGS_T** { ,
  TRDP_TIMED_OUT = 0x2,
  TRDP_INVALID_DATA = 0x4,
  TRDP_REQ_2B_SENT = 0x8,
  TRDP_PULL_SUB = 0x10,
  TRDP_REDUNDANT = 0x20 }

  Internal flags for packets.
- enum **TRDP_SOCK_TYPE_T** {
  TRDP_SOCK_PD = 0,
  TRDP_SOCK_MD_UDP = 1,
  TRDP_SOCK_MD_TCP = 2 }

  Socket usage.

5.21.1 Detailed Description

Typedefs for TRDP communication. TRDP internal type definitions

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_private.h (p. 139) 1329 2014-09-04 16:03:50Z bloehr

```
BL 2014-06-02: Ticket #41: Sequence counter handling fixed
```

5.21.2 Enumeration Type Documentation

5.21.2.1 enum TRDP_MD_ELE_ST_T

Internal MD state.

Enumerator

TRDP_ST_NONE neutral value

TRDP_ST_TX_NOTIFY_ARM ready to send notify MD

TRDP_ST_TX_REQUEST_ARM ready to send request MD

TRDP_ST_TX_REPLY_ARM ready to send reply MD

TRDP_ST_TX_REPLYQUERY_ARM ready to send reply with confirm request MD

TRDP_ST_TX_CONFIRM_ARM ready to send confirm MD

TRDP_ST_RX_READY armed listener

TRDP_ST_TX_REQUEST_W4REPLY request sent, wait for reply

TRDP_ST_RX_REPLYQUERY_W4C reply send, with confirm request MD

TRDP_ST_RX_REQ_W4AP_REPLY request received, wait for application reply send

TRDP_ST_TX_REQ_W4AP_CONFIRM reply conf. rq. tx, wait for application conf send

TRDP_ST_RX_REPLY_SENT reply sent

TRDP_ST_RX_NOTIFY_RECEIVED notification received, wait for application to accept

TRDP_ST_TX_REPLY_RECEIVED reply received

TRDP_ST_RX_CONF_RECEIVED confirmation received

5.21.2.2 enum TRDP_PRIV_FLAGS_T

Internal flags for packets.

Enumerator

TRDP_TIMED_OUT if set, inform the user

TRDP_INVALID_DATA if set, inform the user

TRDP_REQ_2B_SENT if set, the request needs to be sent

TRDP_PULL_SUB if set, its a PULL subscription

TRDP_REDUNDANT if set, packet should not be sent (redundant

5.21.2.3 enum TRDP_SOCK_TYPE_T

Socket usage.

Enumerator

TRDP_SOCK_PD Socket is used for UDP process data.

TRDP_SOCK_MD_UDP Socket is used for UDP message data.

TRDP_SOCK_MD_TCP Socket is used for TCP message data.

5.22 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.

Macros

- #define **TRDP_PD_UDP_PORT** 20548
  process data UDP port
- #define **TRDP_MD_UDP_PORT** 20550
  message data UDP port

- #define **TRDP_MD_TCP_PORT** 20550

  message data TCP port
- #define **TRDP_PROTO_VER** 0x0100

  Protocol version.
- #define **TRDP_PROTOCOL_VERSION_CHECK_MASK** 0xFF00

  Version check, two digits are relevant.
- #define **TRDP_SESS_ID_SIZE** 16

  Session ID (UUID) size in MD header.
- #define **TRDP_DEST_URI_SIZE** 32

  max.
- #define **TRDP_MIN_PD_HEADER_SIZE** sizeof(PD_HEADER_T)

  PD header size with FCS.
- #define **TRDP_MAX_PD_DATA_SIZE** 1432

  PD data.
- #define **TRDP_MAX_LABEL_LEN** 16

  Maximum values.
- #define **TRDP_MAX_URI_USER_LEN** (2 ∗ **TRDP_MAX_LABEL_LEN**)

  URI user part incl.
- #define **TRDP_MAX_URI_HOST_LEN** (4 ∗ **TRDP_MAX_LABEL_LEN**)

  URI host part length incl.
- #define **TRDP_MAX_URI_LEN** ((6 ∗ **TRDP_MAX_LABEL_LEN**) + 8)

  URI length incl.
- #define **TRDP_MAX_FILE_NAME_LEN** 128

  path and file name length incl.
- #define **TDRP_VAR_SIZE** 0

  Variable size dataset.
- #define **TRDP_ETBCTRL_COMID** 1

  TRDP reserved COMIDs in the range 1 ...
- #define **TRDP_ETBCTRL_DSID** 1

  TRDP reserved data set ids in the range 1 ...

Enumerations

- enum **TRDP_MSG_T** {
  TRDP_MSG_PD = 0x5064,
  TRDP_MSG_PP = 0x5070,
  TRDP_MSG_PR = 0x5072,
  TRDP_MSG_PE = 0x5065,
  TRDP_MSG_MN = 0x4D6E,
  TRDP_MSG_MR = 0x4D72,
  TRDP_MSG_MP = 0x4D70,
  TRDP_MSG_MQ = 0x4D71,
  TRDP_MSG_MC = 0x4D63,
  TRDP_MSG_ME = 0x4D65 }

  Message Types.

5.22.1 Detailed Description

Definitions for the TRDP protocol. TRDP internal type definitions

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

trdp_proto.h (p. 142) 1316 2014-08-27 15:05:54Z bloehr

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

5.22.2 Macro Definition Documentation

5.22.2.1 #define TRDP_DEST_URI_SIZE 32

max.

Dest URI size in MD header

5.22.2.2 #define TRDP_ETBCTRL_COMID 1

TRDP reserved COMIDs in the range 1 ...

1000

5.22.2.3 #define TRDP_ETBCTRL_DSID 1

TRDP reserved data set ids in the range 1 ...

1000

5.22.2.4 #define TRDP_MAX_FILE_NAME_LEN 128

path and file name length incl.

terminating '0'

5.22.2.5 #define TRDP_MAX_LABEL_LEN 16

Maximum values.

A uri is a string of the following form: trdp://[user part]@[host part] trdp://instLabel.`funcLabel@devLabel.carLabel.cstLabel.trainLabel` Hence the exact max. uri length is: 7 + (6 ∗ 15) + 5 ∗ (sizeof (separator)) + 1(terminating 0) to facilitate alignment the size will be increased by 1 byte label length incl. terminating '0'

5.22.2.6 #define TRDP_MAX_URI_HOST_LEN (4 ∗ TRDP_MAX_LABEL_LEN)

URI host part length incl.

terminating '0'

5.22.2.7 #define TRDP_MAX_URI_LEN ((6 * TRDP_MAX_LABEL_LEN) + 8)

URI length incl.

terminating '0' and 1 padding byte

5.22.2.8 #define TRDP_MAX_URI_USER_LEN (2 * TRDP_MAX_LABEL_LEN)

URI user part incl.

terminating '0'

5.22.3 Enumeration Type Documentation

5.22.3.1 enum TRDP_MSG_T

Message Types.

Enumerator

TRDP_MSG_PD 'Pd' PD Data

TRDP_MSG_PP 'Pp' PD Data (Pull Reply)

TRDP_MSG_PR 'Pr' PD Request

TRDP_MSG_PE 'Pe' PD Error

TRDP_MSG_MN 'Mn' MD Notification (Request without reply)

TRDP_MSG_MR 'Mr' MD Request with reply

TRDP_MSG_MP 'Mp' MD Reply without confirmation

TRDP_MSG_MQ 'Mq' MD Reply with confirmation

TRDP_MSG_MC 'Mc' MD Confirm

TRDP_MSG_ME 'Me' MD Error

5.23 trdp_stats.c File Reference

Statistics functions for TRDP communication.

```
#include <stdio.h>
#include <string.h>
#include "trdp_stats.h"
#include "trdp_if_light.h"
#include "trdp_if.h"
#include "trdp_private.h"
#include "trdp_pdcom.h"
#include "vos_mem.h"
#include "vos_thread.h"
```

Include dependency graph for trdp_stats.c:

Functions

- void **trdp_UpdateStats** (**TRDP_APP_SESSION_T** appHandle)

  Update the statistics.
- void **trdp_initStats** (**TRDP_APP_SESSION_T** appHandle)

  Init statistics.
- EXT_DECL **TRDP_ERR_T tlc_resetStatistics** (**TRDP_APP_SESSION_T** appHandle)

Reset statistics.

- EXT_DECL **TRDP_ERR_T tlc_getStatistics** (**TRDP_APP_SESSION_T** appHandle, **TRDP_STATISTICS_T** ∗pStatistics)

  Return statistics.

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

  Return PD subscription statistics.

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

  Return PD publish statistics.

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

  Return redundancy group statistics.

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

  Return join statistics.

- void **trdp_pdPrepareStats** (**TRDP_APP_SESSION_T** appHandle, **PD_ELE_T** ∗pPacket)

  Fill the statistics packet.

5.23.1 Detailed Description

Statistics functions for TRDP communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_stats.c (p. 145) 1336 2014-09-30 07:25:02Z ahweiss

5.23.2 Function Documentation

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

Return join statistics.

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumJoin*	Pointer to the number of joined IP Adresses
out	*plpAddr*	Pointer to a list with the joined IP adresses

Return values

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

Here is the call graph for this function:

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

Return PD publish statistics.

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumPub*	Pointer to the number of publishers
out	*pStatistics*	Pointer to a list with the publish statistics information

Return values

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

Here is the call graph for this function:

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

Return redundancy group statistics.

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumRed*	Pointer to the number of redundancy groups
out	*pStatistics*	Pointer to a list with the redundancy group information

Return values

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

Here is the call graph for this function:

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

Return statistics.

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
out	*pStatistics*	Pointer to statistics for this application session

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	parameter error

Here is the call graph for this function:

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

Return PD subscription statistics.

Memory for statistics information must be provided by the user.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pNumSubs*	In: The number of subscriptions requested Out: Number of subscriptions returned
in,out	*pStatistics*	Pointer to an array with the subscription statistics information

Return values

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

Here is the call graph for this function:

5.23.2.6 EXT_DECL TRDP_ERR_T tlc_resetStatistics (TRDP_APP_SESSION_T *appHandle*)

Reset statistics.

Parameters

in	*appHandle*	the handle returned by tlc_openSession

Return values

TRDP_NO_ERR	no error
TRDP_NOINIT_ERR	handle invalid
TRDP_PARAM_ERR	parameter error

Here is the call graph for this function:

5.23.2.7 void trdp_initStats (TRDP_APP_SESSION_T *appHandle*)

Init statistics.

Clear the stats structure for a session.

Parameters

in	*appHandle*	the handle returned by tlc_openSession

< host name

< leader host name

Here is the call graph for this function:

5.23.2.8 void trdp_pdPrepareStats (TRDP_APP_SESSION_T *appHandle,* PD_ELE_T * *pPacket*)

Fill the statistics packet.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pPacket*	pointer to the packet to fill

Here is the call graph for this function:

5.23.2.9 void trdp_UpdateStats (TRDP_APP_SESSION_T *appHandle*)

Update the statistics.

Parameters

in	*appHandle*	the handle returned by tlc_openSession

Here is the call graph for this function:

5.24 trdp_stats.h File Reference

Statistics for TRDP communication.

```
#include "trdp_if_light.h"
#include "trdp_private.h"
#include "vos_utils.h"
```

Include dependency graph for trdp_stats.h: This graph shows which files directly or indirectly include this file:

Functions

- void **trdp_initStats** (**TRDP_APP_SESSION_T** appHandle)
  Init statistics.
- void **trdp_pdPrepareStats** (**TRDP_APP_SESSION_T** appHandle, **PD_ELE_T** *pPacket)
  Fill the statistics packet.

5.24.1 Detailed Description

Statistics for TRDP communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_stats.h (p. 150) 1065 2013-09-06 08:12:09Z aweiss

5.24.2 Function Documentation

5.24.2.1 void trdp_initStats (TRDP_APP_SESSION_T *appHandle*)

Init statistics.

Clear the stats structure for a session.

Parameters

in	*appHandle*	the handle returned by tlc_openSession

< host name

< leader host name

Here is the call graph for this function:

5.24.2.2 void trdp_pdPrepareStats (TRDP_APP_SESSION_T *appHandle,* PD_ELE_T * *pPacket*)

Fill the statistics packet.

Parameters

in	*appHandle*	the handle returned by tlc_openSession
in,out	*pPacket*	pointer to the packet to fill

Here is the call graph for this function:

5.25 trdp_types.h File Reference

Typedefs for TRDP communication.

```
#include "vos_types.h"
#include "vos_mem.h"
#include "vos_sock.h"
#include "trdp_proto.h"
```

Include dependency graph for trdp_types.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **TRDP_VERSION_T**

  Version information.
- struct **TRDP_PD_INFO_T**

  Process data info from received telegram; allows the application to generate responses.
- struct **TRDP_MD_INFO_T**

  Message data info from received telegram; allows the application to generate responses.
- struct **TRDP_SEND_PARAM_T**

  Quality/type of service and time to live.

- struct **TRDP_DATASET_ELEMENT_T**

  Dataset element definition.
- struct **TRDP_DATASET**

  Dataset definition.
- struct **TRDP_COMID_DSID_MAP_T**

  ComId - data set mapping element definition.
- struct **TRDP_MEM_STATISTICS_T**

  TRDP statistics type definitions.
- struct **TRDP_PD_STATISTICS_T**

  Structure containing all general PD statistics information.
- struct **TRDP_MD_STATISTICS_T**

  Structure containing all general MD statistics information.
- struct **TRDP_STATISTICS_T**

  Structure containing all general memory, PD and MD statistics information.
- struct **TRDP_SUBS_STATISTICS_T**

  Table containing particular PD subscription information.
- struct **TRDP_PUB_STATISTICS_T**

  Table containing particular PD publishing information.
- struct **TRDP_LIST_STATISTICS_T**

  Information about a particular MD listener.
- struct **TRDP_RED_STATISTICS_T**

  A table containing PD redundant group information.
- struct **TRDP_MARSHALL_CONFIG_T**

  Marshaling/unmarshalling configuration.
- struct **TRDP_PD_CONFIG_T**

  Default PD configuration.
- struct **TRDP_MD_CONFIG_T**

  Default MD configuration.
- struct **TRDP_MEM_CONFIG_T**

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

  Various flags/general TRDP options for library initialization.

Macros

- #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_TIME_T TRDP_TIME_T**

  Timer value compatible with timeval / select.
- typedef VOS_FDS_T **TRDP_FDS_T**

  File descriptor set compatible with fd_set / select.

- typedef **VOS_UUID_T TRDP_UUID_T**

  UUID definition reuses the VOS definition.

- typedef struct **TRDP_DATASET TRDP_DATASET_T**

  Dataset definition.

- typedef **TRDP_DATASET_T** ∗ **pTRDP_DATASET_T**

  Array of pointers to dataset.

- typedef **VOS_PRINT_DBG_T TRDP_PRINT_DBG_T**

  TRDP configuration type definitions.

- typedef **VOS_LOG_T TRDP_LOG_T**

  Categories for logging, reuse of the VOS definition.

- typedef **TRDP_ERR_T**(∗ **TRDP_MARSHALL_T**)(void ∗pRefCon, UINT32 comId, UINT8 ∗pSrc, UINT8 ∗pDst, UINT32 ∗pDstSize, **TRDP_DATASET_T** ∗∗ppCachedDS)

  Function type for marshalling .

- typedef **TRDP_ERR_T**(∗ **TRDP_UNMARSHALL_T**)(void ∗pRefCon, UINT32 comId, UINT8 ∗pSrc, UINT8 ∗pDst, UINT32 ∗pDstSize, **TRDP_DATASET_T** ∗∗ppCachedDS)

  Function type for unmarshalling.

- typedef void(∗ **TRDP_PD_CALLBACK_T**)(void ∗pRefCon, **TRDP_APP_SESSION_T** appHandle, const **TRDP_PD_INFO_T** ∗pMsg, UINT8 ∗pData, UINT32 dataSize)

  Callback for receiving indications, timeouts, releases, responses.

- typedef void(∗ **TRDP_MD_CALLBACK_T**)(void ∗pRefCon, **TRDP_APP_SESSION_T** appHandle, const **TRDP_MD_INFO_T** ∗pMsg, UINT8 ∗pData, UINT32 dataSize)

  Callback for receiving indications, timeouts, releases, responses.

Enumerations

- enum **TRDP_ERR_T** {
  TRDP_NO_ERR = 0,
  TRDP_PARAM_ERR = -1,
  TRDP_INIT_ERR = -2,
  TRDP_NOINIT_ERR = -3,
  TRDP_TIMEOUT_ERR = -4,
  TRDP_NODATA_ERR = -5,
  TRDP_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_UNKNOWN_ERR = -99 }

  Return codes for all API functions, -1..-29 taken over from vos.
- enum **TRDP_REPLY_STATUS_T**

  TRDP data transfer type definitions.
- enum **TRDP_FLAGS_T** {
  TRDP_FLAGS_DEFAULT = 0,
  TRDP_FLAGS_NONE = 0x01,
  TRDP_FLAGS_MARSHALL = 0x02,
  TRDP_FLAGS_CALLBACK = 0x04,
  TRDP_FLAGS_TCP = 0x08 }

  Various flags for PD and MD packets.
- enum **TRDP_RED_STATE_T** {
  TRDP_RED_FOLLOWER = 0,
  TRDP_RED_LEADER = 1 }

  Redundancy states.
- enum **TRDP_TO_BEHAVIOR_T** {
  TRDP_TO_DEFAULT = 0,
  TRDP_TO_SET_TO_ZERO = 1,
  TRDP_TO_KEEP_LAST_VALUE = 2 }

  How invalid PD shall be handled.

- enum **TRDP_DATA_TYPE_T** {
  TRDP_BITSET8 = 1,
  TRDP_CHAR8 = 2,
  TRDP_UTF16 = 3,
  TRDP_INT8 = 4,
  TRDP_INT16 = 5,
  TRDP_INT32 = 6,
  TRDP_INT64 = 7,
  TRDP_UINT8 = 8,
  TRDP_UINT16 = 9,
  TRDP_UINT32 = 10,
  TRDP_UINT64 = 11,
  TRDP_REAL32 = 12,
  TRDP_REAL64 = 13,
  TRDP_TIMEDATE32 = 14,
  TRDP_TIMEDATE48 = 15,
  TRDP_TIMEDATE64 = 16,
  TRDP_TYPE_MAX = 30 }

  TRDP dataset description definitions.
- enum **TRDP_OPTION_T** { ,
  TRDP_OPTION_BLOCK = 0x01,
  TRDP_OPTION_TRAFFIC_SHAPING = 0x02,
  TRDP_OPTION_NO_REUSE_ADDR = 0x04,
  TRDP_OPTION_NO_MC_LOOP_BACK = 0x08,
  TRDP_OPTION_NO_UDP_CHK = 0x10 }

  Various flags/general TRDP options for library initialization.

5.25.1 Detailed Description

Typedefs for TRDP communication. F

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_types.h (p. 151) 1350 2014-11-06 12:41:20Z ahweiss

```
BL 2014-07-14: Ticket #46: Protocol change: operational topocount needed
BL 2014-02-27: Ticket #17: tlp_subscribe() returns wrong *pSubHandle
```

5.25.2 Typedef Documentation

5.25.2.1 typedef VOS_IP4_ADDR_T TRDP_IP_ADDR_T

TRDP general type definitions.

5.25.2.2 typedef TRDP_ERR_T(∗ TRDP_MARSHALL_T)(void ∗pRefCon, UINT32 comId, UINT8 ∗pSrc, UINT8 ∗pDst, UINT32 ∗pDstSize, TRDP_DATASET_T ∗∗ppCachedDS)

Function type for marshalling .

The function must know about the dataset's alignment etc.

Parameters

in	*∗pRefCon*	pointer to user context
in	*comId*	ComId to identify the structure out of a configuration
in	*∗pSrc*	pointer to received original message
in	*∗pDst*	pointer to a buffer for the treated message
in,out	*∗pDstSize*	size of the provide buffer / size of the treated message
in,out	*∗ppCachedDS*	pointer to pointer of cached dataset

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	provided buffer to small
TRDP_COMID_ERR	comid not existing

5.25.2.3 typedef void(∗ TRDP_MD_CALLBACK_T)(void ∗pRefCon, TRDP_APP_SESSION_T appHandle, const TRDP_MD_INFO_T ∗pMsg, UINT8 ∗pData, UINT32 dataSize)

Callback for receiving indications, timeouts, releases, responses.

Parameters

in	*appHandle*	handle returned also by tlc_init
in	*∗pRefCon*	pointer to user context
in	*∗pMsg*	pointer to received message information
in	*∗pData*	pointer to received data
in	*dataSize*	size of received data pointer to received data

5.25.2.4 typedef void(∗ TRDP_PD_CALLBACK_T)(void ∗pRefCon, TRDP_APP_SESSION_T appHandle, const TRDP_PD_INFO_T ∗pMsg, UINT8 ∗pData, UINT32 dataSize)

Callback for receiving indications, timeouts, releases, responses.

Parameters

in	*∗pRefCon*	pointer to user context
in	*appHandle*	application handle returned by tlc_openSession
in	*∗pMsg*	pointer to received message information
in	*∗pData*	pointer to received data
in	*dataSize*	size of received data pointer to received data

5.25.2.5 typedef VOS_PRINT_DBG_T TRDP_PRINT_DBG_T

TRDP configuration type definitions.

Callback function definition for error/debug output, reuse of the VOS defined function.

5.25.2.6 typedef VOS_TIME_T TRDP_TIME_T

Timer value compatible with timeval / select.

Relative or absolute date, depending on usage

5.25.2.7 typedef TRDP_ERR_T(∗ TRDP_UNMARSHALL_T)(void ∗pRefCon, UINT32 comId, UINT8 ∗pSrc, UINT8 ∗pDst, UINT32 ∗pDstSize, TRDP_DATASET_T ∗∗ppCachedDS)

Function type for unmarshalling.

The function must know about the dataset's alignment etc.

Parameters

in	*∗pRefCon*	pointer to user context
in	*comId*	ComId to identify the structure out of a configuration
in	*∗pSrc*	pointer to received original message
in	*∗pDst*	pointer to a buffer for the treated message
in,out	*∗pDstSize*	size of the provide buffer / size of the treated message
in,out	*∗ppCachedDS*	pointer to pointer of cached dataset

Return values

TRDP_NO_ERR	no error
TRDP_MEM_ERR	provide buffer to small
TRDP_COMID_ERR	comid not existing

5.25.3 Enumeration Type Documentation

5.25.3.1 enum TRDP_DATA_TYPE_T

TRDP dataset description definitions.

Dataset element definition

Enumerator

TRDP_BITSET8 =UINT8

TRDP_CHAR8 char, can be used also as UTF8

TRDP_UTF16 Unicode UTF-16 character.

TRDP_INT8 Signed integer, 8 bit.

TRDP_INT16 Signed integer, 16 bit.

TRDP_INT32 Signed integer, 32 bit.

TRDP_INT64 Signed integer, 64 bit.

TRDP_UINT8 Unsigned integer, 8 bit.

TRDP_UINT16 Unsigned integer, 16 bit.

TRDP_UINT32 Unsigned integer, 32 bit.

TRDP_UINT64 Unsigned integer, 64 bit.

TRDP_REAL32 Floating point real, 32 bit.

TRDP_REAL64 Floating point real, 64 bit.

TRDP_TIMEDATE32 32 bit UNIX time

TRDP_TIMEDATE48 48 bit TCN time (32 bit UNIX time and 16 bit ticks)

TRDP_TIMEDATE64 32 bit UNIX time + 32 bit microseconds (== struct timeval)

TRDP_TYPE_MAX Values greater are considered nested datasets.

5.25.3.2 enum TRDP_ERR_T

Return codes for all API functions, -1..-29 taken over from vos.

Enumerator

TRDP_NO_ERR No error.

TRDP_PARAM_ERR Parameter missing or out of range.

TRDP_INIT_ERR Call without valid initialization.

TRDP_NOINIT_ERR Call with invalid handle.

TRDP_TIMEOUT_ERR 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_UNKNOWN_ERR Unspecified error.

5.25.3.3 enum TRDP_FLAGS_T

Various flags for PD and MD packets.

Enumerator

TRDP_FLAGS_DEFAULT Default value defined in tlc_openDession will be taken.

TRDP_FLAGS_NONE No flags set.

TRDP_FLAGS_MARSHALL Optional marshalling/unmarshalling in TRDP stack.

TRDP_FLAGS_CALLBACK Use of callback function.

TRDP_FLAGS_TCP Use TCP for message data.

5.25.3.4 enum TRDP_OPTION_T

Various flags/general TRDP options for library initialization.

Enumerator

TRDP_OPTION_BLOCK Default: Use nonblocking I/O calls, polling necessary Set: Read calls will block, use select()

TRDP_OPTION_TRAFFIC_SHAPING Use traffic shaping - distribute packet sending Default: OFF.

TRDP_OPTION_NO_REUSE_ADDR Do not allow re-use of address/port (-> no multihoming) Default: Allow.

TRDP_OPTION_NO_MC_LOOP_BACK Do not allow loop back of multicast traffic Default: Allow.

TRDP_OPTION_NO_UDP_CHK Suppress UDP CRC generation Default: Compute UDP CRC.

5.25.3.5 enum TRDP_RED_STATE_T

Redundancy states.

Enumerator

TRDP_RED_FOLLOWER Redundancy follower - redundant PD will be not sent out.

TRDP_RED_LEADER Redundancy leader - redundant PD will be sent out.

5.25.3.6 enum TRDP_REPLY_STATUS_T

TRDP data transfer type definitions.

Reply status messages

5.25.3.7 enum TRDP_TO_BEHAVIOR_T

How invalid PD shall be handled.

Enumerator

TRDP_TO_DEFAULT Default value defined in tlc_openDession will be taken.

TRDP_TO_SET_TO_ZERO If set, data will be reset to zero on time out.

TRDP_TO_KEEP_LAST_VALUE If set, last received values will be returned.

5.26 trdp_utils.c File Reference

Helper functions for TRDP communication.

```
#include <string.h>
#include "trdp_if.h"
#include "trdp_utils.h"
```

Include dependency graph for trdp_utils.c:

Functions

- void **printSocketUsage** (**TRDP_SOCKETS_T** iface[])

  Debug socket usage output.
- BOOL8 **trdp_SockIsJoined** (const **TRDP_IP_ADDR_T** mcList[**VOS_MAX_MULTICAST_CNT**], **TRDP_IP_ADDR_T** mcGroup)

  Check if a mc group is in the list.
- BOOL8 **trdp_SockAddJoin** (**TRDP_IP_ADDR_T** mcList[**VOS_MAX_MULTICAST_CNT**], **TRDP_IP_ADDR_T** mcGroup)

  Add mc group to the list.
- BOOL8 **trdp_SockDelJoin** (**TRDP_IP_ADDR_T** mcList[**VOS_MAX_MULTICAST_CNT**], **TRDP_IP_ADDR_T** mcGroup)

  remove mc group from the list
- UINT32 **trdp_packetSizePD** (UINT32 dataSize)

  Get the packet size from the raw data size.
- UINT32 **trdp_packetSizeMD** (UINT32 dataSize)

  Get the packet size from the raw data size.
- **PD_ELE_T** ∗ **trdp_queueFindComId** (**PD_ELE_T** ∗pHead, UINT32 comId)

  Return the element with same comId.
- **PD_ELE_T** ∗ **trdp_queueFindPubAddr** (**PD_ELE_T** ∗pHead, **TRDP_ADDRESSES_T** ∗addr)

  Return the element with same comId and IP addresses.
- **PD_ELE_T** ∗ **trdp_queueFindSubAddr** (**PD_ELE_T** ∗pHead, **TRDP_ADDRESSES_T** ∗addr)

  Return the element with same comId and IP addresses.
- void **trdp_queueDelElement** (**PD_ELE_T** ∗∗ppHead, **PD_ELE_T** ∗pDelete)

  Delete an element.
- void **trdp_queueAppLast** (**PD_ELE_T** ∗∗ppHead, **PD_ELE_T** ∗pNew)

  Append an element at end of queue.
- void **trdp_queueInsFirst** (**PD_ELE_T** ∗∗ppHead, **PD_ELE_T** ∗pNew)

  Insert an element at front of queue.
- void **trdp_initSockets** (**TRDP_SOCKETS_T** iface[])

  Handle the socket pool: Initialize it.
- **TRDP_ERR_T trdp_requestSocket** (**TRDP_SOCKETS_T** iface[], UINT32 port, const **TRDP_SEND_PARAM_T** ∗params, **TRDP_IP_ADDR_T** srcIP, **TRDP_IP_ADDR_T** mcGroup, **TRDP_SOCK_TYPE_T** usage, **TRDP_OPTION_T** options, BOOL8 rcvMostly, INT32 useSocket, INT32 ∗pIndex, **TRDP_IP_ADDR_T** cornerIp)

  Handle the socket pool: Request a socket from our socket pool First we loop through the socket pool and check if there is already a socket which would suit us.
- void **trdp_releaseSocket** (**TRDP_SOCKETS_T** iface[], INT32 lIndex, UINT32 connectTimeout, BOOL8 checkAll)

  Handle the socket pool: if a received TCP socket is unused, the socket connection timeout is started.
- UINT32 **trdp_getSeqCnt** (UINT32 comId, **TRDP_MSG_T** msgType, **TRDP_IP_ADDR_T** srcIpAddr)

  Get the initial sequence counter for the comID/message type and subnet (source IP).
- void **trdp_resetSequenceCounter** (**PD_ELE_T** ∗pElement, **TRDP_IP_ADDR_T** srcIP, **TRDP_MSG_T** msgType)

remove the sequence counter for the comID/source IP.

- int **trdp_checkSequenceCounter** (**PD_ELE_T** *pElement, UINT32 sequenceCounter, **TRDP_IP_ADDR_T** srcIP, **TRDP_MSG_T** msgType)

  check and update the sequence counter for the comID/source IP.

- BOOL8 **trdp_isAddressed** (const TRDP_URI_USER_T listUri, const TRDP_URI_USER_T destUri)

  Check if listener URI is in addressing range of destination URI.

5.26.1 Detailed Description

Helper functions for TRDP communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

trdp_utils.c (p. 160) 1331 2014-09-22 11:12:05Z railroad-mike

```
BL 2014-08-25: Ticket #57+58: Padding / zero bytes trailing MD & PD packets fixed
BL 2014-06-02: Ticket #41: Sequence counter handling fixed
```

5.26.2 Function Documentation

5.26.2.1 void printSocketUsage (TRDP_SOCKETS_T *iface[]*)

Debug socket usage output.

Parameters

in	*iface[]*	List of sockets

5.26.2.2 int trdp_checkSequenceCounter (PD_ELE_T * *pElement*, UINT32 *sequenceCounter*, TRDP_IP_ADDR_T *srcIP*, TRDP_MSG_T *msgType*)

check and update the sequence counter for the comID/source IP.

If the comID/srcIP is not found, update it and return 0 - else if already received, return 1 On memory error, return -1

Parameters

in	*pElement*	subscription element

in	*sequence-Counter*	sequence counter to check
in	*srcIP*	Source IP address
in	*msgType*	type of the message

Return values

0	- no duplicate 1 - duplicate sequence counter -1 - memory error

Here is the call graph for this function:

5.26.2.3 UINT32 trdp_getSeqCnt (UINT32 *comId,* TRDP_MSG_T *msgType,* TRDP_IP_ADDR_T *srcIpAddr*)

Get the initial sequence counter for the comID/message type and subnet (source IP).

If the comID/srcIP is not found elsewhere, return 0 - else return its current sequence number (the redundant packet needs the same seqNo)

Note: The standard demands that sequenceCounter is managed per comID/msgType at each publisher, but shall be the same for redundant telegrams (subnet/srcIP).

Parameters

in	*comId*	comID to look for
in	*msgType*	PD/MD type
in	*srcIpAddr*	Source IP address

Return values

return	the sequence number

Here is the call graph for this function:

5.26.2.4 void trdp_initSockets (TRDP_SOCKETS_T *iface[]*)

Handle the socket pool: Initialize it.

Parameters

in	*iface*	pointer to the socket pool

5.26.2.5 BOOL8 trdp_isAddressed (const TRDP_URI_USER_T *listUri,* const TRDP_URI_USER_T *destUri*)

Check if listener URI is in addressing range of destination URI.

Parameters

in	*listUri*	Null terminated listener URI string to compare
in	*destUri*	Null terminated destination URI string to compare

Return values

FALSE	- not in addressing range
TRUE	- listener URI is in addressing range of destination URI

Here is the call graph for this function:

5.26.2.6 UINT32 trdp_packetSizeMD (UINT32 *dataSize*)

Get the packet size from the raw data size.

Parameters

in	*dataSize*	net data size

Return values

packet	size the size of the complete packet to be sent or received

5.26.2.7 UINT32 trdp_packetSizePD (UINT32 *dataSize*)

Get the packet size from the raw data size.

Parameters

in	*dataSize*	net data size

Return values

packet	size the size of the complete packet to be sent or received

5.26.2.8 void trdp_queueAppLast (PD_ELE_T ** *ppHead*, PD_ELE_T * *pNew*)

Append an element at end of queue.

Parameters

in	*ppHead*	pointer to pointer to head of queue
in	*pNew*	pointer to element to append

5.26.2.9 void trdp_queueDelElement (PD_ELE_T ** *ppHead*, PD_ELE_T * *pDelete*)

Delete an element.

Parameters

in	*ppHead*	pointer to pointer to head of queue
in	*pDelete*	pointer to element to delete

5.26.2.10 PD_ELE_T* trdp_queueFindComId (PD_ELE_T * *pHead*, UINT32 *comId*)

Return the element with same comId.

Parameters

in	*pHead*	pointer to head of queue
in	*comId*	ComID to search for

Return values

!=	NULL pointer to PD element
NULL	No PD element found

5.26.2.11 PD_ELE_T* trdp_queueFindPubAddr (PD_ELE_T * *pHead*, TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters

in	*pHead*	pointer to head of queue
in	*addr*	Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values

!=	NULL pointer to PD element
NULL	No PD element found

5.26.2.12 PD_ELE_T* trdp_queueFindSubAddr (PD_ELE_T * *pHead*, TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters

in	*pHead*	pointer to head of queue
in	*addr*	Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values

!=	NULL pointer to PD element
NULL	No PD element found

5.26.2.13 void trdp_queueInsFirst (PD_ELE_T ** *ppHead*, PD_ELE_T * *pNew*)

Insert an element at front of queue.

Parameters

in	*ppHead*	pointer to pointer to head of queue
in	*pNew*	pointer to element to insert

5.26.2.14 void trdp_releaseSocket (TRDP_SOCKETS_T *iface[]*, INT32 *lIndex*, UINT32 *connectTimeout*, BOOL8 *checkAll*)

Handle the socket pool: if a received TCP socket is unused, the socket connection timeout is started.

Handle the socket pool: Release a socket from our socket pool.

In Udp, Release a socket from our socket pool

Parameters

in,out	*iface*	socket pool
in	*lIndex*	index of socket to release
in	*connectTimeout*	time out
in	*checkAll*	release all TCP pending sockets

Here is the call graph for this function:

5.26.2.15 TRDP_ERR_T trdp_requestSocket (TRDP_SOCKETS_T *iface[]*, UINT32 *port*, const TRDP_SEND_PARAM_T * *params*, TRDP_IP_ADDR_T *srcIP*, TRDP_IP_ADDR_T *mcGroup*, TRDP_SOCK_TYPE_T *usage*, TRDP_OPTION_T *options*, BOOL8 *rcvMostly*, INT32 *useSocket*, INT32 * *pIndex*, TRDP_IP_ADDR_T *cornerIp*)

Handle the socket pool: Request a socket from our socket pool First we loop through the socket pool and check if there is already a socket which would suit us.

Handle the socket pool: Request a socket from our socket pool.

If a multicast group should be joined, we do that on an otherwise suitable socket - up to 20 multicast goups can be joined per socket. If a socket for multicast publishing is requested, we also use the source IP to determine the interface for outgoing multicast traffic.

Parameters

in,out	*iface*	socket pool
in	*port*	port to use
in	*params*	parameters to use
in	*srcIP*	IP to bind to (0 = any address)
in	*mcGroup*	MC group to join (0 = do not join)
in	*usage*	type and port to bind to (PD, MD/UDP, MD/TCP)
in	*options*	blocking/nonblocking
in	*rcvMostly*	primarily used for receiving (tbd: bind on sender, too?)
out	*useSocket*	socket to use, do not open a new one
out	*pIndex*	returned index of socket pool
in	*cornerIp*	only used for receiving

Return values

TRDP_NO_ERR	
TRDP_PARAM_ERR	

Here is the call graph for this function:

5.26.2.16 void trdp_resetSequenceCounter (PD_ELE_T * *pElement*, TRDP_IP_ADDR_T *srcIP*, TRDP_MSG_T *msgType*)

remove the sequence counter for the comID/source IP.

The sequence counter should be reset if there was a packet time out.

Parameters

in	*pElement*	subscription element
in	*srcIP*	Source IP address
in	*msgType*	message type

Return values

none	

5.26.2.17 BOOL8 trdp_SockAddJoin (TRDP_IP_ADDR_T *mcList[VOS_MAX_MULTICAST_CNT]*, TRDP_IP_ADDR_T *mcGroup*)

Add mc group to the list.

Parameters

in	*mcList[]*	List of multicast groups
in	*mcGroup*	multicast group

Return values

1	if added 0 if list is full

5.26.2.18 BOOL8 trdp_SockDelJoin (TRDP_IP_ADDR_T *mcList[VOS_MAX_MULTICAST_CNT],* TRDP_IP_ADDR_T *mcGroup*)

remove mc group from the list

Parameters

in	*mcList[]*	List of multicast groups
in	*mcGroup*	multicast group

Return values

1	if deleted 0 was not in list

5.26.2.19 BOOL8 trdp_SockIsJoined (const TRDP_IP_ADDR_T *mcList[VOS_MAX_MULTICAST_CNT],* TRDP_IP_ADDR_T *mcGroup*)

Check if a mc group is in the list.

Parameters

in	*mcList[]*	List of multicast groups
in	*mcGroup*	multicast group

Return values

1	if found 0 if not found

5.27 trdp_utils.h File Reference

Common utilities for TRDP communication.

```
#include <stdio.h>
#include "trdp_private.h"
#include "vos_utils.h"
#include "vos_sock.h"
```

Include dependency graph for trdp_utils.h: This graph shows which files directly or indirectly include this file:

Functions

- **PD_ELE_T** ∗ **trdp_queueFindComId** (**PD_ELE_T** ∗pHead, UINT32 comId)

  Return the element with same comId.
- **PD_ELE_T** ∗ **trdp_queueFindSubAddr** (**PD_ELE_T** ∗pHead, **TRDP_ADDRESSES_T** ∗pAddr)

  Return the element with same comId and IP addresses.
- **PD_ELE_T** ∗ **trdp_queueFindPubAddr** (**PD_ELE_T** ∗pHead, **TRDP_ADDRESSES_T** ∗addr)

  Return the element with same comId and IP addresses.
- void **trdp_queueDelElement** (**PD_ELE_T** ∗∗pHead, **PD_ELE_T** ∗pDelete)

  Delete an element.
- void **trdp_queueAppLast** (**PD_ELE_T** ∗∗pHead, **PD_ELE_T** ∗pNew)

  Append an element at end of queue.
- void **trdp_queueInsFirst** (**PD_ELE_T** ∗∗pHead, **PD_ELE_T** ∗pNew)

  Insert an element at front of queue.
- void **trdp_initSockets** (**TRDP_SOCKETS_T** iface[])

  Handle the socket pool: Initialize it.
- void **trdp_initUncompletedTCP** (**TRDP_APP_SESSION_T** appHandle)

  ???
- void **trdp_resetSequenceCounter** (**PD_ELE_T** ∗pElement, **TRDP_IP_ADDR_T** srcIP, **TRDP_MSG_T** msgType)

  remove the sequence counter for the comID/source IP.

- **TRDP_ERR_T trdp_requestSocket** (**TRDP_SOCKETS_T** iface[], UINT32 port, const **TRDP_SEND_PARAM_T** *params, **TRDP_IP_ADDR_T** srcIP, **TRDP_IP_ADDR_T** mcGroup, **TRDP_SOCK_TYPE_T** usage, **TRDP_OPTION_T** options, BOOL8 rcvMostly, INT32 useSocket, INT32 *pIndex, **TRDP_IP_ADDR_T** cornerIp)

  Handle the socket pool: Request a socket from our socket pool.
- void **trdp_releaseSocket** (**TRDP_SOCKETS_T** iface[], INT32 lIndex, UINT32 connectTimeout, BOOL8 checkAll)

  Handle the socket pool: Release a socket from our socket pool.
- UINT32 **trdp_packetSizePD** (UINT32 dataSize)

  Get the packet size from the raw data size.
- UINT32 **trdp_packetSizeMD** (UINT32 dataSize)

  Get the packet size from the raw data size.
- UINT32 **trdp_getSeqCnt** (UINT32 comID, **TRDP_MSG_T** msgType, **TRDP_IP_ADDR_T** srcIP)

  Get the initial sequence counter for the comID/message type and subnet (source IP).
- int **trdp_checkSequenceCounter** (**PD_ELE_T** *pElement, UINT32 sequenceCounter, **TRDP_IP_ADDR_T** srcIP, **TRDP_MSG_T** msgType)

  check and update the sequence counter for the comID/source IP.
- BOOL8 **trdp_isAddressed** (const TRDP_URI_USER_T listUri, const TRDP_URI_USER_T destUri)

  Check if listener URI is in addressing range of destination URI.

5.27.1 Detailed Description

Common utilities for TRDP communication.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

trdp_utils.h (p. 167) 1353 2014-11-11 15:11:13Z ahweiss

5.27.2 Function Documentation

5.27.2.1 int trdp_checkSequenceCounter (**PD_ELE_T** * *pElement,* **UINT32** *sequenceCounter,* **TRDP_IP_ADDR_T** *srcIP,* **TRDP_MSG_T** *msgType*)

check and update the sequence counter for the comID/source IP.

If the comID/srcIP is not found, update it and return 0 - else if already received, return 1 On memory error, return -1

Parameters

in	*pElement*	subscription element
in	*sequence-Counter*	sequence counter to check
in	*srcIP*	Source IP address
in	*msgType*	type of the message

Return values

0	- no duplicate 1 - duplicate sequence counter -1 - memory error

Here is the call graph for this function:

5.27.2.2 UINT32 trdp_getSeqCnt (UINT32 *comId,* TRDP_MSG_T *msgType,* TRDP_IP_ADDR_T *srcIpAddr*)

Get the initial sequence counter for the comID/message type and subnet (source IP).

If the comID/srcIP is not found elsewhere, return 0 - else return its current sequence number (the redundant packet needs the same seqNo)

Note: The standard demands that sequenceCounter is managed per comID/msgType at each publisher, but shall be the same for redundant telegrams (subnet/srcIP).

Parameters

in	*comId*	comID to look for
in	*msgType*	PD/MD type
in	*srcIpAddr*	Source IP address

Return values

return	the sequence number

Here is the call graph for this function:

5.27.2.3 void trdp_initSockets (TRDP_SOCKETS_T *iface[]*)

Handle the socket pool: Initialize it.

Parameters

in	*iface*	pointer to the socket pool

5.27.2.4 void trdp_initUncompletedTCP (TRDP_APP_SESSION_T *appHandle*)

???

Parameters

in	*appHandle*	session handle

5.27.2.5 BOOL8 trdp_isAddressed (const TRDP_URI_USER_T *listUri,* const TRDP_URI_USER_T *destUri*)

Check if listener URI is in addressing range of destination URI.

Parameters

in	*listUri*	Null terminated listener URI string to compare
in	*destUri*	Null terminated destination URI string to compare

Return values

FALSE	- not in addressing range
TRUE	- listener URI is in addressing range of destination URI

Here is the call graph for this function:

5.27.2.6 UINT32 trdp_packetSizeMD (UINT32 *dataSize*)

Get the packet size from the raw data size.

Parameters

in	*dataSize*	net data size

Return values

packet	size the size of the complete packet to be sent or received

5.27.2.7 UINT32 trdp_packetSizePD (UINT32 *dataSize*)

Get the packet size from the raw data size.

Parameters

in	*dataSize*	net data size

Return values

packet	size the size of the complete packet to be sent or received

5.27.2.8 void trdp_queueAppLast (PD_ELE_T ** *ppHead*, PD_ELE_T * *pNew*)

Append an element at end of queue.

Parameters

in	*ppHead*	pointer to pointer to head of queue
in	*pNew*	pointer to element to append

5.27.2.9 void trdp_queueDelElement (PD_ELE_T ** *ppHead*, PD_ELE_T * *pDelete*)

Delete an element.

Parameters

in	*ppHead*	pointer to pointer to head of queue
in	*pDelete*	pointer to element to delete

5.27.2.10 PD_ELE_T* trdp_queueFindComId (PD_ELE_T * *pHead*, UINT32 *comId*)

Return the element with same comId.

Parameters

in	*pHead*	pointer to head of queue
in	*comId*	ComID to search for

Return values

!=	NULL pointer to PD element
NULL	No PD element found

5.27.2.11 PD_ELE_T* trdp_queueFindPubAddr (PD_ELE_T * *pHead,* TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters

in	*pHead*	pointer to head of queue
in	*addr*	Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values

!=	NULL pointer to PD element
NULL	No PD element found

5.27.2.12 PD_ELE_T* trdp_queueFindSubAddr (PD_ELE_T * *pHead,* TRDP_ADDRESSES_T * *addr*)

Return the element with same comId and IP addresses.

Parameters

in	*pHead*	pointer to head of queue
in	*addr*	Pub/Sub handle (Address, ComID, srcIP & dest IP) to search for

Return values

!=	NULL pointer to PD element
NULL	No PD element found

5.27.2.13 void trdp_queueInsFirst (PD_ELE_T ** *ppHead,* PD_ELE_T * *pNew*)

Insert an element at front of queue.

Parameters

in	*ppHead*	pointer to pointer to head of queue
in	*pNew*	pointer to element to insert

5.27.2.14 void trdp_releaseSocket (TRDP_SOCKETS_T *iface[],* INT32 *llIndex,* UINT32 *connectTimeout,* BOOL8 *checkAll*)

Handle the socket pool: Release a socket from our socket pool.

Parameters

in,out	*iface*	socket pool

in	*llIndex*	index of socket to release
in	*connectTimeout*	timeout value
in	*checkAll*	release all TCP pending sockets

Handle the socket pool: Release a socket from our socket pool.

In Udp, Release a socket from our socket pool

Parameters

in,out	*iface*	socket pool
in	*llIndex*	index of socket to release
in	*connectTimeout*	time out
in	*checkAll*	release all TCP pending sockets

Here is the call graph for this function:

5.27.2.15 TRDP_ERR_T trdp_requestSocket (TRDP_SOCKETS_T *iface[]*, UINT32 *port*, const TRDP_SEND_PARAM_T * *params*, TRDP_IP_ADDR_T *srcIP*, TRDP_IP_ADDR_T *mcGroup*, TRDP_SOCK_TYPE_T *usage*, TRDP_OPTION_T *options*, BOOL8 *rcvMostly*, INT32 *useSocket*, INT32 * *pIndex*, TRDP_IP_ADDR_T *cornerIp*)

Handle the socket pool: Request a socket from our socket pool.

Parameters

in,out	*iface*	socket pool
in	*port*	port to use
in	*params*	parameters to use
in	*srcIP*	IP to bind to (0 = any address)
in	*mcGroup*	MC group to join (0 = do not join)
in	*usage*	type and port to bind to
in	*options*	blocking/nonblocking
in	*rcvMostly*	only used for receiving
out	*useSocket*	socket to use, do not open a new one
out	*pIndex*	returned index of socket pool
in	*cornerIp*	only used for receiving

Return values

TRDP_NO_ERR	
TRDP_PARAM_ERR	Handle the socket pool: Request a socket from our socket pool.

If a multicast group should be joined, we do that on an otherwise suitable socket - up to 20 multicast goups can be joined per socket. If a socket for multicast publishing is requested, we also use the source IP to determine the interface for outgoing multicast traffic.

Parameters

in,out	*iface*	socket pool
in	*port*	port to use
in	*params*	parameters to use
in	*srcIP*	IP to bind to (0 = any address)
in	*mcGroup*	MC group to join (0 = do not join)
in	*usage*	type and port to bind to (PD, MD/UDP, MD/TCP)
in	*options*	blocking/nonblocking
in	*rcvMostly*	primarily used for receiving (tbd: bind on sender, too?)

out	*useSocket*	socket to use, do not open a new one
out	*pIndex*	returned index of socket pool
in	*cornerIp*	only used for receiving

Return values

TRDP_NO_ERR	
TRDP_PARAM_ERR	

Here is the call graph for this function:

5.27.2.16 void trdp_resetSequenceCounter (PD_ELE_T * *pElement,* TRDP_IP_ADDR_T *srcIP,* TRDP_MSG_T *msgType*)

remove the sequence counter for the comID/source IP.

The sequence counter should be reset if there was a packet time out.

Parameters

in	*pElement*	subscription element
in	*srcIP*	Source IP address
in	*msgType*	message type

Return values

none	

5.28 vos_mem.c File Reference

Memory functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include "vos_types.h"
#include "vos_utils.h"
#include "vos_mem.h"
#include "vos_thread.h"
#include "vos_private.h"
```

Include dependency graph for vos_mem.c:

Functions

- **VOS_ERR_T vos_mutexLocalCreate** (struct VOS_MUTEX *pMutex)

  Create a recursive mutex.
- void **vos_mutexLocalDelete** (struct VOS_MUTEX *pMutex)

  Delete a mutex.
- EXT_DECL **VOS_ERR_T vos_memInit** (UINT8 *pMemoryArea, UINT32 size, const UINT32 fragMem[VOS_MEM_NBLOCKSIZES])

  Initialize the memory unit.
- EXT_DECL void **vos_memDelete** (UINT8 *pMemoryArea)

  Delete the memory area.

- EXT_DECL UINT8 * **vos_memAlloc** (UINT32 size)

  Allocate a block of memory (from memory area above).
- EXT_DECL void **vos_memFree** (void *pMemBlock)

  Deallocate a block of memory (from memory area above).
- EXT_DECL **VOS_ERR_T vos_memCount** (UINT32 *pAllocatedMemory, UINT32 *pFreeMemory, UINT32 *pMinFree, UINT32 *pNumAllocBlocks, UINT32 *pNumAllocErr, UINT32 *pNumFreeErr, UINT32 blockSize[VOS_MEM_NBLOCKSIZES], UINT32 usedBlockSize[VOS_MEM_NBLOCKSIZES])

  Return used and available memory (of memory area above).
- EXT_DECL void **vos_qsort** (void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))

  Sort an array.
- EXT_DECL void * **vos_bsearch** (const void *pKey, const void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))

  Binary search in a sorted array.
- EXT_DECL INT32 **vos_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 **VOS_ERR_T vos_queueCreate** (**VOS_QUEUE_POLICY_T** queueType, UINT32 maxNoOfMsg, **VOS_QUEUE_T** *pQueueHandle)

  Initialize a message queue.
- EXT_DECL **VOS_ERR_T vos_queueSend** (**VOS_QUEUE_T** queueHandle, UINT8 *pData, UINT32 size)

  Send a message.
- EXT_DECL **VOS_ERR_T vos_queueReceive** (**VOS_QUEUE_T** queueHandle, UINT8 **ppData, UINT32 *pSize, UINT32 usTimeout)

  Get a message.
- EXT_DECL **VOS_ERR_T vos_queueDestroy** (**VOS_QUEUE_T** queueHandle)

  Destroy a message queue.

5.28.1 Detailed Description

Memory functions. OS abstraction of memory access and control

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

vos_mem.c (p. 173) 1323 2014-08-29 14:09:08Z bloehr

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

5.28.2 Function Documentation

5.28.2.1 EXT_DECL void* vos_bsearch (const void * *pKey*, const void * *pBuf*, UINT32 *num*, UINT32 *size*, int(*)(const void *, const void *) *compare*)

Binary search in a sorted array.

This is just a wrapper for the standard bsearch function.

Parameters

in	*pKey*	Key to search for
in	*pBuf*	Pointer to the array to sort
in	*num*	number of elements
in	*size*	size of one element
in	*compare*	Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values

Pointer	to found element or NULL

5.28.2.2 EXT_DECL UINT8* vos_memAlloc (UINT32 *size*)

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

Parameters

in	*size*	Size of requested block

Return values

Pointer	to memory area
NULL	if no memory available

Here is the call graph for this function:

5.28.2.3 EXT_DECL VOS_ERR_T vos_memCount (UINT32 * *pAllocatedMemory*, UINT32 * *pFreeMemory*, UINT32 * *pMinFree*, UINT32 * *pNumAllocBlocks*, UINT32 * *pNumAllocErr*, UINT32 * *pNumFreeErr*, UINT32 *blockSize[VOS_MEM_NBLOCKSIZES]*, UINT32 *usedBlockSize[VOS_MEM_NBLOCKSIZES]*)

Return used and available memory (of memory area above).

Parameters

out	*pAllocated-Memory*	Pointer to allocated memory size
out	*pFreeMemory*	Pointer to free memory size
out	*pMinFree*	Pointer to minimal free memory size in statistics interval
out	*pNumAlloc-Blocks*	Pointer to number of allocated memory blocks
out	*pNumAllocErr*	Pointer to number of allocation errors
out	*pNumFreeErr*	Pointer to number of free errors
out	*blockSize*	Pointer to list of memory block sizes
out	*usedBlockSize*	Pointer to list of used memoryblocks

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised

5.28.2.4 EXT_DECL void vos_memDelete (UINT8 * *pMemoryArea*)

Delete the memory area.

This will eventually invalidate any previously allocated memory blocks! It should be called last before the application quits. No further access to the memory blocks is allowed after this call.

Parameters

in	*pMemoryArea*	Pointer to memory area used

Here is the call graph for this function:

5.28.2.5 EXT_DECL void vos_memFree (void * *pMemBlock*)

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

Parameters

in	*pMemBlock*	Pointer to memory block to be freed

Here is the call graph for this function:

5.28.2.6 EXT_DECL VOS_ERR_T vos_memInit (UINT8 * *pMemoryArea,* UINT32 *size,* const UINT32 *fragMem[VOS_MEM_NBLOCKSIZES]*)

Initialize the memory unit.

Init a supplied block of memory and prepare it for use with vos_memAlloc and vos_memFree. The used block sizes can be supplied and will be preallocated. If half of the overall size of the requested memory area would be pre-allocated, either by the default pre-allocation table or a provided one, no pre-allocation takes place.

Parameters

in	*pMemoryArea*	Pointer to memory area to use
in	*size*	Size of provided memory area
in	*fragMem*	Pointer to list of preallocated block sizes, used to fragment memory for large blocks

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_MEM_ERR	no memory available
VOS_MUTEX_ERR	no mutex available

Here is the call graph for this function:

5.28.2.7 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

5.28.2.8 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	Pointer to mutex struct

5.28.2.9 EXT_DECL void vos_qsort (void * *pBuf*, UINT32 *num*, UINT32 *size*, int(*)(const void *, const void *) *compare*)

Sort an array.

This is just a wrapper for the standard qsort function.

Parameters

in,out	*pBuf*	Pointer to the array to sort
in	*num*	number of elements
in	*size*	size of one element
in	*compare*	Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values

none	

5.28.2.10 EXT_DECL VOS_ERR_T vos_queueCreate (VOS_QUEUE_POLICY_T *queueType*, UINT32 *maxNoOfMsg*, VOS_QUEUE_T * *pQueueHandle*)

Initialize a message queue.

Returns a handle for further calls

Parameters

in	*queueType*	Define queue type (1 = FIFO, 2 = LIFO, 3 = PRIO)
in	*maxNoOfMsg*	Maximum number of messages
out	*pQueueHandle*	Handle of created queue

Return values

VOS_NO_ERR	no error

VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_INIT_ERR	not supported
VOS_QUEUE_ERR	error creating queue

Here is the call graph for this function:

5.28.2.11 EXT_DECL VOS_ERR_T vos_queueDestroy (VOS_QUEUE_T *queueHandle*)

Destroy a message queue.

Free all resources used by this queue

Parameters

in	*queueHandle*	Queue handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid

Here is the call graph for this function:

5.28.2.12 EXT_DECL VOS_ERR_T vos_queueReceive (VOS_QUEUE_T *queueHandle,* UINT8 ∗∗ *ppData,* UINT32 ∗ *pSize,* UINT32 *usTimeout*)

Get a message.

Parameters

in	*queueHandle*	Queue handle
out	*ppData*	Pointer to data pointer to be received
out	*pSize*	Size of receive data
in	*usTimeout*	Maximum time to wait for a message (in usec)

Return values

VOSNO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_QUEUE_ERR	queue is empty

Here is the call graph for this function:

5.28.2.13 EXT_DECL VOS_ERR_T vos_queueSend (VOS_QUEUE_T *queueHandle,* UINT8 ∗ *pData,* UINT32 *size*)

Send a message.

Parameters

in	*queueHandle*	Queue handle

in	*pData*	Pointer to data to be sent
in	*size*	Size of data to be sent

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_INIT_ERR	not supported
VOS_QUEUE_ERR	error creating queue

Here is the call graph for this function:

5.28.2.14 EXT_DECL void vos_strncpy (CHAR8 * *pStrDst*, const CHAR8 * *pStrSrc*, UINT32 *count*)

String copy with length limitation.

Parameters

in	*pStrDst*	Destination string
in	*pStrSrc*	Null terminated string to copy
in	*count*	Maximum number of characters to copy

Return values

none	

5.28.2.15 EXT_DECL INT32 vos_strnicmp (const CHAR8 * *pStr1*, const CHAR8 * *pStr2*, UINT32 *count*)

Case insensitive string compare.

Parameters

in	*pStr1*	Null terminated string to compare
in	*pStr2*	Null terminated string to compare
in	*count*	Maximum number of characters to compare

Return values

0	- equal
<0	- string1 less than string 2
>0	- string 1 greater than string 2

5.29 vos_mem.h File Reference

Memory and queue functions for OS abstraction.

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

Include dependency graph for vos_mem.h: This graph shows which files directly or indirectly include this file:

Macros

- #define **VOS_MEM_BLOCKSIZES**

  We internally allocate memory always by these block sizes.

- #define **VOS_MEM_PREALLOCATE** {0, 0, 0, 0, 0, 0, 0, 8, 0, 0, 1, 0, 0, 0, 0}

  Default pre-allocation of free memory blocks.

Typedefs

- typedef struct VOS_QUEUE * **VOS_QUEUE_T**

  Opaque queue define.

Enumerations

- enum **VOS_QUEUE_POLICY_T**

  Queue policy matching pthread/Posix defines.

Functions

- EXT_DECL **VOS_ERR_T vos_memInit** (UINT8 *pMemoryArea, UINT32 size, const UINT32 fragMem[VOS_MEM_NBLOCKSIZES])

  Initialize the memory unit.
- EXT_DECL void **vos_memDelete** (UINT8 *pMemoryArea)

  Delete the memory area.
- EXT_DECL UINT8 * **vos_memAlloc** (UINT32 size)

  Allocate a block of memory (from memory area above).
- EXT_DECL void **vos_memFree** (void *pMemBlock)

  Deallocate a block of memory (from memory area above).
- EXT_DECL **VOS_ERR_T vos_memCount** (UINT32 *pAllocatedMemory, UINT32 *pFreeMemory, UINT32 *pMinFree, UINT32 *pNumAllocBlocks, UINT32 *pNumAllocErr, UINT32 *pNumFreeErr, UINT32 blockSize[VOS_MEM_NBLOCKSIZES], UINT32 usedBlockSize[VOS_MEM_NBLOCKSIZES])

  Return used and available memory (of memory area above).
- EXT_DECL void **vos_qsort** (void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))

  Sort an array.
- EXT_DECL void * **vos_bsearch** (const void *pKey, const void *pBuf, UINT32 num, UINT32 size, int(*compare)(const void *, const void *))

  Binary search in a sorted array.
- EXT_DECL INT32 **vos_strnicmp** (const CHAR8 *pStr1, const CHAR8 *pStr2, UINT32 count)

  Case insensitive string compare.
- EXT_DECL void **vos_strncpy** (CHAR8 *pStr1, const CHAR8 *pStr2, UINT32 count)

  String copy with length limitation.
- EXT_DECL **VOS_ERR_T vos_queueCreate** (**VOS_QUEUE_POLICY_T** queueType, UINT32 maxNoOfMsg, **VOS_QUEUE_T** *pQueueHandle)

  Initialize a message queue.
- EXT_DECL **VOS_ERR_T vos_queueSend** (**VOS_QUEUE_T** queueHandle, UINT8 *pData, UINT32 size)

  Send a message.
- EXT_DECL **VOS_ERR_T vos_queueReceive** (**VOS_QUEUE_T** queueHandle, UINT8 **ppData, UINT32 *pSize, UINT32 usTimeout)

  Get a message.
- EXT_DECL **VOS_ERR_T vos_queueDestroy** (**VOS_QUEUE_T** queueHandle)

  Destroy a message queue.

5.29.1 Detailed Description

Memory and queue functions for OS abstraction. This module provides memory control supervison

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH Peter Brander (Memory scheme)

Remarks

Id:

vos_mem.h (p. 179) 1323 2014-08-29 14:09:08Z bloehr

5.29.2 Macro Definition Documentation

5.29.2.1 #define VOS_MEM_BLOCKSIZES

Value:

```
{32, 48, 128, 180, 256, 512, 1024, 1480, 2048, \
                             4096, 11520, 16384, 32768, 65536, 131072}
```

We internally allocate memory always by these block sizes.

The largest available block is 524288 Bytes, provided the overal size of the used memory allocation area is larger.

5.29.2.2 #define VOS_MEM_PREALLOCATE {0, 0, 0, 0, 0, 0, 0, 8, 0, 0, 1, 0, 0, 0, 0}

Default pre-allocation of free memory blocks.

To avoid problems with too many small blocks and no large one. Specify how many of each block size that should be pre-allocated (and freed!) to pre-segment the memory area.

5.29.3 Function Documentation

5.29.3.1 EXT_DECL void* vos_bsearch (const void * *pKey,* const void * *pBuf,* UINT32 *num,* UINT32 *size,* int(*)(const void *, const void *) *compare*)

Binary search in a sorted array.

This is just a wrapper for the standard bsearch function.

Parameters

in	*pKey*	Key to search for

in	*pBuf*	Pointer to the array to sort
in	*num*	number of elements
in	*size*	size of one element
in	*compare*	Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values

Pointer	to found element or NULL

5.29.3.2 EXT_DECL UINT8* vos_memAlloc (UINT32 *size*)

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

Parameters

in	*size*	Size of requested block

Return values

Pointer	to memory area
NULL	if no memory available

Here is the call graph for this function:

5.29.3.3 EXT_DECL VOS_ERR_T vos_memCount (UINT32 * *pAllocatedMemory,* UINT32 * *pFreeMemory,* UINT32 * *pMinFree,* UINT32 * *pNumAllocBlocks,* UINT32 * *pNumAllocErr,* UINT32 * *pNumFreeErr,* UINT32 *blockSize[VOS_MEM_NBLOCKSIZES],* UINT32 *usedBlockSize[VOS_MEM_NBLOCKSIZES]*)

Return used and available memory (of memory area above).

Parameters

out	*pAllocated-Memory*	Pointer to allocated memory size
out	*pFreeMemory*	Pointer to free memory size
out	*pMinFree*	Pointer to minimal free memory size in statistics interval
out	*pNumAlloc-Blocks*	Pointer to number of allocated memory blocks
out	*pNumAllocErr*	Pointer to number of allocation errors
out	*pNumFreeErr*	Pointer to number of free errors
out	*blockSize*	Pointer to list of memory block sizes
out	*usedBlockSize*	Pointer to list of used memoryblocks

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised

5.29.3.4 EXT_DECL void vos_memDelete (UINT8 * *pMemoryArea*)

Delete the memory area.

This will eventually invalidate any previously allocated memory blocks! It should be called last before the application quits. No further access to the memory blocks is allowed after this call.

Parameters

in	*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

in	*pMemoryArea*	Pointer to memory area used

Here is the call graph for this function:

5.29.3.5 EXT_DECL void vos_memFree (void * *pMemBlock*)

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

Parameters

in	*pMemBlock*	Pointer to memory block to be freed

Here is the call graph for this function:

5.29.3.6 EXT_DECL VOS_ERR_T vos_memInit (UINT8 * *pMemoryArea,* UINT32 *size,* const UINT32 *fragMem[VOS_MEM_NBLOCKSIZES]*)

Initialize the memory unit.

Init a supplied block of memory and prepare it for use with vos_alloc and vos_dealloc. The used block sizes can be supplied and will be preallocated.

Parameters

in	*pMemoryArea*	Pointer to memory area to use
in	*size*	Size of provided memory area
in	*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

in	*pMemoryArea*	Pointer to memory area to use
in	*size*	Size of provided memory area
in	*fragMem*	Pointer to list of preallocated block sizes, used to fragment memory for large blocks

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_MEM_ERR	no memory available

VOS_MUTEX_ERR	no mutex available

Here is the call graph for this function:

5.29.3.7 EXT_DECL void vos_qsort (void * *pBuf,* UINT32 *num,* UINT32 *size,* int(*)(const void *, const void *) *compare*)

Sort an array.

This is just a wrapper for the standard qsort function.

Parameters

in,out	*pBuf*	Pointer to the array to sort
in	*num*	number of elements
in	*size*	size of one element
in	*compare*	Pointer to compare function return -n if arg1 < arg2, return 0 if arg1 == arg2, return +n if arg1 > arg2 where n is an integer != 0

Return values

none	

5.29.3.8 EXT_DECL VOS_ERR_T vos_queueCreate (VOS_QUEUE_POLICY_T *queueType,* UINT32 *maxNoOfMsg,* VOS_QUEUE_T * *pQueueHandle*)

Initialize a message queue.

Returns a handle for further calls

Parameters

in	*queueType*	Define queue type (1 = FIFO, 2 = LIFO, 3 = PRIO)
in	*maxNoOfMsg*	Maximum number of messages
out	*pQueueHandle*	Handle of created queue

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_INIT_ERR	not supported
VOS_QUEUE_ERR	error creating queue

Here is the call graph for this function:

5.29.3.9 EXT_DECL VOS_ERR_T vos_queueDestroy (VOS_QUEUE_T *queueHandle*)

Destroy a message queue.

Free all resources used by this queue

Parameters

in	*queueHandle*	Queue handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid

Here is the call graph for this function:

5.29.3.10 EXT_DECL VOS_ERR_T vos_queueReceive (VOS_QUEUE_T *queueHandle,* UINT8 ** *ppData,* UINT32 * *pSize,* UINT32 *usTimeout*)

Get a message.

Parameters

in	*queueHandle*	Queue handle
out	*ppData*	Pointer to data pointer to be received
out	*pSize*	Size of receive data
in	*usTimeout*	Maximum time to wait for a message (in usec)

Return values

VOSNO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_QUEUE_ERR	queue is empty

Here is the call graph for this function:

5.29.3.11 EXT_DECL VOS_ERR_T vos_queueSend (VOS_QUEUE_T *queueHandle,* UINT8 * *pData,* UINT32 *size*)

Send a message.

Parameters

in	*queueHandle*	Queue handle
in	*pData*	Pointer to data to be sent
in	*size*	Size of data to be sent

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_INIT_ERR	not supported
VOS_QUEUE_ERR	error creating queue

Here is the call graph for this function:

5.29.3.12 EXT_DECL void vos_strncpy (CHAR8 * *pStrDst,* const CHAR8 * *pStrSrc,* UINT32 *count*)

String copy with length limitation.

Parameters

in	*pStrDst*	Destination string
in	*pStrSrc*	Null terminated string to copy
in	*count*	Maximum number of characters to copy

Return values

none	

5.29.3.13 EXT_DECL INT32 vos_strnicmp (const CHAR8 * *pStr1*, const CHAR8 * *pStr2*, UINT32 *count*)

Case insensitive string compare.

Parameters

in	*pStr1*	Null terminated string to compare
in	*pStr2*	Null terminated string to compare
in	*count*	Maximum number of characters to compare

Return values

0	- equal
<0	- string1 less than string 2
>0	- string 1 greater than string 2

5.30 vos_private.h File Reference

Private definitions for the OS abstraction layer.

```
#include <pthread.h>
#include <sys/types.h>
#include "vos_types.h"
#include "vos_thread.h"
```

Include dependency graph for posix/vos_private.h: This graph shows which files directly or indirectly include this file:

Functions

- **VOS_ERR_T vos_mutexLocalCreate** (struct VOS_MUTEX *pMutex)

  Create a recursive mutex.
- void **vos_mutexLocalDelete** (struct VOS_MUTEX *pMutex)

  Delete a mutex.

5.30.1 Detailed Description

Private definitions for the OS abstraction layer.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_private.h 1133 2013-12-18 08:00:43Z ahweiss

5.30.2 Function Documentation

5.30.2.1 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

5.30.2.2 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	Pointer to mutex struct

5.31 vos_private.h File Reference

Private definitions for the OS abstraction layer.

```
#include <pthread.h>
#include "vos_types.h"
#include "vos_thread.h"
```

Include dependency graph for windows/vos_private.h: This graph shows which files directly or indirectly include this file:

Functions

- **VOS_ERR_T vos_mutexLocalCreate** (struct VOS_MUTEX *pMutex)

  Create a recursive mutex.

- void **vos_mutexLocalDelete** (struct VOS_MUTEX *pMutex)

  Delete a mutex.

5.31.1 Detailed Description

Private definitions for the OS abstraction layer.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_private.h 1065 2013-09-06 08:12:09Z aweiss

*

5.31.2 Function Documentation

5.31.2.1 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

5.31.2.2 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	Pointer to mutex struct

5.32 vos_shared_mem.c File Reference

Shared Memory functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include <unistd.h>
#include <sys/mman.h>
#include <sys/stat.h>
#include <sys/types.h>
#include "vos_types.h"
#include "vos_mem.h"
#include "vos_utils.h"
#include "vos_private.h"
#include "vos_shared_mem.h"
```

Include dependency graph for posix/vos_shared_mem.c:

Functions

- EXT_DECL **VOS_ERR_T vos_sharedOpen** (const CHAR8 *pKey, VOS_SHRD_T *pHandle, UINT8 **pp-MemoryArea, UINT32 *pSize)

  Create a shared memory area or attach to existing one.
- EXT_DECL **VOS_ERR_T vos_sharedClose** (VOS_SHRD_T handle, const UINT8 *pMemoryArea)

  Close connection to the shared memory area.

5.32.1 Detailed Description

Shared Memory functions. OS abstraction of Shared memory access and control

Note

Project: TCNOpen TRDP prototype stack

Author

Kazumasa Aiba, TOSHIBA

Remarks

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 (p. 179) 282 2013-01-11 07:08:44Z 97029

5.32.2 Function Documentation

5.32.2.1 EXT_DECL VOS_ERR_T vos_sharedClose (VOS_SHRD_T *handle,* const UINT8 * *pMemoryArea*)

Close connection to the shared memory area.

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters

in	*handle*	Returned handle
in	*pMemoryArea*	Pointer to memory area

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

5.32.2.2 EXT_DECL VOS_ERR_T vos_sharedOpen (const CHAR8 * *pKey,* VOS_SHRD_T * *pHandle,* UINT8 ** *ppMemoryArea,* UINT32 * *pSize*)

Create a shared memory area or attach to existing one.

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be attached. This function is not available in each target implementation.

Parameters

in	*pKey*	Unique identifier (file name)
out	*pHandle*	Pointer to returned handle
out	*ppMemoryArea*	Pointer to pointer to memory area
in,out	*pSize*	Pointer to size of area to allocate, on return actual size after attach

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

Here is the call graph for this function:

5.33 vos_shared_mem.c File Reference

Shared Memory functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include "vos_shared_mem.h"
#include "vos_utils.h"
#include <windows.h>
#include <conio.h>
#include <tchar.h>
```

Include dependency graph for windows/vos_shared_mem.c:

Functions

- EXT_DECL **VOS_ERR_T vos_sharedOpen** (const CHAR8 *pKey, VOS_SHRD_T *pHandle, UINT8 **pp-MemoryArea, UINT32 *pSize)

  Create a shared memory area or attach to existing one.
- EXT_DECL **VOS_ERR_T vos_sharedClose** (VOS_SHRD_T handle, const UINT8 *pMemoryArea)

Close connection to the shared memory area.

5.33.1 Detailed Description

Shared Memory functions. OS abstraction of Shared memory access and control

Note

Project: TCNOpen TRDP prototype stack

Author

Kazumasa Aiba, TOSHIBA

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_sock.c 253 2013-01-07 13:48:40Z aweiss

*

5.33.2 Function Documentation

5.33.2.1 EXT_DECL VOS_ERR_T vos_sharedClose (VOS_SHRD_T *handle,* const UINT8 * *pMemoryArea*)

Close connection to the shared memory area.

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters

in	*handle*	Returned handle
in	*pMemoryArea*	Pointer to memory area

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

Here is the call graph for this function:

5.33.2.2 EXT_DECL VOS_ERR_T vos_sharedOpen (const CHAR8 * *pKey,* VOS_SHRD_T * *pHandle,* UINT8 ** *ppMemoryArea,* UINT32 * *pSize*)

Create a shared memory area or attach to existing one.

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be opened. This function is not available in each target implementation.

Parameters

in	*pKey*	Unique identifier (file name)
out	*pHandle*	Pointer to returned handle
out	*ppMemoryArea*	Pointer to pointer to memory area
in,out	*pSize*	Pointer to size of area to allocate, on return actual size after attach. Independent from actual value, always multiples of page size (4k) are allocated

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

Here is the call graph for this function:

5.34 vos_shared_mem.h File Reference

Shared Memory functions for OS abstraction.

```
#include "vos_types.h"
#include "vos_mem.h"
#include "vos_private.h"
```

Include dependency graph for vos_shared_mem.h: This graph shows which files directly or indirectly include this file:

Functions

- EXT_DECL **VOS_ERR_T vos_sharedOpen** (const CHAR8 ∗pKey, VOS_SHRD_T ∗pHandle, UINT8 ∗∗ppMemoryArea, UINT32 ∗pSize)

  Create a shared memory area or attach to existing one.
- EXT_DECL **VOS_ERR_T vos_sharedClose** (VOS_SHRD_T handle, const UINT8 ∗pMemoryArea)

  Close connection to the shared memory area.

5.34.1 Detailed Description

Shared Memory functions for OS abstraction. This module provides shared memory control 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 (p. 179) 282 2013-01-11 07:08:44Z 97029

5.34.2 Function Documentation

5.34.2.1 EXT_DECL VOS_ERR_T vos_sharedClose (VOS_SHRD_T *handle,* const UINT8 * *pMemoryArea*)

Close connection to the shared memory area.

If the area was created by the calling process, the area will be closed (freed). If the area was attached, it will be detached. This function is not available in each target implementation.

Parameters

in	*handle*	Returned handle
in	*pMemoryArea*	Pointer to memory area

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

Here is the call graph for this function:

5.34.2.2 EXT_DECL VOS_ERR_T vos_sharedOpen (const CHAR8 * *pKey,* VOS_SHRD_T * *pHandle,* UINT8 ** *ppMemoryArea,* UINT32 * *pSize*)

Create a shared memory area or attach to existing one.

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be opened. This function is not available in each target implementation.

Parameters

in	*pKey*	Unique identifier (file name)
out	*pHandle*	Pointer to returned handle
out	*ppMemoryArea*	Pointer to pointer to memory area
in,out	*pSize*	Pointer to size of area to allocate, on return actual size after attach

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be attached. This function is not available in each target implementation.

Parameters

in	*pKey*	Unique identifier (file name)
out	*pHandle*	Pointer to returned handle
out	*ppMemoryArea*	Pointer to pointer to memory area
in,out	*pSize*	Pointer to size of area to allocate, on return actual size after attach

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

The first call with the a specified key will create a shared memory area with the supplied size and will return a handle and a pointer to that area. If the area already exists, the area will be opened. This function is not available in each target implementation.

Parameters

in	*pKey*	Unique identifier (file name)
out	*pHandle*	Pointer to returned handle
out	*ppMemoryArea*	Pointer to pointer to memory area
in,out	*pSize*	Pointer to size of area to allocate, on return actual size after attach. Independent from actual value, always multiples of page size (4k) are allocated

Return values

VOS_NO_ERR	no error
VOS_MEM_ERR	no memory available

Here is the call graph for this function:

5.35 vos_sock.c File Reference

Socket functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdint.h>
#include <stdlib.h>
#include <unistd.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include <sys/socket.h>
#include <sys/ioctl.h>
#include <net/if.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#include <sys/types.h>
#include <ifaddrs.h>
#include "vos_utils.h"
#include "vos_sock.h"
#include "vos_thread.h"
#include "vos_private.h"
```

Include dependency graph for posix/vos_sock.c:

Functions

- BOOL8 **vos_getMacAddress** (UINT8 *pMacAddr, const char *pIfName)

  Get the MAC address for a named interface.
- **VOS_ERR_T vos_sockSetBuffer** (INT32 sock)

  Enlarge send and receive buffers to TRDP_SOCKBUF_SIZE if necessary.
- EXT_DECL UINT16 **vos_htons** (UINT16 val)

  Byte swapping.
- EXT_DECL UINT16 **vos_ntohs** (UINT16 val)

  Byte swapping 2 Bytes.
- EXT_DECL UINT32 **vos_htonl** (UINT32 val)

  Byte swapping 4 Bytes.
- EXT_DECL UINT32 **vos_ntohl** (UINT32 val)

  Byte swapping 4 Bytes.
- EXT_DECL UINT32 **vos_dottedIP** (const CHAR8 *pDottedIP)

Convert IP address from dotted dec.

- EXT_DECL const CHAR8 * **vos_ipDotted** (UINT32 ipAddress)

  Convert IP address to dotted dec.

- EXT_DECL BOOL8 **vos_isMulticast** (UINT32 ipAddress)

  Check if the supplied address is a multicast group address.

- EXT_DECL INT32 **vos_select** (INT32 highDesc, VOS_FDS_T *pReadableFD, VOS_FDS_T *pWriteableFD, VOS_FDS_T *pErrorFD, **VOS_TIME_T** *pTimeOut)

  select function.

- EXT_DECL **VOS_ERR_T vos_getInterfaces** (UINT32 *pAddrCnt, VOS_IF_REC_T ifAddrs[])

  Get a list of interface addresses The caller has to provide an array of interface records to be filled.

- EXT_DECL **VOS_ERR_T vos_sockInit** (void)

  Initialize the socket library.

- EXT_DECL void **vos_sockTerm** (void)

  De-Initialize the socket library.

- EXT_DECL **VOS_ERR_T vos_sockGetMAC** (UINT8 pMAC[**VOS_MAC_SIZE**])

  Return the MAC address of the default adapter.

- EXT_DECL **VOS_ERR_T vos_sockOpenUDP** (INT32 *pSock, const **VOS_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 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.

5.35.1 Detailed Description

Socket functions. OS abstraction of IP socket functions for UDP and TCP

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

vos_sock.c 1332 2014-09-22 13:10:58Z railroad-mike

```
BL 2014-08-25: Ticket #51: change underlying function for vos_dottedIP
```

5.35.2 Function Documentation

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

Convert IP address from dotted dec.

to !host! endianess

Parameters

in	*pDottedIP*	IP address as dotted decimal.

Return values

address	in UINT32 in host endianess 0 (Zero) if error

Here is the call graph for this function:

5.35.2.2 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

in,out	*pAddrCnt*	in: pointer to array size of interface record out: pointer to number of interface records read
in,out	*ifAddrs*	array of interface records

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMAC == NULL

Here is the call graph for this function:

5.35.2.3 BOOL8 vos_getMacAddress (UINT8 * *pMacAddr,* const char * *pIfName*)

Get the MAC address for a named interface.

Parameters

out	*pMacAddr*	pointer to array of MAC address to return
in	*pIfName*	pointer to interface name

Return values

TRUE	if successfull

5.35.2.4 EXT_DECL UINT32 vos_htonl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.35.2.5 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping.

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.35.2.6 EXT_DECL const CHAR8* vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianess.

Parameters

in	*ipAddress*	address in UINT32 in host endianess

Return values

IP	address as dotted decimal.

5.35.2.7 EXT_DECL BOOL8 vos_isMulticast (UINT32 *ipAddress*)

Check if the supplied address is a multicast group address.

Parameters

in	*ipAddress*	IP address to check.

Return values

TRUE	address is multicast
FALSE	address is not a multicast address

5.35.2.8 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.35.2.9 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.35.2.10 EXT_DECL INT32 vos_select (INT32 *highDesc,* VOS_FDS_T * *pReadableFD,* VOS_FDS_T * *pWriteableFD,* VOS_FDS_T * *pErrorFD,* VOS_TIME_T * *pTimeOut*)

select function.

Set the ready sockets in the supplied sets. Note: Some target systems might define this function as NOP.

Parameters

in	*highDesc*	max. socket descriptor + 1
in,out	*pReadableFD*	pointer to readable socket set
in,out	*pWriteableFD*	pointer to writeable socket set
in,out	*pErrorFD*	pointer to error socket set
in	*pTimeOut*	pointer to time out value

Return values

number	of ready file descriptors

5.35.2.11 EXT_DECL VOS_ERR_T vos_sockAccept (INT32 *sock,* INT32 * *pSock,* UINT32 * *pIPAddress,* UINT16 * *pPort*)

Accept an incoming TCP connection.

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

Parameters

in	*sock*	Socket descriptor
out	*pSock*	Pointer to socket descriptor, on exit new socket
out	*pIPAddress*	source IP to receive on, 0 for any
out	*pPort*	port to receive on, 20548 for PD

Return values

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

Here is the call graph for this function:

5.35.2.12 EXT_DECL VOS_ERR_T vos_sockBind (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Bind a socket to an address and port.

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	source IP to receive on, 0 for any
in	*port*	port to receive on, 20548 for PD

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Here is the call graph for this function:

5.35.2.13 EXT_DECL VOS_ERR_T vos_sockClose (INT32 *sock*)

Close a socket.

Release any resources aquired by this socket

Parameters

in	*sock*	socket descriptor

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown

5.35.2.14 EXT_DECL VOS_ERR_T vos_sockConnect (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Open a TCP connection.

Parameters

in	*sock*	socket descriptor

in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error

Here is the call graph for this function:

5.35.2.15 EXT_DECL VOS_ERR_T vos_sockGetMAC (UINT8 *pMAC[VOS_MAC_SIZE]*)

Return the MAC address of the default adapter.

Parameters

out	*pMAC*	return MAC address.

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMAC == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.35.2.16 EXT_DECL VOS_ERR_T vos_sockInit (void)

Initialize the socket library.

Must be called once before any other call

Return values

VOS_NO_ERR	no error
VOS_SOCK_ERR	sockets not supported

5.35.2.17 EXT_DECL VOS_ERR_T vos_sockJoinMC (INT32 *sock,* UINT32 *mcAddress,* UINT32 *ipAddress*)

Join a multicast group.

Note: Some targeted systems might not support this option.

Parameters

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to join, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.35.2.18 EXT_DECL VOS_ERR_T vos_sockLeaveMC (INT32 *sock*, UINT32 *mcAddress*, UINT32 *ipAddress*)

Leave a multicast group.

Note: Some targeted systems might not support this option.

Parameters

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to leave, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.35.2.19 EXT_DECL VOS_ERR_T vos_sockListen (INT32 *sock*, UINT32 *backlog*)

Listen for incoming connections.

Listen for incoming TCP connections.

Parameters

in	*sock*	socket descriptor
in	*backlog*	maximum connection attempts if system is busy

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

5.35.2.20 EXT_DECL VOS_ERR_T vos_sockOpenTCP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create a TCP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.35.2.21 EXT_DECL VOS_ERR_T vos_sockOpenUDP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create an UDP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

Parameters

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.35.2.22 EXT_DECL VOS_ERR_T vos_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

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	Call would have blocked in blocking mode

5.35.2.23 EXT_DECL VOS_ERR_T vos_sockReceiveUDP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 * *pSrcIPAddr*, UINT16 * *pSrcIPPort*, UINT32 * *pDstIPAddr*, BOOL8 *peek*)

Receive UDP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error 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

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size
out	*pSrcIPAddr*	pointer to source IP
out	*pSrcIPPort*	pointer to source port

out	*pDstIPAddr*	pointer to dest IP
in	*peek*	if true, leave data in queue

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Here is the call graph for this function:

5.35.2.24 EXT_DECL VOS_ERR_T vos_sockSendTCP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*)

Send TCP data.

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	In: size of the data to send, Out: no of bytes sent

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_NOCONN_ERR	no TCP connection
VOS_BLOCK_ERR	Call would have blocked in blocking mode

5.35.2.25 EXT_DECL VOS_ERR_T vos_sockSendUDP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 *ipAddress*, UINT16 *port*)

Send UDP data.

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	In: size of the data to send, Out: no of bytes sent
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Here is the call graph for this function:

5.35.2.26 VOS_ERR_T vos_sockSetBuffer (INT32 *sock*)

Enlarge send and receive buffers to TRDP_SOCKBUF_SIZE if necessary.

Parameters

in	*sock*	socket descriptor

Return values

VOS_NO_ERR	no error
VOS_SOCK_ERR	buffer size can't be set

5.35.2.27 EXT_DECL VOS_ERR_T vos_sockSetMulticastIf (INT32 *sock*, UINT32 *mcIfAddress*)

Set Using Multicast I/F.

Parameters

in	*sock*	socket descriptor
in	*mcIfAddress*	using Multicast I/F Address

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.35.2.28 EXT_DECL VOS_ERR_T vos_sockSetOptions (INT32 *sock*, const VOS_SOCK_OPT_T * *pOptions*)

Set socket options.

Note: Some targeted systems might not support every option.

Parameters

in	*sock*	socket descriptor
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown

5.35.2.29 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

Must be called after last socket call

5.36 vos_sock.c File Reference

Socket functions.

```
#include <stdio.h>
#include <stddef.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include <fcntl.h>
#include <winsock2.h>
#include <Ws2tcpip.h>
#include <MSWSock.h>
#include <lm.h>
#include <iphlpapi.h>
#include "vos_utils.h"
#include "vos_sock.h"
#include "vos_thread.h"
#include "vos_mem.h"
```

Include dependency graph for windows/vos_sock.c:

Functions

- INT32 **recvmsg** (int sock, struct msghdr *pMessage, int flags)

  Receive a message including sender address information.
- **VOS_ERR_T vos_sockSetBuffer** (INT32 sock)

  Enlarge send and receive buffers to TRDP_SOCKBUF_SIZE if necessary.
- EXT_DECL UINT16 **vos_htons** (UINT16 val)

  Byte swapping.
- EXT_DECL UINT16 **vos_ntohs** (UINT16 val)

  Byte swapping 2 Bytes.
- EXT_DECL UINT32 **vos_htonl** (UINT32 val)

  Byte swapping 4 Bytes.
- EXT_DECL UINT32 **vos_ntohl** (UINT32 val)

  Byte swapping 4 Bytes.
- EXT_DECL UINT32 **vos_dottedIP** (const CHAR8 *pDottedIP)

  Convert IP address from dotted dec.
- EXT_DECL const CHAR8 * **vos_ipDotted** (UINT32 ipAddress)

  Convert IP address to dotted dec.
- EXT_DECL BOOL8 **vos_isMulticast** (UINT32 ipAddress)

  Check if the supplied address is a multicast group address.
- EXT_DECL **VOS_ERR_T vos_getInterfaces** (UINT32 *pAddrCnt, VOS_IF_REC_T ifAddrs[])

  Get a list of interface addresses The caller has to provide an array of interface records to be filled.
- EXT_DECL INT32 **vos_select** (INT32 highDesc, VOS_FDS_T *pReadableFD, VOS_FDS_T *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 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.

5.36.1 Detailed Description

Socket functions. OS abstraction of IP socket functions for UDP and TCP

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

vos_sock.c 1352 2014-11-11 15:06:54Z ahweiss

*

5.36.2 Function Documentation

5.36.2.1 INT32 recvmsg (int *sock*, struct msghdr * *pMessage*, int *flags*)

Receive a message including sender address information.

Parameters

in	*sock*	socket descriptor
in	*pMessage*	Pointer to message header
in	*flags*	Receive flags

Return values

number	of received bytes, -1 for error

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

Convert IP address from dotted dec.

to !host! endianess

Parameters

in	*pDottedIP*	IP address as dotted decimal.

Return values

address	in UINT32 in host endianess

Here is the call graph for this function:

5.36.2.3 EXT_DECL VOS_ERR_T vos_getInterfaces (UINT32 * *pAddrCnt,* VOS_IF_REC_T *ifAddrs[]*)

Get a list of interface addresses The caller has to provide an array of interface records to be filled.

Parameters

in,out	*pAddrCnt*	in: pointer to array size of interface record out: pointer to number of interface records read
in,out	*ifAddrs*	array of interface records

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pAddrCnt and/or ifAddrs == NULL
VOS_MEM_ERR	memory allocation error
VOS_SOCK_ERR	GetAdaptersInfo() error

Here is the call graph for this function:

5.36.2.4 EXT_DECL UINT32 vos_htonl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.36.2.5 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping.

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.36.2.6 EXT_DECL const CHAR8* vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianess.

Parameters

in	*ipAddress*	address in UINT32 in host endianess

Return values

IP	address as dotted decimal.

5.36.2.7 EXT_DECL BOOL8 vos_isMulticast (UINT32 *ipAddress*)

Check if the supplied address is a multicast group address.

Parameters

in	*ipAddress*	IP address to check.

Return values

TRUE	address is multicast
FALSE	address is not a multicast address

5.36.2.8 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.36.2.9 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.36.2.10 EXT_DECL INT32 vos_select (INT32 *highDesc*, VOS_FDS_T * *pReadableFD*, VOS_FDS_T * *pWriteableFD*, VOS_FDS_T * *pErrorFD*, VOS_TIME_T * *pTimeOut*)

select function.

Set the ready sockets in the supplied sets. Note: Some target systems might define this function as NOP.

Parameters

in	*highDesc*	max. socket descriptor + 1
in,out	*pReadableFD*	pointer to readable socket set
in,out	*pWriteableFD*	pointer to writeable socket set
in,out	*pErrorFD*	pointer to error socket set
in	*pTimeOut*	pointer to time out value

Return values

number	of ready file descriptors

5.36.2.11 EXT_DECL VOS_ERR_T vos_sockAccept (INT32 *sock*, INT32 * *pSock*, UINT32 * *pIPAddress*, UINT16 * *pPort*)

Accept an incoming TCP connection.

Accept incoming connections on the provided socket. May block and will return a new socket descriptor when accepting a connection. The original socket *pSock, remains open.

Parameters

in	*sock*	Socket descriptor
out	*pSock*	Pointer to socket descriptor, on exit new socket
out	*pIPAddress*	source IP to receive on, 0 for any
out	*pPort*	port to receive on, 20548 for PD

Return values

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

Here is the call graph for this function:

5.36.2.12 EXT_DECL VOS_ERR_T vos_sockBind (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Bind a socket to an address and port.

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	source IP to receive on, 0 for any
in	*port*	port to receive on, 20548 for PD

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Here is the call graph for this function:

5.36.2.13 EXT_DECL VOS_ERR_T vos_sockClose (INT32 *sock*)

Close a socket.

Release any resources aquired by this socket

Parameters

in	*sock*	socket descriptor

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown

5.36.2.14 EXT_DECL VOS_ERR_T vos_sockConnect (INT32 *sock,* UINT32 *ipAddress,* UINT16 *port*)

Open a TCP connection.

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Here is the call graph for this function:

5.36.2.15 EXT_DECL VOS_ERR_T vos_sockGetMAC (UINT8 *pMAC[VOS_MAC_SIZE]*)

Return the MAC address of the default adapter.

Parameters

out	*pMAC*	return MAC address.

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMAC == NULL
VOS_SOCK_ERR	socket not available or option not supported

5.36.2.16 EXT_DECL VOS_ERR_T vos_sockInit (void)

Initialize the socket library.

Must be called once before any other call

Return values

VOS_NO_ERR	no error
VOS_SOCK_ERR	sockets not supported

5.36.2.17 EXT_DECL VOS_ERR_T vos_sockJoinMC (INT32 *sock,* UINT32 *mcAddress,* UINT32 *ipAddress*)

Join a multicast group.

Note: Some targeted systems might not support this option.

Parameters

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to join, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.36.2.18 EXT_DECL VOS_ERR_T vos_sockLeaveMC (INT32 *sock,* UINT32 *mcAddress,* UINT32 *ipAddress*)

Leave a multicast group.

Note: Some targeted systems might not support this option.

Parameters

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to leave, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.36.2.19 EXT_DECL VOS_ERR_T vos_sockListen (INT32 *sock,* UINT32 *backlog*)

Listen for incoming connections.

Listen for incoming TCP connections.

Parameters

in	*sock*	socket descriptor
in	*backlog*	maximum connection attempts if system is busy

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

5.36.2.20 EXT_DECL VOS_ERR_T vos_sockOpenTCP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create a TCP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later.

Parameters

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.36.2.21 EXT_DECL VOS_ERR_T vos_sockOpenUDP (INT32 * *pSock*, const VOS_SOCK_OPT_T * *pOptions*)

Create an UDP socket.

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

Parameters

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.36.2.22 EXT_DECL VOS_ERR_T vos_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

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	call would have blocked in blocking mode

5.36.2.23 EXT_DECL VOS_ERR_T vos_sockReceiveUDP (INT32 *sock*, UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 * *pSrcIPAddr*, UINT16 * *pSrcIPPort*, UINT32 * *pDstIPAddr*, BOOL8 *peek*)

Receive UDP data.

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, *pSize will reflect the number of copied bytes and the call should be repeated until *pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error 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

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size
out	*pSrcIPAddr*	pointer to source IP
out	*pSrcIPPort*	pointer to source port
out	*pDstIPAddr*	pointer to dest IP
in	*peek*	if true, leave data in queue

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Here is the call graph for this function:

5.36.2.24 EXT_DECL VOS_ERR_T vos_sockSendTCP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*)

Send TCP data.

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	IN: bytes to send, OUT: bytes sent

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_NOCONN_ERR	no TCP connection
VOS_BLOCK_ERR	Call would have blocked in blocking mode

5.36.2.25 EXT_DECL VOS_ERR_T vos_sockSendUDP (INT32 *sock*, const UINT8 * *pBuffer*, UINT32 * *pSize*, UINT32 *ipAddress*, UINT16 *port*)

Send UDP data.

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	IN: bytes to send, OUT: bytes sent
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Here is the call graph for this function:

5.36.2.26 VOS_ERR_T vos_sockSetBuffer (INT32 *sock*)

Enlarge send and receive buffers to TRDP_SOCKBUF_SIZE if necessary.

Parameters

in	*sock*	socket descriptor

Return values

VOS_NO_ERR	no error
VOS_SOCK_ERR	buffer size can't be set

5.36.2.27 EXT_DECL VOS_ERR_T vos_sockSetMulticastIf (INT32 *sock*, UINT32 *mcIfAddress*)

Set Using Multicast I/F.

Parameters

in	*sock*	socket descriptor
in	*mcIfAddress*	using Multicast I/F Address

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error

Here is the call graph for this function:

5.36.2.28 EXT_DECL VOS_ERR_T vos_sockSetOptions (INT32 *sock*, const VOS_SOCK_OPT_T * *pOptions*)

Set socket options.

Note: Some targeted systems might not support every option.

Parameters

in	*sock*	socket descriptor
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown

5.36.2.29 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

Must be called after last socket call

5.37 vos_sock.h File Reference

Typedefs for OS abstraction.

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

Include dependency graph for vos_sock.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **VOS_SOCK_OPT_T**

  Common socket options.

Macros

- #define **VOS_MAX_SOCKET_CNT** 4

  The maximum number of sockets influences memory usage; for small systems we should define a smaller set.
- #define **VOS_MAX_MULTICAST_CNT** 5

  The maximum number of multicast groups one socket can join.
- #define **VOS_TTL_MULTICAST** 64

  The maximum number of hops a multicast packet can take.
- #define **VOS_MAX_IF_NAME_SIZE** 16

  The maximum number of IP interface adapters that can be handled by VOS.
- #define **VOS_MAX_NUM_IF** 8

  The maximum number of unicast addresses that can be handled by VOS.
- #define **VOS_MAX_NUM_UNICAST** 10

  The MAC size supported by VOS.

- #define **VOS_MAC_SIZE** 6

  Size of socket send and receive buffer.
- #define **VOS_INVALID_SOCKET** -1

  Invalid socket number.

Functions

- EXT_DECL UINT16 **vos_htons** (UINT16 val)

  Byte swapping 2 Bytes.
- EXT_DECL UINT16 **vos_ntohs** (UINT16 val)

  Byte swapping 2 Bytes.
- EXT_DECL UINT32 **vos_htonl** (UINT32 val)

  Byte swapping 4 Bytes.
- EXT_DECL UINT32 **vos_ntohl** (UINT32 val)

  Byte swapping 4 Bytes.
- EXT_DECL UINT32 **vos_dottedIP** (const CHAR8 *pDottedIP)

  Convert IP address from dotted dec.
- EXT_DECL const CHAR8 * **vos_ipDotted** (UINT32 ipAddress)

  Convert IP address to dotted dec.
- EXT_DECL BOOL8 **vos_isMulticast** (UINT32 ipAddress)

  Check if the supplied address is a multicast group address.
- EXT_DECL **VOS_ERR_T vos_getInterfaces** (UINT32 *pAddrCnt, VOS_IF_REC_T ifAddrs[])

  Get a list of interface addresses The caller has to provide an array of interface records to be filled.
- EXT_DECL INT32 **vos_select** (INT32 highDesc, VOS_FDS_T *pReadableFD, VOS_FDS_T *pWriteableFD, VOS_FDS_T *pErrorFD, **VOS_TIME_T** *pTimeOut)

  select function.
- EXT_DECL **VOS_ERR_T vos_sockInit** (void)

  Initialize the socket library.
- EXT_DECL void **vos_sockTerm** (void)

  De-Initialize the socket library.
- EXT_DECL **VOS_ERR_T vos_sockGetMAC** (UINT8 pMAC[**VOS_MAC_SIZE**])

  Return the MAC address of the default adapter.
- EXT_DECL **VOS_ERR_T vos_sockOpenUDP** (INT32 *pSock, const **VOS_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.

5.37.1 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

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_sock.h (p. 217) 1226 2014-06-04 15:00:44Z bloehr

5.37.2 Macro Definition Documentation

5.37.2.1 #define VOS_MAX_SOCKET_CNT 4

The maximum number of sockets influences memory usage; for small systems we should define a smaller set.

The maximum number of concurrent usable sockets per application session

5.37.2.2 #define VOS_TTL_MULTICAST 64

The maximum number of hops a multicast packet can take.

The maximum size for the interface name

5.37.3 Function Documentation

5.37.3.1 EXT_DECL UINT32 vos_dottedIP (const CHAR8 ∗ *pDottedIP*)

Convert IP address from dotted dec.

to !host! endianess

Parameters

in	*pDottedIP*	IP address as dotted decimal.

Return values

address	in UINT32 in host endianess

to !host! endianess

Parameters

in	*pDottedIP*	IP address as dotted decimal.

Return values

address	in UINT32 in host endianess 0 (Zero) if error

Here is the call graph for this function:

5.37.3.2 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

in,out	*pAddrCnt*	in: pointer to array size of interface record out: pointer to number of interface records read
in,out	*ifAddrs*	array of interface records

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pAddrCnt and/or ifAddrs == NULL
VOS_MEM_ERR	memory allocation error
VOS_SOCK_ERR	GetAdaptersInfo() error

Parameters

in,out	*pAddrCnt*	in: pointer to array size of interface record out: pointer to number of interface records read
in,out	*ifAddrs*	array of interface records

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMAC == NULL

Here is the call graph for this function:

5.37.3.3 EXT_DECL UINT32 vos_htonl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.37.3.4 EXT_DECL UINT16 vos_htons (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.37.3.5 EXT_DECL const CHAR8* vos_ipDotted (UINT32 *ipAddress*)

Convert IP address to dotted dec.

from !host! endianess

Parameters

in	*ipAddress*	address in UINT32 in host endianess

Return values

IP	address as dotted decimal.

from !host! endianess.

Parameters

in	*ipAddress*	address in UINT32 in host endianess

Return values

IP	address as dotted decimal.

5.37.3.6 EXT_DECL BOOL8 vos_isMulticast (UINT32 *ipAddress*)

Check if the supplied address is a multicast group address.

Parameters

in	*ipAddress*	IP address to check.

Return values

TRUE	address is a multicast address
FALSE	address is not a multicast address

Parameters

in	*ipAddress*	IP address to check.

Return values

TRUE	address is multicast
FALSE	address is not a multicast address

5.37.3.7 EXT_DECL UINT32 vos_ntohl (UINT32 *val*)

Byte swapping 4 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.37.3.8 EXT_DECL UINT16 vos_ntohs (UINT16 *val*)

Byte swapping 2 Bytes.

Parameters

in	*val*	Initial value.

Return values

swapped	value

5.37.3.9 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

in	*highDesc*	max. socket descriptor + 1
in,out	*pReadableFD*	pointer to readable socket set
in,out	*pWriteableFD*	pointer to writeable socket set
in,out	*pErrorFD*	pointer to error socket set
in	*pTimeOut*	pointer to time out value

Return values

number	of ready file descriptors

5.37.3.10 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

in	*sock*	Socket descriptor
out	*pSock*	Pointer to socket descriptor, on exit new socket
out	*pIPAddress*	source IP to receive on, 0 for any
out	*pPort*	port to receive on, 20548 for PD

Return values

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

Here is the call graph for this function:

5.37.3.11 EXT_DECL VOS_ERR_T vos_sockBind (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Bind a socket to an address and port.

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	source IP to receive from, 0 for any
in	*port*	port to receive from

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	source IP to receive on, 0 for any
in	*port*	port to receive on, 20548 for PD

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Here is the call graph for this function:

5.37.3.12 EXT_DECL VOS_ERR_T vos_sockClose (INT32 *sock*)

Close a socket.

Release any resources aquired by this socket

Parameters

in	*sock*	socket descriptor

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL

Release any resources aquired by this socket

Parameters

in	*sock*	socket descriptor

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown

5.37.3.13 EXT_DECL VOS_ERR_T vos_sockConnect (INT32 *sock*, UINT32 *ipAddress*, UINT16 *port*)

Open a TCP connection.

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_IO_ERR	Input/Output error

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error

Parameters

in	*sock*	socket descriptor
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Here is the call graph for this function:

5.37.3.14 EXT_DECL VOS_ERR_T vos_sockGetMAC (UINT8 *pMAC[VOS_MAC_SIZE]*)

Return the MAC address of the default adapter.

Parameters

out	*pMAC*	return MAC address.

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMAC == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.37.3.15 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

5.37.3.16 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

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to join, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_SOCK_ERR	option not supported

Note: Some targeted systems might not support this option.

Parameters

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to join, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.37.3.17 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

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to leave, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_SOCK_ERR	option not supported

Note: Some targeted systems might not support this option.

Parameters

in	*sock*	socket descriptor
in	*mcAddress*	multicast group to join
in	*ipAddress*	depicts interface on which to leave, default 0 for any

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.37.3.18 EXT_DECL VOS_ERR_T vos_sockListen (INT32 *sock*, UINT32 *backlog*)

Listen for incoming TCP connections.

Parameters

in	*sock*	socket descriptor
in	*backlog*	maximum connection attempts if system is busy

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

Listen for incoming TCP connections.

Parameters

in	*sock*	socket descriptor
in	*backlog*	maximum connection attempts if system is busy

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	Input/Output error
VOS_MEM_ERR	resource error

5.37.3.19 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

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.37.3.20 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

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Return a socket descriptor for further calls. The socket options are optional and can be applied later. Note: Some targeted systems might not support every option.

Parameters

out	*pSock*	pointer to socket descriptor returned
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pSock == NULL
VOS_SOCK_ERR	socket not available or option not supported

Here is the call graph for this function:

5.37.3.21 EXT_DECL VOS_ERR_T vos_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

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data in non-blocking
VOS_BLOCK_ERR	call would have blocked in blocking mode

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, ∗pSize will reflect the number of copied bytes and the call should be repeated until ∗pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occured. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	Call would have blocked in blocking mode

The caller must provide a sufficient sized buffer. If the supplied buffer is smaller than the bytes received, ∗pSize will reflect the number of copied bytes and the call should be repeated until ∗pSize is 0 (zero). If the socket was created in blocking-mode (default), then this call will block and will only return if data has been received or the socket was closed or an error occured. If called in non-blocking mode, and no data is available, VOS_NODATA_ERR will be returned.

Parameters

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	call would have blocked in blocking mode

5.37.3.22 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

in	*sock*	socket descriptor
out	*pBuffer*	pointer to applications data buffer
in,out	*pSize*	pointer to the received data size
out	*pSrcIPAddr*	pointer to source IP
out	*pSrcIPPort*	pointer to source port
out	*pDstIPAddr*	pointer to dest IP
in	*peek*	if true, leave data in queue

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be read
VOS_NODATA_ERR	no data
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Here is the call graph for this function:

5.37.3.23 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

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	In: size of the data to send, Out: no of bytes sent

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_NOCONN_ERR	no TCP connection
VOS_BLOCK_ERR	call would have blocked in blocking mode, data partially sent

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	In: size of the data to send, Out: no of bytes sent

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_NOCONN_ERR	no TCP connection
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	IN: bytes to send, OUT: bytes sent

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_NOCONN_ERR	no TCP connection
VOS_BLOCK_ERR	Call would have blocked in blocking mode

5.37.3.24 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

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	In: size of the data to send, Out: no of bytes sent
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid
VOS_IO_ERR	data could not be sent
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send
in,out	*pSize*	In: size of the data to send, Out: no of bytes sent
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Send data to the supplied address and port.

Parameters

in	*sock*	socket descriptor
in	*pBuffer*	pointer to data to send

in,out	*pSize*	IN: bytes to send, OUT: bytes sent
in	*ipAddress*	destination IP
in	*port*	destination port

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_IO_ERR	data could not be sent
VOS_BLOCK_ERR	Call would have blocked in blocking mode

Here is the call graph for this function:

5.37.3.25 EXT_DECL VOS_ERR_T vos_sockSetMulticastIf (INT32 *sock*, UINT32 *mcIfAddress*)

Set Using Multicast I/F.

Parameters

in	*sock*	socket descriptor
in	*mcIfAddress*	using Multicast I/F Address

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error

Parameters

in	*sock*	socket descriptor
in	*mcIfAddress*	using Multicast I/F Address

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown, parameter error
VOS_SOCK_ERR	option not supported

Here is the call graph for this function:

5.37.3.26 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

in	*sock*	socket descriptor
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

Note: Some targeted systems might not support every option.

Parameters

in	*sock*	socket descriptor
in	*pOptions*	pointer to socket options (optional)

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	sock descriptor unknown

5.37.3.27 EXT_DECL void vos_sockTerm (void)

De-Initialize the socket library.

Must be called after last socket call

5.38 vos_thread.c File Reference

Multitasking functions.

```
#include <stdint.h>
#include <unistd.h>
#include <errno.h>
#include <sys/time.h>
#include <pthread.h>
#include <semaphore.h>
#include <sched.h>
#include "vos_sock.h"
#include "vos_types.h"
#include "vos_thread.h"
#include "vos_mem.h"
#include "vos_utils.h"
#include "vos_private.h"
```

Include dependency graph for posix/vos_thread.c:

Macros

- #define **NSECS_PER_USEC** 1000

  Cyclic thread functions.

Functions

- EXT_DECL void **vos_cyclicThread** (UINT32 interval, **VOS_THREAD_FUNC_T** pFunction, void ∗pArguments)

  Cyclic thread functions.
- EXT_DECL **VOS_ERR_T vos_threadInit** (void)

  Initialize the thread library.
- EXT_DECL void **vos_threadTerm** (void)

  De-Initialize the thread library.
- EXT_DECL **VOS_ERR_T vos_threadCreate** (**VOS_THREAD_T** ∗pThread, const CHAR8 ∗pName, **VOS_THREAD_POLICY_T** policy, **VOS_THREAD_PRIORITY_T** priority, UINT32 interval, UINT32 stackSize, **VOS_THREAD_FUNC_T** pFunction, void ∗pArguments)

  Create a thread.
- EXT_DECL **VOS_ERR_T vos_threadTerminate** (**VOS_THREAD_T** thread)

Terminate a thread.

- EXT_DECL **VOS_ERR_T vos_threadIsActive** (**VOS_THREAD_T** thread)

  Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.

- EXT_DECL **VOS_ERR_T vos_threadDelay** (UINT32 delay)

  Delay the execution of the current thread by the given delay in us.

- EXT_DECL void **vos_getTime** (**VOS_TIME_T** *pTime)

  Return the current time in sec and us.

- EXT_DECL const CHAR8 * **vos_getTimeStamp** (void)

  Get a time-stamp string.

- EXT_DECL void **vos_clearTime** (**VOS_TIME_T** *pTime)

  Clear the time stamp.

- EXT_DECL void **vos_addTime** (**VOS_TIME_T** *pTime, const **VOS_TIME_T** *pAdd)

  Add the second to the first time stamp, return sum in first.

- EXT_DECL void **vos_subTime** (**VOS_TIME_T** *pTime, const **VOS_TIME_T** *pSub)

  Subtract the second from the first time stamp, return diff in first.

- EXT_DECL void **vos_divTime** (**VOS_TIME_T** *pTime, UINT32 divisor)

  Divide the first time value by the second, return quotient in first.

- EXT_DECL void **vos_mulTime** (**VOS_TIME_T** *pTime, UINT32 mul)

  Multiply the first time by the second, return product in first.

- EXT_DECL INT32 **vos_cmpTime** (const **VOS_TIME_T** *pTime, const **VOS_TIME_T** *pCmp)

  Compare the second to the first time stamp.

- EXT_DECL void **vos_getUuid** (**VOS_UUID_T** pUuID)

  Get a universal unique identifier according to RFC 4122 time based version.

- EXT_DECL **VOS_ERR_T vos_mutexCreate** (**VOS_MUTEX_T** *pMutex)

  Create a recursive mutex.

- EXT_DECL **VOS_ERR_T vos_mutexLocalCreate** (struct VOS_MUTEX *pMutex)

  Create a recursive mutex.

- EXT_DECL void **vos_mutexDelete** (**VOS_MUTEX_T** pMutex)

  Delete a mutex.

- EXT_DECL void **vos_mutexLocalDelete** (struct VOS_MUTEX *pMutex)

  Delete a mutex.

- EXT_DECL **VOS_ERR_T vos_mutexLock** (**VOS_MUTEX_T** pMutex)

  Take a mutex.

- EXT_DECL **VOS_ERR_T vos_mutexTryLock** (**VOS_MUTEX_T** pMutex)

  Try to take a mutex.

- EXT_DECL **VOS_ERR_T vos_mutexUnlock** (**VOS_MUTEX_T** pMutex)

  Release a mutex.

- EXT_DECL **VOS_ERR_T vos_semaCreate** (**VOS_SEMA_T** *pSema, **VOS_SEMA_STATE_T** initialState)

  Create a semaphore.

- EXT_DECL void **vos_semaDelete** (**VOS_SEMA_T** sema)

  Delete a semaphore.

- EXT_DECL **VOS_ERR_T vos_semaTake** (**VOS_SEMA_T** sema, UINT32 timeout)

  Take a semaphore.

- EXT_DECL void **vos_semaGive** (**VOS_SEMA_T** sema)

  Give a semaphore.

5.38.1 Detailed Description

Multitasking functions. OS abstraction of thread-handling functions

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_thread.c 1334 2014-09-23 09:27:40Z railroad-mike

5.38.2 Macro Definition Documentation

5.38.2.1 #define NSECS_PER_USEC 1000

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters

in	*interval*	Interval for cyclic threads in us (incl. runtime)
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

void	

5.38.3 Function Documentation

5.38.3.1 EXT_DECL void vos_addTime (VOS_TIME_T * *pTime,* const VOS_TIME_T * *pAdd*)

Add the second to the first time stamp, return sum in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pAdd*	Pointer to time value

5.38.3.2 EXT_DECL void vos_clearTime (VOS_TIME_T * *pTime*)

Clear the time stamp.

Parameters

out	*pTime*	Pointer to time value

5.38.3.3 EXT_DECL INT32 vos_cmpTime (const VOS_TIME_T * *pTime,* const VOS_TIME_T * *pCmp*)

Compare the second to the first time stamp.

Compare the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pCmp*	Pointer to time value to compare

Return values

0	pTime == pCmp
-1	pTime < pCmp
1	pTime > pCmp

5.38.3.4 EXT_DECL void vos_cyclicThread (UINT32 *interval,* VOS_THREAD_FUNC_T *pFunction,* void * *pArguments*)

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters

in	*interval*	Interval for cyclic threads in us (incl. runtime)
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

void	

Here is the call graph for this function:

5.38.3.5 EXT_DECL void vos_divTime (VOS_TIME_T * *pTime,* UINT32 *divisor*)

Divide the first time value by the second, return quotient in first.

Divide the first time by the second, return quotient in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*divisor*	Divisor

5.38.3.6 EXT_DECL void vos_getTime (VOS_TIME_T * *pTime*)

Return the current time in sec and us.

Parameters

out	*pTime*	Pointer to time value

5.38.3.7 EXT_DECL const CHAR8* vos_getTimeStamp (void)

Get a time-stamp string.

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values

timestamp	"yyyymmdd-hh:mm:ss.ms"

5.38.3.8 EXT_DECL void vos_getUuid (VOS_UUID_T *pUuID*)

Get a universal unique identifier according to RFC 4122 time based version.

Parameters

out	*pUuID*	Pointer to a universal unique identifier

Here is the call graph for this function:

5.38.3.9 EXT_DECL void vos_mulTime (VOS_TIME_T * *pTime*, UINT32 *mul*)

Multiply the first time by the second, return product in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*mul*	Factor

5.38.3.10 EXT_DECL VOS_ERR_T vos_mutexCreate (VOS_MUTEX_T * *pMutex*)

Create a recursive mutex.

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

Here is the call graph for this function:

5.38.3.11 EXT_DECL void vos_mutexDelete (VOS_MUTEX_T *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	mutex handle

Here is the call graph for this function:

5.38.3.12 EXT_DECL VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

5.38.3.13 EXT_DECL void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	Pointer to mutex struct

5.38.3.14 EXT_DECL VOS_ERR_T vos_mutexLock (VOS_MUTEX_T *pMutex*)

Take a mutex.

Wait for the mutex to become available (lock).

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMutex == NULL or wrong type
VOS_MUTEX_ERR	no such mutex

5.38.3.15 EXT_DECL VOS_ERR_T vos_mutexTryLock (VOS_MUTEX_T *pMutex*)

Try to take a mutex.

If mutex is can't be taken VOS_MUTEX_ERR is returned.

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMutex == NULL or wrong type
VOS_MUTEX_ERR	mutex not locked

5.38.3.16 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T *pMutex*)

Release a mutex.

Unlock the mutex.

Parameters

in	*pMutex*	mutex handle

5.38.3.17 EXT_DECL VOS_ERR_T vos_semaCreate (VOS_SEMA_T * *pSema*, VOS_SEMA_STATE_T *initialState*)

Create a semaphore.

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters

out	*pSema*	Pointer to semaphore handle
in	*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

Here is the call graph for this function:

5.38.3.18 EXT_DECL void vos_semaDelete (VOS_SEMA_T *sema*)

Delete a semaphore.

This will eventually release any processes waiting for the semaphore.

Parameters

in	*sema*	semaphore handle

Here is the call graph for this function:

5.38.3.19 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters

in	*sema*	semaphore handle

5.38.3.20 EXT_DECL VOS_ERR_T vos_semaTake (VOS_SEMA_T *sema*, UINT32 *timeout*)

Take a semaphore.

Try to get (decrease) a semaphore.

Parameters

in	*sema*	semaphore handle
in	*timeout*	Max. time in us to wait, 0 means no wait

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_SEMA_ERR	could not get semaphore in time

Here is the call graph for this function:

5.38.3.21 EXT_DECL void vos_subTime (VOS_TIME_T * *pTime*, const VOS_TIME_T * *pSub*)

Subtract the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pSub*	Pointer to time value

5.38.3.22 EXT_DECL VOS_ERR_T vos_threadCreate (VOS_THREAD_T * *pThread*, const CHAR8 * *pName*, VOS_THREAD_POLICY_T *policy*, VOS_THREAD_PRIORITY_T *priority*, UINT32 *interval*, UINT32 *stackSize*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Create a thread.

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters

out	*pThread*	Pointer to returned thread handle
in	*pName*	Pointer to name of the thread (optional)
in	*policy*	Scheduling policy (FIFO, Round Robin or other)
in	*priority*	Scheduling priority (1...255 (highest), default 0)
in	*interval*	Interval for cyclic threads in us (optional)
in	*stackSize*	Minimum stacksize, default 0: 16kB
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_THREAD_ERR	thread creation error

5.38.3.23 EXT_DECL VOS_ERR_T vos_threadDelay (UINT32 *delay*)

Delay the execution of the current thread by the given delay in us.

Parameters

in	*delay*	Delay in us

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

5.38.3.24 EXT_DECL VOS_ERR_T vos_threadInit (void)

Initialize the thread library.

Must be called once before any other call

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	threading not supported

5.38.3.25 EXT_DECL VOS_ERR_T vos_threadIsActive (VOS_THREAD_T *thread*)

Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.

Parameters

in	*thread*	Thread handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

5.38.3.26 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.38.3.27 EXT_DECL VOS_ERR_T vos_threadTerminate (VOS_THREAD_T *thread*)

Terminate a thread.

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters

in	*thread*	Thread handle (or NULL if current thread)

Return values

VOS_NO_ERR	no error
VOS_THREAD_ERR	cancel failed

5.39 vos_thread.c File Reference

Multitasking functions.

```
#include <errno.h>
#include <sys/timeb.h>
#include <time.h>
#include <pthread.h>
#include <semaphore.h>
#include <string.h>
#include "vos_thread.h"
#include "vos_sock.h"
#include "vos_mem.h"
#include "vos_utils.h"
#include "vos_private.h"
```

Include dependency graph for windows/vos_thread.c:

Macros

- #define **NSECS_PER_USEC** 1000

  Cyclic thread functions.
- #define **NSECS_PER_USEC** 1000

  Cyclic thread functions.

Functions

- void **vos_cyclicThread** (UINT32 interval, **VOS_THREAD_FUNC_T** pFunction, void ∗pArguments)

  Cyclic thread functions.
- EXT_DECL **VOS_ERR_T vos_threadInit** (void)

  Initialize the thread library.
- EXT_DECL void **vos_threadTerm** (void)

  De-Initialize the thread library.
- pthread_t ∗ **vos_getFreeThreadHandle** (void)

  Search a free Handle place in the thread handle list.
- EXT_DECL **VOS_ERR_T vos_threadCreate** (**VOS_THREAD_T** ∗pThread, const CHAR8 ∗pName, **VOS_THREAD_POLICY_T** policy, **VOS_THREAD_PRIORITY_T** priority, UINT32 interval, UINT32 stackSize, **VOS_THREAD_FUNC_T** pFunction, void ∗pArguments)

  Create a thread.
- EXT_DECL **VOS_ERR_T vos_threadTerminate** (**VOS_THREAD_T** thread)

  Terminate a thread.
- EXT_DECL **VOS_ERR_T vos_threadIsActive** (**VOS_THREAD_T** thread)

  Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.
- EXT_DECL **VOS_ERR_T vos_threadDelay** (UINT32 delay)

Delay the execution of the current thread by the given delay in us.

- EXT_DECL void **vos_getTime** (**VOS_TIME_T** *pTime)

  Return the current time in sec and us.
- EXT_DECL const CHAR8 * **vos_getTimeStamp** (void)

  Get a time-stamp string.
- EXT_DECL void **vos_clearTime** (**VOS_TIME_T** *pTime)

  Clear the time stamp.
- EXT_DECL void **vos_addTime** (**VOS_TIME_T** *pTime, const **VOS_TIME_T** *pAdd)

  Add the second to the first time stamp, return sum in first.
- EXT_DECL void **vos_subTime** (**VOS_TIME_T** *pTime, const **VOS_TIME_T** *pSub)

  Subtract the second from the first time stamp, return diff in first.
- EXT_DECL void **vos_divTime** (**VOS_TIME_T** *pTime, UINT32 divisor)

  Divide the first time value by the second, return quotient in first.
- EXT_DECL void **vos_mulTime** (**VOS_TIME_T** *pTime, UINT32 mul)

  Multiply the first time by the second, return product in first.
- EXT_DECL INT32 **vos_cmpTime** (const **VOS_TIME_T** *pTime, const **VOS_TIME_T** *pCmp)

  Compare the second from the first time stamp, return diff in first.
- EXT_DECL void **vos_getUuid** (**VOS_UUID_T** pUuID)

  Get a universal unique identifier according to RFC 4122 time based version.
- EXT_DECL **VOS_ERR_T vos_mutexCreate** (**VOS_MUTEX_T** *pMutex)

  Create a recursive mutex.
- **VOS_ERR_T vos_mutexLocalCreate** (struct VOS_MUTEX *pMutex)

  Create a recursive mutex.
- EXT_DECL void **vos_mutexDelete** (**VOS_MUTEX_T** pMutex)

  Delete a mutex.
- void **vos_mutexLocalDelete** (struct VOS_MUTEX *pMutex)

  Delete a mutex.
- EXT_DECL **VOS_ERR_T vos_mutexLock** (**VOS_MUTEX_T** pMutex)

  Take a mutex.
- EXT_DECL **VOS_ERR_T vos_mutexTryLock** (**VOS_MUTEX_T** pMutex)

  Try to take a mutex.
- EXT_DECL **VOS_ERR_T vos_mutexUnlock** (**VOS_MUTEX_T** pMutex)

  Release a mutex.
- EXT_DECL **VOS_ERR_T vos_semaCreate** (**VOS_SEMA_T** *pSema, **VOS_SEMA_STATE_T** initialState)

  Create a semaphore.
- EXT_DECL void **vos_semaDelete** (**VOS_SEMA_T** sema)

  Delete a semaphore.
- EXT_DECL **VOS_ERR_T vos_semaTake** (**VOS_SEMA_T** sema, UINT32 timeout)

  Take a semaphore.
- EXT_DECL void **vos_semaGive** (**VOS_SEMA_T** sema)

  Give a semaphore.

5.39.1 Detailed Description

Multitasking functions. OS abstraction of thread-handling functions

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_thread.c 1334 2014-09-23 09:27:40Z railroad-mike

5.39.2 Macro Definition Documentation

5.39.2.1 #define NSECS_PER_USEC 1000

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters

in	*interval*	Interval for cyclic threads in us (incl. runtime)
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

void	

5.39.2.2 #define NSECS_PER_USEC 1000

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters

in	*interval*	Interval for cyclic threads in us (incl. runtime)
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

void	

5.39.3 Function Documentation

5.39.3.1 EXT_DECL void vos_addTime (VOS_TIME_T * *pTime,* const VOS_TIME_T * *pAdd*)

Add the second to the first time stamp, return sum in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pAdd*	Pointer to time value

5.39.3.2 EXT_DECL void vos_clearTime (VOS_TIME_T * *pTime*)

Clear the time stamp.

Parameters

out	*pTime*	Pointer to time value

5.39.3.3 EXT_DECL INT32 vos_cmpTime (const VOS_TIME_T * *pTime,* const VOS_TIME_T * *pCmp*)

Compare the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pCmp*	Pointer to time value to compare

Return values

0	pTime == pCmp
-1	pTime < pCmp
1	pTime > pCmp

5.39.3.4 void vos_cyclicThread (UINT32 *interval,* VOS_THREAD_FUNC_T *pFunction,* void * *pArguments*)

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters

in	*interval*	Interval for cyclic threads in us (incl. runtime)
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

void	

Here is the call graph for this function:

5.39.3.5 EXT_DECL void vos_divTime (VOS_TIME_T * *pTime,* UINT32 *divisor*)

Divide the first time value by the second, return quotient in first.

Divide the first time by the second, return quotient in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*divisor*	Divisor

5.39.3.6 pthread_t* vos_getFreeThreadHandle (void)

Search a free Handle place in the thread handle list.

Return values

pointer	to a free thread handle or NULL if not available

5.39.3.7 EXT_DECL void vos_getTime (VOS_TIME_T * *pTime*)

Return the current time in sec and us.

Parameters

out	*pTime*	Pointer to time value

5.39.3.8 EXT_DECL const CHAR8* vos_getTimeStamp (void)

Get a time-stamp string.

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values

timestamp	"yyyymmdd-hh:mm:ss.ms"

5.39.3.9 EXT_DECL void vos_getUuid (VOS_UUID_T *pUuID*)

Get a universal unique identifier according to RFC 4122 time based version.

Parameters

out	*pUuID*	Pointer to a universal unique identifier

Here is the call graph for this function:

5.39.3.10 EXT_DECL void vos_mulTime (VOS_TIME_T * *pTime,* UINT32 *mul*)

Multiply the first time by the second, return product in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*mul*	Factor

5.39.3.11 EXT_DECL VOS_ERR_T vos_mutexCreate (VOS_MUTEX_T * *pMutex*)

Create a recursive mutex.

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

Here is the call graph for this function:

5.39.3.12 EXT_DECL void vos_mutexDelete (VOS_MUTEX_T *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	mutex handle

Here is the call graph for this function:

5.39.3.13 VOS_ERR_T vos_mutexLocalCreate (struct VOS_MUTEX * *pMutex*)

Create a recursive mutex.

Fill in a mutex handle. The mutex storage must be already allocated.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

5.39.3.14 void vos_mutexLocalDelete (struct VOS_MUTEX * *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	Pointer to mutex struct

5.39.3.15 EXT_DECL VOS_ERR_T vos_mutexLock (VOS_MUTEX_T *pMutex*)

Take a mutex.

Wait for the mutex to become available (lock).

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMutex == NULL or wrong type
VOS_MUTEX_ERR	no such mutex

5.39.3.16 EXT_DECL VOS_ERR_T vos_mutexTryLock (VOS_MUTEX_T *pMutex*)

Try to take a mutex.

If mutex is can't be taken VOS_MUTEX_ERR is returned.

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMutex == NULL or wrong type
VOS_MUTEX_ERR	mutex not locked

5.39.3.17 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T *pMutex*)

Release a mutex.

Unlock the mutex.

Parameters

in	*pMutex*	mutex handle

5.39.3.18 EXT_DECL VOS_ERR_T vos_semaCreate (VOS_SEMA_T * *pSema,* VOS_SEMA_STATE_T *initialState*)

Create a semaphore.

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters

out	*pSema*	Pointer to semaphore handle
in	*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

Here is the call graph for this function:

5.39.3.19 EXT_DECL void vos_semaDelete (VOS_SEMA_T *sema*)

Delete a semaphore.

This will eventually release any processes waiting for the semaphore.

Parameters

in	*sema*	semaphore handle

Here is the call graph for this function:

5.39.3.20 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters

in	*sema*	semaphore handle

5.39.3.21 EXT_DECL VOS_ERR_T vos_semaTake (VOS_SEMA_T *sema,* UINT32 *timeout*)

Take a semaphore.

Try to get (decrease) a semaphore.

Parameters

in	*sema*	semaphore handle
in	*timeout*	Max. time in us to wait, 0 means no wait

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_SEMA_ERR	could not get semaphore in time

Here is the call graph for this function:

5.39.3.22 EXT_DECL void vos_subTime (VOS_TIME_T * *pTime,* const VOS_TIME_T * *pSub*)

Subtract the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pSub*	Pointer to time value

5.39.3.23 EXT_DECL VOS_ERR_T vos_threadCreate (VOS_THREAD_T * *pThread,* const CHAR8 * *pName,* VOS_THREAD_POLICY_T *policy,* VOS_THREAD_PRIORITY_T *priority,* UINT32 *interval,* UINT32 *stackSize,* VOS_THREAD_FUNC_T *pFunction,* void * *pArguments*)

Create a thread.

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters

out	*pThread*	Pointer to returned thread handle
in	*pName*	Pointer to name of the thread (optional)
in	*policy*	Scheduling policy (FIFO, Round Robin or other)
in	*priority*	Scheduling priority (1...255 (highest), default 0)
in	*interval*	Interval for cyclic threads in us (optional)
in	*stackSize*	Minimum stacksize, default 0: 16kB
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_THREAD_ERR	thread creation error
VOS_INIT_ERR	no threads available

Here is the call graph for this function:

5.39.3.24 EXT_DECL VOS_ERR_T vos_threadDelay (UINT32 *delay*)

Delay the execution of the current thread by the given delay in us.

Parameters

in	*delay*	Delay in us

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

5.39.3.25 EXT_DECL VOS_ERR_T vos_threadInit (void)

Initialize the thread library.

Must be called once before any other call

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	threading not supported

5.39.3.26 EXT_DECL VOS_ERR_T vos_threadIsActive (VOS_THREAD_T *thread*)

Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.

Parameters

in	*thread*	Thread handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

5.39.3.27 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.39.3.28 EXT_DECL VOS_ERR_T vos_threadTerminate (VOS_THREAD_T *thread*)

Terminate a thread.

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters

in	*thread*	Thread handle (or NULL if current thread)

Return values

VOS_NO_ERR	no error
VOS_THREAD_ERR	cancel failed

5.40 vos_thread.h File Reference

Threading functions for OS abstraction.

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

Include dependency graph for vos_thread.h: This graph shows which files directly or indirectly include this file:

Macros

- #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.

5.40.1 Detailed Description

Threading functions for OS abstraction. Thread-, semaphore- and time-handling functions

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2014. All rights reserved.

Id:

vos_thread.h (p. 253) 1334 2014-09-23 09:27:40Z railroad-mike

5.40.2 Function Documentation

5.40.2.1 EXT_DECL void vos_addTime (VOS_TIME_T * *pTime*, const VOS_TIME_T * *pAdd*)

Add the second to the first time stamp, return sum in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pAdd*	Pointer to time value

5.40.2.2 EXT_DECL void vos_clearTime (VOS_TIME_T * *pTime*)

Clear the time stamp.

Parameters

out	*pTime*	Pointer to time value

5.40.2.3 EXT_DECL INT32 vos_cmpTime (const VOS_TIME_T * *pTime*, const VOS_TIME_T * *pCmp*)

Compare the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pCmp*	Pointer to time value to compare

Return values

0	pTime == pCmp
-1	pTime < pCmp
1	pTime > pCmp

Compare the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pCmp*	Pointer to time value to compare

Return values

0	pTime == pCmp
-1	pTime < pCmp
1	pTime > pCmp

5.40.2.4 EXT_DECL void vos_cyclicThread (UINT32 *interval*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Cyclic thread functions.

Wrapper for cyclic threads. The thread function will be called cyclically with interval.

Parameters

in	*interval*	Interval for cyclic threads in us (incl. runtime)
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

void	

Here is the call graph for this function:

5.40.2.5 EXT_DECL void vos_divTime (VOS_TIME_T * *pTime*, UINT32 *divisor*)

Divide the first time by the second, return quotient in first.

Parameters

in,out	*pTime*	Pointer to time value

in	*divisor*	Divisor

Divide the first time by the second, return quotient in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*divisor*	Divisor

5.40.2.6 EXT_DECL void vos_getTime (VOS_TIME_T * *pTime*)

Return the current time in sec and us.

Parameters

out	*pTime*	Pointer to time value

5.40.2.7 EXT_DECL const CHAR8* vos_getTimeStamp (void)

Get a time-stamp string.

Get a time-stamp string for debugging in the form "yyyymmdd-hh:mm:ss.ms" Depending on the used OS / hardware the time might not be a real-time stamp but relative from start of system.

Return values

timestamp	"yyyymmdd-hh:mm:ss.ms"

5.40.2.8 EXT_DECL void vos_getUuid (VOS_UUID_T *pUuID*)

Get a universal unique identifier according to RFC 4122 time based version.

Parameters

out	*pUuID*	Pointer to a universal unique identifier

Here is the call graph for this function:

5.40.2.9 EXT_DECL void vos_mulTime (VOS_TIME_T * *pTime,* UINT32 *mul*)

Multiply the first time by the second, return product in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*mul*	Factor

5.40.2.10 EXT_DECL VOS_ERR_T vos_mutexCreate (VOS_MUTEX_T * *pMutex*)

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

Create a mutex.

Return a mutex handle. The mutex will be available at creation.

Parameters

out	*pMutex*	Pointer to mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_PARAM_ERR	pMutex == NULL
VOS_MUTEX_ERR	no mutex available

Here is the call graph for this function:

5.40.2.11 EXT_DECL void vos_mutexDelete (VOS_MUTEX_T *pMutex*)

Delete a mutex.

Release the resources taken by the mutex.

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error

Release the resources taken by the mutex.

Parameters

in	*pMutex*	mutex handle

Here is the call graph for this function:

5.40.2.12 EXT_DECL VOS_ERR_T vos_mutexLock (VOS_MUTEX_T *pMutex*)

Take a mutex.

Wait for the mutex to become available (lock).

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error

VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle

Wait for the mutex to become available (lock).

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMutex == NULL or wrong type
VOS_MUTEX_ERR	no such mutex

5.40.2.13 EXT_DECL VOS_ERR_T vos_mutexTryLock (VOS_MUTEX_T *pMutex*)

Try to take a mutex.

If mutex is can't be taken VOS_MUTEX_ERR is returned.

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_MUTEX_ERR	no mutex available

If mutex is can't be taken VOS_MUTEX_ERR is returned.

Parameters

in	*pMutex*	mutex handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	pMutex == NULL or wrong type
VOS_MUTEX_ERR	mutex not locked

5.40.2.14 EXT_DECL VOS_ERR_T vos_mutexUnlock (VOS_MUTEX_T *pMutex*)

Release a mutex.

Unlock the mutex.

Parameters

in	*pMutex*	mutex handle

5.40.2.15 EXT_DECL VOS_ERR_T vos_semaCreate (VOS_SEMA_T * *pSema,* VOS_SEMA_STATE_T *initialState*)

Create a semaphore.

Return a semaphore handle. Depending on the initial state the semaphore will be available on creation or not.

Parameters

out	*pSema*	Pointer to semaphore handle
in	*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

Here is the call graph for this function:

5.40.2.16 EXT_DECL void vos_semaDelete (VOS_SEMA_T *sema*)

Delete a semaphore.

This will eventually release any processes waiting for the semaphore.

Parameters

in	*sema*	semaphore handle

Here is the call graph for this function:

5.40.2.17 EXT_DECL void vos_semaGive (VOS_SEMA_T *sema*)

Give a semaphore.

Release (increase) a semaphore.

Parameters

in	*sema*	semaphore handle

5.40.2.18 EXT_DECL VOS_ERR_T vos_semaTake (VOS_SEMA_T *sema,* UINT32 *timeout*)

Take a semaphore.

Try to get (decrease) a semaphore.

Parameters

in	*sema*	semaphore handle
in	*timeout*	Max. time in us to wait, 0 means no wait

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_SEMA_ERR	could not get semaphore in time

Here is the call graph for this function:

5.40.2.19 EXT_DECL void vos_subTime (VOS_TIME_T * *pTime,* const VOS_TIME_T * *pSub*)

Subtract the second from the first time stamp, return diff in first.

Parameters

in,out	*pTime*	Pointer to time value
in	*pSub*	Pointer to time value

5.40.2.20 EXT_DECL VOS_ERR_T vos_threadCreate (VOS_THREAD_T * *pThread*, const CHAR8 * *pName*, VOS_THREAD_POLICY_T *policy*, VOS_THREAD_PRIORITY_T *priority*, UINT32 *interval*, UINT32 *stackSize*, VOS_THREAD_FUNC_T *pFunction*, void * *pArguments*)

Create a thread.

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters

out	*pThread*	Pointer to returned thread handle
in	*pName*	Pointer to name of the thread (optional)
in	*policy*	Scheduling policy (FIFO, Round Robin or other)
in	*priority*	Scheduling priority (1...255 (highest), default 0)
in	*interval*	Interval for cyclic threads in us (optional)
in	*stackSize*	Minimum stacksize, default 0: 16kB
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters

out	*pThread*	Pointer to returned thread handle
in	*pName*	Pointer to name of the thread (optional)
in	*policy*	Scheduling policy (FIFO, Round Robin or other)
in	*priority*	Scheduling priority (1...255 (highest), default 0)
in	*interval*	Interval for cyclic threads in us (optional)
in	*stackSize*	Minimum stacksize, default 0: 16kB
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_THREAD_ERR	thread creation error

Create a thread and return a thread handle for further requests. Not each parameter may be supported by all target systems!

Parameters

out	*pThread*	Pointer to returned thread handle
in	*pName*	Pointer to name of the thread (optional)
in	*policy*	Scheduling policy (FIFO, Round Robin or other)
in	*priority*	Scheduling priority (1...255 (highest), default 0)
in	*interval*	Interval for cyclic threads in us (optional)
in	*stackSize*	Minimum stacksize, default 0: 16kB
in	*pFunction*	Pointer to the thread function
in	*pArguments*	Pointer to the thread function parameters

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid
VOS_THREAD_ERR	thread creation error
VOS_INIT_ERR	no threads available

Here is the call graph for this function:

5.40.2.21 EXT_DECL VOS_ERR_T vos_threadDelay (UINT32 *delay*)

Delay the execution of the current thread by the given delay in us.

Parameters

in	*delay*	Delay in us

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised

Parameters

in	*delay*	Delay in us

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

5.40.2.22 EXT_DECL VOS_ERR_T vos_threadInit (void)

Initialize the thread library.

Must be called once before any other call

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	threading not supported

5.40.2.23 EXT_DECL VOS_ERR_T vos_threadIsActive (VOS_THREAD_T *thread*)

Is the thread still active? This call will return VOS_NO_ERR if the thread is still active, VOS_PARAM_ERR in case it ran out.

Parameters

in	*thread*	Thread handle

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid

Parameters

in	*thread*	Thread handle

Return values

VOS_NO_ERR	no error
VOS_PARAM_ERR	parameter out of range/invalid

5.40.2.24 EXT_DECL void vos_threadTerm (void)

De-Initialize the thread library.

Must be called after last thread/timer call

5.40.2.25 EXT_DECL VOS_ERR_T vos_threadTerminate (VOS_THREAD_T *thread*)

Terminate a thread.

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters

in	*thread*	Thread handle (or NULL if current thread)

Return values

VOS_NO_ERR	no error
VOS_INIT_ERR	module not initialised
VOS_NOINIT_ERR	invalid handle
VOS_PARAM_ERR	parameter out of range/invalid

This call will terminate the thread with the given threadId and release all resources. Depending on the underlying architectures, it may just block until the thread ran out.

Parameters

in	*thread*	Thread handle (or NULL if current thread)

Return values

VOS_NO_ERR	no error
VOS_THREAD_ERR	cancel failed

5.41 vos_types.h File Reference

Typedefs for OS abstraction.

```
#include <stdint.h>
```

Include dependency graph for vos_types.h: This graph shows which files directly or indirectly include this file:

Data Structures

- struct **VOS_TIME_T**

  Timer value compatible with timeval / select.

Macros

- #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.

5.41.1 Detailed Description

Typedefs for OS abstraction.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

vos_types.h (p. 263) 1262 2014-07-14 13:03:58Z bloehr

5.41.2 Typedef Documentation

5.41.2.1 typedef void(∗ VOS_PRINT_DBG_T)(void ∗pRefCon, VOS_LOG_T category, const CHAR8 ∗pTime, const CHAR8 ∗pFile, UINT16 LineNumber, const CHAR8 ∗pMsgStr)

Function definition for error/debug output.

The function will be called for logging and error message output. The user can decide, what kind of info will be logged by filtering the category.

Parameters

in	*∗pRefCon*	pointer to user context
in	*category*	Log category (Error, Warning, Info etc.)
in	*pTime*	pointer to NULL-terminated string of time stamp
in	*pFile*	pointer to NULL-terminated string of source module
in	*LineNumber*	Line number
in	*pMsgStr*	pointer to NULL-terminated string

Return values

none	

5.41.3 Enumeration Type Documentation

5.41.3.1 enum VOS_ERR_T

Return codes for all VOS API functions.

Enumerator

VOS_NO_ERR No error.

VOS_PARAM_ERR Necessary parameter missing or out of range.

VOS_INIT_ERR Call without valid initialization.

VOS_NOINIT_ERR The supplied handle/reference is not valid.

VOS_TIMEOUT_ERR 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.

5.41.3.2 enum VOS_LOG_T

Categories for logging.

Enumerator

VOS_LOG_ERROR This is a critical error.

VOS_LOG_WARNING This is a warning.

VOS_LOG_INFO This is an info.

VOS_LOG_DBG This is a debug info.

5.42 vos_utils.c File Reference

Common functions for VOS.

```
#include <string.h>
#include "vos_utils.h"
#include "vos_sock.h"
#include "vos_thread.h"
#include "vos_mem.h"
#include "vos_private.h"
```

Include dependency graph for vos_utils.c:

Functions

- **VOS_ERR_T vos_initRuntimeConsts** (void)

  Pre-compute alignment and 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.
- **INLINE** BOOL8 **vos_isBigEndian** (void)

  Return endianess.

5.42.1 Detailed Description

Common functions for VOS. Common functions of the abstraction layer. Mainly debugging support.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

Id:

vos_utils.c (p. 266) 1353 2014-11-11 15:11:13Z ahweiss

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

5.42.2 Function Documentation

5.42.2.1 UINT32 vos_crc32 (UINT32 *crc*, const UINT8 * *pData*, UINT32 *dataLen*)

Compute crc32 according to IEEE802.3.

Calculate CRC for the given buffer and length.

Note: Returned CRC is inverted

Parameters

in	*crc*	Initial value.
in,out	*pData*	Pointer to data.
in	*dataLen*	length in bytes of data.

Return values

crc32	according to IEEE802.3

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

Initialize the virtual operating system.

Initialize the vos library.

Parameters

in	*pRefCon*	context for debug output function
in	*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:

5.42.2.3 VOS_ERR_T vos_initRuntimeConsts (void)

Pre-compute alignment and endianess.

Return values

VOS_INTEGRATION_ERR	or VOS_NO_ERR

5.42.2.4 INLINE BOOL8 vos_isBigEndian (void)

Return endianess.

Return values

TRUE	if big endian

5.42.2.5 EXT_DECL void vos_terminate ( )

DeInitialize the vos library.

Should be called last after TRDP stack/application does not use any VOS function anymore.

Here is the call graph for this function:

5.43 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:

Macros

- #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

Functions

- EXT_DECL UINT32 **vos_crc32** (UINT32 crc, const UINT8 *pData, UINT32 dataLen)

  Calculate CRC for the given buffer and length.
- EXT_DECL **VOS_ERR_T vos_init** (void *pRefCon, **VOS_PRINT_DBG_T** pDebugOutput)

  Initialize the vos library.
- EXT_DECL void **vos_terminate** ()

  DeInitialize the vos library.

5.43.1 Detailed Description

Typedefs for OS abstraction.

Note

Project: TCNOpen TRDP prototype stack

Author

Bernd Loehr, NewTec GmbH

Remarks

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 Bombardier Transportation Inc. or its subsidiaries and others, 2013. All rights reserved.

Id:

vos_utils.h (p. 268) 1181 2014-02-28 15:55:27Z bloehr

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

5.43.2 Macro Definition Documentation

5.43.2.1 #define INITFCS 0xffffffff

CRC/FCS constants.

Initial FCS value

5.43.2.2 #define VOS_MAX_ERR_STR_SIZE (VOS_MAX_PRNT_STR_SIZE - VOS_MAX_FRMT_SIZE)

Max.

size of the error part

5.43.2.3 #define VOS_MAX_FRMT_SIZE 64

Max.

size of the 'format' part

5.43.2.4 #define VOS_MAX_PRNT_STR_SIZE 256

String size definitions for the debug output functions.

Max. size of the debug/error string of debug function

5.43.3 Function Documentation

5.43.3.1 EXT_DECL UINT32 vos_crc32 (UINT32 *crc*, const UINT8 * *pData*, UINT32 *dataLen*)

Calculate CRC for the given buffer and length.

For TRDP FCS CRC calculation the CRC32 according to IEEE802.3 with start value 0xffffffff is used.

Parameters

in	*crc*	Initial value.
in,out	*pData*	Pointer to data.
in	*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

in	*crc*	Initial value.
in,out	*pData*	Pointer to data.
in	*dataLen*	length in bytes of data.

Return values

crc32	according to IEEE802.3

5.43.3.2 EXT_DECL VOS_ERR_T vos_init (void * *pRefCon*, VOS_PRINT_DBG_T *pDebugOutput*)

Initialize the vos library.

This is used to set the output function for all VOS error and debug output.

Parameters

in	*pRefCon	user context
in	*pDebugOutput	pointer to debug output function

Return values

VOS_NO_ERR	no error

VOS_INIT_ERR	unsupported

Initialize the vos library.

Parameters

in	*pRefCon*	context for debug output function
in	*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:

5.43.3.3 EXT_DECL void vos_terminate ( )

DeInitialize the vos library.

Should be called last after TRDP stack/application does not use any VOS function anymore.

Here is the call graph for this function:

Index