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Open Source Development



*TRDP*

*Train Real Time Data Protocol*

# TRDP SPY - Reference Manual



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# Chapter 1

## TRDP-SPY

### 1.1 Introduction

#### 1.1.1 Purpose

As part of the IP-Train project, two new protocols namely TRDP-PD (Process Data) and TRDP-MD (Message Data) are intended to be supported by the Wireshark tool. The support is envisaged to be made available in the form of a plug-in.

The existing GUI of the Wireshark V1.8.3 shall not be modified. The plug-in TRDP-SPY shall be available as a DLL for Windows platform and shared library for TRDP-spy for Linux platform.

#### 1.1.2 Audience

The TRDP-SPY will be used primarily by TRDP Engineers.

### 1.2 Description

#### 1.2.1 System

TRDP Wire Protocol Analysis tool (TRDP-SPY) shall provide qualitative and quantitative analysis of TRDP streams, in order to verify system behaviour during qualification tests (level 2 and level 3) and provide help in problem analysis during train integration and debugging.

#### 1.2.2 Environment

The plug-in shall be compatible with Windows XP and Linux implementation of Wireshark. Standard behavior of Wireshark for all other protocols than WP shall not be influenced in any way by the TRDPWP analysis plug-in.

The plug-in shall be delivered as a DLL (Windows) along with the Wireshark-setup.exe and shared Library (.la, .lai and .so files or Linux) along with the minimal source - Wireshark-1.8.3.

### 1.3 Environment for Windows

Following specifications are used for development of the TRDP PD and TRDP MD plug-in for Wireshark.

- Operating System: Windows XP
- Tool : Wireshark V1.8.3
- Programming Language: C
- TRDP Wire Protocol

### 1.3.1 to compile for Windows

#### Prerequisites:

- Wireshark minimal source (wireshark-1.8.3.tar.bz2).
- TRDP-SPY\_src.zip source.
- Follow the online guide [http://www.wireshark.org/docs/wsdg\\_html\\_chunked/ChSetupWin32.html](http://www.wireshark.org/docs/wsdg_html_chunked/ChSetupWin32.html)

#### Steps:

- Unzip wireshark-1.8.3.tar.bz2 to c:\ and rename it to wireshark.
- Unzip TRDP-SPY\_src.zip.
- From TRDP-SPY\_src source copy folders to c:/wireshark/plugins.
- Also copy config.nmake from TRDP-SPY to c:\wireshark (overwrite the existing one).
- Open a Terminal and navigate to the plugin location C:\wireshark\plugins\trpd\_spy\.
- First clean it using command `nmake -f makefile.nmake distclean` or run `clean.bat`.
- Then compile using command `nmake -f makefile.nmake` or run `build.bat`.

This will generate the TRDP\_spy.dll.

The Wireshark version containing TRDP can be started with:

C:\wireshark\wireshark-gtk2\wireshark.exe

## Chapter 2

# Module Index

### 2.1 Modules

Here is a list of all modules:

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## Chapter 3

# Data Structure Index

### 3.1 Data Structures

Here are the data structures with brief descriptions:

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## Chapter 4

# File Index

### 4.1 File List

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

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## Chapter 5

# Module Documentation

### 5.1 Parsing

#### Data Structures

- struct [ComId](#)  
*This struct makes a mapping between one comId and one dataset.*
- struct [Dataset](#)  
*Description of one dataset.*
- struct [Element](#)  
*description of one element, with a variable that is stored*

#### Functions

- gint [trdp\\_lookupType](#) (GHashTable \*pTableDataset, GString \*nameOfType)  
*Search in the given table at the names and return the found id.*
- TRDP\_RET\_t [trdp\\_parsebody\\_init](#) (const char \*\*xmlconfigFile)  
*Create the module and extract all the needed information from the configuration file.*
- void [trdp\\_parsebody\\_clean](#) (void)  
*Clean used memory.*
- int [trdp\\_parsebody\\_isinitied](#) (void)  
*Show the status, if the library is ready to use.*
- struct [Dataset](#) \* [trdp\\_parsebody\\_lookup](#) (guint32 comId)  
*Looks up the dataset for a given ComId.*
- struct [Dataset](#) \* [trdp\\_parsebody\\_search](#) (guint32 datasetId)  
*Uses the second hashmap to find the struct [Dataset](#) for a given datasetId.*

#### Variables

- GString \* [Element::name](#)  
*Name of the variable, that is stored.*
- guint32 [Element::type](#)  
*Numeric type of the variable (see Usermanual, chapter 4.2)*
- guint32 [Element::array\\_size](#)  
*Amount this value occurred.*

- GString \* [Element::unit](#)  
*Unit to display.*
- gfloat [Element::scale](#)  
*A factor the given value is scaled.*
- gint32 [Element::offset](#)  
*Offset that is added to the values.*

## 5.1.1 Function Documentation

### 5.1.1.1 gint trdp\_lookupType ( GHashTable \* *pTableDataset*, GString \* *nameOfType* )

Search in the given table at the names and return the found id.

#### Parameters

in	<i>pTableDataset</i>	table containing all types
in	<i>nameOfType</i>	textual description of a type, searching for

#### Returns

found identifier, or zero on errors

### 5.1.1.2 void trdp\_parsebody\_clean ( void )

Clean used memory.

Release all the allocated memory, needed to store the given information.

#### Returns

nothing

### 5.1.1.3 TRDP\_RET\_t trdp\_parsebody\_init ( const char \*\* *xmlconfigFile* )

Create the module and extract all the needed information from the configuration file.

#### Parameters

in	<i>xmlconfigFile</i>	path to the file containing the XML description of the TRDP packets.
----	----------------------	--

#### Returns

TRDP\_PARSEBODY\_OK when no errors occurred

### 5.1.1.4 int trdp\_parsebody\_isinitied ( void )

Show the status, if the library is ready to use.

#### Returns

> 0 if the library is initialized, 0 if uninitialized

## 5.1.1.5 struct Dataset \* trdp\_parsebody\_lookup ( guint32 comId ) [read]

Looks up the dataset for a given [ComId](#).

### Parameters

in	comId	to search for.
----	-------	----------------

### Returns

NULL, when nothing was found.

## 5.1.1.6 struct Dataset \* trdp\_parsebody\_search ( guint32 datasetId ) [read]

Uses the second hashmap to find the struct [Dataset](#) for a given datasetId.

### Parameters

in	datasetId	the dataset we are searching for
----	-----------	----------------------------------

### Returns

NULL, when nothing was found.

## 5.1.2 Variable Documentation

### 5.1.2.1 Element::array\_size

Amount this value occurred.

1 is default; 0 indicates a dynamic list (the dynamic list starts with a 16bit value with the occurrence)

### 5.1.2.2 Element::offset

Offset that is added to the values.

displayed value = scale \* raw value + offset

## 5.2 Wireshark

### Functions

- void [proto\\_register\\_trdp](#) (void)  
*start analyzing TRDP packets*
- void [proto\\_reg\\_handoff\\_trdp](#) (void)  
*Called, if the analysis of TRDP packets is stopped.*

### 5.2.1 Function Documentation

#### 5.2.1.1 void [proto\\_reg\\_handoff\\_trdp](#) ( void )

Called, if the analysis of TRDP packets is stopped.

If this dissector uses sub-dissector registration add a registration routine. This exact format is required because a script is used to find these routines and create the code that calls these routines.

This function is also called by preferences whenever "Apply" is pressed (see [prefs\\_register\\_protocol](#) above) so it should accommodate being called more than once.

#### 5.2.1.2 void [proto\\_register\\_trdp](#) ( void )

start analyzing TRDP packets

Register the protocol with Wireshark this format is required because a script is used to build the C function that calls all the protocol registration.



## 5.3 Definitions

### Defines

- #define [TRDP\\_BOOL8](#) 1  
*=UINT8, 1 bit relevant (equal to zero -> false, not equal to zero -> true)*
- #define [TRDP\\_CHAR8](#) 2  
*char, can be used also as UTF8*
- #define [TRDP\\_UTF16](#) 3  
*Unicode UTF-16 character.*
- #define [TRDP\\_INT8](#) 4  
*Signed integer, 8 bit.*
- #define [TRDP\\_INT16](#) 5  
*Signed integer, 16 bit.*
- #define [TRDP\\_INT32](#) 6  
*Signed integer, 32 bit.*
- #define [TRDP\\_INT64](#) 7  
*Signed integer, 64 bit.*
- #define [TRDP\\_UINT8](#) 8  
*Unsigned integer, 8 bit.*
- #define [TRDP\\_UINT16](#) 9  
*Unsigned integer, 16 bit.*
- #define [TRDP\\_UINT32](#) 10  
*Unsigned integer, 32 bit.*
- #define [TRDP\\_UINT64](#) 11  
*Unsigned integer, 64 bit.*
- #define [TRDP\\_REAL32](#) 12  
*Floating point real, 32 bit.*
- #define [TRDP\\_REAL64](#) 13  
*Floating point real, 64 bit.*
- #define [TRDP\\_TIMEDATE32](#) 14  
*32 bit UNIX time*
- #define [TRDP\\_TIMEDATE48](#) 15  
*48 bit TCN time (32 bit seconds and 16 bit ticks)*
- #define [TRDP\\_TIMEDATE64](#) 16  
*32 bit seconds and 32 bit microseconds*
- #define [TRDP\\_MD\\_HEADERLENGTH](#) [TRDP\\_HEADER\\_MD\\_OFFSET\\_DATA](#)  
*Length of the TRDP header of an MD message.*
- #define [TRDP\\_FCS\\_LENGTH](#) 4  
*The CRC calculation results in a 32bit result so 4 bytes are necessary.*

### Functions

- quint32 [trdp\\_fcs32](#) (const quint8 buf[], quint32 len, quint32 fcs)  
*Calculates and returns a 32-bit FCS.*
- quint8 [trdp\\_dissect\\_width](#) (quint32 type)  
*Lookup table for length of the standard types.*

### 5.3.1 Function Documentation

#### 5.3.1.1 `uint8 trdp_dissect_width ( uint32 type )`

Lookup table for length of the standard types.

The width of an element in bytes. Extracted from table3 at TCN-TRDP2-D-BOM-011-19.

##### Parameters

<i>in</i>	<i>type</i>	the numeric representation of a type
-----------	-------------	--------------------------------------

##### Returns

the width in byte of one element of the given type

#### 5.3.1.2 `uint32 trdp_fcs32 ( const uint8 buf[], uint32 len, uint32 fcs )`

Calculates and returns a 32-bit FCS.

##### Parameters

<i>in</i>	<i>buf</i>	Input buffer
<i>in</i>	<i>len</i>	Length of input buffer
<i>in</i>	<i>fcs</i>	Initial (seed) value for the FCS calculation

##### Returns

Calculated fcs value

## Chapter 6

# Data Structure Documentation

### 6.1 ComId Struct Reference

This struct makes a mapping between one comId and one dataset.

```
#include <parsebody.h>
```

#### Data Fields

- guint32 [comId](#)

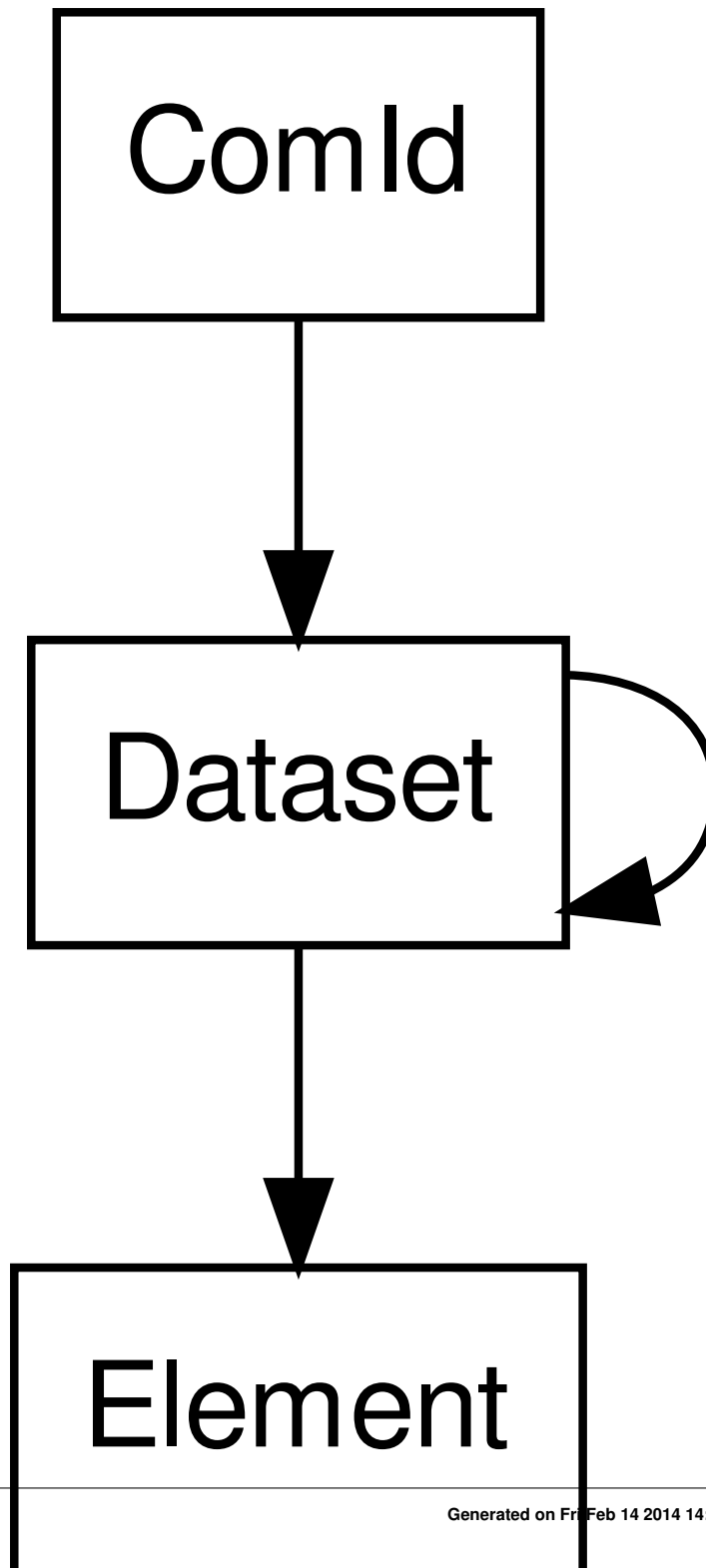
*Communication Id, used as key.*

- guint [datasetId](#)

*Id for a dataset ( [see Dataset structure](#) )*

#### 6.1.1 Detailed Description

This struct makes a mapping between one comId and one dataset.



This is a separate structure, because there could be mappings from a dataset to another one.

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

- [parsebody.h](#)

## 6.2 Dataset Struct Reference

Description of one dataset.

```
#include <parsebody.h>
```

### Data Fields

- guint [datasetId](#)  
*Unique identification of one dataset.*
- GString \* [name](#)  
*Description of the dataset.*
- GSList \* [listOfElements](#)  
*All elements, this dataset consists of.*

### 6.2.1 Detailed Description

Description of one dataset.

### 6.2.2 Field Documentation

#### 6.2.2.1 GSList\* Dataset::listOfElements

All elements, this dataset consists of.

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

- [parsebody.h](#)

## 6.3 Element Struct Reference

description of one element, with a variable that is stored

```
#include <parsebody.h>
```

### Data Fields

- GString \* [name](#)  
*Name of the variable, that is stored.*
- guint32 [type](#)  
*Numeric type of the variable (see Usermanual, chapter 4.2)*
- guint32 [array\\_size](#)  
*Amount this value occurred.*

- GString \* [unit](#)  
*Unit to display.*
- gfloat [scale](#)  
*A factor the given value is scaled.*
- gint32 [offset](#)  
*Offset that is added to the values.*

### 6.3.1 Detailed Description

description of one element, with a variable that is stored

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

- [parsebody.h](#)

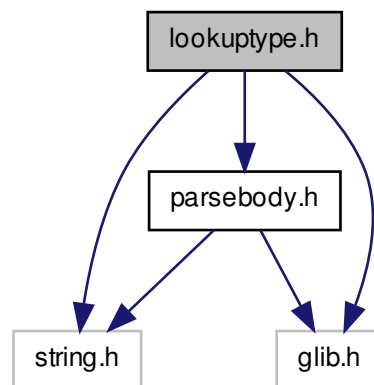
## Chapter 7

# File Documentation

### 7.1 lookuptype.h File Reference

Functionality to find the corresponding type id for a name.

```
#include <string.h> #include <glib.h> #include "parsebody.h" Include dependency graph for lookuptype.h:
```



#### Functions

- gint [trdp\\_lookupType](#) (GHashTable \*pTableDataset, GString \*nameOfType)  
*Search in the given table at the names and return the found id.*

#### 7.1.1 Detailed Description

Functionality to find the corresponding type id for a name.

**Note**

Project: TRDP SPY

**Author**

Florian Weispfenning, Bombardier Transportation

**Remarks**

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**Id:**

[lookuptype.h](#) 1154 2014-01-21 13:11:58Z fweispf

## 7.2 packet-trdp\_spy.h File Reference

Interface between Wireshark and the TRDP analysis module.

**Functions**

- void [proto\\_register\\_trdp](#) (void)  
*start analyzing TRDP packets*
- void [proto\\_reg\\_handoff\\_trdp](#) (void)  
*Called, if the analysis of TRDP packets is stopped.*

### 7.2.1 Detailed Description

Interface between Wireshark and the TRDP analysis module.

**Note**

Project: TRDP SPY

**Author**

Florian Weispfenning, Bombardier Transportation

**Remarks**

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**Id:**

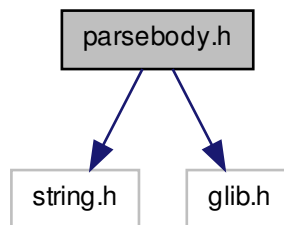
[packet-trdp\\_spy.h](#) 1161 2014-02-14 13:11:15Z fweispf



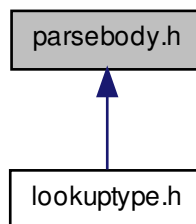
## 7.3 parsebody.h File Reference

Loading of the XML description.

#include <string.h> #include <glib.h> Include dependency graph for parsebody.h:



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



### Data Structures

- struct [ComId](#)  
*This struct makes a mapping between one comId and one dataset.*
- struct [Dataset](#)  
*Description of one dataset.*
- struct [Element](#)  
*description of one element, with a variable that is stored*

### Functions

- TRDP\_RET\_t [trdp\\_parsebody\\_init](#) (const char \*\*xmlconfigFile)  
*Create the module and extract all the needed information from the configuration file.*

- void `trdp_parsebody_clean` (void)  
*Clean used memory.*
- int `trdp_parsebody_isinitd` (void)  
*Show the status, if the library is ready to use.*
- struct `Dataset` \* `trdp_parsebody_lookup` (quint32 comId)  
*Looks up the dataset for a given `ComId`.*
- struct `Dataset` \* `trdp_parsebody_search` (quint32 datasetId)  
*Uses the second hashmap to find the struct `Dataset` for a given datasetId.*

### 7.3.1 Detailed Description

Loading of the XML description.

#### Note

Project: TRDP SPY

#### Author

Florian Weispfenning, Bombardier Transportation

#### Remarks

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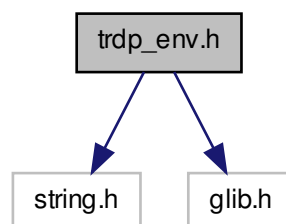
#### Id:

`parsebody.h` 1154 2014-01-21 13:11:58Z fweispf

## 7.4 trdp\_env.h File Reference

Definition of the TRDP constants and specific calculations.

`#include <string.h> #include <glib.h>` Include dependency graph for `trdp_env.h`:



## Defines

- #define [TRDP\\_BOOL8](#) 1  
*=UINT8, 1 bit relevant (equal to zero -> false, not equal to zero -> true)*
- #define [TRDP\\_CHAR8](#) 2  
*char, can be used also as UTF8*
- #define [TRDP\\_UTF16](#) 3  
*Unicode UTF-16 character.*
- #define [TRDP\\_INT8](#) 4  
*Signed integer, 8 bit.*
- #define [TRDP\\_INT16](#) 5  
*Signed integer, 16 bit.*
- #define [TRDP\\_INT32](#) 6  
*Signed integer, 32 bit.*
- #define [TRDP\\_INT64](#) 7  
*Signed integer, 64 bit.*
- #define [TRDP\\_UINT8](#) 8  
*Unsigned integer, 8 bit.*
- #define [TRDP\\_UINT16](#) 9  
*Unsigned integer, 16 bit.*
- #define [TRDP\\_UINT32](#) 10  
*Unsigned integer, 32 bit.*
- #define [TRDP\\_UINT64](#) 11  
*Unsigned integer, 64 bit.*
- #define [TRDP\\_REAL32](#) 12  
*Floating point real, 32 bit.*
- #define [TRDP\\_REAL64](#) 13  
*Floating point real, 64 bit.*
- #define [TRDP\\_TIMEDATE32](#) 14  
*32 bit UNIX time*
- #define [TRDP\\_TIMEDATE48](#) 15  
*48 bit TCN time (32 bit seconds and 16 bit ticks)*
- #define [TRDP\\_TIMEDATE64](#) 16  
*32 bit seconds and 32 bit microseconds*
- #define [TRDP\\_MD\\_HEADERLENGTH](#) [TRDP\\_HEADER\\_MD\\_OFFSET\\_DATA](#)  
*Length of the TRDP header of an MD message.*
- #define [TRDP\\_FCS\\_LENGTH](#) 4  
*The CRC calculation results in a 32bit result so 4 bytes are necessary.*

## Functions

- guint32 [trdp\\_fcs32](#) (const guint8 buf[], guint32 len, guint32 fcs)  
*Calculates and returns a 32-bit FCS.*
- guint8 [trdp\\_dissect\\_width](#) (guint32 type)  
*Lookup table for length of the standard types.*

### 7.4.1 Detailed Description

Definition of the TRDP constants and specific calculations.

#### Note

Project: TRDP SPY

#### Author

Florian Weispfenning, Bombardier Transportation

#### Remarks

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#### Id: