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UDP Socket Test Port for TTCN-3 Toolset with TITAN, User's Guide

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1 Introduction

1.1 Revision history

Date	Rev	Characteristics	Prepared
2003-11-25	PA1	First draft version	ETHJGI
2004-01-13	A	Updated according to review	ETHJGI
2004-02-13	PB1	Local and remote address usage modification	ETHZJZ
2004-02-16	B	Updated according to review	ETHJGI
2004-09-07	PC1	Added advanced mode	ETHGASZ
2004-01-13	C	Updated according to review	ETHGASZ
2006-10-12	PD1	Updated according to MTTSM00011082	ETHGASZ
2007-01-24	PE1	Updated for TITAN R7	ETHGASZ

1.2 About this Document

1.2.1 How to Read this Document

This is the User's Guide for the UDP test port. The UDP test port is developed for the TTCN-3 Toolset with TITAN according to the Requirement Specification [5]. This document is intended to be read together with Product Revision Information [3] and Function Specification [4].

1.2.2 Prerequisite Knowledge

The knowledge of the TITAN TTCN-3 Test Executor [2] and the TTCN-3 language [1] is essential. Basic knowledge of the UDP protocol is valuable when reading this document.

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1.2.3 References

- [1] ETSI ES 201 873-1 (2002)
The Testing and Test Control Notation version 3. Part 1: Core Language
- [2] 1/1553-CRL 113 200 Uen
User Documentation for the TITAN TTCN-3 Test Executor
- [3] 109 21-CNL 113 346-2 Uen
UDP Socket Test Port for TTCN-3 Toolset with TITAN, Product Revision Information
- [4] 155 17-CNL 113 346 Uen
UDP Socket Test Port for TTCN-3 Toolset with TITAN, Function Specification
- [5] 5/1056-200/FCP 11 265 TTCN 3
Functional Test System Requirement Specification for GSN
- [6] RFC 768 (1980)
User Datagram Protocol

1.2.4 Abbreviations

ASP	Abstract Service Primitive
RTE	Run-Time Environment
SUT	System Under Test
TTCN-3	Testing and Test Control Notation version 3
UDP	User Datagram Protocol

1.2.5 Terminology

-

1.3 System Requirements

In order to operate the UDP test port the following system requirements must be satisfied:

- Platform: Solaris 5.8
- TITAN TTCN-3 Test Executor version R7A (1.7.pl0) or higher installed. For installation guide see [2]. Please note: This version of the test port is not compatible with TITAN releases earlier than R7A.
- The same C compiler gcc version installed which the TITAN was compiled with. See the Release Notes of TITAN.

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For other known limitations please see the FS [4].

1.4 Fundamental Concepts

The test port establishes UDP connection between the TTCN-3 test executor and the SUT. The test port transmits and receives UDP protocol messages between the TITAN RTE and the SUT.

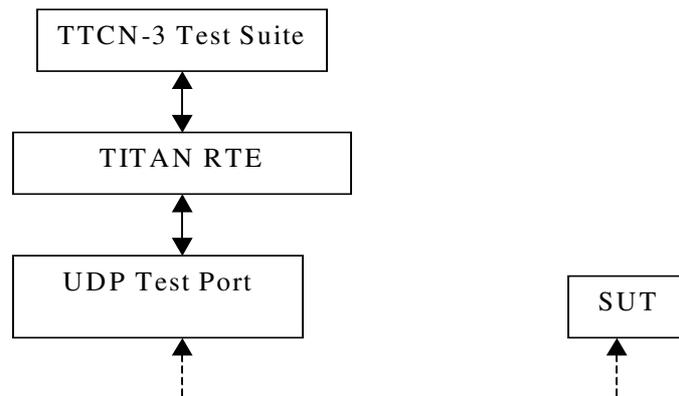
2 The Test Port

2.1 Overview

The UDP test port offers UDP primitives to the test suite in TTCN-3 format. The TTCN-3 definition of the ASPs can be found in a separate TTCN-3 module. This module should be imported into the test suite.

The test port transfers UDP primitives towards the TITAN RTE and UDP datagrams towards the SUT. The overview of the test system is shown on figure 1. below:

Figure 1.: System Overview



2.2 Installation

Since the UDP test port is used as a part of the TTCN-3 test environment this requires TTCN-3 Test Executor to be installed before any operation of the UDP test port. For more details on the installation of TTCN-3 Test Executor see the relevant section of [2].

When building the executable test suite the libraries provided for the TTCN-3 Test Executor should also be linked into the executable. For more information see also [2].

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2.3 Operation modes

2.3.1 Basic mode

2.3.1.1 Description

In basic mode the port provides a simple ASP interface and can handle only one UDP socket. The local IP address and port number can be configured only via config file. This mode is compatible with the previous release of the port. Only the basic ASP can be used.

2.3.1.2 ASP definition

ASP_UDP – send and receive data

2.3.2 Advanced mode

2.3.2.1 Description

In advanced mode the test port provides the following functionality:

- open socket
- close socket
- send and receive data

The port can handle several UDP sockets. The local IP address and port numbers are configured in run time via ASPs. Only the advanced ASP can be used.

2.3.2.2 ASP definition

ASP_UDP_message – send and receive data

ASP_UDP_open – request a new socket

ASP_UDP_open_result – the result of the open request

ASP_UDP_close – close the socket

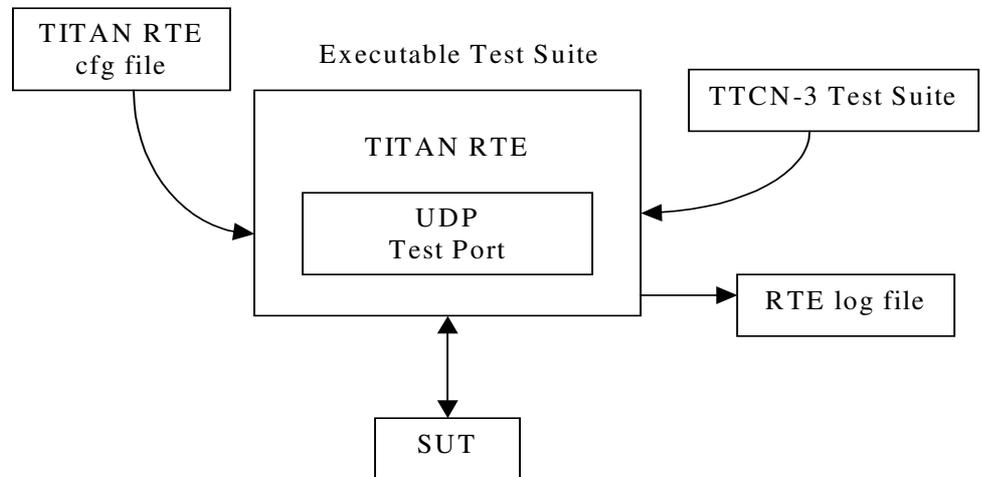
2.4 Configuration

The executable test program behaviour is determined via the RTE configuration file. This is a simple text file, which contains various sections (e.g. [TESTPORT_PARAMETERS]) after each other. The usual suffix of the RTE configuration file is .cfg. For further information about the configuration file see [2].

The overview of the configuration process is shown on figure 2:

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Figure 2: Configuration Overview



2.4.1 UDP test port parameters in the RTE configuration file

In the [TESTPORT_PARAMETERS] section you can specify parameters that are passed to the test ports. Each parameter definition consists of a component name, a port name, a parameter name and a parameter value. The component name can be either an identifier or a component reference (integer) value. The port and parameter names are identifiers while the parameter value always must be a charstring (with quotation marks). Instead of component name or port name (or both of them) the asterisk (“*”) sign can be used, which means “all components” or “all ports of the component”. More information about the RTE configuration file can be found in [2].

In the [TESTPORT_PARAMETERS] section the following parameters can be set for the UDP test port:

mode

This sets the port operation mode. possible values:

- “basic” Basic operation mode
- “advanced” Advanced operation mode

The default mode is the basic operation mode.

localIPAddr

This identifies the IP address of the local host. Only Ipv4 is supported.

Possible values of this parameter are: IP address in Ipv4 format or the host name like: “127.0.0.1” or “localhost”. The default is all network.

Used only in basic mode.

localPort

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This gives the local port number where the test port receives datagrams. Default is "50000".

Used only in basic mode.

debugging

Activates/deactivates logging in the test port. Possible values are:

- "no" Logging is not active
- "yes" Logging is active

Default value is "no".

In the RTE configuration file it is possible to define the name and path of the RTE log file. Debug output from the test port is written into the RTE log file. If no path is given in the configuration file, the RTE log file is stored in the working directory.

broadcast

Enables/disables the broadcast sending capabilities of the test port.

- "enabled" Broadcast sending is enabled
- "disabled" Broadcast sending is disabled

Default value is "disabled".

2.5 Start Procedure

2.5.1 TTCN-3 Test Executor

Before the executable test suite can be run the TTCN-3 modules and C++ codes should be compiled and linked into an executable program. This process can be automated using the make utility. The way how the Makefile should be generated is described in [2]. Note that the C++ implementation files `UDPasp_PT.hh` and `UDPasp_PT.cc` of the test port should be included in the Makefile.

If the executable test suite is ready, run it giving the RTE configuration file as argument in your terminal:

```
Home> ExecutabletestSuite RTEConfigurationFile.cfg
```

For more information, see [2].

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2.6 Sending UDP ASPs

2.6.1 Basic Mode

At send operation the *addressf* and *portf* should contain the remote host IP address and port number. The IP address can be given either as the remote hostname (ex: `localhost`) or in IPv4 format (ex: `127.0.0.1`).

The data field should contain the datagram to be sent.

2.6.2 Advanced mode

2.6.2.1 Open a new socket

The opening of a new socket is requested by the sending of the *ASP_UDP_open* message to the test port. The *local_addr* contains the local IP address or hostname. If it is omitted the default is any address. The *local_port* contains the local port number. If omitted a random port number will be used.

The *remote_addr* and *remote_port* contains the address and port number of the remote host. If specified this address will be the default remote address for the socket.

The test port answers the open request with the *ASP_UDP_open_result*.

2.6.2.2 Sending data

The data sending is requested with the *ASP_UDP_message* message.

The *remote_addr* and *remote_port* can contain the address and port number of the remote host. If specified this address will be used and overwrite the default remote address for the socket. If omitted the default remote address will be used. They are mandatory if no socket id specified.

The *id* specifies the socket used during data sending. If omitted the port will open a socket for the data sending. This socket will be closed after the send is completed.

The data field should contain the datagram to be sent.

2.6.2.3 Close the socket.

The close operation is requested by the *ASP_UDP_close* message.

The *id* identifies the socket to be closed.

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2.7 Receiving UDP ASPs

2.7.1 Basic mode

At receive operation the *addressf* and *portf* contain the remote host IP address and port number. The IP address is given in IPv4 format (ex: 127.0.0.1).

The data field contains the received datagram.

2.7.2 Advanced mode

2.7.2.1 Open result

The open request is answered with *ASP_UDP_open_result* message. It carries the details of the opened socket.

The *local_addr* contains the local IP address. The *local_port* contains the port number.

The *id* is the unique identifier of the socket.

2.7.2.2 Receiving data

The data receiving is indicated via *ASP_UDP_message* message.

At receive operation the *remote_addr* and *remote_port* contain the remote host IP address and port number. The IP address is given in IPv4 format (ex: 127.0.0.1).

The *id* contains the unique id of the socket that received the data.

The data field contains the received datagram.

2.8 Stop Procedure

2.8.1 TTCN-3 Test Executor

The test port should stop automatically after it finished the execution of all test cases. It closes down the open UDP sockets towards the SUT and terminates.

The execution of the test suite can be stopped at any time by pressing `<Cntr>-c`. It will shut down the socket and terminate.

3 Examples

3.1 Configuration file

An example RTE configuration file is shown below:

```
[LOGGING]
```

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LogFile := "UDPtest.log"

FileMask := LOG_ALL | TTCN_DEBUG | TTCN_MATCHING

ConsoleMask := TTCN_ERROR | TTCN_WARNING | TTCN_TESTCASE |
TTCN_STATISTICS | TTCN_PORTEVENT

LogSourceInfo := Yes

[EXECUTE]

UDPtest.tc1

[TESTPORT_PARAMETERS]

*.UDP1.debugging := "yes"

*.UDP1.localPAddr := "localhost"

*.UDP1.localPort := "5679"

*.UDP2.debugging := "yes"

*.UDP2.localPAddr := "localhost"

*.UDP2.localPort := "5678"

3.2 Error messages

The error messages have the following general form:

```
Dynamic test case error: <error text>
```

Error messages are written into the log file. In the log file a time stamp is also given before the message text.

The list of the possible error messages is shown below. Note that this list contains the error messages produced by the test port. The error messages coming from the TITAN are not shown:

<Parameter Name> is not defined in the configuration file
Mandatory parameter is missing from the configuration file.

Error when reading the received UDP PDU.
An error occurred when a UDP PDU was received.

Cannot open socket

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The socket system call fails.

Cannot bind port

The bind system call fails.

Sendto system call failed: <n> bytes was sent instead of <m>

The sendTo system call fails.

The host name <name> is not valid.

The specified host name is not a valid host name.

No remote host name specified.

The remote host name is not specified and there is no default remote host to send the data.

No remote port specified.

The remote port is not specified and there is no default port to send the data.

3.3 Warning messages

The following list shows the possible warning messages produced by the test port:

UDPasp__PT::set_parameter() : Unsupported Test Port parameter <parameter>.

The parameter set in the configuration file is unknown for the UDP test port.