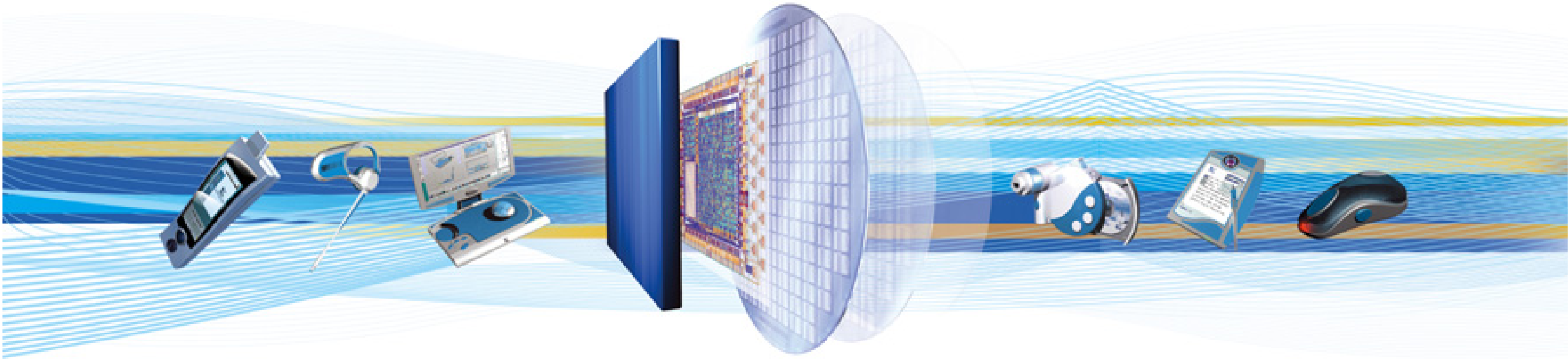
CSR Synergy ®

CSR Synergy Framework 3.1.0

TFTP API

August 2011



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1 Introduction

This document describes how to use the CSR Trivial File Transfer Protocol (TFTP) API.

CSR TFTP described in this document is implemented as defined in RFC-1350 [RFC1350], but only the server side.

The following should be noted about TFTP:

- TFTP only accepts one connection at a time
- TFTP only accepts read and write requests in octet mode

TFTP handles retransmission of the data packets. A data packet is retransmitted at most 3 times, if no response is received after 3 retransmissions a CSR_TFTP_DISCONNECT_IND is sent to the application. There is 3 seconds between each retransmission. As long as TFTP is retransmitting data packets it consider the client as connected. When TFTP has received the last packet in a write request it waits 3 seconds after it has sent the acknowledgement for the last packet before it is ready to accept a new connection. The reason is to be able to retransmit the last acknowledgement again if it has been lost.

Data sent or received in TFTP are in fixed length of 512 bytes. A data packet of less than 512 bytes signals the termination of the transfer.

A CSR_TFTP_DISCONNECT_IND is only sent to the application if an error has occurred, not when the last packet has been sent or received. When a CSR_TFTP_DISCONNECT_IND has been sent to the application the connection shall be considered as closed.

1.1 Reference Model

Figure 1 illustrates the CSR TFTP API and its location relative to applications and CSR IP Socket API.

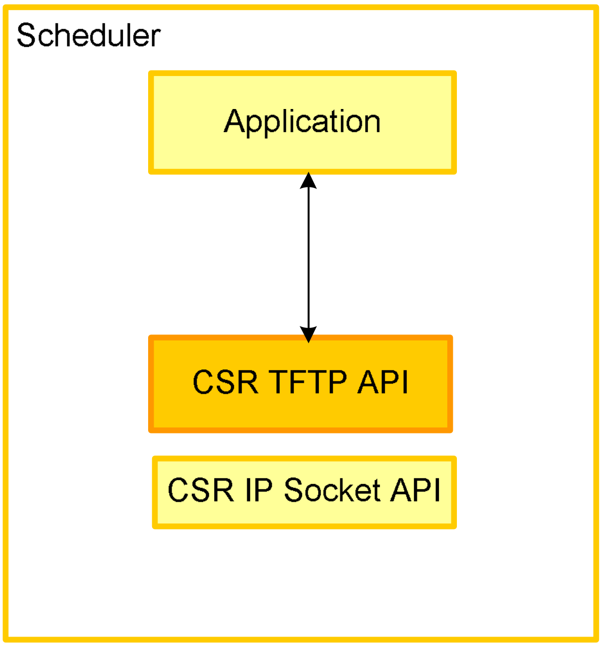

Figure 1: The CSR TFTP API shown relative to the application

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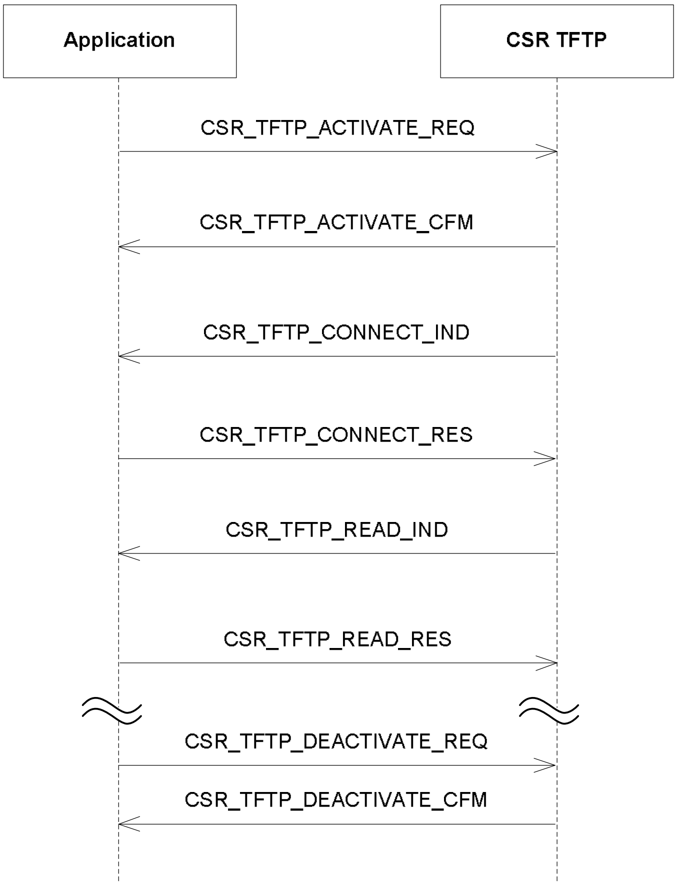
1.1 Sequence Overview

Figure 1 illustrates an application activating the TFTP and a client requesting a read. If the client requested a write, a CSR_TFTP_WRITE_IND is sent to the application instead of a CSR_TFTP_READ_IND and responded with a CSR_TFTP_WRITE_RES instead of a CSR_TFTP_READ_RES.



Figur 1: MSC illustrating the use of TFTP

2 Interface Description

2.1 Activate

This message is used for activating the TFTP.

To send the CSR_TFTP_ACTIVATE_REQ primitive, the CsrTftpActivateReqSend() function is used. The function uses the arguments described in Table 1.

Type	Argument	Description
CsrSchedQid	qid	Queue identifier of application.
CsrTftpFamily	family	The type of IP address – only CSR_TFTP_FAMILY_IP4 is supported
CsrUint8	ipAddress	The IP address of the interface to listen on. If ipAddress is 0.0.0.0 then TFTP will listen on all interfaces.

Table 1: Arguments to CsrTftpActivateReqSend function

When TFTP has processed the activate request, a CSR_TFTP_ACTIVATE_CFM primitive will be sent back to the application. The primitive members are described in Table 2.

Type	Member	Description
CsrTftpPrim	type	Signal identity – always set to CSR_TFTP_ACTIVATE_CFM
CsrResult	result	CSR_RESULT_SUCCESS – TFTP has been activated and is ready for incoming connections. CSR_RESULT_FAILURE – TFTP could not be activated.

Table 2: Members in a CSR_TFTP_ACTIVATE_CFM primitive

2.2 Deactivate

This message is used for deactivating the TFTP. All connections will be closed but no CSR_TFTP_DISCONNECT_IND will be sent to the application.

To send the CSR_TFTP_DEACTIVATE_REQ primitive, the CsrTftpDeactivateReqSend() function is used. The function uses the arguments described in Table 3.

Type	Argument	Description
CsrSchedQid	qid	Queue identifier of application.

Table 3: Arguments to CsrTftpDeactivateReqSend function

When TFTP has processed the deactivate request, a CSR_TFTP_DEACTIVATE_CFM primitive will be sent back to the application. The primitive members are described in Table 4.

Type	Member	Description
CsrTftpPrim	Type	Signal identity – always set to CSR_TFTP_DEACTIVATE_CFM

Table 4: Members in a CSR_TFTP_DEACTIVATE_CFM primitive

2.3 Connect

When a client sends a read request or a write request a CSR_TFTP_CONNECT_IND primitive is sent to the application. The primitive members are described in Table 5.

Type	Member	Description
CsrTftpPrim	Type	Signal identity – always set to CSR_TFTP_CONNECT_IND
CsrTftpFamily	Family	The type of IP address – always set to CSR_TFTP_FAMILY_IP4
CsrUint8	ipAddress	The IP address of the remote device.
CsrUint16	Port	The port of the remote device

Type	Member	Description
`CsrTftpOpcode`	`Opcode`	`CSR_TFTP_OPCODE_READ` – read request from the client `CSR_TFTP_OPCODE_WRITE` – write request from the client
`CsrCharString`	`filename`	The file name

Table 5: Members in a `CSR_TFTP_CONNECT_IND` primitive

`CSR_TFTP_CONNECT_IND` shall be responded with the function `CsrTftpConnectResSend()`. The function uses the arguments described in Table 6.

Type	Argument	Description
`CsrResult`	`result`	`CSR_RESULT_SUCCESS` – the request has been accepted. `CSR_RESULT_FAILURE` – the request has been rejected.

Table 6: Arguments to `CsrTftpConnectResSend` function

2.4 Read

When the data shall be sent a `CSR_TFTP_READ_IND` primitive is sent to the application. The primitive members are described in Table 7.

Type	Member	Description
`CsrTftpPrim`	`Type`	Signal identity – always set to `CSR_TFTP_READ_IND`

Table 7: Members in a `CSR_TFTP_READ_IND` primitive

`CSR_TFTP_READ_IND` shall be responded with the function `CsrTftpReadResSend()`. The function uses the arguments described in Table 8.

Type	Argument	Description
`CsrUint16`	`dataLength`	The length of the data.
`CsrUint8`	`*data`	A pointer to the data.
`CsrResult`	`result`	`CSR_RESULT_SUCCESS` – the request has been accepted. `CSR_RESULT_FAILURE` – the request has been rejected.

Table 8: Arguments to `CsrTftpReadResSend` function

2.5 Write

When the data is received a `CSR_TFTP_WRITE_IND` primitive is sent to the application. The primitive members are described in Table 9.

Type	Member	Description
`CsrTftpPrim`	`Type`	Signal identity – always set to `CSR_TFTP_WRITE_IND`
`CsrUint16`	`dataLength`	The length of the data.
`CsrUint8`	`*data`	A pointer to the data.

Table 9: Members in a `CSR_TFTP_WRITE_IND` primitive

`CSR_TFTP_WRITE_IND` shall be responded with the function `CsrTftpWriteResSend()`. The function uses the arguments described in Table 10.

Type	Argument	Description
`CsrResult`	`result`	`CSR_RESULT_SUCCESS` – the request has been accepted. `CSR_RESULT_FAILURE` – the request has been rejected.

Table 10: Arguments to `CsrTftpWriteResSend` function

2.6 Disconnect

If an error has occurred, e.g., the client sends an error or the client does not respond after the retransmissions then a `CSR_TFTP_DISCONNECT_IND` primitive is sent to the application. The primitive members are described in Table 11.

Type	Member	Description
`CsrTftpPrim`	`Type`	Signal identity – always set to `CSR_TFTP_WRITE_IND`

Table 11: Members in a `CSR_TFTP_DISCONNECT_IND` primitive

3 Document References

Document	**Reference**
RFC-1350 - THE TFTP PROTOCOL (REVISION 2)	RFC1350

Document History

Revision	Date	History
1	Aug 2011	Ready for release 3.1.0

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