Requirement Specification for an Application Demonstrating the Advantages of SCTP

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1 Introduction

1.1 Purpose of this document

This document lists the software requirements for an application demonstrating the additional capabilities of Stream Control Transmission Protocol(SCTP) over Transmission Control Protocol(TCP).

1.2 Scope of this document

1.3 Overview

We are developing a client-server application for transferring files and databases between two machines.It will utilize the multistreaming, message boundary preserving and unordered message delivery capabilities of SCTP to allow simultaneous transfer of multiple files/tables.

2 Stream Control Transmission Protocol

The Stream Control Transmission Protocol (SCTP) is a new IP transport protocol, existing at an equivalent level with UDP (User Datagram Protocol) and TCP (Transmission Control Protocol), which provide transport layer functions to many Internet applications. Like TCP, SCTP provides a reliable transport service,ensuring that data is transported across the network without error and in sequence. Like TCP, SCTP is a session-oriented mechanism, meaning that a relationship is created between the endpoints of an SCTP association prior to data being transmitted, and this relationship is maintained until all data transmission has been successfully completed.

2.1 Additional Capabilities

SCTP has some additional capabilities that TCP lacks.This can make SCTP a better choice for some applications and environments:

multi-streams support: SCTP supports the delivery of multiple independent user message streams within a single SCTP association. This capability, when properly used, can alleviate the so-called head-of-line-blocking problem caused by the strict sequence delivery constraint imposed to the user data by TCP.

multi-homing support: SCTP provides transparent support for communications between two endpoints of which one or both is multi-homed.SCTP provides monitoring of the reachability of the addresses on the remote endpoint and in the case of failure can transparently failover from the primary address to an alternate address, without upper layer intervention.

preservation of message boundaries: SCTP preserves application messages boundaries. This is useful when the application data is not a continuous byte stream but comes in logical chunks that the receiver handles separately. In contrast, TCP offers a reliable data stream that has no indication of what an application may consider logical chunks of the data.

unordered reliable message delivery: SCTP supports the transportation of user messages that have no application-specified order, yet need guaranteed reliable delivery.

3 Product Description

3.1 Functional Requirements

There will be two modes of operation: file transfer mode and database transfer mode. On connecting to server the user will have to specify the required mode of operation and will accordingly be authenticated. The user can change the mode any number of times without disconnecting, but at a time, only one mode will be active.

1. File Transfer Mode This mode will work like a normal FTP application with the additional capability that the user can transfer multiple files or an entire directory simultaneously.

2. Database Transfer Mode In this mode the user can transfer an entire database or a part of database. The database includes the table schemas as well as the records in the tables.

3.2 Technical Details

There will be two connections between the client and the server, data and control connections. Control connection will have single stream, while data connection can have multiple streams. A data connection will be established whenever a data transfer command is given and will be closed after the

transfer is over. Number of streams in the data connection will depend on the command given. For example, if a command is given for transfering a directory containing 5 files, there will be 5 streams in the data connection. This way, even if there is a packet loss for one of the files, transfer of other files can continue uninterrupted.
For file transfer, stream will be ordered. For database transfer, both ordered and unordered streams will be used. All the table schemas will be sent on a single ordered stream. Each schema will be a separate message. Because of the message boundary preserving capability of SCTP we do not have to use a delimiter. The records inside the table will be sent using unordered stream. There will be separate stream for each table. An unordered stream is possible in this case since the order in which the records arrive is not important.
The advantages of SCTP are seen only when some packet is lost during transmission. In lossless situation performance will be same as TCP. To show gain in performance, we will also simulate packet lost environment. We will use a dummy client in between the actual client and server to simulate this environment.

4 Conclusion

The product will be an improvement over the traditional file transfer applications and will have an additional ability for database transfer. In doing so, we hope that it will demonstrate the multistreaming, message boundary preserving and unordered message delivery capabilities of SCTP over TCP.

References

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[2] Q. Xie R. Stewart. *Stream Control Transmission Protocol (RFC 2960).*, October 2000.