

# TED: Tool for Testing and Debugging uDAPL

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## ABSTRACT

User Direct Access Programming Library (uDAPL) defines a single set of user APIs for Remote Direct Memory Access (RDMA) capable transports. Developers of uDAPL have to write test programs for verification of APIs and for integrated testing of software stack along with underlying hardware. The tools available for testing uDAPL suffer from the following limitations: they do not provide control at API level, offer very little control of input parameters of APIs and provide limited flexibility vis-à-vis test cases that can be executed. This paper describes a new tool ‘Test Environment for DAPL’ (TED) that enables integrated testing and debugging of software stack and underlying hardware while providing more flexibility and control to user. It can be used over any implementation of uDAPL and is available as open source. In addition, this paper proposes a novel approach for flow control of RDMA operations. Since in RDMA operations responder side does not receive any completion, mechanisms generally rely on last byte of data buffer for notification of arrival of data. This scheme can fail if underlying transport does not ensure that data arrives in order. The proposed design ensures validity even over networks that do not guarantee in order arrival of data.