INCITS Technical Report for Information Technology – Fibre Channel – Avionics Environment – SCSI-3 Remote Direct Memory Access (FC-AE-RDMA)

INCITS TR-40-2005

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INCITS Technical Report for Information Technology – Fibre Channel – Avionics Envrionment – SCSI-3 Remote Direct Memory Access (FC-AE-RDMA)

Secretariat

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Abstract

This technical report defines a set of features necessary to implement a real-time Fibre Channel network (switched fabric or arbitrated loop) supporting the FC-AE-RDMA Upper Level Protocol. Any device complying with this report should interoperate with other devices that comply with the FC-AE-RDMA protocol. The FC-AE-RDMA ULP was first defined in the FC-AE Technical Report, INCITS TR-31-2002. This is the first update to FC-AE-RDMA as a standalone document.

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Foreword (This foreword is not part of American National Standard INCITS TR-40-2005.)

The original Fibre Channel Avionics Environment (FC-AE) Technical Report, INCITS TR-31-2002, is a set of protocols and profiles that specify Fibre Channel options for devices that could be used in commercial and military aerospace applications. The FC-AE-2 task group determined that it was best to allow protocols and profiles defined in FC-AE to be updated independently. The Fibre Channel - Avionics Environment - SCSI-3 Remote Direct Memory Access (FC-AE-RDMA) Technical Report is the first update to the FC-AE-RDMA protocol since FC-AE was released. This technical report is recommended for new designs, but does not obsolete clause 4.6 of INCITS TR-31-2002.

This technical report was developed by Technical Committee T11 of Accredited Standards Committee INCITS during 2004-2005. The final approval process started in 2005.

This technical report contains one annex, which is informative and is not part of the technical report.

Requests for interpretation, suggestions for improvements or addenda, or defect reports are welcome. They should be sent to the INCITS Secretariat, Information Technology Industry Council, 1250 Eye Street, NW, Suite 200, Washington, DC 20005-3922.

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Introduction

The Fibre Channel - Avionics Environment - SCSI-3 Remote Direct Memory Access (FC-AE-RDMA) Technical Report defines a set of features necessary to implement a real-time Fibre Channel network (switched fabric or arbitrated loop) supporting the FC-AE-RDMA Upper Level Protocol.

FC-AE-RDMA is intended to support bidirectional communication between two N_Ports in a constrained and carefully defined environment, typical of avionics applications. The intended usage is avionic command, control, instrumentation, simulation, signal processing, and sensor/video data distribution. These application areas are characterized by a variety of requirements, among them a need for high reliability, fault tolerance, and deterministic behavior to support real-time control/response.

FC-AE-RDMA follows the FCP standard in its definition of the services necessary to support low-latency, low overhead communication between elements of a mission-critical avionics system. The key feature of FC-AE-RDMA is that it allows an Initiator to read data from, or write data to, a remote Target memory in peer-to-peer mode (similar to SCSI-3 processor device type) with lower latency.

This technical report is divided into four clauses:

Clause 1 is the scope of this technical report.

Clause 2 enumerates the normative references that apply to this technical report.

Clause 3 describes the definitions, abbreviations, and conventions used in this technical report.

Clause 4 defines the FC-AE-RDMA Upper Level Protocol. This clause lists features defined in the FCP standard and indicates whether the features are Required, Prohibited, Allowed, or Invocable in FC-AE-RDMA. FC-AE-RDMA places certain restrictions on FCP in order to improve support for low latency, real-time applications. This clause also defines some new features for FC-AE-RDMA that are not defined in FCP.

This technical report has one annex:

Annex A is an informative annex that contains a profile of the FC-FS and FC-AL-2 standards for an example avionics Fibre Channel network that uses FC-AE-RDMA.

INCITS Technical Report
for Information Technology –

Fibre Channel –
Avionics Environment –
SCSI-3 Remote Direct Memory Access
(FC-AE-RDMA)

1. Scope

The FC-AE-RDMA technical report defines the FC-AE-RDMA Upper Level Protocol. FC-AE-RDMA follows the FCP standard in its definition of the services necessary to support low-latency, low overhead communication between elements of a mission-critical avionics system.

This technical report is intended to serve as an implementation guide to maximize the likelihood of interoperability between conforming implementations. This technical report Prohibits or Requires features that are optional, and Prohibits the use of some non-optional features in the referenced ANSI INCITS standards (see clause 2).

In addition, this technical report simplifies implementations and their associated documentation, testing, and support requirements.

This technical report does not define internal characteristics of conformant implementations. This technical report incorporates features from the normative references in clause 2.