1 Scope

The following paragraphs will identify the CSCI, provide an overview of the system, and then describe the purpose and contents of this document.

1.1 Identification

This Interface Requirements Specification (IRS) specifies the requirements for the interfaces between the CSCI identified as DIS Gateway (DG), CSCI 1 of the Ada Distributed Interactive Simulation Support (ADIS) project and other CSCIs.

1.2 System Overview

The Naval Air Warfare Center Aircraft Division (NAWCAD) Flight Test and Engineering Group (FTEG) develops and maintains a state-of-the-art, high-fidelity flight test simulation facility, the Manned Flight Simulator (MFS). This facility supports a number of Department of the Navy (DON) programs and is a key element of the Air Combat Environment Test and Evaluation Facility (ACETEF). The MFS has worked extensively with integration of a new standard in inter-simulation communications, the Distributed Interactive Simulation (DIS) standard, which allows the MFS to communicate with other simulation facilities.

DIS is a time and space coherent synthetic representation of world environments designed for linking the interactive, free play activities of people in operational exercises. The synthetic environment is created through real-time exchange of data units between distributed, computationally autonomous simulation applications in the form of simulations, simulators, and instrumented equipment interconnected through standard computer communicative services. The computational simulation entities may be present in one location or may be distributed geographically.

The basic architecture concepts of DIS are an extension of the Simulator Networking (SIMNET) program developed by Defense Advanced Research Project Agency (DARPA). The basic architecture concepts for DIS are the following:

1. No central computer controls the entire simulation exercise.
2. Autonomous simulation applications are responsible for maintaining the state of one or more simulation entities.
3. A standard protocol is used for communicating "ground truth" data.
4. Changes in the state of an entity are communicated by simulation applications.
5. Perception of events or other entities is determined by the receiving application.
6. Dead reckoning algorithms are used to reduce communications processing.

The tasks associated with interfacing with the DIS architecture (DIS and network protocol support, tracking of entity state information, communication of simulation events, and updating of dead-reckoned entity positions) are common to all systems. These tasks can be thought of as an interface layer, or "gateway," between a given system and other systems participating in a DIS exercise.

The MFS has been tasked by the Ada Joint Program Office (AJPO) to develop and demonstrate Ada bindings and tools to interface with a DIS gateway. These bindings and tools will become part of the AJPO's publicly available Ada repository upon project completion. This project is referenced as the Ada Distributed Interactive Simulation (ADIS) project and will provide the Ada community with access to DIS technology.

J. F. Taylor, Inc. has been tasked to provide support for the development of Ada software systems to implement basic network communications using the DIS protocol. The DIS Gateway (DG) CSCI's role within the ADIS project would be to provide a generic, portable interface between the DIS network and an application program. Potential application programs which would benefit from the DG would be simulator systems (AH-1W, V-22, Minicrewstation, etc.), simulation monitors (God's Eye View), and DIS-related support programs (ADIS Ordnance Server). The DG CSCI will incorporate a Graphical User Interface (GUI) to establish initial conditions, modify run-time parameters, and monitor network activities.

Table 1.2-1 lists the names and identifiers for the external interfaces of the DG CSCI and briefly describes the role of each interface in the ADIS project.

Table 1.2-1
External Interface Overviewtc "1.2-1 External Interface Overview"\l\f t§

Name	Identifier	Role
DIS Gateway Interface	DG-EI-1	The DIS Gateway Interface is the

		interface between the DG CSCI and the application software. This interface provides simulation information to the application software and permits the application software to send data and commands to the DG CSCI.
DIS Network Interface	DG-EI-2	The DIS Interface is the interface between the DG CSCI and other simulation sites participating in a DIS exercise.
DIS Library Interface	DL-EI-1	The DIS Library Interface is the interface between the DG CSCI and the DL CSCI and permits the DG CSCI to make use of the various filters incorporated in the DL CSCI.

1.3 Document Overview

The purpose of this document is to specify the requirements for the interfaces of the DG CSCI. This IRS identifies interface requirements, including synchronization and protocol. This IRS also identifies data requirements, such as source, destination, units, limits/ranges.

2 Applicable Documents

The following paragraphs describe those documents which form a part of this specification.

2.1 Government Documents

The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

Document Number	Title
DOD-STD-2167A	Defense System Software Development
DI-MCCR-80026A	Interface Requirements Specification
	Statement of Work - Ada Distributed Interactive Simulation Support

Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the contracting agency or as directed by the contracting officer.

2.2 Non-Government Documentstc "2.2 Non-Government Documents"\l§

The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

Document Number	Title	Source
DMA TR 8350.2	Department of Defense World Geodetic System 1984 (WGS 84) Its Definition and Relationships with Local Geodetic Systems Defense Mapping Agency Technical Report 8350.2	National Technical Information Service
IST-CR-93-13	Proposed IEEE Final Draft Communication Architecture for Distributed Interactive Simulations (CADIS)	Institute for Simulation and Training
IEEE 1278.1	IEEE Standard P1278.1 Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications Version 2.0, Third Draft	Institute for Simulation and Training
IST-CR-93-19	Enumeration and Bit Encoded Values for Use with Protocols for Distributed Interactive Simulation Applications	Institute for Simulation and Training

JFT-149-DL.IRS	Interface Requirements Specification for the DIS Library (DL) CSCI 2 of the Ada Distributed Interactive Simulation Support (ADIS) Project	J. F. Taylor, Inc.
JFT-149-DG.SRM	Software Reference Manual for the DIS Gateway (DG) CSCI 1 of the Ada Distributed Interactive Simulation Support (ADIS) Project	J. F .Taylor, Inc.

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal Agencies.

Documents originating from the National Technical Information Service (NTIS) are available from the following address:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Documents originating from the Institute for Simulation and Training (IST) are available from the following address:

Institute for Simulation and Training
12424 Research Parkway, Suite 300
Orlando, FL 32826

Documents originating from J. F. Taylor, Inc. are available from the following address:

J. F. Taylor, Inc.
PO Box 760
Lexington Park, MD 20653

3 Interface Specification

The following paragraphs and subparagraphs specify the requirements for those DG CSCI interfaces to which this IRS applies.

3.1 Interface Diagrams

The following subparagraphs identify the external interfaces of the DG CSCI. Figure 3.1-1 depicts the relationships of these interfaces to the DG CSCI and other CSCIs/systems.

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Figure 3.1-1
External Interface Diagram

3.2 DIS Gateway Interface (DG-EI-1)

The DIS Gateway Interface (DG-EI-1) is the interface between the DG CSCI and the application software. This interface provides simulation information to the application software and permits the application software to send data and commands to the DG CSCI.

3.2.1 DG Interface Requirements

There are no interface requirements associated with the DG Interface.

3.2.2 DG Data Requirements

The data requirements for the DG interface are documented in the *DG Software Reference Manual* in Chapter 3.

3.3 DIS Interface (DG-EI-2)tc "3.3 DIS Interface (DG-EI-2)"\l§

The DIS Interface (DG-EI-2) is the interface between the DG CSCI and other simulation sites participating in a DIS exercise.

3.3.1 DIS Interface Requirementstc "3.3.1 DIS Interface Requirements"\l§

The communication protocol for the DIS Interface is UDP/IP, as specified in *Proposed IEEE Final Draft, Communication Architecture for Distributed Interactive Simulations (CADIS)* (IST-CR-93-13).

3.3.2 DIS Interface Data Requirementstc "3.3.2 DIS Interface Data Requirements"\l§

The data requirements of the DIS Interface are discussed in *IEEE Standard P1278.1, Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0, Third Draft* (IEEE 1278.1), and *Enumeration and Bit Encoded Values for Use with Protocols for Distributed Interactive Simulation Applications* (IST-CR-93-19).

3.4 DIS Library Interface (DL-EI-1)tc "3.4 DIS Filter Library Interface (DFL-EI-1)"\l§

The DIS Library Interface (DL-EI-1) is the interface between the DG CSCI and the DL CSCI and permits the DG CSCI to make use of the various routines incorporated in the DL CSCI. This interface is described in *Interface Requirements Specification for the DIS Library (DL), CSCI 2 of the Ada Distributed Interactive Simulation Support (ADIS) Project*.

4 Quality Assurancetc "4 Quality Assurance"\l§

Not applicable.

5 Preparation for Deliverytc "5 Preparation for Delivery"\l§

Not applicable.

6 Notestc "6 Notes"\l§

The following subparagraphs contain general information to aid in understanding this specification, including usage of specific keywords, a list of acronyms/abbreviations and their meanings, and conventions for project-unique identifiers.

6.1 Keyword Usagetc "6.1 Keyword Usage"\l§

This Interface Requirements Specification adheres to the following word usage:

Shall has been used only where a particular feature, capability, or method of operation is mandatory.

Should has been used only where a particular feature, capability, or method of operation is recommended.

May and *need not* have been used only where a particular feature, capability, or method of operation is optimal or to suggest a possible design approach to a requirement.

Will has been used to indicate futurity, never to indicate any degree of requirement.

6.2 Acronyms and Abbreviations

Table 6.2-1 contains a list of all acronyms and abbreviations used in this SRS, and their meanings as used in this document.

Table 6.2-1
Meanings of Acronyms and Abbreviations

Acronym/ Abbreviation	Meaning
ACETEF	Air Combat Environment Test and Evaluation Facility
ADIS	Ada Distributed Interactive Simulation Support
AJPO	Ada Joint Program Office
CDRL	Contract Data Requirements List
CSCI	Computer Software Configuration Item
DARPA	Defense Advanced Research Project Agency

DL	DIS Library
DG	DIS Gateway
DIS	Distributed Interactive Simulation
DOD	Department of Defense
DON	Department of the Navy
DRM	Dead-Reckoning Model
FTEG	Flight Test and Engineering Group
GUI	Graphical User Interface
I/F	Interface
I/O	Input/Output
IP	Internet Protocol
IEEE	Institute of Electrical and Electronics Engineers
IRS	Interface Requirements Specification
IST	Institute for Simulation and Training
MFS	Manned Flight Simulator

NAWCAD	Naval Air Warfare Center Aircraft Division
NTIS	National Technical Information Service
OS	Ordnance Server
PDU	Protocol Data Unit
SIMNET	Simulator Networking
SOW	Statement of Work
SRS	System Requirements Specification
UDP	User Defined Protocol

6.3 Project-Unique Identifier Conventions

tc "6.3 Project-Unique Identifier Conventions"\l§

This Interface Requirements Specification adheres to the following project-unique identifier conventions:

Capability	*csci*-C-*nn*
Data Element	*csci*-D-*nn*
Internal Interface	*csci*-II-*nn*
External Interface	*csci*-EI-*nn*

Where:

csci is the CSCI abbreviation (DG for the DIS Gateway), and
nn is a unique number

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INTERFACE REQUIREMENTS SPECIFICATION

FOR THE

DIS GATEWAY (DG) CSCI 1

OF THE

ADA DISTRIBUTED INTERACTIVE SIMULATION (ADIS) PROJECT

CONTRACT NO. N00421-92-D-0028

CDRL SEQUENCE NO. A007

Prepared for:

Naval Air Warfare Center Aircraft Division
Flight Test and Engineering Group

Prepared by:

J. F. Taylor, Inc.
Rt. 235 and Maple Rd.
Lexington Park, MD 20653

Authenticated by:	Approved by:
(Contracting Agency)	(Contractor)
(Date)	(Date)

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