1 Scopetc "1 Scope"\l§

The following paragraphs will identify the Computer Software Configuration Item (CSCI), provide an overview of the system, and then describe the purpose and contents of this document.

1.1 Identificationtc "1.1   Identification"\l§

This Software Requirements Specification (SRS) specifies the engineering and qualification requirements for the CSCI identified as DIS Gateway (DG), CSCI 1 of the Ada Distributed Interactive Simulation Support (ADIS) project.

1.2 CSCI Overviewtc "1.2   CSCI Overview"\l§

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. The DG CSCI will incorporate a Graphical User Interface (GUI) to establish initial conditions, modify run-time parameters, and monitor network activities. Potential MFS 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). Upon AJPO making the DG CSCI available through its Ada repository, the DG CSCI could be used by other organizations to speed the design and implementation of their own DIS applications.

1.3 Document Overviewtc "1.3   Document Overview"\l§

The purpose of this document is to describe the engineering and qualification requirements of the DG CSCI. This SRS identifies engineering requirements, including external interfaces of this CSCI, capabilities of this CSCI, internal interfaces between these capabilities, adaptation requirements, installation-dependent data, operational parameters, sizing and timing requirements, safety requirements, security requirements, design constraints, software quality factors, human performance/human engineering requirements, and requirements traceability. This SRS also identifies qualification requirements, including qualification methods and special qualification requirements. Finally, this SRS specifies the delivery requirements for the CSCI.

2 Applicable Documentstc "2   Applicable Documents"\l§

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

2.1 Government Documentstc "2.1 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

DOD-STD-2167A   Defense System Software Development

DI-MCCR-80025A   Software 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-DG.IRS	Interface Requirements Specification for the DIS Gateway (DG) CSCI 1 of the Ada Distributed Interactive Simulation Support (ADIS) Project	J. F. Taylor, Inc.
JFT-149-DFL.IRS	Interface Requirements Specification for the DIS Filter Library (DL) CSCI 2 of the Ada Distributed Interactive Simulation Support (ADIS) Project	J. F. Taylor, Inc.
	Ada Distributed Interactive Simulation Support Project Kickoff Meeting/Requirements Discussion November 17, 1993	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 Engineering Requirementstc "3   Engineering Requirements"\l§

The following paragraphs and subparagraphs specify the engineering requirements necessary to ensure proper development of the DG CSCI. Requirements to be included herein shall be allocated or derived from requirements established by the applicable SSS, PIDS, or CIDS.

3.1 CSCI External Interface Requirementstc "3.1   CSCI External Interface Requirements"\l§

This 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 Diagramtc "3.1-1   External Interface Diagram"\l\f f§

3.1.1 DIS Gateway Interface (DG-EI-1)tc "3.1.1   DIS Gateway Interface (DG-EI-1)"\l§

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. This interface is described in *Interface Requirements Specification for the DIS Gateway (DG), CSCI 1 of the Ada Distributed Interactive Simulation Support (ADIS) Project*.

3.1.2 DIS Interface (DG-EI-2)tc "3.1.2   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. This interface is described in *Interface Requirements Specification for the DIS Gateway (DG), CSCI 1 of the Ada Distributed Interactive Simulation Support (ADIS) Project*.

3.1.3 DIS Filter Library Interface (DFL-EI-1)tc "3.1.3   DIS Filter Library Interface (DFL-EI-1)"\l§

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

3.2 CSCI Capability Requirementstc "3.2 CSCI Capability Requirements"\l§

The following subparagraphs identify the capability requirements that the DG CSCI must satisfy. Each subparagraph specifies the name of the capability requirement followed by a project-unique identifier in parentheses, a description of the capability requirement, and the input/output (I/O) data associated with the capability requirement.

3.2.1 DIS PDU Support Capability (DG-C-1)tc "3.2.1   DIS PDU Support Capability"\l§

The DG CSCI shall support the reception and transmission of all PDUs defined in *IEEE Standard P1278.1, Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0, Third Draft* (IEEE 1278.1). Table 3.2.1-1 describes the I/O data associated with this capability.

Table 3.2.1-1
I/O Data for DIS PDU Support Capabilitytc "3.2.1-1   I/O Data for DIS PDU Support Capability"\l\f t§

Name	Data Flow	Description	Reference
Transmit PDU List	Input	Contains all PDUs (both DIS and/or experimental) which are ready for transmission across the network.	Paragraph 3.3.4
Received Network Data	Input	Contains DIS PDUs and/or experimental PDUs which have been received from the network.	Paragraph 3.3.2
Transmit Network Data	Output	Contains DIS PDUs and/or experimental PDUs which are ready for transmission across the network.	Paragraph 3.3.1
Unfiltered PDU List	Output	Contains all PDUs (both DIS and/or experimental) which have been received from the network.	Paragraph 3.3.3

3.2.2 Experimental PDU Support Capability (DG-C-2)tc "3.2.2 Experimental PDU Support Capability"\l§

The DG CSCI shall support reception and transmission of PDUs which are not defined in *IEEE Standard P1278.1, Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0, Third Draft* (IEEE P1278.1). This capability permits the DG to be used with application software which supports new and/or experimental PDUs (i.e., PDUs other than those defined in IEEE P1278.1). Table 3.2.2-1 describes the I/O data associated with this capability.

Table 3.2.2-1
I/O Data for Experimental PDU Support Capabilitytc "3.2.2-1 I/O Data for
Experimental PDU Support Capability"\l\f t§

Name	Data Flow	Description	Reference
Transmit PDU List	Input	Contains all PDUs (both DIS and/or experimental) which are ready for transmission across the network.	Paragraph 3.3.4
Received Network Data	Input	Contains DIS PDUs and/or experimental PDUs which have been received from the network.	Paragraph 3.3.2
Transmit Network Data	Output	Contains DIS PDUs and/or experimental PDUs which are ready for transmission across the network.	Paragraph 3.3.1
Unfiltered PDU List	Output	Contains all PDUs (both DIS and/or experimental) which have been received from the network.	Paragraph 3.3.3

3.2.3 Interface Control Capability (DG-C-3)tc "3.2.3   Interface Control
Capability"\l§

    The DG CSCI shall permit reception and transmission of network traffic to be
independently enabled or disabled. This capability permits the DG CSCI to be used with
reception-only and broadcast-only application software. Table 3.2.3-1 describes the I/O
data associated with this capability.

Table 3.2.3-1
I/O Data for Interface Control Capabilitytc "3.2.3-1   I/O Data for Interface Control Capability"\l\f t§

Name	Data Flow	Description	Reference
Transmit Network Data	Input	Contains DIS PDUs and/or experimental PDUs which are ready for transmission across the network.	Paragraph 3.3.1
DIS Interface	Input/Output	Interface between the DG CSCI and other simulation sites participating in a DIS exercise.	JFT-149-DG.SRS
Received Network Data	Output	Contains DIS PDUs and/or experimental PDUs which have been received from the network.	Paragraph 3.3.2

3.2.4 DIS Dead-Reckoning Support Capability (DG-C-4)tc "3.2.4   DIS Dead-Reckoning Support Capability"\l§

The DG CSCI shall support a subset of the dead-reckoning models (DRMs) defined in *Enumeration and Bit Encoded Values for Use with Protocols for Distributed Interactive Simulation Applications* (IST-CR-93-19) Section 7, consisting of the following algorithms: Static, DRM(F,P,W), DRM(R,P,W), DRM(R,V,W), and DRM(F,V,W). All other algorithms shall be handled using the Static DRM. Table 3.2.4-1 describes the I/O data associated with this capability.

Table 3.2.4-1
I/O Data for DIS Dead-Reckoning Support Capabilitytc "3.2.4-1   I/O Data for DIS Dead-Reckoning Support Capability"\l\f t§

Name	Data Flow	Description	Reference
DG Interface (Transmit Entity List)	Input	Contains information entities maintained by the application software.	JFT-149-DG.IRS
DG Interface (Received Entity List)	Input/Output	Contains information for entities received from the network.	JFT-149-DG.IRS
Local Entity List	Output	Contains the dead-reckoned positions of all local entities.	Paragraph 3.3.10

3.2.5 DIS Threshold Support Capability (DG-C-5)tc "3.2.5   DIS Threshold Support Capability"\l§

The DG CSCI shall support the update thresholds for distance, orientation, and elapsed time specified in *IEEE Standard P1278.1, Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0, Third Draft* (IEEE P1278.1) in Section 4.4.2.1.3. Table 3.2.5-1 describes the I/O data associated with this capability.

Table 3.2.5-1
I/O Data for DIS Threshold Support Capabilitytc "3.2.5-1   I/O Data for DIS Threshold Support Capability"\l\f t§

Name	Data Flow	Description	Reference
Threshold Parameters	Input	Contains threshold values (such as distance, orientation, etc.).	Paragraph 3.3.8
DG Interface (Transmit Entity List)	Input	Contains information entities maintained by the application software.	JFT-149-DG.IRS

Transmit PDU List	Output	Contains all PDUs (both DIS and/or experimental) which are ready for transmission across the network.	Paragraph 3.3.4

3.2.6 Filtering Capability (DG-C-6)tc "3.2.6   Filtering Capability"\l§

The DG CSCI shall be capable of performing filtering functions on received PDUs. The filtering functions shall permit the elimination or retention of PDUs based on various criteria, including (at a minimum):

1. PDU Type
2. Force ID
3. Entity ID
4. Entity Domain
5. Entity Type
6. Exercise ID

Table 3.2.6-1 describes the I/O data associated with this capability.

Table 3.2.6-1
I/O Data for Filtering Capabilitytc "3.2.6-1   I/O Data for Filtering Capability"\l\f
t§

Name	Data Flow	Description	Reference
Filter Parameters	Input	Contains data such as entity IDs, force IDs, etc. to support the Filtering Capability.	Paragraph 3.3.7
PDU Lists	Input/Output	Contain lists of PDUs which are being compared to filtering criteria.	Paragraph 3.3.6

3.2.7 Multi-User Mode Capability (DG-C-6)tc "3.2.7   Multi-User Mode Capability"\l§

The DG CSCI shall implement a "multi-user" mode which is capable of supporting multiple application programs. All capabilities described in the preceding paragraphs (3.2.1 to 3.2.6) shall be supported in this mode. There are no I/O data elements associated with this capability.

3.2.8 Exclusive-Use Mode Capability (DG-C-6)tc "3.2.8 Exclusive-Use Mode Capability"\l§

The DG CSCI shall implement an "exclusive-use" mode which is capable of restricting access of DG CSCI resources to a single application program. All capabilities described in the preceding paragraphs (3.2.1 to 3.2.6) shall be supported in this mode. Furthermore, this "exclusive-use" mode permits the application program to make use of the capabilities described in the following subparagraphs. There are no I/O data elements associated with this capability.

3.2.8.1 Exclusive Entity Dead-Reckoning Capability (DG-C-6.1)tc "3.2.8.1   Exclusive Entity Dead-Reckoning Capability"\l§

The DG CSCI, when operating in "exclusive-use" mode, shall be capable of dead-reckoning a specific remote entity to the exclusion of all other remote entities. Table 3.2.8.1-1 describes the I/O data associated with this capability.

Table 3.2.8.1-1
I/O Data for Exclusive Entity Dead-Reckoning Capabilitytc "3.2.8.1-1 I/O Data for Exclusive Entity Dead-Reckoning Capability"\l\f t§

Name	Data Flow	Description	Reference
Entity ID	Input	Contains the entity ID to be dead-reckoned.	Paragraph 3.3.12
DFL Interface	Input/Output	Permits the use of the various filters incorporated in the DFL CSCI.	JFT-149-DFL.IRS
Local Entity List	Input/Output	Contains the dead-reckoned positions of all local entities.	Paragraph 3.3.10

3.2.8.2 Dead-Reckoning Prioritization by Distance Capability (DG-C-6.2)tc "3.2.8.2 Dead-Reckoning Prioritization by Distance Capability"\l§

The DG CSCI, when operating in "exclusive-use" mode, shall be capable of prioritizing entities such that those entities closest to a specific entity or location have their dead-reckoned positions updated more frequently than those entities which are more distant. Table 3.2.8.2-1 describes the I/O data associated with this capability.

Table 3.2.8.2-1
I/O Data for Dead Reckoning Prioritization by Distance Capability
tc "3.2.8.2-1   I/O Data for Dead Reckoning Prioritization by Distance
Capability"\l\f t§

Name	Data Flow	Description	Reference
Centerpoint Location	Input	Contains the geographic location of the origin.	Paragraph 3.3.13
Entity ID	Input	Contains the entity ID to use for the origin.	Paragraph 3.3.12
DFL Interface	Input/Output	Permits the use of the various filters incorporated in the DFL CSCI.	JFT-149-DFL.IRS
Local Entity List	Input/Output	Contains the dead-reckoned positions of all local entities.	Paragraph 3.3.10

3.2.8.3 Dead-Reckoning Prioritization by Entity Kind Capability (DG-C-6.3)tc
"3.2.6.3　　　Dead-Reckoning Prioritization by Entity Kind Capability"\l§

The DG CSCI, when operating in "exclusive-use" mode, shall be capable of prioritizing entities such that those entities of a particular kind have their dead-reckoned positions updated more frequently than those entities of other kinds. The possible values for entity kind are described in *Enumeration and Bit Encoded Values for Use with Protocols for Distributed Interactive Simulation Applications* (IST-CR-93-19) in Section 6.3.1. Table 3.2.8.3-1 describes the I/O data associated with this capability.

Table 3.2.8.3-1
I/O Data for Dead-Reckoning Prioritization by Entity Kind Capabilitytc "3.2.8.3-1
I/O Data for DR Prioritization by Entity Kind Capability"\l\f t§

Name	Data Flow	Description	Reference
Entity Kind	Input	Contains the entity kind priorities.	Paragraph 3.3.14
DFL Interface	Input/Output	Permits the use of the various filters incorporated in the DFL CSCI.	JFT-149-DFL.IRS
Local Entity List	Input/Output	Contains the dead-reckoned positions of all local entities.	Paragraph 3.3.10

3.2.8.4 Dead-Reckoning Prioritization by Entity Domain Capability (DG-C-6.4)tc "3.2.8.4 Dead-Reckoning Prioritization by Entity Domain Capability"\l§

The DG CSCI, when operating in "exclusive-use" mode, shall be capable of prioritizing entities such that those entities of a particular domain have their dead-reckoned positions updated more frequently than those entities of other domains. The possible values for entity domain are described in *Enumeration and Bit Encoded Values for Use with Protocols for Distributed Interactive Simulation Applications* (IST-CR-93-19) in Section 6.3.1.1 and its associated subparagraphs. Table 3.2.8.4-1 describes the I/O data associated with this capability.

Table 3.2.8.4-1
I/O Data for Dead-Reckoning Prioritization by Entity Domain Capabilitytc "3.2.8.4-1   I/O Data for DR Prioritization by Entity Domain Capability"\l\f t§

Name	Data Flow	Description	Reference
Entity Domain	Input	Contains the entity domain priorities used by the Dead-Reckoning Prioritization by Entity Domain Capability.	Paragraph 3.3.11
DFL Interface	Input/Output	Permits the use of the various filters incorporated in the DFL CSCI.	JFT-149-DFL.IRS
Local Entity List	Input/Output	Contains the dead-reckoned positions of all local entities.	Paragraph 3.3.10

3.2.8.5 Bandpass Mode Capability (DG-C-6.5)tc "3.2.8.5Bandpass Mode Capability"\l§

The DG CSCI, when operating in "exclusive-use" mode, shall implement a "bandpass" mode in which all PDUs (including Entity State PDUs) are sent to the application software using the Received Event List. Normally, Entity State PDUs are sent to the application software using the Received Entity List, but applications such as network load monitors, data loggers, etc. would benefit from access to all received PDUs. Table 3.2.8.5-1 describes the I/O data associated with this capability.

Table 3.2.8.5-1
I/O Data for Bandpass Mode Capabilitytc "3.2.8.5-1   I/O Data for Bandpass Mode Capability"\l\f t§

Name	Data Flow	Description	Reference
Bandpass Mode Flag	Input	Indicates if the Bandpass Mode Capability is active or inactive.	Paragraph 3.3.9
Filtered PDU List	Input	Contains PDUs which remain after all filtering criteria have been applied to the PDUs received from the network.	Paragraph 3.3.5
DG Interface (Received Entity List and Received Event List)	Output	Contain information for entities and events received from the network.	JFT-149-DG.IRS

3.2.9 Filter Combination Capability (DG-C-6)tc "3.2.9   Filter Combination Capability"\l§

The DG CSCI shall permit the various filters described in the preceding paragraphs to be combined. The following combinations (at a minimum) shall be supported by the DG CSCI:

Exercise ID and PDU Type
Exercise ID and Force ID
Exercise ID and Entity ID
Exercise ID and Entity Domain
Exercise ID and Entity Type
Exercise ID, Force ID, and Entity ID
Exercise ID, Force ID, and Entity Domain
Exercise ID, Force ID, and Entity Type
Exercise ID, Force ID, Entity Domain, and Entity Type

Table 3.2.9-1 describes the I/O data associated with this capability.

Table 3.2.9-1
I/O Data for Filter Combination Capabilitytc "3.2.9-1   I/O Data for Filter Combination Capability"\l\f t§

Name	Data Flow	Description	Reference
Filter Parameters	Input	Contains data such as filter order required to support the Filter Combination Capability.	Paragraph 3.3.7
Unfiltered PDU List	Input	Contains all PDUs (both DIS and/or experimental) which have been received from the network.	Paragraph 3.3.3
PDU Lists	Input/Output	Contain lists of PDUs which are being compared to filtering criteria.	Paragraph 3.3.6
Filtered PDU List	Output	Contains PDUs which remain after all filtering criteria have been applied to the PDUs received from the network.	Paragraph 3.3.5

3.2.10 Cycle Rate Support Capability (DG-C-6)tc "3.2.10   Cycle Rate Support Capability"\l§

The DG CSCI shall permit the user to specify the desired cycle rate of the DG CSCI, and to modify this rate during run-time. The DG CSCI is not required to execute at the specified cycle rate, but it shall inform the user if the specified cycle rate is not being achieved. Table 3.2.10-1 describes the I/O data associated with this capability.

Table 3.2.10-1
I/O Data for Cycle Rate Support Capabilitytc "3.2.10-1 I/O Data for Cycle Rate Support Capability"\l\f t§

Name	Data Flow	Description	Reference
Cycle Rate	Input	Rate at which DG CSCI is requested to complete main-line processing.	Paragraph 3.3.15

3.2.11 GUI Capability (DG-C-6)tc "3.2.11 GUI Capability"\l§

The DG CSCI shall incorporate a GUI based on X-Windows and Motif for establishment of initial conditions, modification of run-time parameters, and monitoring of network activities. The parameter set shall include (at a minimum):

1. Update distance threshold
2. Update angular threshold
3. Update elapsed time threshold
4. Entity expiration threshold
5. Filter activation/combination/order
6. Filter parameters (distance, force ID, entity ID, etc., as appropriate)
7. DG CSCI operation mode (multi-user or exclusive use)
8. Exclusive-use mode parameters (entity ID, centerpoint entity/location, etc., as appropriate)
9. Cycle rate desired for DG CSCI main-line processing
10. External interface parameters (number of entities to support, maximum event PDU size, overflow buffer size, etc.)
11. Site ID
12. UDP port number
13. UDP destination address

Table 3.2.11-1 describes the I/O data associated with this capability.

Table 3.2.11-1
I/O Data for GUI Capabilitytc "3.2.11-1   I/O Data for GUI Capability"\l\f t§

Name	Data Flow	Description	Reference
Bandpass Mode Flag	Output	Indicates if the Bandpass Mode Capability is active or inactive.	Paragraph 3.3.9
Filter Parameters	Output	Contains parameters (entity IDs, force IDs, filter orders, etc.) required to support the Filtering Capability and the Filter Combination Capability.	Paragraph 3.3.7
Threshold Parameters	Output	Contains threshold values (such as distance, orientation, etc.).	Paragraph 3.3.8
Entity Domain	Output	Contains the entity domain priorities used by the Dead-Reckoning Prioritization by Entity Domain Capability.	Paragraph 3.3.11
Entity ID	Output	Contains the entity ID used by the Exclusive Entity Dead-Reckoning Capability and the Dead-Reckoning Prioritization by Distance Capability.	Paragraph 3.3.12
Centerpoint Location	Output	Contains the geographic location of the origin used by the Dead-Reckoning Prioritization by Distance Capability.	Paragraph 3.3.13
Entity Kind	Output	Contains the entity kind	Paragraph 3.3.14

		priorities used by the Dead-Reckoning Prioritization by Entity Kind Capability.

3.2.7 Configuration File Support Capability (DG-C-7)tc "3.2.7 Configuration File Support Capability"\l§

The DG CSCI shall support the use of configuration files to store parametric data. These files can then be used to set up initial conditions, modify conditions during run-time, and store new parameter sets. The I/O Data for this capability is the same as that for the GUI Capability (see Table 3.2.11-1).

3.3 CSCI Internal Interfacestc "3.3   CSCI Internal Interfaces"\l§

The following subparagraphs identify and briefly describe the interfaces between the capabilities identified in Section 3.2. Figure 3.3-1 depicts the relationships between these internal interfaces and capabilities.

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Figure 3.3-1
Internal Interface Diagramtc "3.3-1   Internal Interface Diagram"\l\f f§

3.3.1 Transmit Network Data (DG-II-1)tc "3.3.1 Transmit Network Data (DG-II-1)"\l§

The Transmit Network Data internal interface (DG-II-1) contains DIS PDUs and/or experimental PDUs which are ready for transmission across the network.

3.3.2 Received Network Data (DG-II-2)tc "3.3.2 Received Network Data (DG-II-2)"\l§

The Received Network Data internal interface (DG-II-2) contains DIS PDUs and/or experimental PDUs which have been received from the network.

3.3.3 Unfiltered PDU List (DG-II-3)tc "3.3.3   Unfiltered PDU List (DG-II-3)"\l§

The Unfiltered PDU List internal interface (DG-II-3) contains all PDUs (both DIS and/or experimental) which have been received from the network.

3.3.4 Transmit PDU List (DG-II-4)tc "3.3.4   Transmit PDU List (DG-II-4)"\l§

The Transmit PDU List internal interface (DG-II-4) contains all PDUs (both DIS and/or experimental) which are ready for transmission across the network. PDUs in the Transmit PDU List may originate from within the DG CSCI or from the application software.

3.3.5 Filtered PDU List (DG-II-5)tc "3.3.5 Filtered PDU List (DG-II-5)"\l§

The Filtered PDU List internal interface (DG-II-5) contains PDUs which remain after all filtering criteria have been applied to the PDUs received from the network.

3.3.6 PDU Lists (DG-II-6)tc "3.3.6 PDU Lists (DG-II-6)"\l§

The PDU Lists internal interface (DG-II-6) contains lists of PDUs which are being compared to filtering criteria.

3.3.7 Filter Parameters (DG-II-7)tc "3.3.7 Filter Parameters (DG-II-7)"\l§

The Filter Parameters internal interface (DG-II-7) contains the parameters (entity IDs, force IDs, etc.) required to support the Filtering Capability, as well as data to support the Filter Combination Capability.

3.3.8 Threshold Parameters (DG-II-8)tc "3.3.8   Threshold Parameters (DG-II-8)"\l§

The Threshold Parameters internal interface (DG-II-8) contains the parameters (distance threshold, orientation threshold, etc.) required to support the DIS Threshold Support Capability.

3.3.9 Bandpass Mode Flag (DG-II-9)tc "3.3.9   Bandpass Mode Flag (DG-II-9)"\l§

The Bandpass Mode Flag internal interface (DG-II-9) indicates if the Bandpass Mode Capability is active or inactive.

3.3.10 Local Entity List (DG-II-10)tc "3.3.10   Local Entity List (DG-II-10)"\l§

The Local Entity List internal interface (DG-II-10) contains the dead-reckoned positions of all local entities (i.e., those entities maintained by the application software).

3.3.11 Entity Domain (DG-II-11)tc "3.3.11   Entity Domain (DG-II-11)"\l§

The Entity Domain internal interface (DG-II-11) contains the entity domain priorities used by the Dead-Reckoning Prioritization by Entity Domain Capability.

3.3.12 Entity ID (DG-II-12)tc "3.3.12   Entity ID (DG-II-12)"\l§

The Entity ID internal interface (DG-II-12) contains the entity ID used by the Exclusive Entity Dead-Reckoning Capability and the Dead-Reckoning Prioritization by Distance Capability.

3.3.13 Centerpoint Location (DG-II-13)tc "3.3.13Centerpoint Location (DG-II-13)"\l§

The Centerpoint Location internal interface (DG-II-13) contains the geographic center used by the Dead-Reckoning Prioritization by Distance Capability.

3.3.14 Entity Kind (DG-II-14)tc "3.3.14   Entity Kind (DG-II-14)"\l§

The Entity Kind internal interface (DG-II-14) contains the entity kind priorities used by the Dead-Reckoning Prioritization by Entity Kind Capability.

3.3.15 Cycle Rate (DG-II-15)tc "3.3.15   Cycle Rate (DG-II-15)"\l§

The Cycle Rate internal interface (DG-II-15) contains the cycle rate used by the Cycle Rate Support Capability. This is the rate at which the user desires the DG CSCI to execute main-line processing.

3.4 CSCI Data Element Requirementstc "3.4   CSCI Data Element Requirements"\l§

This paragraph has been tailored out of the DG SRS.

3.5 Adaptation Requirementstc "3.5   Adaptation Requirements"\l§

The following subparagraphs specify the requirements for adapting the DG CSCI to site-unique conditions and to changes in the system environment.

3.5.1 Installation-Dependent Data tc "3.5.1   Installation-Dependent Data"\l§

There are no installation-dependent data items in the DG CSCI.

3.5.2 Operational Parameters tc "3.5.2   Operational Parameters"\l§

There are no operational parameters in the DG CSCI.

3.6 Sizing and Timing Requirements tc "3.6   Sizing and Timing Requirements"\l§

This paragraph has been tailored out of the DG SRS.

3.7 Safety Requirements tc "3.7   Safety Requirements"\l§

This paragraph has been tailored out of the DG SRS.

3.8 Security Requirements tc "3.8   Security Requirements"\l§

This paragraph has been tailored out of the DG SRS.

3.9 Design Constraints tc "3.9   Design Constraints"\l§

The following subparagraphs describe requirements which constrain the CSCI design.

3.9.1 Programming Language Constraints tc "3.9.1   Programming Language Constraints"\l§

The Statement of Work (SOW) for the ADIS specifies that software developed for this project shall be written in the Ada programming language except where interface requirements to existing MFS software or operating system functions require use of a low-order language. In particular, the SOW states that the contractor shall provide appropriately segmented packages containing Ada definitions for the PDU structures and data types.

3.9.2 GUI Design Constraints tc "3.9.2   GUI Design Constraints"\l§

The Statement of Work for the ADIS specifies that the GUI developed for this CSCI shall be based on the X-Windows and Motif standards. The design of the DG CSCI shall not require the presence of the GUI for proper operation -- alternative means of parameter modification (such as loading a default configuration file or calling an initialization routine) shall be provided.

3.10 Software Quality Factorstc "3.10   Software Quality Factors"\l§

This paragraph has been tailored out of the DG SRS.

3.11 Human Performance/Human Engineering Requirementstc "3.11 Human Performance/Human Engineering Requirements"\l§

This paragraph has been tailored out of the DG SRS.

3.12 Requirements Traceabilitytc "3.12   Requirements Traceability"\l§

This paragraph has been tailored out of the DG SRS.

4 Qualification Requirementstc "4 Qualification Requirements"\l§

The following subparagraphs specify the qualification methods and special qualification requirements necessary to establish that the CSCI satisfies the requirements of sections 3 and 5.

4.1 Qualification Methodstc "4.1   Qualification Methods"\l§

Table 4.1-1 specifies the qualification methods necessary to establish that the DG CSCI satisfies the requirements of sections 3 and 5. The CIU CSCI does not have any special qualification requirements. In Table 4.1-1, the following qualification methods are specified:

A   Analysis - The processing of accumulated data obtained from other qualification methods, such as interpretation or extrapolation of test data.

D   Demonstration - The operation of the CSCI (or some part of the CSCI) that relies on observable functional operation not requiring the use of elaborate instrumentation or special test equipment.

I   Inspection - The visual examination of CSCI code, documentation, memory, etc.

If the box for the qualification method is shaded, then the method is appropriate for verifying the corresponding requirement. An empty box indicates that the method is not necessary or is not appropriate for verifying the requirement.

Table 4.1-1
Qualification Methodstc "4.1-1   Qualification Methods"\l\f t§

Capability Identifier	Capability Requirement	SRS Page	Qualification Method(s)		
			A	D	I
DG-C-1	DIS PDU Support Capability	6		▓	
DG-C-2	Experimental PDU Support Capability	7		▓	
DG-C-3	Interface Control Capability	8		▓	
DG-C-4	DIS Dead-Reckoning Support Capability	9	▓		
DG-C-5	DIS Threshold Support Capability	10		▓	
DG-C-6	Filtering Capability	10		▓	
DG-C-7	Coordinate System Support Capability	11	▓		
DG-C-8	Orientation System Support Capability	12	▓		
DG-C-9	Multi-User Mode Capability	12		▓	▓
DG-C-10	Exclusive-Use Mode Capability	12		▓	▓
DG-C-10.1	Exclusive Entity Dead-Reckoning Capability	12	▓	▓	
DG-C-10.2	Dead-Reckoning Prioritization by Distance	13	▓	▓	

	Capability				
DG-C-10.3	Dead-Reckoning Prioritization by Entity Kind Capability	13			
DG-C-10.4	Dead-Reckoning Prioritization by Entity Domain Capability	14			
DG-C-10.5	Bandpass Mode Capability	15			
DG-C-11	Filter Combination Capability	15			
DG-C-12	Cycle Rate Support Capability	16			
DG-C-13	GUI Capability	17			
DG-C-14	Configuration File Support Capability	19			

4.2 Special Qualification Requirementstc "4.2   Special Qualification Requirements"\l§

There are no special qualification requirements for the DG CSCI.

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

The code for the DG CSCI will be developed using resources owned by MFS, thereby eliminating the need to deliver the code. Similarly, the majority of support documentation for the DG CSCI will be developed on MFS resources and will not require delivery. Documentation which is not developed using MFS resources will be delivered in both printed and magnetic format.

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 System 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 Abbreviationstc "6.2   Acronyms and Abbreviations"\l§

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 Abbreviationstc "6.2-1   Meanings of Acronyms and Abbreviations"\l\f t§

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
DFL	DIS Filter Library
DG	DIS Gateway
DIS	Distributed Interactive Simulation
DOD	Department of Defense
DON	Department of the Navy
DR	Dead-Reckoning
DRM	Dead-Reckoning Model

FTEG	Flight Test and Engineering Group
GUI	Graphical User Interface
I/F	Interface
I/O	Input/Output
IEEE	Institute of Electrical and Electronics Engineers
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 Conventionstc "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

SOFTWARE 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. A006

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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