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SOFTWARE REQUIREMENTS SPECIFICATION

FOR THE

DIS LIBRARY (DL) CSCI 2

OF THE

ADA DISTRIBUTED INTERACTIVE SIMULATION (ADIS) PROJECT

CONTRACT NO. N00421-92-D-0028

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1 Scope

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

1.1 Identification

This Software Requirements Specification (SRS) specifies the engineering and qualification requirements for the CSCI identified as DIS Library (DL), CSCI 2 of the Ada Distributed Interactive Simulation Support system.

1.2 CSCI 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, including the development of a generic software filter library. The DIS Library (DL) CSCI provides a means of prioritizing or refining a list or stream of Protocol Data Units (i.e., PDUs, which represent sets of related simulation data describing an entity or event) that are received from the DIS network. The library consists of a set of independent data processing units that each have a specific filtering purpose. The units may be used in any desired combination; however, the resulting data reduction and associated processing time may vary with different usages.

1.3 Document Overview

The purpose of this document is to describe the engineering and qualification requirements of the DL 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 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.

Table 2.1-1
Government Documentstc "2.1-1 Government Documents" \f t§

Document Number	Title
DOD-STD-2167A	Defense System Software Development
	Statement of Work, Ada Distributed Interactive Simulation Support
DI-MCCR-80025A	Software Requirements Specification

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 Documents tc "2.2 Non-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.

Table 2.2-1
Non-Government Documentstc "2.2-1 Non-Government Documents" \f t§

Document Number	Title	Source
IST-CR-93-15	IEEE Standard P1278.1 Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0	Institute for Simulation and Training

3 Engineering Requirements tc "3 Engineering Requirements"§

The following paragraphs and subparagraphs specify the engineering requirements necessary to ensure proper development of the DL CSCI.

3.1 CSCI External Interface Requirements tc "3.1 CSCI External Interface

Requirements"§

The DL CSCI shall be capable of being combined and linked with other software [DL-R-1]. Interaction between the DL CSCI and other CSCIs may take place via the DL external interface. Table 3.1-1 identifies and describes the external interface of the DL CSCI. Figure 3.1-1 depicts the relationships between this interface, the DL CSCI, and other ADIS CSCIs.

Table 3.1-1
External Interfaces of the DL CSCItc "3.1-1 External Interfaces of the DFL CSCI" \f t§

Interface Name	Project-Unique Identifier	Description	Document
DIS Library Interface	DL-EI-1	Contains data regarding the characteristics of DIS entities (i.e., PDUs) which must be parsed or prioritized based on the filter criteria. Also includes filter threshold information. This data will be requested and used by the DIS Gateway (DG CSCI 1), the Ordnance Server (OS CSCI 3), and possibly by various Simulation Models which require the filtering of DIS-formatted data. Further descriptions of the data contained within this interface may be found in the DL Interface Requirements Specification (IRS).	JFT-145-1-DL.IRS-A (DL IRS)

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Figure 3.1-1
DL CSCI External Interface Requirementstc "3.1-1 CSCI External Interface Requirements" \f f§

3.2 CSCI Capability Requirements§

The following subparagraphs identify all of the capability requirements that the DL CSCI satisfies.

3.2.1 Filtering Algorithms (DL-C-1)§

The DL contains the capability to filter entities or events or lists of entities or events based on criteria which is received via passed parameters. The filtering may be in the form of prioritizing a list of PDUs according to the selected criteria or processing a PDU or a stream of PDUs such that a PDU which does not meet the specified criteria is excluded from further processing. The filtering criteria shall be considered individually (i.e., a filter shall be developed for each of the criteria) [DL-R-2]. This capability may be decomposed into constituent components, described in the following subparagraphs.

3.2.1.1 Calculation Algorithms (DL-C-1.1)§

The DL contains the capability to calculate specific quantities based on the data elements within PDUs. The results of the calculations may be used for various purposes such as evaluation against a threshold, sorting, or for some user-specific purpose. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.1.1 Calculate Distance (DL-C-1.1.1)§

The DL shall calculate a distance quantity based on two position vectors [DL-R-3]. The results of the calculation may be used for various purposes such as evaluation against a threshold, sorting, or for some user-specific purpose. Table 3.2.1.1.1-1 describes the input and output of this capability.

Table 3.2.1.1.1-1
I/O Elements for Calculate Distance

Element	Identifier	Input / Output	Purpose
Position_Vector_1	DL-D-01	Input	Represents the position of an entity or event
Position_Vector_2	DL-D-01	Input	Represents the position of a different entity or event
Distance	DL-D-02	Output	Represents the distance between the two vectors

3.2.1.1.2 Calculate Velocity (DL-C-1.1.2)tc "3.2.1.1.2 Calculate Velocity (DFL-C-1.1.2)"§

The DL shall calculate a velocity quantity based on the components of a velocity vector [DL-R-4]. The results of the calculation may be used for various purposes such as evaluation against a threshold, sorting, or for some user-specific purpose. Table 3.2.1.1.2-1 describes the input and output of this capability.

Table 3.2.1.1.2-1
I/O Elements for Calculate Velocity
tc "3.2.1.1.2-1 I/O Elements for Calculate Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Velocity_Vector	DL-D-03	Input	Represents the velocity of an entity in terms of the x, y, and z components
Velocity	DL-D-04	Output	Represents the velocity of an entity as a single quantity

3.2.1.2 Evaluation Algorithms (DL-C-1.2)tc "3.2.1.2 Evaluation Algorithms (DFL-C-1.2)"§

The DL contains the capability to evaluate PDUs for the purposes of accepting them or rejecting them based on criteria which is passed via parameters. The evaluation consists of comparing the results of a calculation on PDU data elements against a threshold value and providing a response of True or False. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.2.1 Evaluate Distance (DL-C-1.1.1)tc "3.2.1.2.1 Evaluate Distance (DFL-C-1.2.1)"§

The DL shall evaluate the result of a distance calculation between two position vectors against a distance threshold. The DL shall then provide a response of True if the result of the calculation is less than or equal to the threshold value; otherwise, it will provide a response of False [DL-R-5]. Table 3.2.1.2.1-1 describes the input and output of this capability.

Table 3.2.1.2.1-1
I/O Elements for Evaluate Distance
tc "3.2.1.2.1-1 I/O Elements for Evaluate Distance" \f t§

Element	Identifier	Input / Output	Purpose

Position_Vector_1	DL-D-01	Input	Represents the position of an entity or event
Position_Vector_2	DL-D-01	Input	Represents the position of a different entity or event
Distance_Threshold	DL-D-02	Input	Represents the maximum value allowed for the distance between the two position vectors
Evaluation	DL-D-05	Output	Represents whether or not the distance between the vectors is less than or equal to the distance threshold

3.2.1.2.2 Evaluate Orientation (DL-C-1.2.2)tc "3.2.1.2.2 Evaluate Orientation (DFL-C-1.2.2)"§

The DL shall evaluate the position of an entity or event to determine whether it is positioned within a specific range of orientation relative to the position of a reference entity or event and provide a corresponding response of True or False [DL-R-6]. Table 3.2.1.2.2-1 describes the input and output of this capability.

Table 3.2.1.2.2-1
I/O Elements for Evaluate Orientationtc "3.2.1.2.2-1 I/O Elements for Evaluate Orientation" \f t§

Element	**Identifier**	**Input / Output**	**Purpose**
Entity_State_PDU	DL-D-06	Input	Represents the entity which requires the filtering of other entities or events
Position_Vector	DL-D-01	Input	Represents the position of a different entity or event
Minimum_Orientation	DL-D-07	Input	Represents the minimum value in the range of interest (i.e., field of view)
Maximum_Orientation	DL-D-07	Input	Represents the maximum value in the range of interest

			(i.e., field of view)
Evaluation	DL-D-05	Output	Represents whether or not the position vector represents an entity or event between the minimum and maximum threshold values with respect to the entity defined by the Entity State PDU

3.2.1.2.3 Evaluate Velocity (DL-C-1.2.3)tc "3.2.1.2.3 Evaluate Velocity (DFL-C-1.1.3)"§

The DL contains the capability to evaluate a velocity vector with respect to a threshold value to determine whether the summation of the velocity components meet the threshold criteria. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.2.3.1 Evaluate Velocity Minimum Threshold(DL-C-1.2.3.1)tc "3.2.1.2.3.1 Evaluate Velocity Minimum Threshold(DFL-C-1.2.3.1)"§

The DL shall evaluate the result of a velocity vector summation against a minimum velocity threshold and provide a response of True if the summation is greater than or equal to the threshold value and provide a response of False otherwise [DL-R-7]. Table 3.2.1.2.3-1 describes the input and output of this capability.

Table 3.2.1.2.3.1-1
I/O Elements for Evaluate Velocity Minimum Thresholdtc "3.2.1.2.3.1-1 I/O Elements for Evaluate Velocity Minimum Threshold" \f t§

Element	Identifier	Input / Output	Purpose
Velocity_Vector	DL-D-03	Input	Represents the velocity of an entity
Velocity_Minimum_ Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of an entity
Evaluation	DL-D-05	Output	Represents whether or not the velocity of the entity associated with the velocity vector is greater than or equal to the velocity threshold value

3.2.1.2.3.2 Evaluate Velocity Maximum Threshold (DL-C-1.2.3.2)tc "3.2.1.2.3.2 Evaluate Velocity Maximum Threshold (DFL-C-1.2.3.2)"§

The DL shall evaluate the result of a velocity vector summation against a maximum velocity threshold and provide a response of True if the summation is less than or equal to the threshold value and provide a response of False otherwise [DL-R-8]. Table 3.2.1.2.3.2-1 describes the input and output of this capability.

Table 3.2.1.2.3.2-1
I/O Elements for Evaluate Velocity Maximum Thresholdtc "3.2.1.2.3.2-1 I/O Elements for Evaluate Velocity Maximum Threshold" \f t§

Element	Identifier	Input / Output	Purpose
Velocity_Vector	DL-D-03	Input	Represents the velocity of an entity
Velocity_Maximum_ Threshold	DL-D-04	Input	Represents the maximum value allowed for the velocity of an entity
Evaluation	DL-D-05	Output	Represents whether or not the velocity of the entity associated with the velocity vector is less than or equal to the velocity threshold value

3.2.1.3 List Processing Algorithms (DL-C-1.3)tc "3.2.1.3 List Processing Algorithms (DFL-C-1.3)"§

The DL contains the capability to process lists of PDUs or events for the purpose of evaluating or sorting the PDUs within the list. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.1 List Evaluation Algorithms (DL-C-1.3.1)tc "3.2.1.3.1 List Evaluation Algorithms(DFL-C-1.3.1)"§

The DL contains the capability to evaluate lists of PDUs or events against a threshold value for the purpose of accepting or rejecting individual PDUs based on the filter criteria and the threshold values. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.1.1 Evaluate List By Distance (DL-C-1.3.1.1)tc "3.2.1.3.1.1 Evaluate List By Distance (DFL-C-1.3.1.1)"§

The DL contains the capability to evaluate lists of PDUs or events against a distance threshold for the purpose of accepting or rejecting individual PDUs based on the threshold value. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.1.1.1 Evaluate Entity State List Distance (DL-C-1.3.1.1.1)
tc "3.2.1.3.1.1.1 Evaluate Entity State List Distance (DFL-C-1.3.1.1.1)"§

The DL shall evaluate lists of Entity State PDUs based on the distance between the entities and a referential position, which is compared to a distance threshold value, and produce a resulting list containing only PDUs which fall within the specified threshold [DL-R-9]. Table 3.2.1.3.1.1.1-1 describes the input and output of this capability.

Table 3.2.1.3.1.1.1-1
I/O Elements for Evaluate Entity State List Distancetc "3.2.1.3.1.1.1-1 I/O Elements for Evaluate Entity State List Distance" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Entity_ State_PDU_List	DL-D-08	Input	Represents a list of entities which have not been evaluated regarding distance
Position_Vector	DL-D-01	Input	Represents the position of an entity or event
Distance_Threshold	DL-D-02	Input	Represents the maximum value allowed for the distance between the entity and the position vector
Filtered_Entity_State_ PDU_List	DL-D-08	Output	Represents a list of entities which have been evaluated regarding distance

3.2.1.3.1.1.2 Evaluate Fire List Distance (DL-C-1.3.1.1.2)tc "3.2.1.3.1.1.2 Evaluate Fire List Distance (DFL-C-1.3.1.1.2)"§

The DL shall evaluate lists of Fire PDUs based on the distance between the firing entity and some referential position vector, which is compared to a distance threshold value, and produce a resulting list containing only the PDUs which fall within the specified threshold [DL-R-10]. Table 3.2.1.3.1.1.2-1 describes the input and output of this capability.

Table 3.2.1.3.1.1.2-1
I/O Elements for Evaluate Fire List Distancetc "3.2.1.3.1.1.2-1 I/O Elements for Evaluate Fire List Distance" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Fire_PDU_ List	DL-D-09	Input	Represents a list of firing entities which have not been evaluated regarding distance
Position_Vector	DL-D-01	Input	Represents the position of an entity or event

Distance_Threshold	DL-D-02	Input	Represents the maximum value allowed for the distance between the firing entity and the position vector
Filtered_Fire_PDU_List	DL-D-09	Output	Represents a list of firing entities which have been evaluated regarding distance

3.2.1.3.1.1.3 Evaluate Detonation List Distance (DL-C-1.3.1.1.3)tc "3.2.1.3.1.1.3 Evaluate Detonation List Distance (DFL-C-1.3.1.1.3)"§

The DL shall evaluate lists of Detonation PDUs based on the distance between the entity and some referential position vector, which is compared to a distance threshold value, and produce a resulting list containing only the PDUs which fall within the specified threshold [DL-R-11]. Table 3.2.1.3.1.1.3-1 describes the input and output of this capability.

Table 3.2.1.3.1.1.3-1
I/O Elements for Evaluate Detonation List Distancetc "3.2.1.3.1.1.3-1 I/O Elements for Evaluate Detonation List Distance" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Detonation_ PDU_List	DL-D-10	Input	Represents a list of detonations which have not been evaluated regarding distance
Position_Vector	DL-D-01	Input	Represents the position of an entity or event
Distance_Threshold	DL-D-02	Input	Represents the maximum value allowed for the distance between the detonation and the position vector
Filtered_Detonation_ PDU_List	DL-D-10	Output	Represents a list of detonations which have been evaluated regarding distance

3.2.1.3.1.2 Evaluate List By Velocity (DL-C-1.3.1.2)tc "3.2.1.3.1.2 Evaluate List By Velocity (DFL-C-1.3.1.2)"§

The DL contains the capability to evaluate lists of PDUs or events against a minimum or maximum velocity threshold for the purpose of accepting or rejecting individual PDUs based on the threshold value. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.1.2.1 Evaluate List By Minimum Velocity (DL-C-1.3.1.2.1)tc "3.2.1.3.1.2.1 Evaluate List By Minimum Velocity (DFL-C-1.3.1.2.1)"§

The DL contains the capability to evaluate lists of PDUs or events against a minimum velocity threshold for the purpose of accepting or rejecting individual PDUs based on the threshold value. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.1.2.1.1 Evaluate Entity State List Min Velocity (DL-C-1.3.1.2.1.1)tc "3.2.1.3.1.2.1.1 Evaluate Entity State List Min Velocity (DFL-C-1.3.1.2.1.1)"§

The DL shall evaluate lists of Entity State PDUs based on the velocity of the entity, which is compared to a minimum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity greater than or equal to the specified threshold [DL-R-12]. Table 3.2.1.3.1.2.1.1-1 describes the input and output of this capability.

Table 3.2.1.3.1.2.1.1-1
I/O Elements for Evaluate Entity State List Min Velocitytc "3.2.1.3.1.2.1.1-1 I/O Elements for Evaluate Entity State List Min Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Entity_State_PDU_List	DL-D-08	Input	Represents a list of entities which have not been evaluated regarding velocity
Velocity_Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of an entity
Filtered_Entity_State_PDU_List	DL-D-08	Output	Represents a list of entities which have been evaluated regarding velocity

3.2.1.3.1.2.1.2 Evaluate Fire List Min Velocity (DL-C-1.3.1.2.1.2)tc "3.2.1.3.1.2.1.2 Evaluate Fire List Min Velocity (DFL-C-1.3.1.2.1.2)"§

The DL shall evaluate lists of Fire PDUs based on the velocity of the firing entity, which is compared to a minimum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity greater than or equal to the specified threshold [DL-R-13]. Table 3.2.1.3.1.2.1.2-1 describes the input and output of this capability.

Table 3.2.1.3.1.2.1.2-1
I/O Elements for Evaluate Fire List Min Velocitytc "3.2.1.3.1.2.1.2-1 I/O Elements for Evaluate Fire List Min Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Fire_PDU_List	DL-D-09	Input	Represents a list of firing entities which have not been evaluated regarding velocity

Velocity_Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of a firing entity
Filtered_Fire_PDU_List	DL-D-09	Output	Represents a list of firing entities which have been evaluated regarding velocity

3.2.1.3.1.2.1.3 Evaluate Detonation List Min Velocity (DL-C-1.3.1.2.1.3)tc "3.2.1.3.1.2.1.3 Evaluate Detonation List Min Velocity (DFL-C-1.3.1.2.1.3)"§

The DL shall evaluate lists of Detonation PDUs based on the velocity of the detonation, which is compared to a minimum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity greater than or equal to the specified threshold [DL-R-14]. Table 3.2.1.3.1.2.1.3-1 describes the input and output of this capability.

Table 3.2.1.3.1.2.1.3-1
I/O Elements for Evaluate Detonation List Min Velocity
tc "3.2.1.3.1.2.1.3-1 I/O Elements for Evaluate Detonation List Min Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Detonation_ PDU_List	DL-D-10	Input	Represents a list of detonations which have not been evaluated regarding velocity
Velocity_Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of a detonation
Filtered_Detonation_ PDU_List	DL-D-10	Output	Represents a list of detonations which have been evaluated regarding velocity

3.2.1.3.1.2.2 Evaluate List By Maximum Velocity (DL-C-1.3.1.2.2)tc "3.2.1.3.1.2.2 Evaluate List By Maximum Velocity (DFL-C-1.3.1.2.2)"§

The DL contains the capability to evaluate lists of PDUs or events against a maximum velocity threshold for the purpose of accepting or rejecting individual PDUs based on the threshold value. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.1.2.2.1 Evaluate Entity State List Max Velocity (DL-C-1.3.1.2.2.1)tc "3.2.1.3.1.2.2.1 Evaluate Entity State List Max Velocity (DFL-C-1.3.1.2.2.1)"§

The DL shall evaluate lists of Entity State PDUs based on the velocity of the entity, which is compared to a maximum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity less than or equal to the specified threshold [DL-R-15]. Table 3.2.1.3.1.2.2.1-1 describes the input and output of this capability.

Table 3.2.1.3.1.2.2.1-1
I/O Elements for Evaluate Entity State List Max Velocitytc "3.2.1.3.1.2.2.1-1 I/O Elements for Evaluate Entity State List Max Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Entity_State_ PDU_List	DL-D-08	Input	Represents a list of entities which have not been evaluated regarding velocity
Velocity_Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of an entity
Filtered_Entity_State_ PDU_List	DL-D-08	Output	Represents a list of entities which have been evaluated regarding velocity

3.2.1.3.1.2.2.2 Evaluate Fire List Max Velocity (DL-C-1.3.1.2.2.2)tc "3.2.1.3.1.2.2.2 Evaluate Fire List Max Velocity (DFL-C-1.3.1.2.2.2)"§

The DL shall evaluate lists of Fire PDUs based on the velocity of the firing entity, which is compared to a maximum velocity threshold value, and produce a resulting list containing only PDUs which have a velocity less than or equal to the specified threshold [DL-R-16]. Table 3.2.1.3.1.2.2.2-1 describes the input and output of this capability.

Table 3.2.1.3.1.2.2.2-1
I/O Elements for Evaluate Fire List Max Velocitytc "3.2.1.3.1.2.2.2-1 I/O Elements for Evaluate Fire List Max Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Fire_PDU_ List	DL-D-09	Input	Represents a list of firing entities which have not been evaluated regarding velocity
Velocity_Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of a firing entity
Filtered_Fire_PDU_List	DL-D-09	Output	Represents a list of firing entities which have been evaluated regarding velocity

3.2.1.3.1.2.2.3 Evaluate Detonation List Max Velocity (DL-C-1.3.1.2.2.3)tc "3.2.1.3.1.2.2.3 Evaluate Detonation List Max Velocity (DFL-C-1.3.1.2.2.3)"§

The DL shall evaluate lists of Detonation PDUs based on the velocity of the detonation, which is compared to a maximum velocity threshold value, and produce a resulting list containing only PDUs which have a velocity less than or equal to the specified threshold [DL-R-17]. Table 3.2.1.3.1.2.2.3-1 describes the input and output of this capability.

Table 3.2.1.3.1.2.2.3-1
I/O Elements for Evaluate Detonation List Max Velocitytc "3.2.1.3.1.2.2.3-1 I/O Elements for Evaluate Detonation List Max Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unfiltered_Detonation_ PDU_List	DL-D-10	Input	Represents a list of detonations which have not been evaluated regarding velocity
Velocity_Threshold	DL-D-04	Input	Represents the minimum value allowed for the velocity of a detonation
Filtered_Detonation_ PDU_List	DL-D-10	Output	Represents a list of detonations which have been evaluated regarding velocity

3.2.1.3.2 List Sorting Algorithms (DL-C-1.3.2)tc "3.2.1.3.2 List Sorting Algorithms(DFL-C-1.3.2)"§

The DL contains the capability to sort lists of PDUs based on specified prioritization criteria. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.2.1 Sort List By Distance (DL-C-1.3.2.1)tc "3.2.1.3.2.1 Sort List By Distance (DFL-C-1.3.2.1)"§

The DL contains the capability to sort lists of PDUs based on distance from a specified reference vector. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.2.1.1 Sort Entity State List Distance (DL-C-1.3.2.1.1)tc "3.2.1.3.2.1.1 Sort Entity State List Distance (DFL-C-1.3.2.1.1)"§

The DL shall sort lists of Entity State PDUs based on the distance between the entity and some referential position vector [DL-R-18]. Table 3.2.1.3.2.1.1-1 describes the input and output of this capability.

Table 3.2.1.3.2.1.1-1
I/O Elements for Sort Entity State List Distance tc "3.2.1.3.2.1.1-1 I/O Elements for Sort Entity State List Distance" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_Entity_State_ PDU_List	DL-D-08	Input	Represents a list of entities which have not been sorted by distance
Position_Vector	DL-D-01	Input	Represents the position of an entity or event
Sorted_Entity_State_ PDU_List	DL-D-08	Output	Represents a list of entities which have been sorted by distance

3.2.1.3.2.1.2 Sort Fire List Distance (DL-C-1.3.2.1.1)tc "3.2.1.3.2.1.2 Sort Fire List Distance (DFL-C-1.3.2.1.1)"§

The DL shall sort lists of Fire PDUs based on the distance between the firing entity and some referential position vector [DL-R-19]. Table 3.2.1.3.2.1.2-1 describes the input and output of this capability.

Table 3.2.1.3.2.1.2-1
I/O Elements for Sort Fire List Distancetc "3.2.1.3.2.1.2-1 I/O Elements for Sort Fire List Distance" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_Fire_PDU_ List	DL-D-09	Input	Represents a list of firing entities which have not been sorted regarding distance
Position_Vector	DL-D-01	Input	Represents the position of an entity or event
Sorted_Fire_PDU_List	DL-D-09	Output	Represents a list of firing entities which have been sorted regarding distance

3.2.1.3.2.1.3 Sort Detonation List Distance (DL-C-1.3.2.1.3)

The DL shall sort lists of Detonation PDUs based on the distance between the entity and some referential position vector [DL-R-20]. Table 3.2.1.3.2.1.3-1 describes the input and output of this capability.

Table 3.2.1.3.2.1.3-1
I/O Elements for Sort Detonation List Distancetc "3.2.1.3.2.1.3-1 I/O Elements for Evaluate Sort List Distance" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_Detonation_ PDU_List	DL-D-10	Input	Represents a list of detonations which have not been sorted by distance
Position_Vector	DL-D-01	Input	Represents the position of an entity or event
Sorted_Detonation_ PDU_List	DL-D-10	Output	Represents a list of detonations which have been sorted by distance

3.2.1.3.2.2 Sort List By Velocity (DL-C-1.3.2.2)tc "3.2.1.3.2.2 Sort List By Velocity (DFL-C-1.3.2.2)"§

The DL contains the capability to sort lists of PDUs based on distance from a specified reference vector. This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.1.3.2.2.1 Sort Entity State List Velocity (DL-C-1.3.2.2.1)tc "3.2.1.3.2.2.1 Sort Entity State List Velocity (DFL-C-1.3.2.2.1)"§

The DL shall sort lists of Entity State PDUs based on the velocity of the entity [DL-R-21]. Table 3.2.1.3.2.2.1-1 describes the input and output of this capability.

Table 3.2.1.3.2.2.1-1
I/O Elements for Sort Entity State List Velocitytc "3.2.1.3.2.2.1-1 I/O Elements for Sort Entity State List Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_Entity_State_ PDU_List	DL-D-08	Input	Represents a list of entities which have not been sorted by velocity
Sorted_Entity_State_ PDU_List	DL-D-08	Output	Represents a list of entities which have been sorted by velocity

3.2.1.3.2.2.2 Sort Fire List Velocity (DL-C-1.3.2.2.2)tc "3.2.1.3.2.2.2 Sort Fire List Velocity (DFL-C-1.3.2.2.2)"§

The DL shall sort lists of Fire PDUs based on the velocity of the firing entity [DL-R-22]. Table 3.2.1.3.1.2.2-1 describes the input and output of this capability.

Table 3.2.1.3.2.2.2-1
I/O Elements for Sort Fire List Velocitytc "3.2.1.3.2.2.2-1 I/O Elements for Sort Fire List Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_Fire_PDU_ List	DL-D-09	Input	Represents a list of firing entities which have not been sorted by velocity
Sorted_Fire_PDU_List	DL-D-09	Output	Represents a list of firing entities which have been sorted by velocity

3.2.1.3.2.2.3 Sort Detonation List Velocity (DL-C-1.3.2.2.3)tc "3.2.1.3.2.2.3 Sort Detonation List Velocity (DFL-C-1.3.2.2.3)"§

The DL shall sort lists of Detonation PDUs based on the velocity of the detonation [DL-R-23]. Table 3.2.1.3.2.2.3-1 describes the input and output of this capability.

Table 3.2.1.3.2.2.3-1
I/O Elements for Sort Detonation List Velocitytc "3.2.1.3.2.2.3-1 I/O Elements for Sort Detonation List Velocity" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_Detonation_ PDU_List	DL-D-10	Input	Represents a list of detonations which have not been sorted by velocity
Sorted_Detonation_ PDU_List	DL-D-10	Output	Represents a list of detonations which have been sorted by velocity

3.2.2 Sorting Algorithms (DL-C-2)tc "3.2.2 DIS Dead-Reckoning Support Capability"§

The DL contains the capability to generically sort lists of entities or events based on criteria which is received via passed parameters. The sorting shall be in the form of prioritizing a list of indices, which represent PDUs within a list, and sort keys, which represent the sort criteria associated with the PDU (e.g. distance, velocity) [DL-R-24]. Table 3.2.2-1 describes the input and output of this capability.

Table 3.2.2-1
I/O Elements for Sorting Algorithmstc "3.2.2-1 I/O Elements for Sorting Algorithms" \f t§

Element	Identifier	Input / Output	Purpose
Unsorted_List	DL-D-11	Input	Represents an unsorted list of indices and sort keys which are associated with a list of entities or events
Sorted_List	DL-D-11	Output	Represents a sorted list of indices and sort keys which are associated with a list of entities or events

3.2.3 Smoothing Algorithms (DL-C-3)tc "3.2.3 DIS Dead-Reckoning Support Capability"§

The DL contains the capability to apply smoothing algorithms to selected vectors within PDUs as a means of compensating for network anomalies (i.e., time lags, etc.). This capability may be decomposed into constituent components which are described in the following subparagraphs.

3.2.3.1 Rate Limiter (DL-C-3.1)tc "3.2.3.1 Rate Limiter (DFL-C-3.1)"§

The DL shall apply rate limiting algorithms to selected vectors within PDUs to ensure that the vector data is not out of range [DL-R-25]. Table 3.2.3.1-1 describes the input and output of this capability.

Table 3.2.3.1-1
I/O Elements for Rate Limiter tc "3.2.3.1-1 I/O Elements for Rate Limiter" \f t§

Element	Identifier	Input / Output	Purpose
Unsmoothed_Entity_ State_PDU_List	DL-D-08	Input	Represents a list of Entity State PDUs received from the DIS network which have not been processed using a smoothing algorithm
Smoothed_Entity_ State_PDU_List	DL-D-08	Output	Represents a list of Entity State PDUs received from the DIS network which have

been processed using a smoothing algorithm

3.2.3.2 Alpha-Beta Filter (DL-C-3.2)tc "3.2.3.2 Rate Limiter (DFL-C-3.2)"§
The DL shall apply an Alpha-Beta smoothing filter to selected vectors within PDUs to ensure that the vector data is not out of range [DL-R-26]. Table 3.2.3.2-1 describes the input and output of this capability.

Table 3.2.3.2-1
I/O Elements for Alpha-Beta Filter tc "3.2.3.2-1 I/O Elements for Time Averager" \f t§

Element	Identifier	Input / Output	Purpose
Unsmoothed_Entity_ State_PDU_List	DL-D-08	Input	Represents a list of Entity State PDUs received from the DIS network which have not been processed using a smoothing algorithm
Smoothed_Entity_ State_PDU_List	DL-D-08	Output	Represents a list of Entity State PDUs received from the DIS network which have been processed using a smoothing algorithm

3.2.4 DIS Dead-Reckoning Support Capability (DL-C-4)tc "3.2.4 DIS Dead-Reckoning Support Capability"§

The DL 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 Capability tc "3.2.4-1 I/O Data for DIS Dead Reckoning Support Capability" \f t§

Element	Identifier	Input / Output	Purpose
Transmit Entity List	DL-D-12	Input	Contains information entities maintained by the application software
Received Entity List	DL-D-13	Input/Output	Contains information for

			entities received from the network
Local Entity List	DL-D-14	Output	Contains the dead-reckoned positions of all local entities

3.2.5 Coordinate System Support Capability (DL-C-5)tc "3.2.5 Coordinate System Support Capability"§

The DL CSCI shall include routines to convert between geocentric, geodetic, and local coordinate systems. A geocentric coordinate system uses offsets along an orthogonal axis system with its origin at the center of the earth, as described in *IEEE Standard P1278.1, Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0* (IST-CR-93-15), Section 1.2.2. A geodetic coordinate system uses latitude, longitude, and altitude relative to sea level. A local coordinate system (for purposes of this CSCI) is one which uses north, east, and elevation offsets from a centerpoint defined in geodetic coordinates. Table 3.2.5-1 describes the I/O data associated with this capability. Note that each data item may be either an input (if it is the coordinate system being converted from), or an output (if it is the coordinate system being converted to).

Table 3.2.5-1
I/O Data for Coordinate System Support Capabilitytc "3.2.5-1 I/O Data for Coordinate System Support Capability" \f t§

Element	Identifier	Input / Output	Purpose
Geocentric Coordinates	DL-D-15	Input/Output	X/Y/Z position to convert from/to
Geodetic Coordinates	DL-D-15	Input/Output	Latitude/longitude/ elevation to convert from/to
Local Coordinates	DL-D-16	Input/Output	North/East/elevation offsets to convert from/to

3.2.6 Orientation System Support Capability (DL-C-6)tc "3.2.6 Orientation System Support Capability"§

The DL CSCI shall include routines to convert between Euler angles and orientation angles. An Euler angle system uses psi, theta, and phi to describe a rotational transformation between a geocentric and entity coordinate system, as described in *IEEE Standard P1278.1, Standard for Information Technology - Protocols for Distributed Interactive Simulation Applications, Version 2.0* (IST-CR-93-15), Section 1.2.2. An orientation angle system uses heading, pitch, and roll to describe the orientation of an entity. Table 3.2.6-1 describes the I/O data associated with this capability. Note that each data item may be either an input (if it is the coordinate system being converted from), or an output (if it is the coordinate system being converted to).

Table 3.2.6-1
I/O Data for Orientation System Support Capability
tc "3.2.6-1 I/O Data for Orientation System Support Capability" \f t§

Element	**Identifier**	**Input / Output**	**Purpose**
Euler Angles	DL-D-17	Input/Output	Euler angles to convert from/to
Orientation Angles	DL-D-18	Input/Output	Orientation angles to convert from/to

3.3 CSCI Internal Interfaces tc "3.3 CSCI Internal Interfaces"§

The DL CSCI does not contain any internal data interfaces; all exchanging of data occurs via passed parameters. Figure 3.3-1 illustrates the DL data flow which occurs during the execution of library calls.

µ §

Figure 3.3-1
Flow of DL CSCI Capabilitiestc "3.3-1 Flow of DFL CSCI Capabilities" \f f§

3.4 CSCI Data Element Requirements tc "3.4 CSCI Data Element Requirements"§

This paragraph has been tailored out of the DL SRS. Data elements will be addressed in the DL SDD.

3.5 Adaptation Requirementstc "3.5 Adaptation Requirements"§

The DL CSCI shall be integrated and demonstrated within the MFS laboratory; however, the system will not require the laboratory to function [DL-R-27]. The DL shall be able to operate with or without the MFS laboratory Simulation Control Environment [DL-R-28].

3.6 Sizing and Timing Requirementstc "3.6 Sizing and Timing Requirements"§

The DL CSCI shall maintain sufficient throughput to prevent excessive data latency [DL-R-29]. Benchmark (timing) data will be provided for each filter so that an optimal invocation sequence may be determined when the use of multiple filters is required.

3.7 Safety Requirementstc "3.7 Safety Requirements"§

This paragraph has been tailored out of the DL SRS.

3.8 Security Requirementstc "3.8 Security Requirements"§

This paragraph has been tailored out of the DL SRS. All processing for the ADIS project will be unclassified and will not require security measures.

3.9 Design Constraintstc "3.9 Design Constraints"§

The DL CSCI shall be written entirely in Ada, however the design for the DL shall not contain any Ada-specific features which would prohibit use of the filter system by a CSCI that is not written in Ada [DL-R-30]. While it is expected that the system will primarily support other Ada-based CSCIs (such as the DIS Gateway and the Ordnance Server), it is not necessary to limit the useability of the DL by placing Ada-specific features in the DL software interface (i.e., in the function and procedure calls).

3.10 Software Quality Factorstc "3.10 Software Quality Factors"§

This paragraph has been tailored out of the DL SRS.

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

This paragraph has been tailored out of the DL SRS.

4 Qualification Requirements§

Table 4-1 specifies the qualification methods necessary to establish that the DL CSCI satisfies the requirements of Paragraph 3 (Engineering Requirements) and Paragraph 5 (Preparation for Delivery). The DL CSCI does not have any special qualification requirements. In Table 4-1, 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 for verifying the requirement. It is important that requirements be interpreted within the context where they occur -- the originating capabilities and page numbers are included to assist with this.

Table 4-1
Qualification Methods

Requirement Identifier	Requirement	SRS Para	Qualification Method(s) A	D	I
DL-R-01	The DL CSCI shall be capable of being combined and linked with other software.	3.1		■	
DL-R-02	The filtering criteria shall be considered individually (i.e., a filter shall be developed for each of the criteria).	3.2.1			■
DL-R-03	The DL shall calculate a distance quantity based on two position	3.2.1.1.1	■		

	vectors.			
DL-R-04	The DL shall calculate a velocity quantity based on the components of a velocity vector.	3.2.1.1.2		

Requirement Identifier	Requirement	SRS Para	Qualification Method(s)		
			A	D	I
DL-R-05	The DL shall evaluate the result of a distance calculation between two position vectors against a distance threshold and provide a response of True if the result of the calculation is less than or equal to the threshold value or provide a response False otherwise.	3.2.1.2.1			
DL-R-06	The DL shall evaluate the position of an entity or event to determine whether it is positioned within a specific range of orientation relative to the position of a reference entity or event and provide a corresponding response of True or False.	3.2.1.2.2			
DL-R-07	The DL shall evaluate the result of a velocity vector summation against a minimum velocity threshold and provide a response of True if the summation is greater than or equal to the threshold value and provide a response of False otherwise.	3.2.1.2.3.1			
DL-R-08	The DL shall evaluate the result of a velocity vector summation against a maximum velocity threshold and provide a response of True if the summation is less than or equal to the threshold value and provide a response of False otherwise.	3.2.1.2.3.2			

Requirement Identifier	Requirement	SRS Para	Qualification Method(s)		
			A	D	I
DL-R-09	The DL shall evaluate lists of Entity State PDUs based on the distance between the entity and some referential position vector, which is compared to a distance threshold value, and produce a resulting list containing only the PDUs which fall within the specified threshold.	3.2.1.3.1.1.1			
DL-R-10	The DL shall evaluate lists of Fire PDUs based on the distance between the firing entity and some referential position vector, which is compared to a distance threshold value, and produce a resulting list containing only the PDUs which fall within the specified threshold.	3.2.1.3.1.1.2			
DL-R-11	The DL shall evaluate lists of Detonation PDUs based on the distance between the entity and some referential position vector, which is compared to a distance threshold value, and produce a resulting list containing only the PDUs which fall within the specified threshold.	3.2.1.3.1.1.3			
DL-R-12	The DL shall evaluate lists of Entity State PDUs based on the velocity of the entity, which is compared to a minimum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity	3.2.1.3.1.2.1.1			

	greater than or equal to the specified threshold.			

Requirement Identifier	Requirement	SRS Para	Qualification Method(s)		
			A	D	I
DL-R-13	The DL shall evaluate lists of Fire PDUs based on the velocity of the firing entity, which is compared to a minimum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity greater than or equal to the specified threshold.	3.2.1.3.1.2.1.2			
DL-R-14	The DL shall evaluate lists of Detonation PDUs based on the velocity of the detonation, which is compared to a minimum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity greater than or equal to the specified threshold.	3.2.1.3.1.2.1.3			
DL-R-15	The DL shall evaluate lists of Entity State PDUs based on the velocity of the entity, which is compared to a maximum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity less than or equal to the specified threshold.	3.2.1.3.1.2.2.1			
DL-R-16	The DL shall evaluate lists of Fire PDUs based on the velocity of the firing entity, which is compared to a maximum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity less than or equal to the specified threshold.	3.2.1.3.1.2.2.2			

Requirement Identifier	Requirement	SRS Para	Qualification Method(s)		
			A	D	I
DL-R-17	The DL shall evaluate lists of Detonation PDUs based on the velocity of the detonation, which is compared to a maximum velocity threshold value, and produce a resulting list containing only the PDUs which have a velocity less than or equal to the specified threshold.	3.2.1.3.1.2.2.3			
DL-R-18	The DL shall sort lists of Entity State PDUs based on the distance between the entity and some referential position vector.	3.2.1.3.2.1.1			
DL-R-19	The DL shall sort lists of Fire PDUs based on the distance between the firing entity and some referential position vector.	3.2.1.3.2.1.2			
DL-R-20	The DL shall sort lists of Detonation PDUs based on the distance between the entity and some referential position vector	3.2.1.3.2.1.3			
DL-R-21	The DL shall sort lists of Entity State PDUs based on the velocity of the entity.	3.2.1.3.2.2.1			
DL-R-22	The DL shall sort lists of Fire PDUs based on the velocity of the firing entity.	3.2.1.3.2.2.2			
DL-R-23	The DL shall sort lists of Detonation PDUs based on the velocity of the detonation.	3.2.1.3.2.2.3			

DL-R-24	The sorting shall be in the form of prioritizing a list of indices, which represent PDUs within a list, and sort keys, which represent the sort criteria associated with the PDU (e.g. distance, velocity).	3.2.2		
DL-R-25	The DL shall apply rate limiting algorithms to selected vectors within PDUs to ensure that the vector data is not out of range.	3.2.3.1		

Requirement Identifier	Requirement	SRS Para	Qualification Method(s)		
			A	D	I
DL-R-26	The DL shall apply an Alpha-Beta smoothing filter to selected vectors within PDUs to ensure that the vector data is not out of range.	3.2.3.2			
DL-R-27	The DL CSCI shall be integrated and demonstrated within the MFS laboratory; however, the system will not require the laboratory to function.	3.5			
DL-R-28	The DL shall be able to operate with or without the MFS laboratory Simulation Control Environment.	3.5			
DL-R-29	The DL CSCI shall maintain sufficient throughput to prevent excessive data latency.	3.6			
DL-R-30	The DL CSCI shall be written entirely in Ada; however, the design for the DL shall not contain any Ada-specific features which would prohibit use of the filter system by a CSCI that is not written in Ada.	3.9			

Table 4-2

Validation Requirementstc "4-2 Validation Requirements" \f t§

Requirement Number	Validation Requirement
DL-R-01	Validation of this requirement shall consist of a demonstration that the DL CSCI may be combined and linked with other software. The demonstration shall be performed using a test driver which exercises the units within the DIS Library.
DL-R-02	Validation of this requirement shall consist of inspecting the code to ensure that each filter routine applies only one filter criteria.
DL-R-03	Validation of this requirement shall consist of data analysis on the input and resulting output for distance calculations.
DL-R-04	Validation of this requirement shall consist of data analysis on the input and resulting output for velocity calculations.
DL-R-05	Validation of this requirement shall consist of data analysis on the input from the distance calculation and the resulting output from comparison against the distance threshold.
DL-R-06	Validation of this requirement shall consist of data analysis on the input position vectors, the ensuing coordinate transformations involved, and the resulting output from comparison against the orientation threshold range.
DL-R-07	Validation of this requirement shall consist of data analysis on the input from the velocity calculation and the resulting output from comparison against the minimum velocity threshold.
DL-R-08	Validation of this requirement shall consist of data analysis on the input from the velocity calculation and the resulting output from comparison against the maximum velocity threshold.
DL-R-09	Validation of this requirement shall consist of data analysis on the input list of Entity State PDUs and the resulting output list of PDUs after filtering against the distance threshold.
DL-R-10	Validation of this requirement shall consist of data analysis on the input list of Fire PDUs and the resulting output list of PDUs after filtering against the distance threshold.
DL-R-11	Validation of this requirement shall consist of data analysis on the

	input list of Detonation PDUs and the resulting output list of PDUs after filtering against the distance threshold.
DL-R-12	Validation of this requirement shall consist of data analysis on the input list of Entity State PDUs and the resulting output list of PDUs after filtering against the minimum velocity threshold.
DL-R-13	Validation of this requirement shall consist of data analysis on the input list of Fire PDUs and the resulting output list of PDUs after filtering against the minimum velocity threshold.

Requirement Number	Validation Requirement
DL-R-14	Validation of this requirement shall consist of data analysis on the input list of Detonation PDUs and the resulting output list of PDUs after filtering against the minimum velocity threshold.
DL-R-15	Validation of this requirement shall consist of data analysis on the input list of Entity State PDUs and the resulting output list of PDUs after filtering against the minimum velocity threshold.
DL-R-16	Validation of this requirement shall consist of data analysis on the input list of Fire PDUs and the resulting output list of PDUs after filtering against the minimum velocity threshold.
DL-R-17	Validation of this requirement shall consist of data analysis on the input list of Detonation PDUs and the resulting output list of PDUs after filtering against the minimum velocity threshold.
DL-R-18	Validation of this requirement shall consist of data analysis on the input list of Entity State PDUs and the resulting output list of PDUs after sorting based on distance from the reference entity or event.
DL-R-19	Validation of this requirement shall consist of data analysis on the input list of Fire PDUs and the resulting output list of PDUs after sorting based on distance from the reference entity or event.
DL-R-20	Validation of this requirement shall consist of data analysis on the input list of Detonation PDUs and the resulting output list of PDUs after sorting based on distance from the reference entity or event.
DL-R-21	Validation of this requirement shall consist of data analysis on the input list of Entity State PDUs and the resulting output list of PDUs after sorting based on the velocity of each entity.
DL-R-22	Validation of this requirement shall consist of data analysis on the input list of Fire PDUs and the resulting output list of PDUs after sorting based on the velocity of each event.
DL-R-23	Validation of this requirement shall consist of data analysis on the input list of Detonation PDUs and the resulting output list of PDUs after sorting based on the velocity of each event.
DL-R-24	Validation of this requirement shall consist of data analysis on the

	input list indices and keys and the resulting list of output indices and keys to ensure that the list is sorted properly.
DL-R-25	Validation of this requirement shall consist of data analysis on the input Entity State PDUs to determine whether the values in the position vector and the velocity vector are valid based on the values in the velocity vector and the acceleration vector, respectively. The output Entity State PDU must have values which are adjusted accordingly in the event that the vector data is invalid.

Requirement Number	Validation Requirement
DL-R-26	Validation of this requirement shall consist of data analysis on the input Entity State PDUs to determine whether the values in the position vector are valid based on the values in the velocity vector. The output Entity State PDU must have values which are adjusted accordingly in the event that the vector data is invalid.
DL-R-27	Validation of this requirement shall consist of a demonstration that the system passes all tests (unit tests, system tests, etc.) at the MFS laboratory.
DL-R-28	Validation of this requirement shall consist of a demonstration that the system passes all tests (unit tests, system tests, etc.) at a site other than the MFS laboratory.
DL-R-29	Validation of this requirement shall consist of a thorough analysis of filter benchmark results, which indicate the efficiency of each filter routine.
DL-R-30	Validation of this requirement shall consist of inspecting the code to ensure that each filter routine is written in Ada and that the function and procedure parameters do not use Ada-specific features which would prohibit inter-language use of the library.

4.2 Special Qualification Requirementstc "4.2 Special Qualification Requirements"§

This paragraph has been tailored out of the DL SRS.

5 Preparation for Deliverytc "5 Preparation for Delivery"§

Delivery of this CSCI will consist of hard copy versions of the software and documentation and magnetic disk copies of all software and documentation which is not developed on GFE host machines.

6 Notestc "6 Notes"§

The following subparagraphs contain general information to assist in understanding this specification, such as meanings of acronyms and abbreviations.

6.1 Word Usagetc "6.1 Word Usage"§

This System Requirements Specification adheres to the following word usage for paragraphs 1 through 6:

> *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* has 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.

The appendices included with this specification constitute supplemental information which may be useful in understanding the requirements of this specification and do not adhere to the word usage specified above.

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
AJPO	Ada Joint Program Office
CDRL	Contract Data Requirements List
CSCI	Computer Software Configuration Item

DARPA	Defense Advanced Research Project Agency
DL	DIS Library
DIS	Distributed Interactive Simulation
DOD	Department of Defense
DON	Department of the Navy
FTEG	Flight Test and Engineering Group
I/O	Input/Output
IEEE	Institute of Electrical and Electronics Engineers
IRS	Interface Requirements Specification
IST	Institute for Simulation and Training
MFS	Manned Flight Simulator
n/a	Not Applicable
NAWCAD	Naval Air Warfare Center, Aircraft Division
PDU	Protocol Data Unit
SETD	Systems Engineering Test Directorate

SIMNET	Simulator Networking program
SRS	Software Requirements Specification

6.3 Project Unique Identifiers

Table 6.3-1 contains a list of all project unique identifiers used in ADIS system, and their associated meanings.

Table 6.3-1
Project Unique Identifiers

Project Unique Identifier	Meaning
csci-C-nn	Capability nn of the specified CSCI
csci-D-nn	Data element nn of the specified CSCI
csci-II-nn	Internal Interface nn of the specified CSCI
csci-EI-nn	External Interface nn of the specified CSCI
csci-R-nn	Requirement nn of the specified CSCI