Appendix A – VDIS Variable Records

for

**Synthetic Environment (SE) Core**

**Common Virtual Environment Management (CVEM)**

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**Prepared by:**Leidos, Inc.  
Surveillance & Reconnaissance Group  
12901 Science Drive  
Orlando, Florida 32826

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| 1.1 | 19 February 2009 | Added additional clarification to various types of records. Added SIMAN, Gateway Control, Stealth State and Control records for Application Control. Added new record: CFS – Tether-Untether Command. Added section to support Sling Loads. Added support for Common Weather records and Logistics records. |
| 1.2 | 28 October 2009 | Added document control number from VDIS Spec, revision history, and cleanup of headers. Added Command from Simulator (CFS) and Mounting/Towing records. |
| 1.3 | 05 January 2010 | Revised Force ID Affiliation record (VDIS-76, VDIS-86) |
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Table of Contents

[List of Figures vi](#_Toc422237283)

[List of Tables vi](#_Toc422237284)

[A.1 Introduction 1](#_Toc422237285)

[A.2 SIMAN 1](#_Toc422237286)

[A.2.1 SIMAN Record Enumerations 1](#_Toc422237287)

[A.2.2 Application State Record 3](#_Toc422237288)

[A.2.3 Application Health Status Record 4](#_Toc422237289)

[A.2.4 Application Status Type Description Record 5](#_Toc422237290)

[A.2.5 Application Status Description Record 6](#_Toc422237291)

[A.2.6 Application Health Status Capability Record 7](#_Toc422237292)

[A.2.7 Application Health Status Heartbeat Request Record 7](#_Toc422237293)

[A.2.8 Application Initialization Data Record 8](#_Toc422237294)

[A.2.9 Exercise ID Record 9](#_Toc422237295)

[A.2.10 Application Capability Record 10](#_Toc422237296)

[A.2.11 Data Query Request Record 11](#_Toc422237297)

[A.3 Gateway Control 11](#_Toc422237298)

[A.3.1 Gateway Control Record Enumerations 12](#_Toc422237299)

[A.3.2 Gateway Information Request Record 13](#_Toc422237300)

[A.3.3 Gateway Supported Dialects Record 13](#_Toc422237301)

[A.3.4 Gateway Dialect Index Report Record 14](#_Toc422237302)

[A.3.5 Gateway Destination Information Record 15](#_Toc422237303)

[A.3.6 Gateway General Information Record 16](#_Toc422237304)

[A.3.7 Gateway Entity Proximity Filter Information Record 17](#_Toc422237305)

[A.3.8 Gateway Entity Proximity Filters Record 18](#_Toc422237306)

[A.3.9 Gateway Static Geographic Filter Information Record 19](#_Toc422237307)

[A.3.10 Gateway Static Geographic Filter Extents Record 20](#_Toc422237308)

[A.3.11 Gateway Named Static Geographic Filter Extents Record 21](#_Toc422237309)

[A.3.12 Gateway Dynamic Geographic Filter Information Record 23](#_Toc422237310)

[A.3.13 Gateway Dynamic Geographic Filter Extents Record 24](#_Toc422237311)

[A.4 Stealth 25](#_Toc422237312)

[A.4.1 Stealth View Mode Record 25](#_Toc422237313)

[A.4.2 Stealth Location/Orientation Record 26](#_Toc422237314)

[A.4.3 Stealth Attachment Record 27](#_Toc422237315)

[A.4.4 Stealth Dead Reckoning Parameters Record 28](#_Toc422237316)

[A.4.5 Stealth Field of View (FOV) Record 29](#_Toc422237317)

[A.4.6 Stealth Eyepoint Record 30](#_Toc422237318)

[A.4.7 Stealth Fly to Location Record 31](#_Toc422237319)

[A.4.8 Stealth ID Record 31](#_Toc422237320)

[A.5 Task Organization 32](#_Toc422237321)

[A.5.1 Force ID Affiliation Record 32](#_Toc422237322)

[A.5.2 CFS – Tether-Untether Command Datum Record 33](#_Toc422237323)

[A.5.3 Command from Simulator (CFS) Datum Record 33](#_Toc422237324)

[A.6 AAR Event Reporting 34](#_Toc422237325)

[A.6.1 Damage Event Report Datum Record 34](#_Toc422237326)

[A.6.2 Mission Request Event Report 35](#_Toc422237327)

[A.6.3 Indirect or CAS Fire Event Report Datum Record 35](#_Toc422237328)

[A.6.4 Minefield Entry Datum Record 36](#_Toc422237329)

[A.6.5 Mine Detonation Datum Record 36](#_Toc422237330)

[A.6.6 Radar Track Perception Report Datum Record 36](#_Toc422237331)

[A.7 Entity Status Datums 37](#_Toc422237332)

[A.7.1 Munition Record 37](#_Toc422237333)

[A.7.2 Engine Fuel Record 38](#_Toc422237334)

[A.7.3 Storage Fuel Record 38](#_Toc422237335)

[A.7.4 Expendable Record 38](#_Toc422237336)

[A.7.5 Launched Munition Record 38](#_Toc422237337)

[A.7.6 Association Record 38](#_Toc422237338)

[A.7.7 Sensor Record 38](#_Toc422237339)

[A.8 Mounting / Towing / Sling Load Datums 38](#_Toc422237340)

[A.8.1 Number to Mount/Dismount 38](#_Toc422237341)

[A.8.2 Mount/Dismount Data Record 39](#_Toc422237342)

[A.8.3 Carrier Mount ID Record 40](#_Toc422237343)

[A.8.4 Sling Load Capability 41](#_Toc422237344)

[A.9 Weather Records 43](#_Toc422237345)

[A.9.1 Weather State Atmospheric Record 43](#_Toc422237346)

[A.9.2 Weather State Celestial Record 44](#_Toc422237347)

[A.9.3 Weather State Wind Record 45](#_Toc422237348)

[A.9.4 Weather State Precipitation Record 46](#_Toc422237349)

[A.9.5 Weather State Clouds Record 47](#_Toc422237350)

[A.9.6 Weather State Ground Fog Record 49](#_Toc422237351)

[A.9.7 Weather State Haze Record 50](#_Toc422237352)

[A.9.8 Weather State Lightning Record 51](#_Toc422237353)

[A.9.9 Weather State Thunder Record 52](#_Toc422237354)

[A.9.10 Weather State Layer Record 53](#_Toc422237355)

[A.9.11 Bounding Sphere Record 54](#_Toc422237356)

[A.9.12 Uniform Geometry Record 55](#_Toc422237357)

[A.9.13 Rectangular Volume Record 2 Record 55](#_Toc422237358)

[A.10 Logistics Datums 57](#_Toc422237359)

[A.10.1 Component Damage 57](#_Toc422237360)

List of Figures

[Figure 1. Example Destination Traffic Status 16](#_Toc422237361)

[Figure 2. Sling Load Example: Line Length and Hook Offset 42](#_Toc422237362)

List of Tables

[Table 1. SIMAN Record Types 1](#_Toc422237363)

[Table 2. Application State Enumeration 2](#_Toc422237364)

[Table 3. Exercise State Enumeration 2](#_Toc422237365)

[Table 4. Application General Status Enumeration 2](#_Toc422237366)

[Table 5. Application Transition Enumeration 2](#_Toc422237367)

[Table 6. Exercise Transition Enumeration 2](#_Toc422237368)

[Table 7. Status Type Enumeration 2](#_Toc422237369)

[Table 8. Application State record (47100) 4](#_Toc422237370)

[Table 9. Application Health Status record (47200) 5](#_Toc422237371)

[Table 10. Application Status Type Description record (47210) 5](#_Toc422237372)

[Table 11. Application Status Description record (47220) 6](#_Toc422237373)

[Table 12. Application Health Status Capability record (47230) 7](#_Toc422237374)

[Table 13. Application Health Status Heartbeat Request record (47240) 8](#_Toc422237375)

[Table 14. Application Initialization Data record (47300) 9](#_Toc422237376)

[Table 15. Exercise ID record (47400) 9](#_Toc422237377)

[Table 16. Application Capability record (47500) 10](#_Toc422237378)

[Table 17. Data Query Request record (47600) 11](#_Toc422237379)

[Table 18. Gateway Control Record Types 12](#_Toc422237380)

[Table 19. PDU Traffic Status 12](#_Toc422237381)

[Table 20. Gateway Proximity Filter Shape 12](#_Toc422237382)

[Table 21. Filter State 12](#_Toc422237383)

[Table 22. Filter Function 12](#_Toc422237384)

[Table 23. Gateway Information Request record (250110) 13](#_Toc422237385)

[Table 24. Gateway Supported Dialects record (250120) 14](#_Toc422237386)

[Table 25. Gateway Dialect Index Report record (250130) 15](#_Toc422237387)

[Table 26. Gateway Destination Information record (250140) 15](#_Toc422237388)

[Table 27. Example Destination Interactions 16](#_Toc422237389)

[Table 28. Gateway General Information record (250150) 17](#_Toc422237390)

[Table 29. Gateway Entity Proximity Filter Information record (250160) 18](#_Toc422237391)

[Table 30. Gateway Entity Proximity Filters record (250161) 19](#_Toc422237392)

[Table 31. Gateway Static Geographic Filter Information record (250170) 20](#_Toc422237393)

[Table 32. Gateway Static Geographic Filter Extents record (250171) 21](#_Toc422237394)

[Table 33. Gateway Named Static Geographic Filter Extents record (250172) 22](#_Toc422237395)

[Table 34. Gateway Dynamic Geographic Filter Information record (250180) 23](#_Toc422237396)

[Table 35. Gateway Dynamic Geographic Filter Extents record (250181) 24](#_Toc422237397)

[Table 36. Stealth Record IDs 25](#_Toc422237398)

[Table 37. Stealth View Mode record (240160) 26](#_Toc422237399)

[Table 38. Stealth Location/Orientation record (240161) 26](#_Toc422237400)

[Table 39. Stealth Attachment record (240163) 27](#_Toc422237401)

[Table 40. Stealth Dead Reckoning Parameters record (240164) 29](#_Toc422237402)

[Table 41. Stealth Field of View (FOV) record (240165) 30](#_Toc422237403)

[Table 42. Stealth Eyepoint record (240166) 30](#_Toc422237404)

[Table 43. Stealth Fly to Location record (240170) 31](#_Toc422237405)

[Table 44. Stealth ID record (240172) 32](#_Toc422237406)

[Table 45. Task Organization Datum IDs 32](#_Toc422237407)

[Table 46. Force ID Affiliation Datum Record (11250) 32](#_Toc422237408)

[Table 47. Enumeration for CFS Tether-Untether (15500) 33](#_Toc422237409)

[Table 48. Command from Simulator (CFS) Datum Record (15505) 34](#_Toc422237410)

[Table 49. AAR Event Reporting Datum IDs 34](#_Toc422237411)

[Table 50. Damage Event Report Datum Record (35000) 35](#_Toc422237412)

[Table 51. Mission Request Event Report Datum Record (42050) 35](#_Toc422237413)

[Table 52. Indirect or CAS Fire Event Report Datum Record (42060) 35](#_Toc422237414)

[Table 53. Minefield Entry Datum Record (42070) 36](#_Toc422237415)

[Table 54. Mine Detonation Datum Record (42080) 36](#_Toc422237416)

[Table 55. Radar Track Perception Report Datum Record (35500) 37](#_Toc422237417)

[Table 56. Entity Status Datum IDs 37](#_Toc422237418)

[Table 57. Mounting / Towing / Sling Load Datum IDs 38](#_Toc422237419)

[Table 58. Mount/Dismount Data record (16215) 39](#_Toc422237420)

[Table 59. Carrier Mount ID record (16220) 40](#_Toc422237421)

[Table 60. Sling Load Capability record (20030) 42](#_Toc422237422)

[Table 61. Weather Environment Record IDs 43](#_Toc422237423)

[Table 62. Weather State Atmospheric record (260100) 44](#_Toc422237424)

[Table 63. Weather State Celestial record (260200) 45](#_Toc422237425)

[Table 64. Weather State Wind record (260300) 46](#_Toc422237426)

[Table 65. Weather State Precipitation record (260400) 47](#_Toc422237427)

[Table 66. Weather State Clouds record (260500) 48](#_Toc422237428)

[Table 67. Weather State Ground Fog record (260600) 49](#_Toc422237429)

[Table 68. Weather State Haze record (260700) 51](#_Toc422237430)

[Table 69. Weather State Lightning record (260800) 51](#_Toc422237431)

[Table 70. Weather State Thunder record (260900) 52](#_Toc422237432)

[Table 71. Weather State Layer record (261000) 53](#_Toc422237433)

[Table 72. Bounding Sphere record (65536) 54](#_Toc422237434)

[Table 73. Uniform Geometry record (327680) 55](#_Toc422237435)

[Table 74. Rectangular Volume Record 2 record (1342177280) 56](#_Toc422237436)

[Table 75. Logistics Datum IDs 57](#_Toc422237437)

[Table 76. Component Damage Datum Record (35400) 57](#_Toc422237438)

Introduction

The following variable record identifiers and variable specification records are directly supported in VDIS.  The usage and issuance rules of these records specific to the records only are discussed here, but rules regarding several records or sequence diagrams of several records are detailed in the VDIS specification.

Notes regarding the record formats:

1. Standard Variable (SV) records – These shall be at least 16-bits in length. If longer than 16-bits, then the excess data shall be a multiple of 64-bits, i.e., 16+64, 16+128, etc. Padding shall be explicitly defined, and may occur anywhere in the record. The description of Record Type and Record Length is not included for each of the records because they are common to all records.
2. Variable Datum records – These shall be multiples of 64-bits. Padding is defined in the standard as occurring at the end of the record, but given the direction on SV records, it’s recommended to explicitly pad the record wherever necessary.
3. Fixed Datum records – These shall be atomic fields of 8- to 32-bits in length. The padding (if necessary) is not defined in the record and is left to the standard as occurring at the end of the field.
4. Variable Parameter (VP) records – These shall be 128-bits long, including the required 8-bit Record Type at the beginning of the record. Any padding shall be explicitly defined.
5. Environment records – These shall be a multiple of 64-bits in length. Padding shall be explicitly defined, and may occur anywhere in the record. The description of Record Type, Record Length, and Index is not included for each of the records because they are common to all records.

SIMAN

The following table defines the set of Standard Variable record and Datum record IDs that are proposed to be used with scenario initialization, asset control, and exercise control.

Table 1. SIMAN Record Types

| ID | Description | Length (octets) |
| --- | --- | --- |
| 47100 | Application State | 12+4N (padded to multiple of 8) |
| 47200 | Application Health Status | 24 |
| 47210 | Application Status Type Description | 40+N (max 40+128) |
| 47220 | Application Status Description | 16+N (max 16+128) |
| 47230 | Application Health Status Capability | 8+2N+Pi/8 |
| 47240 | Application Health Status Heartbeat Request | 8+4N+Pi/8 |
| 47300 | Application Initialization Data | 456 |
| 47400 | Exercise ID | 8 (SV) or 4 (Fixed Datum) |
| 47500 | Application Capability | 112+32N (max 1136) |
| 47600 | Data Query Request | 8+4N+P*i* /8 |

SIMAN Record Enumerations

This section will identify all the enumerations used in the listed SIMAN records, in addition to the Record Type enumerations listed above.

Table 2. Application State Enumeration

|  |  |
| --- | --- |
| Field Value | Description |
| 0 | Offline/Unknown |
| 1 | Available |
| 2 | Allocated |
| 3 | Error |

Table 3. Exercise State Enumeration

| Field Value | Description |
| --- | --- |
| 0 | Unknown |
| 1 | Unallocated |
| 2 | Allocated |
| 3 | Initialized |
| 4 | Paused |
| 5 | Executing |
| 6 | Error |

Table 4. Application General Status Enumeration

| Field Value | Description |
| --- | --- |
| 0 | Unknown |
| 1 | Functional |
| 2 | Degraded But Functional |
| 3 | Not Functional |

Table 5. Application Transition Enumeration

| Field Value | Description |
| --- | --- |
| 0 | Not Transitioning |
| 1 | Transitioning |

Table 6. Exercise Transition Enumeration

| Field Value | Description |
| --- | --- |
| 0 | Not Transitioning |
| 1 | Transitioning |

Table 7. Status Type Enumeration

| Field Value | Description | Integer Component | Float Component |
| --- | --- | --- | --- |
| 0 | Not Specified | 0 | 0 |
| 10-49 | **CPU Usage** | CPU # | % |
| 10 | User | CPU # | % |
| 11 | System | CPU # | % |
| 12 | I/O | CPU # | % |
| 13 | Idle | CPU # | % |
| 14 | Steal | CPU # | % |
| 15 | Nice | CPU # | % |
| 50-99 | **Memory Usage** | kilobytes | % |
| 50 | Memory Free | kilobytes | % |
| 51 | Memory Used | kilobytes | % |
| 60 | Swap Free | kilobytes | % |
| 61 | Swap Used | kilobytes | % |
| 62 | Swap Cached | kilobytes | % |
| 100-149 | **Networking** | port | value |
| 100 | Transmitted Packets/sec | port | value |
| 101 | Transmitted Bytes/sec | port | value |
| 110 | Received Packets/sec | port | value |
| 111 | Received Bytes/sec | port | value |
| 150-179 | Application Parameters | varies | varies |
| 150 | Niceness Level | level (-20 to 19, def. 10) | N/A |

Application State Record

Purpose

Application state information shall be communicated with the Application State record.

Record Definition

The Application State record shall contain the following fields. Padding may be required at the end of the record for alignment. If the number of exercise allocations is even, then 32-bits of padding shall be added at the end of the record.

1. **Current Application State**. This 8-bit enumeration shall specify the current application state.
2. **Requested Application State**. This 8-bit enumeration shall specify the requested application state.
3. **Current Application Configuration**. This 8-bit unsigned integer shall specify the current configuration. The Application Configuration is intended to be used when an application supports multiple configurations (such as in the case of a reconfigurable manned module). This field is application specific and the corresponding description can be obtained from the simulation application via the Application Capability record. This field corresponds to the numerical order of the Available Application Configurations.
4. **Number of Exercise Allocations**. This 8-bit unsigned integer shall indicate the number of exercise allocations performed by the application.
5. **Exercise State**. These records shall indicate the exercise state for each of the allocated exercises and consist of the following fields:
   1. *Exercise ID*. This 8-bit unsigned integer shall indicate the exercise ID of an allocated exercise of the application.
   2. *Exercise Transition*. This 8-bit enumeration shall specify the transitional exercise state.
   3. *Current Exercise State*. This 8-bit enumeration shall specify the current exercise state.
   4. *Requested Exercise State*. This 8-bit enumeration shall specify the requested exercise state.

Table 8. Application State record (47100)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=12+4N+Pi/8 | 16-bit unsigned integer |
| Padding | 8-bits unused |
| Application Transition | 8-bit enumeration |
| Current Application State | 8-bit enumeration |
| Requested Application State | 8-bit enumeration |
| Current Application Configuration | 8-bit unsigned integer |
| Number of Exercise Allocations (N) | 8-bit unsigned integer |
| Exercise State #1 | Exercise ID – 8-bit unsigned integer |
| Exercise Transition – 8-bit enumeration |
| Current Exercise State – 8-bit enumeration |
| Requested Exercise State – 8-bit enumeration |
| … | |
| Exercise State #N | Exercise ID – 8-bit unsigned integer |
| Exercise Transition – 8-bit enumeration |
| Current Exercise State – 8-bit enumeration |
| Requested Exercise State – 8-bit enumeration |
| Padding | P*i* bits unused (32 if N is even, 0 if N is odd) |

Issuance Rules

The following specific field requirements apply:

* The Number of Exercise Allocations shall be in the range of 0 (to indicate no exercises) to 32.
* The Exercise ID shall be in the range of 1 to 254.
* The Requested Exercise State shall match the Current Exercise State field value, except when the application is in the process of transitioning into a different exercise state.
* This Request Application State shall match the Current Application State value, except when the application is in the process of transitioning into a different application state.

Receipt Rules

There are no specific receipt rules for this record.

Application Health Status Record

Purpose

Application health status information shall be communicated via the Application Health Status record.

Record Definition

The Application Health Status record shall contain the following fields.

1. **Status Type**. This 16-bit enumeration shall indicate the type of status for this entry.
2. **General Status**. This 8-bit enumeration shall indicate the general application status for this status type.
3. **Specific Status**. This 8-bit enumeration shall indicate the specific application status for this status type.
4. **Status Value (Integer Component)**. This 32-bit signed integer shall indicate the integer component of the application status for this status type. The limits, range, and units for this field are defined per Status Type.
5. **Status Value (Float Component)**. This 64-bit floating point shall indicate the floating point component of the application status for this status type. The limits, range, and units for this field are defined per Status Type.

Table 9. Application Health Status record (47200)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=24 | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Status Type | 16-bit enumeration |
| General Status | 8-bit enumeration |
| Specific Status | 8-bit enumeration |
| Status Value (Integer Component) | 32-bit signed integer |
| Status Value (Float Component) | 64-bit floating point |

Issuance Rules

The following specific field requirements apply:

* Application specific values for the Status Type should be 10,000 and higher.
* The enumeration value 0 for Specific Status shall be reserved for “Not specified.”

Receipt Rules

There are no specific receipt rules for this record.

Application Status Type Description Record

Purpose

The detailed description of a particular Status Type shall be communicated with the Application Status Type Description record. The Status Type is communicated via the Application Health Status record.

Record Definition

The Application Status Type Description record shall contain the following fields:

1. **Status Type**. This 16-bit enumeration shall indicate the type of status for this entry.
2. **Status Name**. This field shall define the name (abbreviated text description) for this status type. It shall be represented by a 256-bit null-terminated string of ASCII characters.
3. **Status Description**. This field shall provide a description for this status type. It shall be represented by a variable-length (max 1024-bits, min 64-bits), null-terminated string of ASCII characters. This field shall be in multiples of 64-bits (8 octets) and padded by blanks or null characters.

Table 10. Application Status Type Description record (47210)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=40+N (max 40+128) | 16-bit unsigned integer |
| Status Type | 16-bit enumeration |
| Status Name | 256-bit string (32 characters) |
| Status Description | variable-length string (padded by blanks to multiple of 64-bits) |

Issuance Rules

The following issuance rules apply:

* The Application Status Type Description record should only be used prior to exercise start.

The following specific field requirements apply:

* Application specific values for the Status Type should be 10,000 and higher.

Receipt Rules

There are no specific receipt rules for this record.

Application Status Description Record

Purpose

The detailed description of a particular application status shall be communicated with the Application Status Description record. The Status Type, General Status, and Specific Status are communicated via the Application Health Status record.

Record Definition

The Application Status Description record shall contain the following fields:

1. **Status Type**. This 16-bit enumeration shall indicate the type of status for this entry.
2. **General Status**. This 8-bit enumeration shall indicate the general application status for this status type.
3. **Specific Status**. This 8-bit enumeration shall indicate the specific application status for this status type.
4. **Status Description**. This field shall provide a description for this status type. It shall be represented by a variable-length (max 1024-bits, min 64-bits), null-terminated string of ASCII characters. This field shall be in multiples of 64-bits (8 octets) and padded by blanks or null characters.

Table 11. Application Status Description record (47220)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=16+N (max 16+128) | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Status Type | 16-bit enumeration |
| General Status | 8-bit enumeration |
| Specific Status | 8-bit enumeration |
| Padding | 32-bits unused |
| Status Description | variable-length string (padded by blanks to multiple of 64-bits) |

Issuance Rules

The following issuance rules apply:

* The Application Status Description record should only be used prior to exercise start.

The following specific field requirements apply:

* Application specific values for the Status Type should be 10,000 and higher.
* The enumeration value 0 for Specific Status shall be reserved for “Not specified.”

Receipt Rules

There are no specific receipt rules for this record.

Application Health Status Capability Record

Purpose

Health status capability of a simulation application shall be communicated with the Application Health Status Capability record.

Record Definition

The Application Health Status Capability record shall contain the following fields:

1. **Number of Status Types**. This 16-bit unsigned integer shall identify the number of status types that are supported by this application and that are transmitted in this PDU.
2. **Status Type**. These 16-bit enumerations shall indicate the types of status supported by this application.

Table 12. Application Health Status Capability record (47230)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=8+2N+Pi/8 | 16-bit unsigned integer |
| Number of Status Types (N) | 16-bit unsigned integer |
| Status Type #1 | 16-bit enumeration |
| … | |
| Status Type #N | 16-bit enumeration |
| Padding | P*i* bits unused (to 64-bit boundary) |

Issuance Rules

The following issuance rules apply:

* The Application Health Status Capability record should only be used prior to exercise start.

The following specific field requirements apply:

* Application specific values for the Status Type should be 10,000 and higher.

Receipt Rules

There are no specific receipt rules for this record.

Application Health Status Heartbeat Request Record

Purpose

Health status heartbeat requests to a simulation application shall be communicated with the Application Health Status Heartbeat Request record.

Record Definition

The Application Health Status Heartbeat Request record shall contain the following fields:

1. **Number of Status Types.** This 16-bit unsigned integer shall identify the number of status types that are to be heartbeated and that are identified in this PDU.
2. **Status Type Heartbeat Record.** These fields shall indicate the types of status to be heartbeated and the heartbeat update rate. They shall be represented by 32-bit records as defined below.
   1. *Status Type*. This 16-bit enumeration shall indicate the type of status for this entry.
   2. *Status Threshold*. This 8-bit enumeration shall indicate the threshold for which this status should be updated outside the heartbeat rate. This value is defined per Status Type.
   3. *Heartbeat Rate*. This 8-bit unsigned integer shall indicate the heartbeat update rate in seconds.

Table 13. Application Health Status Heartbeat Request record (47240)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=8+4N+Pi/8 | 16-bit unsigned integer |
| Number of Status Types (N) | 16-bit unsigned integer |
| Status Type Heartbeat Record #1 | Status Type – 16-bit unsigned integer |
| Status Threshold – 8-bit enumeration |
| Heartbeat Rate – 8-bit unsigned integer |
| … | |
| Status Type Heartbeat Record #N | Status Type – 16-bit unsigned integer |
| Status Threshold – 8-bit enumeration |
| Heartbeat Rate – 8-bit unsigned integer |
| Padding | P*i* bits unused (32 if N is odd, 0 if N is even) |

Issuance Rules

The following specific field requirements apply:

* The Number of Status Types shall be set to zero to disable all health status heartbeating.
* Application specific values for the Status Type should be 10,000 and higher.
* A Status Threshold of zero shall signify “No Threshold,” indicating that this Status Type is never updated outside the request heartbeat rate.

Receipt Rules

There are no specific receipt rules for this record.

Application Initialization Data Record

Purpose

Simulation application initialization data shall be communicated with the Application Initialization Data record.

Record Definition

The Application Initialization Data Record shall contain the following fields:

1. **Exercise ID.** This 8-bit unsigned integer shall identify the exercise ID.
2. **Exercise File Path.** This field shall specify the file path for the application initialization data file. It shall be represented by a 2048-bit null-terminated string of ASCII characters.
3. **Exercise File Name**. This field shall specify the file name for the application initialization data file. It shall be represented by a 1024-bit null-terminated string of ASCII characters.
4. **Application Role.** This field shall define the role of the receiving simulation application. It shall be represented by a 512-bit null-terminated string of ASCII characters. The enumeration and identification of application roles is not within the current scope of this specification and is left as an exercise agreement.

Table 14. Application Initialization Data record (47300)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=456 | 16-bit unsigned integer |
| Exercise ID | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Exercise File Path | 2048-bit string (256 characters) |
| Exercise File Name | 1024-bit string (128 characters) |
| Application Role | 512-bit string (64 characters) |

Issuance Rules

The following issuance rules apply:

* The Application Initialization Data record should only be used prior to exercise start.

The following specific field requirements apply:

* If there is no common directory or drive for the location of the initialization data, then the Exercise File Path field shall be blank.
* The Exercise File Name should not include file format identification, i.e., specific file extension. The receiving application determines the file formats it understands.

Receipt Rules

There are no specific receipt rules for this record.

Exercise ID Record

Purpose

If the exercise ID needs to be transmitted outside the scope of other records or PDUs, then it shall be communicated with the Exercise ID record.

Record Definition

The Exercise ID record shall contain the following fields:

1. **Exercise ID.** This 8-bit unsigned integer shall identify the exercise ID.

Table 15. Exercise ID record (47400)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=8 | 16-bit unsigned integer |
| Exercise ID | 8-bit unsigned integer |
| Padding | 8-bits unused |

Issuance Rules

The following specific field requirements apply:

* The Exercise ID shall in the range of 1-254. Exercise 0 shall be reserved for asset management and other simulation control functions. Exercise 255 shall be reserved to signify All Exercises.

Receipt Rules

There are no specific receipt rules for this record.

Application Capability Record

Purpose

Capabilities of the simulation application shall be communicated with the Application Capability record.

Record Definition

The Application Capability Record shall contain the following fields (an extra 64-bits of padding is included for (easier) future expansion):

1. **Maximum Number of Supported Exercises.** This 8-bit unsigned integer shall specify the maximum number of exercises supported by the application.
2. **Number of Available Application Configurations.** This 8-bit unsigned integer shall specify the number of application configurations available.
3. **Application Kind Name.** This field shall indicate the generic application name, such as “Data Collector”, “SAF”, or “M1A1\_Sim”. It shall be represented by a 256-bit null-terminated string of ASCII characters.
4. **Application Instance Name.** This field shall indicate the specific application name that is unique within a training system, such as “M1A1\_G7”, “SAF Three”, or “Data Collector in I&T Lab”. It shall be represented by a 256-bit null-terminated string of ASCII characters.
5. **Application Host Alias.** This field shall indicate any alias of the application host. It shall be represented by a 256-bit null-terminated string of ASCII characters.
6. **Available Application Configuration.** These fields shall specify the available application configurations. They shall be represented by 256-bit null-terminated strings of ASCII characters.

Table 16. Application Capability record (47500)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=112+32N | 16-bit unsigned integer |
| Maximum Number of Supported Exercises | 8-bit unsigned integer |
| Number of Available Application Configurations (N) | 8-bit unsigned integer |
| Padding | 64-bits unused |
| Application Kind Name | 256-bit string (32 characters) |
| Application Instance Name | 256-bit string (32 characters) |
| Application Host Alias | 256-bit string (32 characters) |
| Available Application Configuration #1 | 256-bit string (32 characters) |
| … |  |
| Available Application Configuration #N | 256-bit string (32 characters) |

Issuance Rules

The following issuance rules apply:

* The Application Capability record should only be used prior to exercise start.

The following specific field requirements apply:

* The Maximum Number of Supported Exercises shall be in the range of 1 to 32.
* The Number of Available Application Configurations shall be in the range of 1 to 32.
* The Application Kind Name field is intended to allow for the classification of application information in a user interface and should be used in conjunction with the Application Instance Name field. An example use of this field is an Application Kind Name of “Fruit,” when the Application Instance Name is “Apple.”
* The Application Instance Name field is intended to uniquely identify an application for display in a user interface and should be used in conjunction with the Application Kind Name field. An example use of this field is an Application Instance Name of “Pear,” when the Application Kind Name is “Fruit.”

Receipt Rules

There are no specific receipt rules for this record.

Data Query Request Record

Purpose

Data request for application control shall be communicated with the Data Query Request record. Information about current application settings can be retrieved by sending the Application Control PDU with the Control Type set to Data Query (2) and a Data Query Request record containing a list of the desired record types.

Record Definition

The Data Query Request record shall contain the following fields:

1. **Number of Records.** This 16-bit unsigned integer shall specify the number of record types for which information is being requested.
2. **Record Type.** These 32-bit enumerations shall indicate the unique record numbers for which information is being requested.

Table 17. Data Query Request record (47600)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=8+4N+P*i* /8 | 16-bit unsigned integer |
| Number of Records (*N*) | 16-bit unsigned integer |
| Record Type #*1* | 32-bit enumeration |
| … | |
| Record Type #*N* | 32-bit enumeration |
| Padding | P*i* bits unused (32 if N is odd) |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Control

The following table defines the set of Standard Variable record IDs that are proposed to be used with gateway control (primarily within context of the Application Control PDU).

Table 18. Gateway Control Record Types

| ID | Description | Length (octets) |
| --- | --- | --- |
| 250110 | Gateway Information Request | 8+4N+P*i* /8 |
| 250120 | Gateway Supported Dialects | 8+(8+ Mi)N |
| 250130 | Gateway Dialect Index Report | 8+P*i*/8 |
| 250140 | Gateway Destination Information | 8 |
| 250150 | Gateway General Information | 16 |
| 250160 | Gateway Entity Proximity Filter Information | 16 |
| 250161 | Gateway Entity Proximity Filters | 16+8N |
| 250170 | Gateway Static Geographic Filter Information | 16 |
| 250171 | Gateway Static Geographic Filter Extents | 16+32N |
| 250172 | Gateway Named Static Geographic Filter Extents | 16+32N |
| 250180 | Gateway Dynamic Geographic Filter Information | 16 |
| 250181 | Gateway Dynamic Geographic Filter Extents | 16+32N |

Gateway Control Record Enumerations

This section will identify all the enumerations used in the listed Gateway Control records, in addition to the Record Type enumerations listed above.

Table 19. PDU Traffic Status

| Value | Description |
| --- | --- |
| 0 | No Traffic |
| 1 | Traffic Can Only Flow To Destination |
| 2 | Traffic Can Only Flow Out Of Destination |
| 3 | Bi-Directional Traffic |

Table 20. Gateway Proximity Filter Shape

| Value | Description |
| --- | --- |
| 0 | Spherical |
| 1 | Cylindrical |

Table 21. Filter State

| Value | Description |
| --- | --- |
| 0 | Inactive |
| 1 | Active |

Table 22. Filter Function

| Value | Description |
| --- | --- |
| 0 | Inclusive – Has to pass all other inclusive filters as well |
| 1 | Exclusive/Unblockable – Has to pass any one exclusive/unblockable filter |

Gateway Information Request Record

Purpose

Information about current gateway settings can be retrieved by sending the Application Control PDU with the Control Type set to Data Query (2) and a Gateway Information Request record containing a list of the desired gateway record types.

Record Definition

The Gateway Information Request record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this request applies.
2. **Number of Records.** This 8-bit unsigned integer shall specify the number of record types for which information is being requested.
3. **Record Type.** These 32-bit enumerations shall indicate the unique record numbers for which information is being requested.

Table 23. Gateway Information Request record (250110)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=8+4N+P*i* /8 | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Number of Records (*N*) | 8-bit unsigned integer |
| Record Type #*1* | 32-bit enumeration |
| … | |
| Record Type #*N* | 32-bit enumeration |
| Padding | P*i* bits unused (32 if N is odd) |

Issuance Rules

The following issuance rules apply:

* A simulation application should only request gateway information on Gateway control records as documented in this section.

The following specific field requirements apply:

* A Destination value of 0 shall indicate all destinations.
* The Gateway Information Request record type itself shall not be one of the Record Types requested.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Supported Dialects Record

Purpose

Information pertaining to the supported dialects by the gateway shall be communicated with the Gateway Supported Dialects record.

Record Definition

The Gateway Supported Dialects record shall contain the following fields:

1. **Number of Dialects.** This 8-bit unsigned integer shall specify the number of dialect records present in the current PDU.
2. **Dialect.** These fields shall specify the DIS entity enumeration dialects supported by the gateway application. These fields shall be represented by records containing a length value and a variable length string, as follows.
   1. *Dialect Name Length*. This 8-bit unsigned integer shall specify the number of characters in the dialect name including room for a NULL termination character.
   2. *Dialect Name*. This field shall specify the DIS entity enumeration dialect name. It shall be represented by a variable-length, null-terminated string of ASCII characters.

Table 24. Gateway Supported Dialects record (250120)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=8+(8+ Mi)N | 16-bit unsigned integer |
| Padding | 8-bits unused |
| Number of Dialects (*N*) | 8-bit unsigned integer |
| Dialect #*1* | Dialect Name Length (Mi) – 8-bit unsigned integer |
| Dialect Name – variable-length string |
| … | |
| Dialect #*N* | Dialect Name Length (Mi) – 8-bit unsigned integer |
| Dialect Name – variable-length string |
| Padding | P*i* bits unused |

Issuance Rules

The following issuance rules apply:

* The actual Dialect Names provided by a simulation application is outside the scope of this specification. Gateways may use whatever values they wish.

The following specific field requirements apply:

* The Number of Dialects shall not be zero.
* The Dialect Name Length shall not be zero.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Dialect Index Report Record

Purpose

The number of dialects supported by a particular destination shall be communicated with the Gateway Dialect Index Report record.

Record Definition

The Gateway Dialect Index Report record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this report applies.
2. **Number of Dialect Indices.** This 8-bit unsigned integer shall specify the number of dialects supported by the destination.
3. **Dialect Index.** These 8-bit unsigned integers shall specify the DIS dialects supported by the destination.

Table 25. Gateway Dialect Index Report record (250130)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=8+P*i*/8 | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Number of Dialect Indices (*N*) | 8-bit unsigned integer |
| Dialect Index #*1* | 8-bit unsigned integer |
| … | |
| Dialect Index #*N* | 8-bit unsigned integer |
| Padding | P*i* bits unused (to 64-bit boundary) |

Issuance Rules

The following specific field requirements apply:

* The Destination shall not be zero. A request for all dialects on all destinations is not allowed.
* The Number of Dialect Indices shall not be zero.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Destination Information Record

Purpose

The number of destinations and the current one receiving this PDU shall be communicated with the Gateway Destination Information record.

Record Definition

The Gateway Destination Information record shall contain the following fields:

1. **Number of Destinations.** This 8-bit unsigned integer shall contain the number of destinations currently in use by the gateway.
2. **Current Destination.** This 8-bit unsigned integer shall contain the destination number that the PDU is currently being transmitted on.

Table 26. Gateway Destination Information record (250140)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=8 | 16-bit unsigned integer |
| Number of Destinations | 8-bit unsigned integer |
| Current Destination | 8-bit unsigned integer |

Issuance Rules

The following specific field requirements apply:

* The Number of Destinations shall be between 1 and 255. A value of 1 should only be used for testing purposes or data capturing. One destination has no purpose in a traditional gateway.
* The Current Destination shall not be zero.

Receipt Rules

There are no specific receipt rules for this record.

Gateway General Information Record

Purpose

Information about a destination on the gateway shall be communicated with the Gateway General Information record.

Figure 1 depicts a gateway application connected to four different destinations with each destination having a unique PDU Traffic Status (shown by arrows). Utilizing this configuration, no PDU traffic will be received from or sent to Destination 1. Destination 2 will receive PDU traffic from Destinations 3 and 4. Destination 3 will not receive any PDU traffic from any of the other destinations. Destination 4 will receive PDU traffic from Destination 3.



Figure 1. Example Destination Traffic Status

Table 27 describes the interactions of the destinations from the figure.

Table 27. Example Destination Interactions

| Destination | PDU Traffic Status Type | Internal PDU Traffic Sent To | External PDU  Traffic Received From |
| --- | --- | --- | --- |
| 1 | (0) No Traffic | N/A | N/A |
| 2 | (1) Traffic Can Only Flow To Destination | N/A | Destinations 3 and 4 |
| 3 | (2) Traffic Can Only Flow Out Of Destination | Destinations 2 and 4 | N/A |
| 4 | (3) Bi-Directional Traffic | Destination 2 | Destination 3 |

Record Definition

The Gateway General Information record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this report applies.
2. **PDU Traffic Status.** This 8-bit enumeration shall contain the current PDU traffic status for the specified destination.
3. **Exercise ID.** This 8-bit unsigned integer shall specify the exercise to which the destination is connected.
4. **Protocol Version.** This 8-bit enumeration shall specify the version of protocol used in the PDUs on the specified destination.

Table 28. Gateway General Information record (250150)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16 | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| PDU Traffic Status | 8-bit enumeration |
| Exercise ID | 8-bit unsigned integer |
| Protocol Version | 8-bit enumeration |
| Padding | 16-bits unused |
| Padding | 32-bits unused |

Issuance Rules

The following specific field requirements apply:

* Exercise ID shall be in the range of 0 to 254. An Exercise ID of ALL\_EXERCISES (255) shall not be used. NO\_EXERCISE (0) is allowed because the gateway could be translating for the control traffic exercise number.
* A Protocol Version value of 0 shall indicate that the version is unknown and PDUs forwarded to this destination do not undergo any protocol version translations.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Entity Proximity Filter Information Record

Purpose

Entity proximity filter information for Entity States shall be communicated with the Gateway Entity Proximity Filter Information record.

Record Definition

This record defines or provides the entity proximity filter information for Entity States. This record is used to both query and set the information. The Gateway Entity Proximity Filter Information record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Filter State.** This 8-bit enumeration identifies the state of all entity proximity filters, whether or not they are currently active.
3. **Filter Function.** This 8-bit enumeration identifies how this filter functions with other, active Entity State filters, such as whether or not external entities that pass this filter must also pass other filters.
4. **Default Distance.** This 8-bit unsigned integer shall specify the default radial distance in kilometers around the entities in which external entities are considered to have passed the filter.
5. **Proximity Filter Shape.** This 8-bit enumeration shall contain the shape of the proximity filter around each entity.

Table 29. Gateway Entity Proximity Filter Information record (250160)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16 | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Filter State | 8-bit enumeration |
| Filter Function | 8-bit enumeration |
| Default Distance | 8-bit unsigned integer |
| Proximity Filter Shape | 8-bit enumeration |
| Padding | 8-bits unused |
| Padding | 32-bits unused |

Issuance Rules

The following issuance rules apply:

* This record may be used to set and query the information.

The following specific field requirements apply:

* A Filter State of nonzero shall indicate an active filter. External entities shall be required to pass the filter in order to be forwarded to the destination.
* If the Filter State is Inactive (0), then the Dynamic Geographic Filter shall utilize the entities defined in the Gateway Entity Proximity Filters record when the Dynamic Filter Group is non-zero.
* A Filter Function that has a value of Inclusive (0) shall indicate that external entities that pass this filter shall also be required to pass any other Entity State filters with the same function.
* A Filter Function that has a value of Exclusive/Unblockable (1) shall indicate that external entities that pass this filter shall not be required to pass any other filters.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Entity Proximity Filters Record

Purpose

Entity proximity filters for Entity States shall be communicated with the Gateway Entity Proximity Filters record.

Record Definition

This record defines or provides the entity proximity filters for Entity States. This record is used to both query and set the information. The Gateway Entity Proximity Filters record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Number of Filters**. This 32-bit unsigned integer shall specify the number of entity proximity filters for the specified destinations that are in this PDU.
3. **Filter.** These fields shall specify the entity proximity filters defined for the destination. These fields shall be represented by records defined as follows.
   1. *Proximity Distance*. This 8-bit unsigned integer shall specify the radial distance in kilometers around the entity in which external entities are considered to have passed the filter.
   2. *Dynamic Filter Group*. This 8-bit unsigned integer shall specify the geographic filter group that the entity belongs to for the automatic geographic filter capability.
   3. *Entity ID*. This 48-bit Entity Identifier record shall identify the entity to which the filter is applied.

Table 30. Gateway Entity Proximity Filters record (250161)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16+8N | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Padding | 32-bits unused |
| Number of Filters (*N*) | 32-bit unsigned integer |
| Filter/Entity #*1* | Proximity Distance – 8-bit unsigned integer |
| Dynamic Filter Group – 8-bit unsigned integer |
| Entity ID – 48-bit Entity Identifier Record |
| … | |
| Filter/Entity #*N* | Proximity Distance – 8-bit unsigned integer |
| Dynamic Filter Group – 8-bit unsigned integer |
| Entity ID – 48-bit Entity Identifier Record |

Issuance Rules

The following issuance rules apply:

* This record may be used to set and query the information.

The following specific field requirements apply:

* The Proximity Distance shall not be used by the dynamic filter.
* A Proximity Distance of zero shall indicate that the Default Distance value be used. See Gateway Entity Proximity Filter Information record for more information on Default Distance.
* If the entity does not belong to a group, then Dynamic Filter Group shall be zero.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Static Geographic Filter Information Record

Purpose

Static geographic filter information for Entity States shall be communicated with the Gateway Static Geographic Filter Information record.

Record Definition

The Gateway Static Geographic Filter Information record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Filter State.** This 8-bit enumeration identifies the state of all static geographic filters, whether or not they are currently active.
3. **Filter Function.** This 8-bit enumeration identifies how this filter functions with other, active Entity State filters, such as whether or not external entities that pass this filter must also pass other filters.

Table 31. Gateway Static Geographic Filter Information record (250170)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16 | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Filter State | 8-bit enumeration |
| Filter Function | 8-bit enumeration |
| Padding | 8-bits unused |
| Padding | 16-bits unused |
| Padding | 32-bits unused |

Issuance Rules

The following issuance rules apply:

* This record may be used to set and query the information.

The following specific field requirements apply:

* A Filter State of nonzero shall indicate an active filter. External entities shall be required to pass the filter in order to be forwarded to the destination.
* A Filter Function that has a value of Inclusive (0) shall indicate that external entities that pass this filter shall also be required to pass any other Entity State filters with the same function.
* A Filter Function that has a value of Exclusive/Unblockable (1) shall indicate that external entities that pass this filter shall not be required to pass any other filters.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Static Geographic Filter Extents Record

Purpose

Static geographic filters for Entity States shall be communicated with the Gateway Static Geographic Filter Extents record.

Record Definition

The Gateway Static Geographic Filter Extents record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Number of Filters.** This 32-bit unsigned integer shall specify the number of static geographic filters for the specified destination that are in this PDU.
3. **Filter.** These fields shall specify the static geographic filters defined for the destination. These fields shall be represented by records defined as follows.
   1. *Lower Left Latitude*. This 64-bit floating point shall specify the latitude of the lower left corner of the filter.
   2. *Lower Left Longitude*. This 64-bit floating point shall specify the longitude of the lower left corner of the filter.
   3. *Upper Right Latitude*. This 64-bit floating point shall specify the latitude of the upper right corner of the filter.
   4. *Upper Right Longitude*. This 64-bit floating point shall specify the longitude of the upper right corner of the filter.

Table 32. Gateway Static Geographic Filter Extents record (250171)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16+32N | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Padding | 32-bits unused |
| Number of Filters (*N*) | 32-bit unsigned integer |
| Filter #*1* | Lower Left Latitude – 64-bit floating point |
| Lower Left Longitude – 64-bit floating point |
| Upper Right Latitude – 64-bit floating point |
| Upper Right Longitude – 64-bit floating point |
| … | |
| Filter #*N* | Lower Left Latitude – 64-bit floating point |
| Lower Left Longitude – 64-bit floating point |
| Upper Right Latitude – 64-bit floating point |
| Upper Right Longitude – 64-bit floating point |

Issuance Rules

The following issuance rules apply:

* This record may be used to set and query the information.

The following specific field requirements apply:

* The Destination shall not be zero.
* The Filters shall not degenerate into a line or point.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Named Static Geographic Filter Extents Record

Purpose

Named static geographic filters for Entity States shall be communicated with the Gateway Named Static Geographic Filter Extents record.

Record Definition

The Gateway Named Static Geographic Filter Extents record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Number of Filters.** This 32-bit unsigned integer shall specify the number of static geographic filters for the specified destination that are in this PDU.
3. **Filter.** These fields shall specify the static geographic filters defined for the destination. These fields shall be represented by records defined as follows.
   1. *Active*. This 8-bit enumeration indicates the status of the filter. The values for this are False (0) and True (1).
   2. *Name*. This 31-character NULL-terminated string defines the name for this static geographic filter.
   3. *Lower Left Latitude*. This 64-bit floating point shall specify the latitude of the lower left corner of the filter.
   4. *Lower Left Longitude*. This 64-bit floating point shall specify the longitude of the lower left corner of the filter.
   5. *Upper Right Latitude*. This 64-bit floating point shall specify the latitude of the upper right corner of the filter.
   6. *Upper Right Longitude*. This 64-bit floating point shall specify the longitude of the upper right corner of the filter.

Table 33. Gateway Named Static Geographic Filter Extents record (250172)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16+64N | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Padding | 32-bits unused |
| Number of Filters (*N*) | 32-bit unsigned integer |
| Filter #*1* | Active – 8-bit enumeration |
| Name – 248-bit string (31 characters) |
| Lower Left Latitude – 64-bit floating point |
| Lower Left Longitude – 64-bit floating point |
| Upper Right Latitude – 64-bit floating point |
| Upper Right Longitude – 64-bit floating point |
| … | |
| Filter #*N* | Active – 8-bit enumeration |
| Name – 248-bit string (31 characters) |
| Lower Left Latitude – 64-bit floating point |
| Lower Left Longitude – 64-bit floating point |
| Upper Right Latitude – 64-bit floating point |
| Upper Right Longitude – 64-bit floating point |

Issuance Rules

The following issuance rules apply:

* This record may be used to set and query the information.

The following specific field requirements apply:

* The Destination shall not be zero.
* The Filters shall not degenerate into a line or point.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Dynamic Geographic Filter Information Record

Purpose

Dynamic geographic filter information for Entity States shall be communicated with the Gateway Dynamic Geographic Filter Information record.

Record Definition

The Gateway Dynamic Geographic Filter Information record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Filter State.** This 8-bit enumeration identifies the state of all dynamic geographic filters, whether or not they are currently active.
3. **Filter Function.** This 8-bit enumeration identifies how this filter functions with other, active Entity State filters, such as whether or not external entities that pass this filter must also pass other filters.
4. **Extension Distance.** This 8-bit unsigned integer shall specify the distance in kilometers that the filter shall be extended in each direction around the entities.
5. **Update Rate.** This 8-bit unsigned integer shall contain the update interval in seconds between recalculating the bounds of the filters.

Table 34. Gateway Dynamic Geographic Filter Information record (250180)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16 | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Filter State | 8-bit enumeration |
| Filter Function | 8-bit enumeration |
| Extension Distance | 8-bit unsigned integer |
| Update Rate | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Padding | 32-bits unused |

Issuance Rules

The following issuance rules apply:

* This record may be used to set and query the information.

The following specific field requirements apply:

* The Destination shall not be zero.
* The Extension Distance shall not be zero.

Receipt Rules

There are no specific receipt rules for this record.

Gateway Dynamic Geographic Filter Extents Record

Purpose

Dynamic geographic filters for Entity States shall be communicated with the Gateway Dynamic Geographic Filter Extents record.

Record Definition

The Gateway Dynamic Geographic Filter Extents record shall contain the following fields:

1. **Destination.** This 8-bit unsigned integer shall contain the destination number to which this record applies.
2. **Number of Filters.** This 32-bit unsigned integer shall specify the number of dynamic geographic filters for the specified destination that are in this PDU.
3. **Filter.** These fields shall specify the dynamic geographic filters defined for the destination. These fields shall be represented by records defined as follows.
   1. *Lower Left Latitude*. This 64-bit floating point shall specify the latitude of the lower left corner of the filter.
   2. *Lower Left Longitude*. This 64-bit floating point shall specify the longitude of the lower left corner of the filter.
   3. *Upper Right Latitude*. This 64-bit floating point shall specify the latitude of the upper right corner of the filter.
   4. *Upper Right Longitude*. This 64-bit floating point shall specify the longitude of the upper right corner of the filter.

Table 35. Gateway Dynamic Geographic Filter Extents record (250181)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16+32N | 16-bit unsigned integer |
| Destination | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Padding | 32-bits unused |
| Number of Filters (*N*) | 32-bit unsigned integer |
| Filter #*1* | Lower Left Latitude – 64-bit floating point |
| Lower Left Longitude – 64-bit floating point |
| Upper Right Latitude – 64-bit floating point |
| Upper Right Longitude – 64-bit floating point |
| … | |
| Filter #*N* | Lower Left Latitude – 64-bit floating point |
| Lower Left Longitude – 64-bit floating point |
| Upper Right Latitude – 64-bit floating point |
| Upper Right Longitude – 64-bit floating point |

Issuance Rules

The following issuance rules apply:

* This record shall not be used to set the dynamic filter extents.

The following specific field requirements apply:

* The Destination shall not be zero.
* The Filters shall not degenerate into a line or point.

Receipt Rules

The following receipt rules apply:

* If this record is received in a Set Data (4) or Add Data (5) Application Control PDU, then the function shall fail. Dynamic filter extents cannot be set outside the gateway.

Stealth

The following table defines the set of record IDs that are proposed to be used with stealth state and control.

Table 36. Stealth Record IDs

| ID | Description | Length (Octets) |
| --- | --- | --- |
| 240160 | Stealth View Mode | 16 |
| 240161 | Stealth Location/Orientation | 48 |
| 240163 | Stealth Attachment | 40 |
| 240164 | Stealth Dead Reckoning Parameters | 48 |
| 240165 | Stealth Field Of View (FOV) | 16 |
| 240166 | Stealth Eyepoint | 24 |
| 240170 | Stealth Fly to Location | 40 |
| 240172 | Stealth ID | 24 |

Stealth View Mode Record

Purpose

Information about the stealth view mode shall be communicated with the Stealth View Mode record. The Stealth View Mode record defines the spectrum image type and whether the output should be inverted. It also defines the magnification and sensor mode.

Record Definition

The Stealth View Mode record shall contain the following fields:

1. **Spectrum Image Type.** This 8-bit enumeration shall indicate the spectrum type. This enumeration is provided below:
   1. 0 – Out the Window (OTW)
   2. 1 – Day TV
   3. 2 – Thermal Manual
   4. 3 – Thermal Automatic
   5. 4 – Thermal Quarter Resolution
   6. 5 – Thermal Half Resolution
2. **Invert Flag.** This 8-bit enumeration shall specify if the output should be inverted. This enumeration is provided below:
   1. 0 – False
   2. 1 – True
3. **Magnification.** This 32-bit floating point shall indicate the magnification of the stealth. The magnification units are a power relative to 1:1. So, a value of 1.0 is the default where no magnification or minification occurs.
4. **Sensor Mode.** This 16-bit enumeration shall indicate the sensor mode of the stealth. This enumeration is provided below:
   1. 0 – Other
   2. 1 – Out the Window (OTW)
   3. 2 – Infrared (IR)
   4. 3 – Night Vision Goggles (NVG)

Table 37. Stealth View Mode record (240160)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16 | 16-bit unsigned integer |
| Spectrum Image Type | 8-bit enumeration |
| Invert Flag | 8-bit enumeration |
| Magnification | 32-bit floating point |
| Sensor Mode | 16-bit enumeration |
| Padding | 16-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

There are no specific receipt rules for this record.

Stealth Location/Orientation Record

Purpose

Stealth location and orientation shall be communicated with the Stealth Location/Orientation record. The Stealth Location/Orientation record provides the Stealth position in real world coordinates and the orientation.

Record Definition

The Stealth Location/Orientation record shall contain the following fields:

1. **Location.** This World Coordinates record shall indicate the location of the stealth in world coordinates.
2. **Orientation.** This Euler Angles record shall indicate the orientation of the stealth in radians.

Table 38. Stealth Location/Orientation record (240161)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=48 | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Location | X-component – 64-bit floating point |
| Y-component – 64-bit floating point |
| Z-component – 64-bit floating point |
| Orientation | Psi-component – 32-bit floating point |
| Theta-component – 32-bit floating point |
| Phi-component – 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

The following receipt rules apply:

* Upon receiving this command, the stealth shall terminate any in-progress Fly to Location commands.

Stealth Attachment Record

Purpose

The current attached status for the stealth eyepoint shall be communicated with the Stealth Attachment record. This record shall also be used for setting the control information necessary to command that the stealth to attach itself to the specified entity.

Record Definition

The Stealth Attachment record shall contain the following fields:

1. **Attached Entity ID.** This Entity Identifier record shall indicate the ID of the entity to which the stealth is attached or to which the stealth should attach.
2. **Attach Command.** This 8-bit enumeration shall specify if the stealth attaches to the given entity ID. This enumeration is provided below:
   1. 0 – Specific (attach to a specific entity ID)
   2. 1 – Any (attach to any entity ID)
   3. 2 – Detach
3. **Attachment Mode.** This 8-bit enumeration shall indicate the type of attachment (mode). This enumeration is provided below:
   1. 0 – Free
   2. 1 – Hug
   3. 2 – Tether
   4. 3 – Compass
   5. 4 – Orbit
   6. 5 – Mimic
   7. 6 – No
   8. 7 – Gunsight
4. *Relative Location*. This Entity Coordinate Vector record shall specify the offset from the attached entity.
5. *Relative Orientation*. This Euler Angles record shall specify the orientation relative to the attached entity.

Table 39. Stealth Attachment record (240163)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=40 | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Attached Entity ID | Site Number – 16-bit unsigned integer |
| Application Number – 16-bit unsigned integer |
| Entity Number – 16-bit unsigned integer |
| Attach Command | 8-bit enumeration |
| Attachment Mode | 8-bit enumeration |
| Relative Location | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Relative Orientation | Psi-component – 32-bit floating point |
| Theta-component – 32-bit floating point |
| Phi-component – 32-bit floating point |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Attached Entity ID shall be set to NO\_ENTITY (0, 0, 0) when the stealth is not attached to any entity or when the stealth is given an Attach Command of Any (1) or Detach (2).
* The Attach Command shall be set to the last Attach Command value given when output as state information.
* The Attachment Mode shall be set to Free (0) when the stealth is not attached to an entity.
* The Relative Location shall be zero when the Attachment Mode is not set to Tether (2), Compass (3), or Orbit (4).
* The Relative Orientation shall be zero when the Attachment Mode is not set to Tether (2), Compass (3), or Orbit (4).

Receipt Rules

The following receipt rules apply:

* Upon receiving this command, the stealth shall terminate any in-progress Fly to Location commands.

Stealth Dead Reckoning Parameters Record

Purpose

The current stealth eyepoint linear and angular velocity and linear acceleration shall be communicated with the Stealth Dead Reckoning Parameters record.

Record Definition

The Stealth Dead Reckoning Parameters record shall contain the following fields:

1. **Relative Type.** This 8-bit enumeration shall indicate whether the linear and angular velocities are relative to an attached entity. This enumeration is provided below:
   1. Not Relative – 0
   2. Relative – 1
2. **Dead Reckoning Algorithm.** This 8-bit enumeration shall indicate the dead reckoning algorithm to use or in use by the stealth.
3. **Linear Velocity.** This Linear Velocity Vector record shall indicate the velocity of the stealth, possibly relative to an attached entity, in meters per second.
4. **Angular Velocity.** This Angular Velocity Vector record shall indicate the angular velocity of the stealth in radians per second.
5. **Linear Acceleration.** This Entity Linear Acceleration record shall indicate the linear acceleration of the stealth in meters per second squared.

Table 40. Stealth Dead Reckoning Parameters record (240164)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=48 | 16-bit unsigned integer |
| Relative Type | 8-bit enumeration |
| Dead Reckoning Algorithm | 8-bit enumeration |
| Linear Velocity | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Angular Velocity | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Linear Acceleration | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

The following receipt rules apply:

* Upon receiving this command, the stealth shall terminate any in-progress Fly to Location commands.

Stealth Field of View (FOV) Record

Purpose

The current stealth eyepoint horizontal and vertical fields of view shall be communicated with the Stealth Field of View (FOV) record.

Record Definition

The Stealth Field of View record shall contain the following fields:

1. **Horizontal FOV.** This 32-bit floating point shall indicate the horizontal field of view (FOV) in degrees.
2. **Vertical FOV.** This 32-bit floating point shall indicate the vertical field of view (FOV) in degrees.

Table 41. Stealth Field of View (FOV) record (240165)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=16 | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Horizontal FOV | 32-bit floating point |
| Vertical FOV | 32-bit floating point |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

There are no specific receipt rules for this record.

Stealth Eyepoint Record

Purpose

The offset position of the eyepoint and its height above terrain (HAT) from the stealth location shall be communicated with the Stealth Eyepoint record.

Record Definition

The Stealth Eyepoint record shall contain the following fields:

1. **Offset.** This Entity Coordinate Vector record shall indicate the offset of the eyepoint from the stealth location.
2. **Height Above Terrain.** This 32-bit floating point shall indicate the height above terrain (HAT) in meters.

Table 42. Stealth Eyepoint record (240166)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=24 | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Eyepoint Offset | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Height Above Terrain (HAT) | 32-bit floating point |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

The following receipt rules apply:

* Upon receiving this command, the stealth shall terminate any in-progress Fly to Location commands.

Stealth Fly to Location Record

Purpose

The location for the stealth to fly to using the specified travel speed shall be communicated with the Stealth Fly to Location record.

Record Definition

The Stealth Fly to Location record shall contain the following fields:

1. **Location.** This World Coordinates record shall specify the location in world coordinates for the stealth to fly to.
2. **Travel Speed.** This 32-bit floating point shall specify the speed at which the stealth should travel in reaching the Location. The speed is given in meters per second.

Table 43. Stealth Fly to Location record (240170)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=40 | 16-bit unsigned integer |
| Padding | 16-bits unused |
| Location | X-component – 64-bit floating point |
| Y-component – 64-bit floating point |
| Z-component – 64-bit floating point |
| Travel Speed | 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

The following receipt rules apply:

* This command may be interrupted (terminated) while in progress on the stealth. If any of the following commands are sent to the stealth, then the Fly to Location should be terminated: Stealth Location/Orientation (240161), Stealth Attachment (240163), Stealth Dead Reckoning Parameters (240164), or Stealth Eyepoint (240166).

Stealth ID Record

Purpose

Marking of the stealth shall be communicated with the Stealth ID record.

Record Definition

The Stealth ID record shall contain the following fields:

1. **Stealth ID.** This 16-bit unsigned integer shall uniquely identify the stealth at the location receiving the control data or sending the state data.
2. **Marking.** This Entity Marking record shall indicate the any unique markings for the stealth (for example, a bumper number or country symbol). This field is generally used to identify the stealth for control purposes by an Instructor Operator Station. For example, “GREEN” and “YELLOW” could identity two stealths by color, which a controlling simulation application could use to send different commands to each.

Table 44. Stealth ID record (240172)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit unsigned integer |
| Record Length=32 | 16-bit unsigned integer |
| Stealth ID | 16-bit unsigned integer |
| Marking | Character Set – 8-bit enumeration |
| Characters – 11 8-bit unsigned integers |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* A Stealth ID of zero shall indicate that only one stealth exists (that may be controlled or that outputs data). If more than one stealth application exists, then they shall be numbered from 1 to the number of stealths.

Receipt Rules

There are no specific receipt rules for this record.

Task Organization

The following table defines the set of datum IDs that are proposed to be used with Task Organization.

Table 45. Task Organization Datum IDs

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | Datum Type | Length |
| 11250 | Force ID Affiliation | Variable | 320-bits |
| 15500 | CFS – Tether-Untether Command | Fixed | 32-bits |
| 15505 | Command from Simulator (CFS) | Variable | 192-bits + |

Force ID Affiliation Record

Purpose

Force affiliation data shall be communicated with the Force ID Affiliation record.

Record Definition

The Force ID Affiliation record shall contain the following fields. Padding is explicitly added for 64-bit alignment. Padding is separated out into potential field sizes so that a future implementation does not accidentally improperly align new fields.

1. **Force ID.** This 8-bit enumeration shall indicate the force ID.
2. **Affiliation Name.** This field shall specify the name of the affiliation.

Table 46. Force ID Affiliation Datum Record (11250)

| Field | Data Type | Description |
| --- | --- | --- |
| Force ID | 8-bit enumeration | Force ID enumeration |
| Padding | 8-bits unused | Not used |
| Padding | 16-bits unused | Not used |
| Padding | 32-bits unused | Not used |
| Affiliation Name | 256-bit string, null terminated | ASCII string, null terminated, max 31 chars + null = 32 bytes |

Issuance Rules

The following issuance rules apply:

* A simulation application shall send out an unsolicited Data PDU with the Force ID Affiliation datum record during exercise initialization.
* A simulation application shall send out an unsolicited Data PDU with the Force ID Affiliation datum record during the course of the exercise if the affiliation data (in the record) changes.
* The unsolicited Data PDU with the Force ID Affiliation datum record shall be sent out only once per Force ID (not once per entity).
* The unsolicited Data PDU with the Force ID Affiliation datum record should be sent out by the simulation manager, if one is available. This PDU should not be replicated by the dependent simulation applications if the simulation manager transmits the data.
* A simulation application shall send out an unsolicited Data PDU with the Force ID Affiliation datum record whenever a new force is created.

Receipt Rules

The following receipt rules apply:

* A simulation application shall send out a Data PDU in response to a Data Query PDU (with regards to the Force ID Affiliation record).
* The Time Interval parameter in the Data Query PDU shall not be supported for the Force ID Affiliation record.

CFS – Tether-Untether Command Datum Record

The Command from Simulator (CFS) Tether-Untether Command datum record shall contain a 32-bit unsigned integer. This value shall represent an enumeration identifying the tether command from simulator. The enumeration is provided below:

Table 47. Enumeration for CFS Tether-Untether (15500)

|  |  |
| --- | --- |
| Value | Description |
| 0 | Initiate Tether Whole Group by Lead |
| 1 | Initiate Tether Sub-Group by Lead |
| 2 | Initiate Tether by Follow |
| 3 | Untether – Formation Not Specified |
| 4 | Untether – Service Station Formation |
| 5 | Untether – Tailgate Resupply Formation |

Command from Simulator (CFS) Datum Record

The Command from Simulator (CFS) datum record shall contain the following fields (padding is explicitly added for 64-bit alignment):

1. **Entity Type.** This 64-bit field shall indicate the type of entity that is being task reorganized. This value shall correspond to the actual Entity Type of the manned module (or live entity).
2. **Entity ID.** This 48-bit field shall identify the entity that is going to replace the SAF element. It shall be a valid entity ID and cannot be set to NO\_ENTITY, ALL\_ENTITIES, or RQST\_ASSIGNED\_ID.
3. **CFS Name Length.** This 16-bit unsigned integer shall indicate the length, in characters, of the CFS Name, not including the null terminator.
4. **CFS Name.** This null-terminated ASCII string shall indicate the unique name of the SAF element to replace. This field is a minimum of 64-bits and shall be padded to the nearest 64-bit boundary. It shall include a null-terminating character so if the string has 8 character, the null termination requirement will cause the length of this field to be 128-bits. The maximum length of this string is only limited by the maximum size of the PDU in which this datum record is contained.

Table 48. Command from Simulator (CFS) Datum Record (15505)

|  |  |  |
| --- | --- | --- |
| Field | Data Type |  |
| Entity Type | 64-bit Entity Type record | Entity Type |
| Entity ID | 48-bit Entity ID record | Site ID, Application ID, Entity ID |
| CFS Name Length | 16-bit unsigned integer | length of CFS Name in characters |
| CFS Name | 64+-bit string, null terminated | ASCII string, null terminated, padded to a 64-bit boundary |

AAR Event Reporting

The following table defines the set of datum IDs that are proposed to be used with AAR Event Reporting.

Table 49. AAR Event Reporting Datum IDs

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | Datum Type | Length |
| 35000 | Damage Event Report | Variable | 128-bits |
| 42050 | Mission Request Event Report | Variable | 128-bits |
| 42060 | Indirect or CAS Fire Record | Variable | 64-bits |
| 42070 | Minefield Entry | Variable | 128-bits |
| 42080 | Mine Detonation | Variable | 128-bits |

Damage Event Report Datum Record

The Damage Event Report datum record shall contain the following fields (padding is explicitly added for 64-bit alignment):

1. **Personnel Casualties.** This field shall indicate the number of personnel casualties. It shall be represented by a 16-bit unsigned integer.
2. **Damage Cause.** This field shall indicate the cause for the damage. It shall be represented by an 8-bit enumeration.
3. **Event.** This field shall specify the event that caused the damage. It shall be represented by a 48-bit Event Identifier record.
4. **Extent of Damage.** This field shall specify the extent of the damage to the entity. It shall be represented by a 16-bit enumeration.

Table 50. Damage Event Report Datum Record (35000)

|  |  |  |
| --- | --- | --- |
| Field | Data Type |  |
| Personnel Casualties | 16-bit unsigned integer | 0..2E16-1 |
| Damage Cause | 8-bit enumeration | Damage Cause enumeration |
| Padding | 8-bits unused | Not used |
| Event | 48-bit Event Identifier record | Site ID – 16-bit unsigned integer  Application ID – 16-bit unsigned integer  Event ID – 16-bit unsigned integer |
| Extent of Damage | 16-bit enumeration | Damage Extent enumeration |
| Padding | 32-bits unused | Not used |

Mission Request Event Report

The Mission Request Event Report datum record shall contain the following fields.

1. **Mission ID.** This field shall indicate the mission ID. It shall be represented by a 16-bit unsigned integer.
2. **Mission Type.** This field shall specify the type of mission. It shall be represented by an 8-bit enumeration.
3. **Force ID.** This field shall indicate the force ID of the mission requestor. It shall be represented by an 8-bit enumeration.
4. **Mission Requestor Marking.** This field shall specify the mission requestor marking. It shall be represented by a 96-bit Entity Marking record.

Table 51. Mission Request Event Report Datum Record (42050)

|  |  |  |
| --- | --- | --- |
| Field | Data Type |  |
| Mission ID | 16-bit unsigned integer | Unique to mission |
| Mission Type | 8-bit enumeration | Mission Type enumeration |
| Force ID | 8-bit enumeration | Force ID enumeration |
| Mission Requester Marking | 96-bit Entity Marking record | 8-bit enumeration, Character Set  11 8-bit unsigned integers |

Indirect or CAS Fire Event Report Datum Record

The Indirect or CAS Fire Event Report datum record shall contain the following fields.

1. **Handle.** This field shall indicate the event ID. It shall be represented by a 48-bit Event Identifier record.
2. **Mission ID.** This field shall indicate the mission ID. It shall be represented by a 16-bit unsigned integer.

Table 52. Indirect or CAS Fire Event Report Datum Record (42060)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Handle | 48-bit Event Identifier record | Site ID – 16-bit unsigned integer  Application ID – 16-bit unsigned integer  Event ID – 16-bit unsigned integer |
| Mission ID | 16-bit unsigned integer | 0..2E16-1 |

Minefield Entry Datum Record

The Minefield Entry datum record shall contain the following fields.

1. **Intruder ID.** This 48-bit Entity Identifier shall indicate the intruder ID of the entity that entered the minefield.
2. **Minefield ID.** This 48-bit Object Identifier shall indicate the minefield object ID.

Table 53. Minefield Entry Datum Record (42070)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Intruder ID | 48-bit Entity Identifier record | Site Number – 16-bit unsigned integer  Application Number – 16-bit unsigned integer  Entity Number – 16-bit unsigned integer |
| Minefield ID | 48-bit Object Identifier record | Site Number – 16-bit unsigned integer  Application Number – 16-bit unsigned integer  Object Number – 16-bit unsigned integer |
| Padding | 32-bits unused | Not used |

Mine Detonation Datum Record

The Mine Detonation datum record shall contain the following fields.

1. **Detonation Event ID.** This 48-bit Event Identifier shall indicate the detonation event ID.
2. **Minefield ID.** This 48-bit Object Identifier shall indicate the minefield ID.

Table 54. Mine Detonation Datum Record (42080)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Detonation Event ID | 48-bit Event Identifier record | Site Number – 16-bit unsigned integer  Application Number – 16-bit unsigned integer  Event Number – 16-bit unsigned integer |
| Minefield ID | 48-bit Object Identifier record | Site Number – 16-bit unsigned integer  Application Number – 16-bit unsigned integer  Object Number – 16-bit unsigned integer |
| Padding | 32-bits unused | Not used |

Radar Track Perception Report Datum Record

Purpose

The Radar Track Perception Report record is used to identify when an entity has perceived that it is being tracked by an external entity, and when that tracking is lost. This event report data is primarily intended for after action review purposes.

Record Definition

The Radar Track Perception Report datum record shall contain the following fields.

1. **Radar Track Status.** This 16-bit enumeration shall indicate the status of the radar track.
2. **Tracking Entity.** This 48-bit Entity Identifier shall indicate the ID of the tracking entity.

Table 55. Radar Track Perception Report Datum Record (35500)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Radar Track Status | 16-bit enumeration | Radar Track Status enumeration |
| Tracking Entity | 48-bit Entity Identifier record | Site Number – 16-bit unsigned integer  Application Number – 16-bit unsigned integer  Object Number – 16-bit unsigned integer |

Issuance Rules

The issuance rules for this record are as follows:

* Simulation Applications that model Radar Warning Receivers shall issue an Event Report PDU when the sensor first detects that the ownship is being targeted by an entity.
  + This PDU shall have an Event Type of Radar Perception (18) and contain one datum, the Radar Track Perception (35500) Variable Datum record.
  + This record shall contain a status of Radar Track Detected (1) and indicate the entity that is tracking the ownship.
* Simulation Applications that model Radar Warning Receivers shall issue an Event Report PDU when the sensor no longer detects that the ownship is being targeted by an entity. Depending on the fidelity of the sensor, this could be when the received power level is below a certain threshold, line of sight between the sensor and targeting entity is broken, or the targeting entity is no longer tracking the ownship.
  + This PDU shall have an Event Type of Radar Perception (18) and contain one datum, the Radar Track Perception (35500) Variable Datum Record.
  + This record shall contain a status of Radar Track Broken (2) and indicate the entity that is no longer tracking the ownship.

Receipt Rules

There are no special receipt rules for this record.

Entity Status Datums

The following table defines the set of datum IDs that are proposed to be used with entity status.

Table 56. Entity Status Datum IDs

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | Datum Type | Length |
| 500001 | Munition Record | Variable | 128-bits |
| 500002 | Engine Fuel Record | Variable | 64-bits |
| 500003 | Storage Fuel Record | Variable | 64-bits |
| 500005 | Expendable Record | Variable | 128-bits |
| 500007 | Launched Munition Record | Variable | 384-bits |
| 500008 | Association Record | Variable | 256-bits |
| 500009 | Sensor Record | Variable | 96-bits |

Munition Record

Please refer to Table 88, section 6.2.62 in Draft 13.

Engine Fuel Record

Please refer to Table 48, section 6.2.24 in Draft 13.

Storage Fuel Record

Please refer to Table 106, section 6.2.85 in Draft 13.

Expendable Record

Please refer to Table 60, section 6.2.37 in Draft 13.

Launched Munition Record

Please refer to Table 76, section 6.2.51 in Draft 13.

Association Record

Please refer to Table 33, section 6.2.11 in Draft 13.

Sensor Record

Please refer to Table 101, section 6.2.79 in Draft 13. Note that this record is not 64-bit aligned, so padding must be added at the end when the PDU is encoded/transmitted. Per the revision in PCR 200 of Draft 13, the length of the record does not include the padding. VDIS is not explicitly appending a 32-bit padding field to the end of this record for 64-bit alignment because this record has already been defined.

Mounting / Towing / Sling Load Datums

The following table defines the set of datum IDs that are proposed to be used with sling load operations, mounting, and towing.

Table 57. Mounting / Towing / Sling Load Datum IDs

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | Datum Type | Length |
| 16210 | Number to Mount/Dismount | Fixed | 32-bits |
| 16215 | Mount/Dismount Data | Variable | 128-bits |
| 16220 | Carrier Mount ID | Variable | 64-bits |
| 20030 | Sling Load Capability | Variable | 192 + 64N bits |

Number to Mount/Dismount

Purpose

The number of entities or object to mount or dismount in a mount operation shall be communicated using the Number to Mount/Dismount record. This is a Fixed Datum record. This record may be used in Action Request / Action Response interactions to perform mounting operations.

Record Definition

This fixed datum record is a 32-bit unsigned integer.

Issuance Rules

The following issuance rules apply:

* Only one Number to Mount/Dismount record shall be transmitted per interaction.
* This record shall be transmitted when issuing an Action Request PDU with an Action ID of Mount (18) or Dismount (19).
* When returned in an Action Response PDU indicating a reject condition, this value shall identify the maximum number of entities/objects remaining that are allowed to mount or dismount (depending on the request).
* This record shall be in the range of 1 to 32.

Receipt Rules

The following receipt rules apply:

* Simulation Applications conducting Mounting operations shall process this record when receiving Action Request PDUs with an Action ID of Mount (18) or Dismount (19).

Mount/Dismount Data Record

Purpose

The data for a mount operation shall be communicated using the Mount/Dismount Data record. This is a Variable Datum record. This record may be used in Action Request / Action Response interactions to perform mounting operations.

Record Definition

The Mount/Dismount Data record shall contain the following fields.

1. **Mount/Dismount ID.** This field shall indicate the entity or object ID of the mounted entity or object. It shall be represented by a 48-bit Object Identifier record when it represents an object and a 48-bit Entity Identifier record when it represents an entity.
2. **Station ID.** This 16-bit enumeration shall identify the station where this mounted entity/object shall be placed on the carrier. A value of 0 shall represent “Not specified.”
3. **Mass.** This 32-bit floating point shall indicate the mass in kilograms of the mounted entity/object. A value of “0.0” shall indicate “Not Specified.”
4. **Volume.** This 32-bit floating point shall indicate the volume in meters cubed of the mounted entity/object. A value of “0.0” shall indicate “Not Specified.”

Table 58. Mount/Dismount Data record (16215)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Mount/Dismount ID | 48-bit Object/Entity Identifier record | Site ID – 16-bit unsigned integer  Application ID – 16-bit unsigned integer  Object/Entity ID – 16-bit unsigned integer |
| Station ID | 16-bit enumeration | The station ID for this mounted entity/object |
| Mass | 32-bit floating point | kilograms |
| Volume | 32-bit floating point | meters cubed |

Issuance Rules

The following issuance rules apply:

* Only one Mount/Dismount Data record shall be transmitted per interaction.
* This record shall be transmitted when issuing an Action Request PDU with an Action ID of Mount (18) or Dismount (19).
* When returned in an Action Response PDU indicating a reject condition, this record may indicate that the given ID is invalid, the Station ID is invalid, or that the given mass or volume is too much to carry (see below for further specifics on reject conditions). It might be invalid if it doesn’t exist or if that object or entity is incapable of being mounted (and not just due to current conditions such as moving or the ramp not being down).
* If the original Mount/Dismount ID is valid, then when returned in a reject condition, this field shall be set to NO\_ENTITY.
* If the original Station ID is valid or Not specified (0), then when returned in a reject condition, this field shall be set to Not specified (0).
* If the original Mass is valid or Not specified (0.0), then when returned in a reject condition, this field shall be set to Not specified (0.0).
* If the original Volume is valid or Not specified (0.0), then when returned in a reject condition, this field shall be set to Not specified (0.0).
* When returned in an Action Response PDU indicating a success condition, this record may indicate the actual station assigned, even if not originally given as Not specified (0). This reassignment might happen to avoid race conditions of multiple mount operations occurring simultaneously. In such a case, it is better to succeed and alter the Station ID assignments than to fail and force additional mount requests.

The following specific field requirements apply:

* The Mass shall be greater than zero, when specified. It shall be set to zero if the mass is unknown or not applicable.
* The Volume shall be greater than zero, when specified. It shall be set to zero if the volume is unknown or not applicable.
* The Volume field should not be specified when mounting humans.

Receipt Rules

The following receipt rules apply:

* Simulation Applications conducting Mounting operations shall process this record when receiving Action Request PDUs with an Action ID of Mount (18) or Dismount (19).

Carrier Mount ID Record

Purpose

The ID of a carrier in a mount operation shall be communicated using the Carrier Mount ID record. This is a Variable Datum record. This record may be used in Action Request / Action Response interactions to perform mounting operations.

Record Definition

The Carrier Mount ID record shall contain the following fields.

1. **Carrier ID.** This field shall indicate the entity or object ID of the carrier of the mount operation. It shall be represented by a 48-bit Object Identifier record when it represents an object and a 48-bit Entity Identifier record when it represents an entity.

Table 59. Carrier Mount ID record (16220)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Carrier ID | 48-bit Object/Entity Identifier record | Site ID – 16-bit unsigned integer  Application ID – 16-bit unsigned integer  Object/Entity ID – 16-bit unsigned integer |
| Padding | 16-bits unused | Unused |

Issuance Rules

The following issuance rules apply:

* Only one Carrier Mount ID record shall be transmitted per interaction.
* This record shall be transmitted when issuing an Action Request PDU with an Action ID of Mount (18) or Dismount (19).
* When returned in an Action Response PDU indicating a reject condition, this value shall indicate that the given Carrier ID is invalid. It might be invalid if it doesn’t exist or if that object or entity is incapable of being mounted (and not just due to current conditions such as moving or the ramp not being down).

Receipt Rules

The following receipt rules apply:

* Simulation Applications conducting Mounting operations shall process this record when receiving Action Request PDUs with an Action ID of Mount (18) or Dismount (19).

Sling Load Capability

Purpose

The capability to perform a sling load operation shall be communicated using the Sling Load Capability record. This is a Variable Datum record. This record may be used in Action Request / Action Response interactions to perform sling load operations.

Record Definition

The Sling Load Capability datum record shall contain the following fields.

1. **Payload Entity ID.** This 48-bit Entity Identifier record shall indicate the entity ID of the payload (the object to be carried).
2. **Carrier Entity ID.** This 48-bit Entity Identifier record shall indicate the entity ID of the carrier of the sling load (this is typically a rotary-winged aircraft that carries the payload).
3. **Drag Coefficient.** This 32-bit floating point shall identify the drag coefficient of the payload. This is a positive value greater than zero. A value of zero indicates that the drag coefficient is not defined by the payload (not that it is has zero resistance).
4. **Current Mass.** This 32-bit floating point shall identify the current mass in kilograms of the payload.
5. **Hook Type.** This 8-bit enumeration shall indicate the type of hook on the payload. The enumeration is provided below:
   1. Not specified – 0
   2. Single Hook – 1
   3. Forward Hook – 2
   4. Center Hook – 3
   5. Aft Hook – 4
   6. Tandem Hook (Fore/Aft) – 5
   7. Mismanaged Tandem Hook (Fore/Center) – 6
   8. Mismanaged Tandem Hook (Center/Aft) – 7
   9. All Hooks – 8
6. **Lines Needed.** This 8-bit unsigned integer shall indicate the number of lines needed to support the payload. All lines use the same hook type.
7. **Line Sling Geometry.** This field shall identify the geometry for each of the lines. There shall be one record provided for each line as identified in the Lines Needed field. This field shall be represented by a 64-bit record as identified below:
   1. *Line Length*. This 32-bit floating point shall indicate the length of the line in meters.
   2. *Hook Offset*. This 32-bit floating point shall indicate the offset from the hook to the payload in meters.

Table 60. Sling Load Capability record (20030)

| Field size (bits) | Field name | Data type |
| --- | --- | --- |
| 48 | Payload Entity ID | Site ID – 16-bit unsigned integer |
| Application ID – 16-bit unsigned integer |
| Entity ID – 16-bit unsigned integer |
| 48 | Carrier Entity ID | Site ID – 16-bit unsigned integer |
| Application ID – 16-bit unsigned integer |
| Entity ID – 16-bit unsigned integer |
| 32 | Drag Coefficient | 32-bit floating point |
| 32 | Current Mass | 32-bit floating point |
| 16 | Padding | 16-bits unused |
| 8 | Hook Type | 8-bit enumeration |
| 8 | Lines Needed (N) | 8-bit unsigned integer |
| 64 | Line Sling Geometry (N records) | Line Length – 32-bit floating point |
| Hook Offset – 32-bit floating point |

The diagram in Figure 2 illustrates an example helicopter with a sling load attachment and shows the line length and hook offset. The value for helicopter hook offset is not defined in this datum record and is left for the internal modeling of the RWA or the transmission of its Entity State PDU.



Figure 2. Sling Load Example: Line Length and Hook Offset

Issuance Rules

The following issuance rules apply:

* Only one Sling Load Capability record shall be transmitted per interaction.
* This record shall be transmitted when issuing an Action Request PDU with an Action ID of Sling Load Capability Request (4300), Sling Load Attach Request (4301), or Sling Load Detach Request (4302).
* This record should not be transmitted when issuing an Action Response PDU.

The following specific field requirements apply:

* The Drag Coefficient shall be greater than zero, when specified. It shall be set to zero if the drag coefficient is unknown or not applicable.
* The Current Mass shall be a positive, nonzero value.
* The Lines Needed should be between 1 and 3. A value of 0 shall not be used.

Receipt Rules

Simulation Applications conducting Sling Load operations shall process this record when receiving Action Request PDUs with an Action ID of Sling Load Capability Request (4300), Sling Load Attach Request (4301), or Sling Load Detach Request (4302).

Weather Records

The following table defines the set of Environment record IDs that are proposed to be used with weather.

Table 61. Weather Environment Record IDs

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | Type | Length |
| 260100 | Weather State Atmospheric | State | 192 |
| 260200 | Weather State Celestial | State | 128 |
| 260300 | Weather State Wind | State | 192 |
| 260400 | Weather State Precipitation | State | 128 |
| 260500 | Weather State Clouds | State | 256 |
| 260600 | Weather State Ground Fog | State | 192 |
| 260700 | Weather State Haze | State | 192 |
| 260800 | Weather State Lightning | State | 128 |
| 260900 | Weather State Thunder | State | 128 |
| 261000 | Weather State Layer | State | 256 |
| 65536 | Bounding Sphere Record | Geometry | 320 |
| 327680 | Uniform Geometry Record | Geometry | 64 |
| 1342177280 | Rectangular Volume Record 2 | Geometry | 768 |

Weather State Atmospheric Record

Purpose

Atmospheric weather data shall be communicated with the Weather State Atmospheric record.

Record Definition

The Weather State Atmospheric record shall contain the following fields:

1. **General Visibility Range.** This 32-bit floating point shall indicate the distance in meters at which it is possible to see without instrumental assistance.
2. **Outside Air Temperature.** This 32-bit floating point shall indicate the uniform air temperature in degrees Celsius within a region or layer.
3. **Barometric Pressure.** This 32-bit floating point shall indicate the uniform barometric pressure in millibars within a region or layer.
4. **Relative Humidity.** This 8-bit unsigned integer shall indicate the uniform relative humidity in (whole number) percentage within a region or layer.

Table 62. Weather State Atmospheric record (260100)

|  |  |
| --- | --- |
| Field | Data Type |
| Record Type | 32-bit enumeration |
| Record Length=192 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| General Visibility Range | 32-bit floating point |
| Outside Air Temperature | 32-bit floating point |
| Barometric Pressure | 32-bit floating point |
| Padding | 16-bits unused |
| Relative Humidity | 8-bit unsigned integer |
| Padding | 8-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Outside Air Temperature shall be in the range of -60.0◦ to 100.0◦.
* The Barometric Pressure shall be in the range of 660.0 mb – 1070.0 mb.
* The Relative Humidity shall be in the range 0 – 100%.

Receipt Rules

There are no specific receipt rules for this record.

Weather State Celestial Record

Purpose

Celestial environment data shall be communicated with the Weather State Celestial record.

Record Definition

The Weather State Celestial record shall contain the following fields:

1. **Season.** This 8-bit enumeration shall indicate the annual season selection. The enumeration is provided below:
   1. Summer – 0
   2. Winter – 1
   3. Spring – 2
   4. Autumn – 3
2. **Time of Day Mode.** This field shall indicate the mode that identifies a frozen time state or the simulated passage of time. It shall be represented by an 8-bit enumeration. The enumeration is provided below:
   1. Scene – 0
   2. Static – 1
   3. Continuous – 2
3. **Time of Day Scene.** This 8-bit enumeration shall indicate the scene selection for the scene time-of-day mode. The enumeration is provided below:
   1. Dawn – 0
   2. Day – 1
   3. Dusk – 2
   4. Night – 3
4. **Night Time Illumination.** This 8-bit enumeration shall indicate the nighttime sky conditions contributing to natural illumination. The enumeration is provided below:
   1. None – 0
   2. Starlight – 1
   3. Quarter Moon – 2
   4. Half Moon – 3
   5. Three Quarter Moon – 4
   6. Full Moon – 5

Table 63. Weather State Celestial record (260200)

|  |  |
| --- | --- |
| Field | Data Type |
| Record Type | 32-bit enumeration |
| Record Length=126 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Season | 8-bit enumeration |
| Time of Day Mode | 8-bit enumeration |
| Time of Day Scene | 8-bit enumeration |
| Night Time Illumination | 8-bit enumeration |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

Receipt Rules

There are no specific receipt rules for this record.

Weather State Wind Record

Purpose

Wind environment data shall be communicated with the Weather State Wind record.

Record Definition

The Weather State Wind record shall contain the following fields:

1. **Horizontal Wind Speed.** This 32-bit floating point shall indicate the horizontal wind speed in meters/second across the terrain.
2. **Vertical Wind Speed.** This 32-bit floating point shall indicate the vertical wind speed in meters/second.
3. **Wind Direction.** This 32-bit floating point shall indicate the direction in degrees from which the wind is blowing. The direction is measured clockwise from true north. For example, if the wind is blowing from due west to due east (a west-to-east travel), then this field would contain a value of 270.0◦.

Table 64. Weather State Wind record (260300)

|  |  |
| --- | --- |
| Field | Data Type |
| Record Type | 32-bit enumeration |
| Record Length=192 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Horizontal Wind Speed | 32-bit floating point |
| Vertical Wind Speed | 32-bit floating point |
| Wind Direction | 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Horizontal Wind Speed shall be in a range of 0.0 to 75.0 m/s.
* The Vertical Wind Speed shall be in a range of 0.0 to 75.0 m/s.
* The Wind Direction shall be in a range of 0.0◦ to 360.0◦.

Receipt Rules

There are no specific receipt rules for this record.

Weather State Precipitation Record

Purpose

Precipitation weather data shall be communicated with the Weather State Precipitation record.

Record Definition

The Weather State Precipitation record shall contain the following fields:

1. **Precipitation Type.** This 8-bit enumeration shall indicate the type of precipitation. The enumeration is provided below:
   1. None – 0
   2. Other – 1
   3. Rain – 2
   4. Snow – 3
   5. Hail – 4
   6. Sleet – 5
   7. Freezing Rain – 6
2. **Precipitation Density.** This 8-bit unsigned integer shall indicate the percent precipitation from 0% (no precipitation) to 100%. This represents the amount of precipitation.
3. **Rainsoak.** This 8-bit enumeration shall indicate the measure of ground wetness that is the result of precipitation, wetness accumulation, or other moisture deposition on the terrain surface. The enumeration is provided below:
   1. Off – 0
   2. On – 1
4. **Precipitation Rate.** This 8-bit enumeration shall indicate the rate at which the currently selected precipitation is falling. The enumeration is provided below:
   1. No Precipitation – 0
   2. Light Precipitation – 1
   3. Moderate Precipitation – 2
   4. Heavy Precipitation – 3
5. **Precipitation Velocity**. This 32-bit floating point shall indicate the velocity of the precipitation effect in meters/second.

Table 65. Weather State Precipitation record (260400)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=128 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Precipitation Type | 8-bit enumeration |
| Precipitation Density | 8-bit unsigned integer |
| Rainsoak | 8-bit enumeration |
| Precipitation Rate | 8-bit enumeration |
| Precipitation Velocity | 32-bit floating point |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Precipitation Density shall be in the range of 0% to 100%.
* The Precipitation Velocity shall not be negative.

Receipt Rules

There are no specific receipt rules for this record.

Weather State Clouds Record

Purpose

Cloud data shall be communicated with the Weather State Clouds record.

Record Definition

The Weather State Clouds record shall contain the following fields:

1. **Cloud Status.** This 8-bit enumeration shall indicate the status of clouds in the simulated environment. The enumeration is provided below:
   1. Off – 0
   2. On – 1
2. **Cloud Type.** This 8-bit enumeration shall indicate the type of clouds simulated in the sky. The enumeration is provided below:
   1. None – 0
   2. Altocumulus – 1
   3. Altostratus – 2
   4. Cirrocumulus – 3
   5. Cirrostratus – 4
   6. Cirrus – 5
   7. Cumulonimbus – 6
   8. Cumulus – 7
   9. Nimbostratus – 8
   10. Stratocumulus – 9
   11. Stratus – 10
3. **Cloud Density.** This 8-bit enumeration shall provide an indication of the current cloud density. The enumeration is provided below:
   1. Not Specified – 0
   2. Clear – 1
   3. Scattered – 2
   4. Broken – 3
   5. Overcast – 4
4. **Scud Flags.** This 8-bit enumeration shall indicate the state of the cloud scud layer below and above the clouds in the simulated environment. The enumeration is provided below:
   1. Off – 0
   2. Bottom On – 1
   3. Top On – 2
   4. Top and Bottom On – 3
5. **Scud Bottom Frequency.** This 8-bit unsigned integer shall indicate the percentage of the coverage of scud bottom layer.
6. **Scud Top Frequency.** This 8-bit unsigned integer shall indicate the percentage of the coverage of scud top layer.
7. **Cloud Base Height.** This 32-bit floating point shall indicate the altitude in meters of the cloud layer bottom above Mean Sea Level.
8. **Cloud Ceiling Height.** This 32-bit floating point shall indicate the altitude in meters of the cloud layer top above Mean Sea Level.
9. **Cloud Visibility Range.** This 32-bit floating point shall indicate the distance in meters which it is possible to see within a cloud layer without instrumental assistance. This provides an additional indication of cloud density.

Table 66. Weather State Clouds record (260500)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=256 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Cloud Status | 8-bit enumeration |
| Cloud Type | 8-bit enumeration |
| Cloud Density | 8-bit enumeration |
| Scud Flags | 8-bit enumeration |
| Scud Bottom Frequency | 8-bit unsigned integer |
| Scud Top Frequency | 8-bit unsigned integer |
| Padding | 16-bits unused |
| Cloud Base Height | 32-bit floating point |
| Cloud Ceiling Height | 32-bit floating point |
| Cloud Visibility Range | 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The scud frequency (top and bottom) shall be in the range of 0% to 100%.
* The Cloud Base Height, Cloud Ceiling Height, and Cloud Visibility Range shall not contain negative values.
* The Cloud Ceiling Height shall be greater than the Cloud Base Height, unless there is no cloud layer.
* The Cloud Base Height and Cloud Ceiling Height shall be zero when there is no cloud layer.
* The Cloud Visibility Range shall be set to zero when there is no cloud layer or when the actual visibility range is unknown.

Receipt Rules

The following specific receipt rules apply:

* A Cloud Visibility Range of zero shall indicate unlimited visual range (not zero visual range).

Weather State Ground Fog Record

Purpose

Ground fog environment data shall be communicated with the Weather State Ground Fog record.

Record Definition

The Weather State Ground Fog record shall contain the following fields:

1. **Ground Fog Status.** This 8-bit enumeration shall indicate the state of ground fog in the simulated environment. The enumeration is provided below:
   1. Off – 0
   2. On – 1
2. **Ground Fog Ceiling Height.** This 32-bit floating point shall indicate the altitude in meters of the fog layer top above Mean Sea Level.
3. **Ground Fog Visibility Range.** This 32-bit floating point shall indicate the distance in meters which it is possible to see within a fog layer without instrumental assistance.

Table 67. Weather State Ground Fog record (260600)

|  |  |
| --- | --- |
| Field | Data Type |
| Record Type | 32-bit enumeration |
| Record Length=192 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Ground Fog Status | 8-bit enumeration |
| Padding | 8-bits unused |
| Padding | 16-bits unused |
| Ground Fog Ceiling Height | 32-bit floating point |
| Ground Fog Visibility Range | 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Ground Fog Ceiling Height and Ground Fog Visibility Range shall not contain negative values.
* The Ground Fog Ceiling Height shall be zero when there is no ground fog layer.
* The Ground Fog Visibility Range shall be set to zero when there is no ground fog layer or when the actual visibility range is unknown.

Receipt Rules

The following receipt rules apply:

* A Ground Fog Visibility Range of zero shall indicate unlimited visual range (not zero visual range).

Weather State Haze Record

Purpose

Haze environment data shall be communicated with the Weather State Haze record.

Record Definition

The Weather State Haze record shall contain the following fields:

1. **Haze Status.** This 8-bit enumeration shall indicate the state of haze in the simulated environment. The enumeration is provided below:
   1. Off – 0
   2. On – 1
2. **Haze Type.** This 8-bit enumeration shall indicate the type of haze contained in the haze layer. The enumeration is provided below:
   1. No Haze – 0
   2. Other Haze – 1
   3. Rural Haze – 2
   4. Maritime Haze – 3
   5. Urban Haze – 4
   6. Tropospheric Haze – 5
   7. Advective Fog Haze – 6
   8. Radiative Fog Haze – 7
   9. Desert Haze – 8
   10. Desert Summer Haze – 9
   11. Desert Winter Haze – 10
   12. Temperate Summer Day – 11
   13. Temperate Summer Night – 12
   14. Temperate Winter – 13
   15. Dust Storm Haze – 14
   16. Snow Haze – 15
   17. Blowing Snow Haze – 16
   18. Fog And Snow Haze – 17
3. **Haze Ceiling Height.** This 32-bit floating point shall indicate the altitude in meters of the haze layer top above Mean Sea Level.
4. **Haze Visibility Range.** This 32-bit floating point shall indicate the distance in meters which it is possible to see within a haze layer without instrumental assistance.

Table 68. Weather State Haze record (260700)

|  |  |
| --- | --- |
| Field | Data Type |
| Record Type | 32-bit enumeration |
| Record Length=192 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Haze Status | 8-bit enumeration |
| Haze Type | 8-bit enumeration |
| Padding | 16-bits unused |
| Haze Ceiling Height | 32-bit floating point |
| Haze Visibility Range | 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Haze Ceiling Height and Haze Visibility Range shall not contain negative values.
* The Haze Ceiling Height shall be zero when there is no haze layer.
* The Haze Visibility Range shall be set to zero when there is no haze layer or when the actual visibility range is unknown.

Receipt Rules

The following receipt rules apply:

* A Haze Visibility Range of zero shall indicate unlimited visual range (not zero visual range).

Weather State Lightning Record

Purpose

Lightning environment data shall be communicated with the Weather State Lightning record.

Record Definition

The Weather State Lightning record shall contain the following fields:

1. **Lightning Status.** This 8-bit enumeration shall indicate the state of lightning in the simulated environment. The enumeration is provided below:
   1. Off – 0
   2. Instantaneous Lightning – 1
   3. Random Lightning – 2
2. **Lightning Frequency.** This 8-bit unsigned integer shall indicate the frequency of the lightning events, set to vary the storm intensity.
3. **Lightning Duration.** This 8-bit unsigned integer shall indicate the duration of the visual effects of the lightning for each lightning event.

Table 69. Weather State Lightning record (260800)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=128 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Lightning Status | 8-bit enumeration |
| Lightning Frequency | 8-bit unsigned integer |
| Lightning Duration | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Lightning Frequency shall be in the range of 0 to 100.
* The Lightning Duration shall be in the range of 0 to 100.

Receipt Rules

There are no specific receipt rules for this record.

Weather State Thunder Record

Purpose

Thunder environment data shall be communicated with the Weather State Thunder record.

Record Definition

The Weather State Thunder record shall contain the following fields:

1. **Thunder Status.** This 8-bit enumeration shall indicate the state of thunder in the simulated environment. The enumeration is provided below:
   1. Off – 0
   2. Instantaneous Thunder – 1
   3. Random Thunder – 2
   4. Thunder Coincident with Lightning – 3
2. **Thunder Offset.** This 16-bit unsigned integer shall indicate the time delay in milliseconds between the lightning event and the sound of the thunder when the Thunder Status is set to Thunder Coincident with Lightning (3).
3. **Thunder Frequency.** This 8-bit unsigned integer shall indicate the frequency of the thunder events, set to vary the storm intensity.
4. **Thunder Duration.** This 8-bit unsigned integer shall indicate the duration of the sound of the thunder for each thunder event.

Table 70. Weather State Thunder record (260900)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=128 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Thunder Status | 8-bit enumeration |
| Padding | 8-bits unused |
| Thunder Offset | 16-bit unsigned integer |
| Thunder Frequency | 8-bit unsigned integer |
| Thunder Duration | 8-bit unsigned integer |
| Padding | 16-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Thunder Frequency shall be in the range of 0 to 100.
* The Thunder Duration shall be in the range of 0 to 100.

Receipt Rules

There are no specific receipt rules for this record.

Weather State Layer Record

Purpose

Generic layer environment data shall be communicated with the Weather State Layer record. This record is used for layers that are not supported by other records.

Record Definition

The Weather State Layer record shall contain the following fields.

1. **Layer Type.** This 8-bit enumeration shall indicate the layer type. The enumeration is provided below:
   1. Ground Fog – 0
   2. Cloud Layer 1 – 1
   3. Cloud Layer 2 – 2
   4. Cloud Layer 3 – 3
   5. Rain – 4
   6. Snow – 5
   7. Sleet – 6
   8. Hail – 7
   9. Sand – 8
   10. Dust – 9
   11. Haze – 10
2. **Layer Base Height**. This 32-bit floating point shall indicate the altitude in meters of the bottom of the layer above Mean Sea Level.
3. **Layer Ceiling Height.** This 32-bit floating point shall indicate the altitude in meters of the top of the layer above Mean Sea Level.
4. **Layer Visibility Range.** This 32-bit floating point shall indicate the distance in meters which it is possible to see within this layer without instrumental assistance.
5. **Layer Transition Band.** This 32-bit floating point shall indicate the vertical height in meters of both the region above and below the layer through which visibility gradually changes from that of the layer to that of the region outside the layer.

Table 71. Weather State Layer record (261000)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=256 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8-bits unused |
| Layer Type | 8-bit enumeration |
| Padding | 8-bits unused |
| Padding | 16-bits unused |
| Layer Base Height | 32-bit floating point |
| Layer Ceiling Height | 32-bit floating point |
| Layer Visibility Range | 32-bit floating point |
| Layer Transition Band | 32-bit floating point |
| Padding | 32-bits unused |

Issuance Rules

There are no specific issuance rules for this record.

The following specific field requirements apply:

* The Layer Base Height, Layer Ceiling Height, Layer Visibility Range, and Layer Transition Band shall not contain negative values.
* The Layer Ceiling Height shall be greater than the Layer Base Height.
* The Layer Visibility Range shall be set to zero when the actual visibility range is unknown.

Receipt Rules

There are no specific receipt rules for this record.

Bounding Sphere Record

Purpose

Multiple weather regions shall be enclosed in a Bounding Sphere record.

Record Definition

The Bounding Sphere record shall contain the following fields.

1. **Centroid Location.** This 192-bit World Coordinates record shall indicate the centroid of the volume.
2. **Radius.** This 32-bit floating point value shall indicate the radius of the bounding sphere in meters.

Table 72. Bounding Sphere record (65536)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=320 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8 bits unused |
| Centroid Location | X-component – 64-bit floating point |
| Y-component – 64-bit floating point |
| Z-component – 64-bit floating point |
| Radius | 32-bit floating point |
| Padding | 32 bits unused |

Issuance Rules

The following issuance rules apply:

* A simulation application shall not send out degenerate volumes. The Radius field shall be greater than 0.0.
* The Centroid Location shall be within the extents of the terrain database in the XY-plane, but may be below ground level.
* The Bounding Sphere record shall be the first Environmental Record within an Environmental Process PDU if more than one geometry record (region) is included (not including the Bounding Sphere).
* A Bounding Sphere record should not be included if there is only one geometry record (region or global) in the PDU.

Receipt Rules

There are not specific receipt rules that apply to this record.

Uniform Geometry Record

Purpose

Global weather geometry shall be communicated with the Uniform Geometry record.

Record Definition

The Uniform Geometry record shall contain the following fields.

1. **Field 1.** This 8-bit unsigned integer shall be set to 0 and indicates uniform geometry.

Table 73. Uniform Geometry record (327680)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=64 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Field 1 = 0 | 8-bit unsigned integer |

Rectangular Volume Record 2 Record

Purpose

Regional weather geometry shall be communicated with the Rectangular Volume Record 2 record.

Record Definition

The Rectangular Volume Record 2 record shall contain the following fields.

1. **Corner Location**. This 192-bit World Coordinates record shall indicate the southwest bottom coordinate of the volume. What is meant by “southwest bottom coordinate” is that this point indicates the most negative value along each of the axes (X, Y, and Z).
2. **Length X**. This 32-bit floating point value shall indicate the length in meters of the volume along the positive X-axis.
3. **Length Y**. This 32-bit floating point value shall indicate the length in meters of the volume along the positive Y-axis.
4. **Length Z**. This 32-bit floating point value shall indicate the length in meters of the volume along the positive Z-axis.
5. **d(Length X)/dt**. This 32-bit floating point value shall indicate the rate of change in meters per second of the length along the X-axis.
6. **d(Length Y)/dt**. This 32-bit floating point value shall indicate the rate of change in meters per second of the length along the Y-axis.
7. **d(Length Z)/dt**. This 32-bit floating point value shall indicate the rate of change in meters per second of the length along the Z-axis.
8. **Orientation**. This 96-bit Euler Angles record shall indicate the orientation of the region in degrees.
9. **Velocity**. This 96-bit Linear Velocity Vector record shall indicate the velocity of the region in meters per second.
10. **Angular Velocity**. This 96-bit Angular Velocity Vector record shall indicate the angular velocity of the region in radians per second.

Table 74. Rectangular Volume Record 2 record (1342177280)

| Field | Data Type |
| --- | --- |
| Record Type | 32-bit enumeration |
| Record Length=768 | 16-bit unsigned integer |
| Index | 8-bit unsigned integer |
| Padding | 8 bits unused |
| Corner Location | X-component – 64-bit floating point |
| Y-component – 64-bit floating point |
| Z-component – 64-bit floating point |
| Length X | 32-bit floating point |
| Length Y | 32-bit floating point |
| Length Z | 32-bit floating point |
| d(Length X)/dt | 32-bit floating point |
| d(Length Y)/dt | 32-bit floating point |
| d(Length Z)/dt | 32-bit floating point |
| Orientation | Psi-component – 32-bit floating point |
| Theta-component – 32-bit floating point |
| Phi-component – 32-bit floating point |
| Velocity | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Angular Velocity | X-component – 32-bit floating point |
| Y-component – 32-bit floating point |
| Z-component – 32-bit floating point |
| Padding | 32 bits unused |

Issuance Rules

The following issuance rules apply:

* A simulation application shall not send out degenerate volumes. The Length fields shall be greater than 0.0.
* The d(Length)/dt fields may be positive or negative.
* The Corner Location shall be within the extents of the terrain database in the XY-plane, but may be below ground level.
* The “northeast upper coordinate,” that which is defined as the Corner Location plus the Length fields, should be within the extents of the terrain database in the XY-plane, and should be above ground level.

Receipt Rules

The following receipt rules apply:

* When updating the dead reckoning of the extents of a volume, the receiving simulation application shall not produce a degenerate volume.
* In the event that dead reckoning the extents of a volume would make the region degenerate, the receiving simulation application shall discontinue dead reckoning until a new update has been received.

Logistics Datums

The following table defines the set of datum IDs that are proposed to be used with logistics operations such as resupply, repair, and recovery.

Table 75. Logistics Datum IDs

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | Datum Type | Length |
| 35400 | Component Damage | Variable | 64-bits |

Component Damage

The Component Damage datum record shall contain the following fields.

1. **Repair Code.** This 16-bit enumeration shall indicate the repair code. The enumeration for this field matches that of the Repair field in the Repair Complete PDU.
2. **Repair Time.** This 32-bit unsigned integer shall indicate the time to repair the component in seconds.

Table 76. Component Damage Datum Record (35400)

|  |  |  |
| --- | --- | --- |
| Field | Data Type | Limits/Range/Ref |
| Repair Code | 16-bit enumeration | (see enumeration description above) |
| Padding | 16-bits unused | N/A |
| Repair Time | 32-bit unsigned integer | seconds |