AN2507 – ARMOR CIGI ICD

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Table of Contents

- Host to IG
  - IG Control
  - Entity Position
  - Conformal Clamped Entity Position
  - Short Articulated Part Control
  - Velocity Control
  - Celestial Sphere Control
  - Atmosphere Control
  - Weather Control
  - Wave Control
  - View Control
  - Acceleration Control
  - View Definition
  - Line of Sight Vector Request
  - Line of Sight Segment Request
  - Symbol Surface Definition
  - Symbol Text Definition
  - Symbol Circle Definition
  - Symbol Polygon Definition
  - Symbol Clone
  - Symbol Control
  - Short Symbol Control
  - Symbol Textured Circle Definition
  - Symbol Textured Polygon Definition
  - Entity Control
- IG to Host
  - Start of Frame
  - Line of Sight Response
  - Line of Sight Extended Response
- Not Supported
- ARMOR Custom
- Component Controls
  - Entity Appearance
  - Fire Weapon
  - Detonation
  - Entity Attachment
  - Designation
  - Entity Thermal Signature

  - Selected Weapon
  - Character Stance
  - Entity Identification
  - Reset Symbols
- Event Notifications
  - IG Up
  - Symbols Up
  - View Info

Overview

This document is the Interface Configuration Document (ICD) for integrating with the ARMOR image generator using the CIGI 4.0 Standard.

Host to IG

The following standard CIGI 4.0 packets are supported with the stated limitations and caveats.

IG Control

Field	Notes
Major Version	Not checked (CIGI4 assumed)
Database Number	Not relevant (whole Earth model)
Entity Type Substitution	Used if ARMOR / System / Entity / Entity Type Substitution is set to “CIGI Specified”.
Smoothing	No dead-reckoning currently implemented
Minor Version	Not checked

Entity Position

Fully Supported

Conformal Clamped Entity Position

Fully Supported

Short Articulated Part Control

Field	Notes
Degree of Freedom 1	Parts are currently defined in ARMOR in such a way that the degree of freedom is already set. DOF in the CIGI packets is only checked to be non-zero.
Degree of Freedom 2	

Velocity Control

Field	Notes
Apply to Articulated Part	Not supported
Angular Velocity	Not used, except for in ARMOR HUD.
Coordinates	Untested. Assumes body frame.

Celestial Sphere Control

Field	Notes
Continuous Time of Day Enabled.	Assumed true.
Sun Enable	Assumed true.
Moon Enable	Assumed true.
Star Field Enable	Assumed true.
Star Field Intensity	Not used.

Atmosphere Control

Field	Notes
Atmosphere Enable	Always applied.
Global Visibility Range	Overridden by the Ground Fog and/or Sand layers (if enabled) to always be the minimum, because only one visibility effect is applied.

Weather Control

Field	Notes
Entity ID / Region ID	Not supported in these modes
Layer ID	Layer 0 / Ground Fog
	Layer 1 / Cloud Layer 1
	Layer 2 / Cloud Layer 2
	Layer 4 / Rain
	Layer 5 / Snow
	Layer 8 / Sandstorm
Random Wind	Not supported
Random Lightning	Not supported
Cloud Type	Not supported
Scope	Only GLOBAL is supported
All Scud Effects	Not supported
Transition Bands	Not supported
Aerosol Concentration	Not supported

Wave Control

Field	Notes
General	Only Wave Height is read, and this is converted to a fixed sea-state representation.

View Control

Fully Supported

Acceleration Control

Field	Notes
ALL	Received but not used in ARMOR

View Definition

Field	Notes
FOV Control	Cannot specify directional FOVs, because Unity camera is limited to setting either horizontal or vertical FOV, and calculating the other from the window aspect ratio.
Mirror Mode	Not supported
Pixel Replication Mode	Not supported
Projection Type	Only Perspective is supported. Orthographic is not supported by many of ARMOR's shaders.
Reorder	Not supported, because ARMOR only supports a single viewport while in CIGI mode.
View Type	0: Undefined (–> Color) 1: Black/White 2: Color 3: IR White Hot 4: IR Black Hot 5: NVG Green 6: NVG White 7: Custom (Thermal)

Line of Sight Vector Request

Field	Notes
Material Mask	Bit 0: Ground/Terrain Bit 1: Water Bit 2: Biome Tree (Trunk) Bit 3: Biome Bush (Leaves) Bit 4: Particle Bit 5: Building Obstruction, Portion of roof / bridge support that can cause entity collision. Bit 6: Building (Roof) / Bridge Decking, Portion of roof / decking that can actually be stood on Bit 7: Mission Entities
General	If sampling water, only vertical raycast requests are supported.

Line of Sight Segment Request

Field	Notes
Material Mask	Bit 0: Ground/Terrain Bit 1: Water Bit 2: Biome Tree (Trunk) Bit 3: Biome Bush (Leaves) Bit 4: Particle Bit 5: Building Obstruction, Portion of roof / bridge support that can cause entity collision. Bit 6: Building (Roof) / Bridge Decking, Portion of roof / decking that can actually be stood on Bit 7: Mission Entities
General	If sampling water, only vertical raycast requests are supported.

Symbol Surface Definition

Fully Supported

Symbol Text Definition

Fully Supported

Symbol Circle Definition

Fully Supported

Symbol Polygon Definition

Field	Notes
Primitive Type	Point and TriangleFan types are not supported.

Symbol Clone

Field	Notes
General	Untested. Cloning is supported. However, these requests are processed after all other symbol and symbol control messages. This means that cloned symbols cannot be modified or controlled until the next frame.

Symbol Control

Fully Supported

Short Symbol Control

Field	Notes
Remove	Supported
Anything else	Not supported.

Symbol Textured Circle Definition

Field	Notes
General	Only intended to be used with custom texture transmission system (not published).

Symbol Textured Polygon Definition

Field	Notes
General	Only intended to be used with custom texture transmission system (not published).

Entity Control

Field	Notes
Entity State	Inactive/Standby not supported.
Collision Reporting	Not supported, because ARMOR does not use colliders.
Inherit Alpha	Not supported.
Smoothing	Not supported.
Extended Entity Type	Assumed extended type.

IG to Host

ARMOR sends the following CIGI 4.0 IG to Host packets.

Start of Frame

Field	Notes
Major Version	Ignored
Database Number	Not relevant.
IG Mode	Not supported
Earth Reference Model	Not supported. Fixed to WGS84.
Minor Version	Ignored.

Line of Sight Response

Fully Supported

Line of Sight Extended Response

Fully Supported

Not Supported

The following standard CIGI 4.0 packets are not yet supported in ARMOR.

Packet	Notes
Articulated Part Control	Use Short Articulated Part instead.
Environmental Region Control	
Maritime Surface Conditions	Received but not used
Terrestrial Surface Conditions	
Sensor Control	
Motion Tracker Control	
Earth Reference Model Definition	It is not currently possible to modify the earth reference model in ARMOR, which assumes WGS84.
Collision Detection Volume Definition	
HAT HOT Request	Not yet supported, but coming soon.
Position Request	
Environmental Condition Request	
Animation Control	
HAT HOT Response	Not yet supported, but coming soon.
HAT HOT Extended Response	Not yet supported, but coming soon.
Sensor Response	
Sensor Extended Response	
Position Response	
Weather Conditions Response	
Aerosol Concentration Response	
Maritime Surface Conditions Response	
Terrestrial Surface Conditions Response	
Collision Detection Segment Notification	
Collision Detection Volume Notification	
Animation Stop Notification	

ARMOR Custom

This section details the custom CIGI 4.0 packets that shall be received and sent by ARMOR.

Component Controls

The following custom packets shall be sent to ARMOR.

Entity Appearance

Name	Entity Appearance
Description	Sent for each platform to control its appearance.
Packet Type	Short Component Control
Component ID	1
Component Class	0 (Entity)
Instance ID	CIGI Entity ID
Component State	0
Component Data 1	Bit: Field 0/1: 0 = No Damage 1 = Slight Damage 2 = Moderate Damage 3 = Destroyed 2: Is Smoking 3: Is Burning 4: Mobility Killed 5: Weapons Killed 6: Engine Powered 7: Rocket Flash / Afterburner 8/9: 0 = No Trailing Effect 1 = Small Trailing Effect 2 = Medium Trailing Effect 3 = Large Trailing Effect 10: Landing Gear Extended 11: Transport State (Deployed) 12: Is Parachuting

Component Data 2	Bit: Field 0: Covert Lighting 1: Landing / Headlight / Flash Light 2: Navigation / Tail Lights 3: Reverse Lights 4: Brake Lights 5: Interior Lights 6: Exterior Lights / Spot Light 7: Formation Lights 8: Anti-Collision Lights 9: IR Strobe 10: Signal Mirror

Fire Weapon

Name	Fire Weapon
Description	Sent whenever a weapon is fired to produce fire and launch effects, including muzzle flash, smoke, shell ejection, etc.
Packet Type	Short Component Control
Component ID	2
Component Class	0 (Entity)
Instance ID	Shooter CIGI Entity ID
Component State	CIGI Barrel ID
Component Data 1	Bits 24-31: Weapon Kind Bits 16-23: Weapon Domain Bits 0-15: Weapon Country
Component Data 2	Bits 24-31: Weapon Category Bits 16-23: Weapon Subcategory Bits 8-15: Weapon Specific Bits 0-7: Weapon Extra

Detonation

Name	Detonation
Description	Sent whenever a detonation occurs to produce explosive effects, including combustion, smoke, ejecta, dust, etc.
Packet Type	Component Control
Component ID	3
Component Class	0 (Entity)
Instance ID	0
Component State	Bits 0-7: DIS Detonation Type 0 = Other 1 = Entity Impact 2 = Entity Proximate Detonation 3 = Ground Impact 4 = Ground Proximate Detonation 5 = Detonation 6 = None (Dud) 7 = HEHitSmall 8 = HEHitMedium 9 = HEHitLarge 10 = ArmorPiercingHit 11 = DirtBlastSmall 12 = DirtBlastMedium 13 = DirtBlastLarge 14 = WaterBlastSmall 15 = WaterBlastMedium 16 = WaterBlastLarge 17 = AirHit 18 = BuildingHitSmall 19 = BuildingHitMedium 20 = BuildingHitLarge 21 = MineClearingLineCharge 22 = EnvironmentObjectImpact 23 = EnvironmentObjectProximateDetonation

	24 = WaterImpact 25 = AirBurst 26 = KillWithFragmentType1 27 = KillWithFragmentType2 28 = KillWithFragmentType3 29 = KillWithFragmentType1AfterFlyoutFailure 30 = KillWithFragmentType2AfterFlyoutFailure 31 = MissDueToFlyoutFailure 32 = MissDueToEndGameFailure 33 = MissDueToFlyoutAndEndGameFailure
Component Data 1	Bits 24-31: Weapon Kind Bits 16-23: Weapon Domain Bits 0-15: Weapon Country
Component Data 2	Bits 24-31: Weapon Category Bits 16-23: Weapon Subcategory Bits 8-15: Weapon Specific Bits 0-7: Weapon Extra
Component Data 3	Single Float Latitude (deg)
Component Data 4	Single Float Longitude (deg)
Component Data 5	Single Float Altitude MSL (m)
Component Data 6	Bits 16-23: Impact Speed (10 meters per second increments) *Data Value 0 = 0 meters per second* *Data Value 10 = 100 meters per second* Bits 8-15: Impact Elevation (deg, starting from -90 deg) *Data Value 0 = Elevation -90 degrees* *Data Value 90 = Elevation 0 degrees* *Data Value 180 = Elevation +90 degrees* Bits 0-7: Impact Azimuth (2 deg increments) *Data Value 0 = Azimuth 0 degrees* *Data Value 90 = Azimuth 180 degrees*

Entity Attachment

Name	Entity Attachment
Description	Sent to command one entity to attach to another based on predefined attachment points. In the future, this will allow attachment relative to articulated parts, and for ARMOR to articulate doors and animate characters appropriately to step inside the vehicle, etc.
Packet Type	Short Component Control
Component ID	4
Component Class	0 (Entity)
Instance ID	Attaching CIGI Entity ID
Component State	0
Component Data 1	Bits 16-31: Vehicle ID (0 for detach) Bits 0-15: Position ID (0 for default)
Component Data 2	RESERVED

Designation

Name	Designation
Description	Sent to relay IR pointers, laser designators, and similar laser energy to ARMOR. Additional packets may be sent to update its location. A final packet shall be sent to remove the designation.
Packet Type	Component Control
Component ID	7
Component Class	12 (Event)
Instance ID	Designation ID
Component State	Designation Type: 0 = IR Pointer 1 = Laser Designator 2 = Laser Range Finder 3 = Directed Energy 4 = Laser Beam Riding
Component Data 1	Bits 0-15: Source CIGI Entity ID

Component Data 2	Designator Code: Flash Rate in Hz for IR Pointer PRF Code for Laser Designator
Component Data 3	Flags: Bit 0: Remove Designation
Component Data 4	Single Float Target Latitude (deg)
Component Data 5	Single Float Target Longitude (deg)
Component Data 6	Single Float Target Altitude MSL (m)

Entity Thermal Signature

Name	Entity Thermal Signature
Description	Sent for each vehicle to relay the heat emitting from its engine, wheels, and gun barrels.
Packet Type	Short Component Control
Component ID	8
Component Class	0 (Entity)
Instance ID	CIGI Entity ID
Component State	Flags: Bit 0: Absolute Temperature (0.1 degree K increments, 0 to 6553.5 degrees). If not set, then temperature reported is a percentage from 0 (Cold) to 65535 (Hot).
Component Data 1	Bits 16-31: Engine Heat from 0 (Cold) to 65535 (Hot) Bits 0-15: Wheels/Tracks Heat from 0 (Cold) to 65535 (Hot)
Component Data 2	Bits 16-31: Gun Heat from 0 (Cold) to 65535 (Hot) Bits 0-15: Surface Heat from 0 (Cold) to 65535 (Hot)

Selected Weapon

Name	Selected Weapon
Description	Sent to control the type of weapon in use by a platform. For life forms, send values such as a M16 or SA-7 so the life form holds the appropriate launcher model.
Packet Type	Short Component Control
Component ID	9
Component Class	0 (Entity)
Instance ID	CIGI Entity ID
Component State	0
Component Data 1	Bits 24-31: Weapon Kind Bits 16-23: Weapon Domain Bits 0-15: Weapon Country
Component Data 2	Bits 24-31: Weapon Category Bits 16-23: Weapon Subcategory Bits 8-15: Weapon Specific Bits 0-7: Weapon Extra

Character Stance

Name	Character Stance
Description	Sent to control the stance of a life form and how it is holding its wielded item.
Packet Type	Short Component Control
Component ID	10
Component Class	0 (Entity)
Instance ID	CIGI Entity ID
Component State	Bit 0: Detailed Animation Expected Bit 1: Character is in water

Component Data 1

Bits 16-31: Action Stance
Bits 8-15: Weapon Stance
Bits 0-7: Character Stance

Action Stances:

0 = None
1 = Detained
2 = Surrender
3 = Fists
4 = Verbal 1
5 = Verbal 2
6 = Verbal 3
7 = Resist 1
8 = Resist 2
9 = Resist 3
10 = Digging
11 = Smoking
12 = Using Phone

Weapon Stances:

0 = Stowed
1 = Deployed
2 = Firing Position

Character Stances:

0 = Upright (Standing, Walking, Running)
1 = Crouching (Kneeling, Crouching)
2 = Prone (Prone, Crawling)
3 = Sitting

Component Data 2	Bits 16-31: ARMOR Action Stance Bits 0-15: ARMOR One Time Animation ARMOR Action Stance: None = 0 Salute = 1 Clap = 2 Sit_Low_Vehicle = 3 Drive_Low_Vehicle = 4 Sit_Vehicle = 5 Drive_Vehicle = 6 Dance = 7 One Time Animation: None = 0, Jump = 1, Throw = 2, Taunt = 3, Victory_Cheer = 4, Wave = 5, Reload = 6

Entity Identification

Name	Identification
Description	Relates a CIGI Entity ID to a DIS Identifier. Used for waypoints, animations, effects, and some other subsystems. Send for each entity at its creation and when an IG reports it is up.
Packet Type	Short Component Control
Component ID	16
Component Class	0 (Entity)
Instance ID	CIGI Entity ID
Component State	0

Component Data 1	Bit: Field Bits 16-31: DIS Site Bits 0-15: DIS Application
Component Data 2	Bit: Field Bits 16-31: DIS Entity

Reset Symbols

Name	Reset Symbols
Description	Instructs ARMOR to reset all symbols and then send a Symbols Up notification.
Packet Type	Short Component Control
Component ID	20
Component Class	13 (System)
Instance ID	
Component State	
Component Data 1	
Component Data 2	

Event Notifications

ARMOR shall send the following event notifications.

IG Up

Name	IG Up
Description	Sent after the IG has started. The Host should re-send entities, attachments, view controls, weather, and HUD so the IG has the latest state without having to wait for a heartbeat.
Event ID	1
Event Data 1	
Event Data 2	
Event Data 3	

Symbols Up

Name	Symbols Ready
Description	Sent to notify the host that ARMOR is ready to receive symbols. To be sent on startup (after initialization and after IG Up), or in response to Reset Symbols.
Event ID	3
Event Data 1	
Event Data 2	
Event Data 3	

View Info

Name	View Info
Description	Sent to notify the host about the actual information about a view. Does so regardless of CIGI vs ARMOR configuration, thereby reflecting actual ARMOR state.
Event ID	4
Event Data 1	ushort View ID
	ushort InfoType
Event Data 2	
Event Data 3	

Info Type	Event Data 2	Event Data 3
1	int Horizontal Resolution	int Vertical Resolution
2	float Horizontal FOV	float Vertical FOV
…		