

Enhancing Distributed Simulation to C2 interoperability using NETN v4.

Oscar Bergman



Introduction

- NETN 4 Developer and integrator
- Task group developing NETN 4
- Developed NETN 4 connections from scratch
- Updating from RPR2 and NETN 3 to NETN 4
- Based on experiences from SweAF exercises.



Background to problem

- C2 exercises with multiple simulators and C2 systems
 - How do we transfer information between the systems?
 - How to streamline the integration as much as possible?
 - How to we decrease the exercise overhead?



Transfer information between systems

- HLA and NETN 4
- Standardized communication interface
- Standardised object model that covers the base need
 - Can be extended to cover special use cases for systems



Why NETN 4?

- Its HLA4 and modular
- Both Ground Truth and Perceived truth in same environment
 - Or in separate depending on the need and design
- Send basic tasks between systems
- Possible to change responsible system during runtime
- Possible to change one model without having a new system



NETN4 Observation reports

- Basic requirements for sending a report
 - 5 required parameters
- Multiple more fields to include more information about the report

Name:

Transportation:

Sharing
☒ Publish
☒ Subscribe

Parameters:

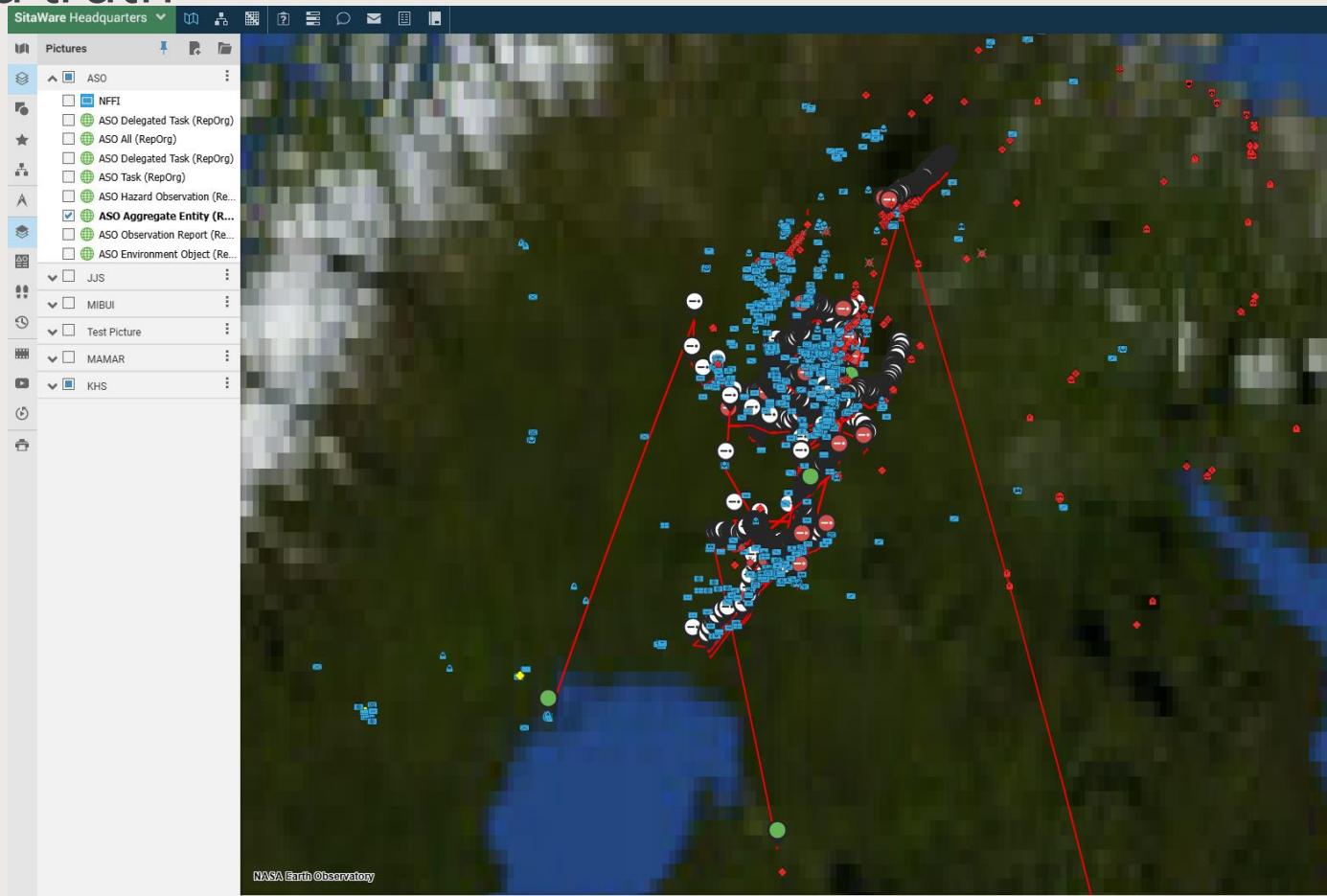
Name	Datatype	Semantics	Source
ObservedEntity	UUID	Required: The unique identifier ...	ObservationReport
ObservationTime	EpochTime	Required: The time when the ob...	ObservationReport
IdentificationLevel	IdentificationLevelEnum8	Optional: The identification leve...	ObservationReport
ConfidenceLevel	Float64	Optional:	ObservationReport
SensorType	EntityTypeStruct	Optional: The type of sensor tha...	ObservationReport
UncertaintyInterval	Float64	Optional	ObservationReport
Activity	AggregateMissionEnum16	Optional: The current activity of...	ObservationReport
Health	PercentFloat32	Optional: Observed strength of ...	ObservationReport
Location	LocationStruct	Optional: Observed location wh...	ObservationReport
Heading	DirectionDegreesFloat32	Optional: Observed heading of ...	ObservationReport
Speed	VelocityMeterPerSecondFloat32	Optional: Observed speed of th...	ObservationReport
HostilityStatus	HostilityStatusCodeEnum32	Optional: Perceived hostility of t...	ObservationReport
Marking	HLAUnicodeString	Optional: Observed marking on ...	ObservationReport
Name	HLAUnicodeString	Optional: Perceived name of th...	ObservationReport
Side	UUID	Optional: Perceived force identi...	ObservationReport
Equipment	ArrayOfObservedEquipment	Optional: Observed supplies an...	ObservationReport
Symbol	SymbolIdentifier	Optional: Symbol identifier for t...	ObservationReport
ReportId	UUID	Required: Unique identifier for t...	ETR_Report
ReportingEntity	UUID	Required: The entity sending th...	ETR_Report
Receiver	UUID	Optional: The indended receiver...	ETR_Report
TimeStamp	EpochTime	Required: The time when the re...	ETR_Report
Comments	HLAUnicodeString	Optional: Any additional comm...	ETR_Report
Uniqueld	UUID	Optional: A unique identifier for...	HLAInteractionRoot
SendTime	EpochTime	Optional: Scenario time when t...	HLAInteractionRoot



How does it work in practice?

- Multiple Simulators
 - Each simulator can calculate their own reports or one shared sensor module
- C2 system shall consume all reports
 - Simulators can consume if it is relevant
- Option to change sensor modules based on needs and design

Ground truth



Perceived truth



SitaWare Headquarters

Pictures

- ASO
 - ☐ NFFT
 - ☐ ASO Delegated Task (RepOrg)
 - ☐ ASO All (RepOrg)
 - ☐ ASO Delegated Task (RepOrg)
 - ☐ ASO Task (RepOrg)
 - ☐ ASO Hazard Observation (Re...
 - ☐ **ASO Aggregate Entity (R...**
 - ☒ ASO Observation Report (Re...
 - ☐ ASO Environment Object (Re...
- JJS
- MIBUI
- Test Picture
- MAMAR
- KHS

NASA Earth Observatory

Layer Contents: ASO Observation Report - 199 of 199 Obj.

Symbol	Name ^	Last Reported By	Observation Time	End Time	Symbol Code
	1.BRIGLSB	RepOrg	22 1528B SEP 25		SFGPUJ—E***
	10.MOT	RepOrg	21 2246B SEP 25		SHGPUCIM—F***



The future – Transferring data from C2 to Sim

- Tactical graphics
 - Custom FOM to transfer Tactical graphics in the federation
- Transfer orders directly from C2 systems to Simulation
 - Utilize the tactical graphics data for routes and similar



Questions?