Fjärrstridsgrupp Alfa (FSG-A) — open-source defence engineering

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Interoperability Matrix

Reference Design — NATO/Swedish System Compatibility Mapping

STATUS — REFERENCE DESIGN / CONCEPT DOCUMENT. This document is a design contribution, not a programme deliverable. It describes a proposed approach, structure, or analysis that researchers at FOI, FMV, Försvarsmakten, or defence industry partners may adapt when building their own prototypes or running their own programmes. FSG-A does not operate a UAS programme at the scale or maturity this document describes; no organisational roles, test schedules, logistics facilities, or maintenance processes named within are currently active. Any dates, RPN scores, MTBF values, budget figures, or organisational structures are **illustrative examples** intended to show how a real programme might approach the subject — they are not commitments, plans, or claims of current capability.

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Revision History

Version	Date	Author	Description
0.1 DRAFT	2026-04-19	FSG-A	Initial draft reference design. Illustrative structure for a funded programme to adapt; not a programme deliverable in its own right.

1. Purpose

This Interoperability Matrix documents every external system that FSG-A has either validated against, designed compatibility for, or identified as a future integration target. The matrix is the single authoritative reference for 'will FSG-A work with X?' questions.

Status values use a five-tier scale from operational (fielded and in use) down to future (identified but not yet scoped). Evidence column cites the specific source file, wiki chapter, or external artefact supporting the claim.

2. Status Legend

• Operational / Implemented (green) — Fielded and in use; no additional work required.

• SITL validated / Compatible (green-yellow) — Tested in software simulation; round-trip verified against reference implementation.

• Concept / Protocol-level / Analytical (amber) — Design complete; awaits physical integration test or partner access.

• Future (red) — Identified as required capability but not yet scoped for current phase; typical TRL 7+ activity.

Claims with analytical or simulation evidence must not be represented as operationally proven. This document is the canonical source for avoiding such overstatement.

3. Swedish C2 and Forces

9 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
Swedish Battle Lab (SLB)	JC3IEDM (STANAG 5525)	FSG-A → SLB	Track reporting, COP contribution	**SITL validated**	sdk/libfischer26e/swecis_bridge.py — SITL round-trip test in stress suite
SWECCIS	NFFI	FSG-A → SWECCIS	Friendly force position reporting	**SITL validated**	libfischer26e/jas39_nffi.py — NFFI payload generator
ATAK / Swedish variant	Cursor-on-Target (CoT)	FSG-A ↔ ATAK	Operator tablet COP sync; target marking	**SITL + reference ATAK server**	libfischer26e/swecis_bridge.py ATAKCoTAdapter; TAK Server docker tested
JAS 39 Gripen	NFFI + Link 16 (via gateway)	FSG-A → JAS 39	Target handoff for BVR engagement	**SITL validated**	libfischer26e/jas39_nffi.py — NFFI payload format verified against published samples
GUTE II (FMV SEK 8.7 bn)	JSON over HTTPS (FMV-defined)	FSG-A → GUTE II	C-UAS target cueing to Tridon Mk2 / Trackfire	**Mock endpoint validated**	libfischer26e/gute_ii.py — JSON schema matches published FMV spec; endpoint authorised 2026-04-02 procurement
Stridsvagn 122	HMI via SDK adapter	FSG-A → Strv 122	Threat warning to tank crew	**Concept — planned for Phase 4**	Wiki chapter cuav-strv122.html documents integration path

CV90 (Strf 90)	HMI via SDK adapter	FSG-A → Strf 90	Threat warning and C-UAS cueing	Concept — planned for Phase 4	Wiki chapter cuav-strf90.html
Archer self-propelled artillery	JC3IEDM + FireSupport message	FSG-A → Archer	Target handoff for artillery engagement	SITL validated	libfischer26e/stanag_5525.py — JC3IEDM track message format
Ra 180 tactical radio	MIL-STD-188-220 + adaptation layer	FSG-A ↔ Ra 180	Ground radio interop for dismounted operators	SDK implemente	libfischer26e/ra180.py — self-test passes in stress suite

3. Swedish Air Defence and Commercial

2 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
Silvus StreamCaster mesh	Silvus proprietary + IP	FSG-A ↔ Silvus	MANET backbone for all FSG-A operations	Operational	Primary comms platform; all Fischer 26/26E use this
Patriot / NASAMS	Link 16 (future via gateway)	FSG-A → Allied ADA	Air-breathing threat cueing	Future roadmap	Not yet scoped; TRL 7+ activity

3. NATO Standards (STANAG)

6 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
STANAG 4586 UCS	STANAG 4586 Ed. 3	FSG-A ↔ NATO GCS	Control of UAS by any NATO GCS	LOI 2-5 SITL validated	libfischer26e/stanag_4586.py — all five Levels of Interoperability implemented; acceptance via VSM (Vehicle Specific Module)
STANAG 4660 IC2DL	STANAG 4660 Ed. 1	FSG-A ↔ NATO C2	Common Control Data Link protocol	SITL validated	libfischer26e/stanag_4660.py — frame pack/unpack verified; fuzz tested
STANAG 4609 KLV	MISB ST 0601	FSG-A → NATO ISR	Motion imagery with KLV metadata	Implemented	libfischer26e/stanag_4609.py — MISB ST 0601 tags round-trip verified
STANAG 4607 GMTI	STANAG 4607 Ed. 3	FSG-A → NATO ISR	Ground Moving Target Indication (passive radar)	Implemented (Fi	libfischer26e/stanag_4607.py — track report format validated
STANAG 5525 JC3IEDM	STANAG 5525 Ed. 3	FSG-A ↔ NATO C2	Joint Consultation, Command and Control IEDM	Implemented	libfischer26e/stanag_5525.py — track message schema compliant
STANAG 4671 USAR	STANAG 4671 Ed. 1	Fischer 26 airworthiness	UAV airworthiness requirements compliance	Analytical compliance; flight-test pending Phase 3	Wiki chapter fischer26-stanag.html; structural margins in design

3. Allied Partners

4 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
Finnish TAK (ATAK variant)	CoT	FSG-A ↔ Finnish TAK	Cross-border interop (Norrbotten ↔ Lappi)	Protocol-level compatible	Same CoT schema; bilateral exercise integration planned
Estonian Defence Cyber	Standard API (TBD)	FSG-A ↔ EST cyber	Threat intelligence sharing	Future — subject	Protocol evaluation only
Norwegian ADA (NASAMS)	Link 16 (via gateway)	FSG-A → Norwegian ADA	Cross-border air track sharing	Future — require	Wiki chapter lisa26-jef-integration.html documents concept
UK JEF coordination	STANAG 5525 + NATO messaging	FSG-A ↔ UK JEF	Joint Expeditionary Force multi-national C2	Protocol-level	NATO standard compliance inferred from JC3IEDM

3. Coalition / US

1 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
US DoD coalition C2	Link 16 + Variable Message Format	FSG-A ↔ US	Coalition integration	Future — require	Not detailed in the reference design

3. Commercial / OSS

2 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
ArduPilot / Mission Planner	MAVLink 2.0	FSG-A ↔ ArduPilot	Airframe autopilot and GCS	Operational	Primary airframe firmware
QGroundControl	MAVLink 2.0	FSG-A ↔ QGC	Alternative GCS for operators	Compatible	MAVLink compliance; all FSG-A airframes appear as standard UAS

3. Intelligence / OSINT

2 interop relationship(s) in this category.

System	Standard	Direction	Purpose	Status	Evidence
OpenStreetMap + copernicus-DEM	WMS / GeoTIFF	FSG-A ← OSM/copernicus	Terrain reference data	Operational	Wiki chapter lisa26-terrain-mapping.html; pipeline documented
NATO OSINT Bureau feeds	STIX/TAXII	FSG-A ← OSINT	Threat intelligence integration	Future — require	Not in the reference design; a real programme may prioritise it

4. Evidence and Test Methodology

For items marked 'SITL validated' or 'Implemented', the evidence consists of: (a) SDK source code with unit tests, (b) execution of the stress suite in test_stress.py, and (c) round-trip validation against either a reference implementation or published message samples.

For items marked 'Concept' or 'Future', no system-level test has been performed; representation is limited to protocol compliance claims based on published standards.

No operational interop has been demonstrated in live exercise because the system is currently at TRL 3. Phase 4 (TRL 6) operational test is expected to upgrade 5-8 of the currently-SITL-validated entries to 'operational' status.

5. Dependencies and Risk

The following interop relationships are on the critical path for specific operational capabilities:

• GUTE II endpoint — C-UAS effect chain. Without this, Fischer 26E cannot cue Tridon Mk2 / Trackfire.

• SWECCIS/SLB — C2 integration. Without this, Lisa 26 is a parallel island rather than integrated with Swedish Armed Forces operations.

• STANAG 4586 VSM — required for any NATO partner nation's GCS to operate Fischer 26 airframes.

• Silvus MANET — comms backbone. Supply chain risk covered in FSG-A-RISK-001 and FSG-A-THREAT-001.

6. References

NATO STANAG 4586 Ed. 3 — UAV Control System (UCS) Interoperability.

NATO STANAG 4660 Ed. 1 — Common Control Data Link Protocol (IC2DL).

NATO STANAG 4609 / MISB ST 0601 — Motion Imagery and KLV Metadata.

NATO STANAG 4607 Ed. 3 — Ground Moving Target Indication.

NATO STANAG 5525 Ed. 3 — Joint Consultation, Command and Control IEDM.

NATO STANAG 4671 Ed. 1 — UAV Systems Airworthiness Requirements.

NFFI — NATO Friendly Force Identification (NATO Coalition Warrior Interoperability eXercise series).

MIL-STD-188-220 — Interoperability Standard for Digital Message Transfer Device Subsystems.

FSG-A wiki https://fsg-a.com/ — chapter-level integration documentation.