

where the Contractor shall store all Project related documentation deliverables and maintain their up keep for the duration of the Contract.

- MNG-156 The Reach service will be a Contractor paid-for-service, as detailed in the Contract.
- MNG-157 The website shall be used to share working documentation to ensure easy access.
- MNG-158 The CWE structure shall be proposed by the Contractor and shall be subject to agreement by the Purchaser's PM.
- MNG-159 All documentation, subject to formal review and acceptance by the Purchaser, shall be clearly identified up front to allow the Purchaser to conduct the review. The Contractor shall provide a review sheet with each document for Purchaser to list their comments. The Contractor shall provide the proposed actions and responses in the same sheet before the next review cycle.
- MNG-160 The Contractor shall use organised folder structure to clearly identify the documents (with their CI numbers) and their working versions from the released versions. Each document type folder should have two separate folders to clearly distinguish the released versions from the working versions including the document review sheet.
- MNG-161 The Contractor shall implement an access control mechanism to restrict viewing of all documentation on the CWE to a list of users approved by the Purchaser and administered by the Contractor.
- MNG-162 The CWE Portal site shall allow the Purchaser access to the management documentation.
- MNG-163 The CWE Portal shall allow the Purchaser access to the finished and in-progress items, including design specifications, documentation, source code, installers and executables.
- MNG-164 The Contractor shall present a proposed design for the CWE no later than six weeks after Contract Award.
- MNG-165 The Contractor shall populate and activate this website within eight weeks after the Contract Award.

3.7 SECURITY ASPECTS

- MNG-166 Contractor's premises shall be able to handle information up to and including NATO S*CR*T.
- MNG-167 All information items used in support of the execution of the project shall be classified and handled according to their security classification.
- MNG-168 The Contractor's premises shall be approved by their Government authority to receive, handle and store crypto material.
- MNG-169 The Contractor shall ensure that all Contractor and Subcontractor personnel that shall work for this Project or have at a minimum, a valid NATO S*CR*T clearance as required by NATO policy.
- MNG-170 The Contractor shall follow the Purchaser site access procedure to gain access to the site for the conduct of Project business. The Contractor shall allow time in their planning to achieve this.

4 INTEGRATED PRODUCT SUPPORT

- [124] This Section addresses the Integrated Product Support (IPS) requirements of the project. The purpose of this Section is to ensure that the Contractor uses sound best practices to plan, implement, integrate, continuously measure and fine tune the IPS activities, as well as to ensure timely and correct delivery of the project.
- [125] The Purchaser will review and approve (in 4 weeks) the IPS deliveries provided under this Contract and subject to review and approval by the Purchaser.
- [126] The Purchaser will review and approve (in 8 weeks) Technical Publications and Training Materials provided under this Contract. Upon acceptance of the draft version, the Contractor is allowed to deliver the final version of the technical publications.
- IPS-1 The Contractor’s internal Life Cycle Management (LCM) process and system shall comply with STANAG 4728 “System Life Cycle Management (SLCM)”.
- IPS-2 The Contractor shall manage the IPS activities within this Contract by:
- a. Providing evidence that the designed system solution is for a **service life of at least fifteen (15) years** based on the operational conditions required through the development of the activities described in the Integrated Product Support Plan (IPSP) and the In Service Support Plan (ISSP) assuring and managing the supportability of the solution (i.e.: availability for supply of spare parts and/or the relevant repair services);
 - b. Providing evidence that for a period of at least five (5) years after successful completion of last batch’s Final System Acceptance (FSA) by the Purchaser, the system’s equipment shall not become obsolete and the Customer shall be able to obtain all necessary spare parts, components and technical expertise for planned routine maintenance and normal repair, following which it shall continue to meet the design performance parameters when operated under design conditions;
 - c. Appointing an IPS manager for the entire duration of the contract to conduct the IPS Programme that shall:
 - i. Be at a level commensurate with the systems engineering and the software engineering managers;
 - ii. Be point of contact to interface with the Purchaser on IPS matters;
 - d. Providing all relevant IPS deliverables (documents, data and activities) as a result of all IPS processes.
- IPS-3 The Contractor shall provide the required IPS deliveries in accordance with the following schedule that shall be included in the contractor’s Project Master Schedule (PMS) of the PMP in the PIP.

Table 4-1 IPS Deliverables

| IPS Deliveries | Issue | Due date |
|---|-------------|----------|
| Integrated Product Support Plan (IPSP) | Draft | EDC + 2w |
| | Final Draft | PDR – 4w |
| | Final | CDR + 4w |
| Reliability Availability Maintainability Testability (RAMT) Case Report | Draft | SRR – 4w |
| | Final Draft | PDR – 4w |

| IPS Deliveries | Issue | Due date |
|---|-------------|-------------------------------|
| | Final | CDR – 4w |
| | Test & Demo | PSA |
| Failure Mode Effects and Criticality Analysis (FMECA) | Draft | SRR – 4w |
| | Final Draft | PDR – 4w |
| | Final | CDR – 4w |
| Maintenance Task Analysis (MTA) [incl. Product Support Database] | Draft | PDR – 4w |
| | Final Draft | CDR – 4w |
| | Final | FAAT + 4w |
| Level of Repair Analysis (LORA) [incl. Repair Price List (RPL)] | Draft | PDR – 4w |
| | Final Draft | CDR – 4w |
| | Final | FAAT + 4w |
| Packaging, Handling, Storage and Transportation (PHST) Report | Draft | CDR – 4w |
| | Final | FAAT + 4w |
| Initial Provisioning List (IPL) | Draft | CDR - 4w |
| | Final | FAAT + 4w |
| Obsolescence Report | Draft | CDR – 4w |
| | Final Draft | FAAT + 4w |
| | Quarterly | First delivery at PSA + 3m |
| Warranty Report | Draft | FSA - 6m |
| | Quarterly | First delivery at FSA + 3m |
| Operation Manuals | Draft | CDR – 4w |
| | Final | FAAT + 4w |
| Maintenance Manuals | Draft | CDR – 4w |
| | Final | FAAT + 4w |
| Training Plan (TRNP) [incl. Training NeEDC Analysis (TNA)] | Draft | CDR – 4w |
| | Final Draft | CDR + 8w |
| | Final | PSA – 4w |
| Training documentation | Draft | FAAT – 20w |
| | Final | Training Start – 4w |
| Training execution of Testing Personnel | Execution | Immediately before tests |
| Training execution of Operators (including reports) | Execution | PSA + 1w |
| | Report | Training End + 4w |
| Training execution of Maintainers (including reports) | Execution | PSA + 1w |
| | Report | Training End + 4w |
| Training execution of Instructors (including reports) | Execution | PSA + 1w |
| | Report | Training End + 4w |
| In Service Support Plan (ISSP) | Draft | FSA - 6m |
| | Final | FSA + 6m |

4.1 INTEGRATED PRODUCT SUPPORT PLAN

[127] The Integrated Product Support Plan (IPSP) is the primary document that details the approach to IPS, tailored to meet the needs of a specific product or service. The IPSP includes detailed information for the planning, implementation and co-ordination of the IPS program, together with element plans detailing how the

appropriate IPS elements are addressed. The IPSP is integrated and consistent with other program documentation. The IPSP is a living document and therefore the content will vary depending on the type and phase of any program or project.

IPS-4 The Contractor shall establish, provide, execute and maintain an effective Integrated Product Support Plan (IPSP) in accordance with ASD SX000i iss.3.0.

IPS-5 The IPSP shall:

- a. Describe the Contractor’s plans for the management control, interface, and integration of all elements of the Contractor’s Integrated Product Support with the system engineering and design processes;
- b. Establish/describe the policies, procedures, and methodologies to ensure the logistic requirements are achieved and to refine the support to the system;
- c. Document the Contractor’s plans, organisational structure, procedures and activities implemented, followed and performed to ensure that product support elements influence and interface with system design and other functional areas, to satisfy supportability criteria; and
- d. Incorporate Purchaser-approved changes, additions and deletions.

IPS-6 The IPSP shall describe the Contractor’s approach and plans for each of the following element:

- a. Reliability Availability Maintainability and Testability (RAMT) and Failure Mode Effect and Criticality Analysis (FMECA),
- b. Logistics Support Analysis (LSA) including Logistic Data and Database, Supply Support, Packaging Handling Storage and Transportation (PHST),
- c. Parts Obsolescence Management,
- d. Technical Publications,
- e. Training,
- f. Support during Warranty and Post Warranty.

IPS-7 The Contractor shall provide the IPSP detailing the relevant content to cover the following structure.

Table 4-2 IPSP Content and Structure

| Structure | Content |
|-----------|--|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | System Overview |
| 3.1 | Architecture |
| 3.2 | Operational scenario |
| 3.3 | Maintenance Concept |
| 3.4 | Support Concept |
| 4 | IPS Management |
| 4.1 | IPS team and sub-Contractors |
| 4.2 | IPS processes and procedure overview |
| 4.3 | IPS constraints |
| 4.4 | IPS tools |
| 4.5 | IPS Contractual Deliverable Requirements List (CDRL) |

| Structure | Content |
|-----------|--|
| 5 | System Breakdown |
| 6 | Reliability, Availability, Maintainability and Testability (RAMT) Plan |
| 6.1 | Reliability |
| 6.2 | Maintainability |
| 6.3 | Testability |
| 6.4 | Availability |
| 6.5 | Failure Mode Effects and Criticality Analysis (FMECA) |
| 7 | Logistics Support Analysis (LSA) Plan |
| 7.1 | Maintenance Concept |
| 7.1.1 | Preventive/Scheduled maintenance |
| 7.1.2 | Corrective/Unscheduled maintenance |
| 7.1.3 | Hardware Maintenance Concept |
| 7.1.4 | Software Maintenance Concept |
| 7.2 | Maintenance Levels Description |
| 7.3 | Support Concept |
| 7.4 | Support Levels Description |
| 7.5 | Maintenance Task Analysis (MTA) |
| 7.6 | Level Of Repair Analysis (LORA) |
| 7.7 | LSA Database |
| 8 | Supply Support Plan |
| 8.1 | Manpower and personnel |
| 8.2 | Spare Parts |
| 8.3 | Tool and Test Equipment |
| 8.4 | Facilities |
| 8.5 | Packaging, Handling, Storage and Transportation (PHST) |
| 8.5.1 | Packing, Coding and Labelling (Packaging) |
| 8.5.2 | Delivery and Shipment (Handling and Storage) |
| 8.5.3 | Transportation |
| 9 | Parts Obsolescence Management |
| 9.1 | Evaluation criteria |
| 9.2 | Resolution strategies |
| 10 | Technical Publications |
| 11 | Training |
| 12 | In service Support (ISS) |
| 12.1 | Warranty period |
| 12.2 | Post Warranty period |
| 12.2.1 | Post Warranty Services (PWS): Repair On Need |
| 12.2.2 | Performance Based Services |
| 12.3 | Sub-Contractors |

4.2 RELIABILITY, AVAILABILITY, MAINTENABILITY TESTABILITY CASE REPORT

IPS-8 The Contractor shall provide a Reliability Availability Maintainability Testability (RAMT) Case Report that shall include:

- a. All COTS equipment data sheets and references, clearly indicating the COTS equipment's reliability and maintainability characteristics used as data input to any of the RAMT activities;
- b. The complete set of Reliability Block Diagrams (RBDs), including reliability, maintainability and intrinsic availability allocations per block, per aggregated block, per sub-system, per location, and for the entire system;
- c. All draft and final calculations for (ref MIL-HDBK-338B):

- i. Reliability (MTBF and MTBCF);
 - ii. Maintainability (TTR, MTTR, MTTRS and MTBPM);
 - iii. Testability: Fault Detection (FD) percentage and Fault Isolation (FI) percentage with and without ambiguity;
 - iv. Intrinsic Availability (Ai);
 - v. Rationale and justifications for all data and formulas used in any of the calculations and models.
- IPS-9 The Contractor shall develop and maintain, in accordance with IEC 61078:2006 or MIL-STD-756B, the Reliability Block Diagrams (RBDs) for the entire system and subsystems, relating all items (i.e. hardware down to LRU level and firmware/software CSCI) based on failure dependencies, and explaining how the reliability of each item contributes to the success or failure of the entire system. Firmware shall be treated as being part of the pertinent LRU.
- IPS-10 The reliability predictions shall be in accordance with one of the following:
- a. Bellcore/Telcordia SR-332, Ground Fixed Uncontrolled, 30°C Case temperature;
 - b. HDBK-217Plus and ANSI VITA51, Ground Fixed, 30°C Case temperature;
 - c. Certified field data (scaling i.a.w. MIL-HDBK-338B table for Environment and Temperatures);
 - d. A combination of the above.
- IPS-11 The reliability predictions shall consider the System duty 100% (components de-rating and local duties may be applied).
- IPS-12 The Contractor shall provide detailed and comprehensive historical evolution in versioning for each firmware/software including the technical motivation linked to each release vs the previous one.
- IPS-13 The Contractor shall plan, design and execute **on-site Reliability tests** in accordance with MIL-HDBK-781 to demonstrate the MTBF relevant requirement in the SRS with 90% (ninety percent) confidence (10% Consumer's risk).
- IPS-14 The Contractor shall propose a test plan and procedure indicating the minimum number of testing hours based on the cumulative failures as per Chi-Squared test matching the above criteria. The test hours shall be distributed on all the systems with a minimum testing time of 1000 hours per system.
- IPS-15 The Contractor shall plan, design and execute the system maintainability/testability demonstration in accordance with IEC 60706-3:2006 test method 1 Annex B or MIL-HDBK-470A Annex B (test plan 1A).
- IPS-16 The Contractor shall ensure that the maintainability/testability demonstration addresses both hardware and firmware/software maintenance tasks.
- IPS-17 The Contractor shall demonstrate the MTTR requirement in the SRS by providing 90% (ninety percent) confidence.
- IPS-18 The Contractor shall demonstrate system diagnostic capability (fault detection and isolation) in accordance with the relevant requirements set in the SRS.
- IPS-19 The Contractor shall provide the RAMT Case Report detailing the relevant content to cover the following structure.

Table 4-3 RAMT Case Report Content and Structure

| Structure | Content |
|-----------|-------------------------------------|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | System Breakdown Description |
| 4 | Design for Reliability |
| 4.1 | Reliability Prediction Formulas |
| 4.2 | Reliability Block Diagram |
| 4.3 | Reliability Prediction |
| 5 | Design For Maintainability |
| 5.1 | Maintainability Prediction Formulas |
| 5.2 | Maintainability Prediction |
| 6 | Design For Testability |
| 6.1 | Testability Prediction Formulas |
| 6.2 | Testability Prediction |
| 7 | Availability |
| 8 | Conclusions |

- IPS-20 The Contractor shall provide one .xls spreadsheet as annex of the RAMT Case Report in accordance with the following content and structure:
- a. **Product Breakdown:** Level, Description, Cage Code, Part Number, Quantity;
 - b. **Reliability:** Critical item (Y/N), Source data (Calculated / Predicted / Estimated / Contractor evidence), Failure rate (fpmh), MTBF (h), Redundancy model, MTBCF(h);
 - c. **Maintainability:** TTR (h), MTTR (h), MTRS (h), MTBPM (h), Mpt (h);
 - d. **Testability:** Fault detection (FD%), Fault Isolation [FI(1LRU)%, FI(2LRU)%, FI(3LRU)%, FI(>3LRU)%].

4.3 FAILURE MODE EFFECT & CRITICALITY ANALYSIS

- IPS-21 The Contractor shall provide a **Failure Mode Effect and Criticality Analysis (FMECA)** down to the hardware LRU and firmware/software CSCI level in accordance with IEC 60812:2018 or MIL-STD-1629A.
- IPS-22 The Contractor shall provide functional descriptions for the systems and allocated to the subsystems, covering all operational modes and mission phases.
- IPS-23 The Contractor shall perform a functional FMECA considering the effects of failure of hardware LRU and firmware/software CSCI level directly to the functions that shall be lost or degraded.
- IPS-24 The Contractor shall identify critical items as the items (hardware LRU and firmware/software CSCI) whose failure induce loss of critical function.
- IPS-25 In case of catastrophic and/or safety critical failures have been identified through the FMECA, the Contractor shall perform a **Fault Tree Analysis (FTA)** down to the SRU or CSC level as appropriate for development items in accordance with MIL-HDBK-338B.
- IPS-26 The Contractor shall provide FMECA detailing the relevant content to cover the following structure.

Table 4-4 FMECA Content and Structure

| Structure | Content |
|-----------|--------------------------------------|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | System Breakdown Description |
| 4 | FMECA Procedures |
| 5 | Failure Mode Effects Analysis (FMEA) |
| 6 | Criticality Analysis (CA) |
| 7 | Criticality Matrix (CM) |
| 8 | Conclusions |

IPS-27 The Contractor shall provide one .xls spreadsheet as annex of the FMECA in accordance with the following content and structure:

- a. **Product Breakdown:** Level, Description, Cage Code, Part Number;
- b. **Failure Mode Effects Analysis (FMEA):** Failure Modes, Mission Phase / Operational Mode, Failure effects (Local Effects, Next Higher Level, End Effect), Failure Detection Method, Compensating Provisions, Severity Classification, Remarks;
- c. **Criticality Analysis (CA):** Failure probability, Failure Effect Probability (β), Failure Mode Ratio (α), Failure Rate (λp), Operating Time (t), Failure Mode Crit Number [$Cm = \beta \alpha \lambda p t$], Item Crit Number [$Cr = \sum(Cm)$], Remarks;

IPS-28 The Contractor shall also provide Criticality Matrix (CM) summary tables for:

- a. Criticality vs Failure probability vs Severity classification;
- b. Apportionment of criticality vs Failure end effect;
- c. Apportionment of criticality vs Manufacturer (Cage Code).

4.4 MAINTENANCE TASK ANALYSIS

IPS-29 The Contractor shall provide a **Maintenance Task Analysis (MTA)** down to the hardware LRU and firmware/software CSCI level compliant with ASD S3000L iss.2.0.

IPS-30 The Contractor shall provide the MTA, covering hardware and software, that summarises the maintenance planning:

- a. Analysing the results of the FMECA to identify candidate corrective maintenance tasks;
- b. Identifying procedures, spares and materials, tools, support equipment, personnel skill levels, estimated and elapsed times as well as any facility issues that must be considered for a maintenance task;
- c. Identifying scheduled maintenance tasks and develop a scheduled maintenance programme at each Level of Maintenance (HL/SL 1-4) allocated to the appropriate Level of Support (LoS 1 to 4) for the TDCIS systems, that is consistent with the maintenance concept described for the intended use of the system. The decision logic used for task selection shall implement the following priorities:

- i. Avoidance of safety and mission critical failures;
- ii. Achievement of system availability requirements;
- iii. Sustainability of deployed operations in accordance with the intended use and the logistics support environment of the system;
- iv. Minimization of Life Cycle Cost;
- d. Identifying the operation support tasks required to support operational readiness of the system;
- e. Considering ad hoc pre deployment and post deployment maintenance actions to allow no down time (i.e.: zero hours) due to preventive/scheduled maintenance during deployment;
- f. Assessing for each maintenance task: skill levels, tools and test equipment required, facilities, spares and consumables, duration.

IPS-31 The Contractor shall provide the MTA detailing the relevant content to cover the following structure.

Table 4-5 MTA Content and Structure

| Structure | Content |
|-----------|---|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | System Breakdown Description |
| 4 | MTA Approach |
| 4.1 | Levels of Maintenance |
| 4.1.1 | Hardware Levels of Maintenance |
| 4.1.1.1 | HL1 |
| 4.1.1.2 | HL2 |
| 4.1.1.3 | HL3 |
| 4.1.1.4 | HL4 |
| 4.1.2 | Software Levels of Maintenance |
| 4.1.2.1 | SL1 |
| 4.1.2.2 | SL2 |
| 4.1.2.3 | SL3 |
| 4.1.2.4 | SL4 |
| 4.2 | Task Justification |
| 4.3 | Task Structure |
| 4.3.1 | Unscheduled and Corrective Maintenance Task structure |
| 4.3.2 | Scheduled and Preventive Maintenance Task structure |
| 4.4 | MTA Data Element |
| 5 | MTA Output |
| 6 | Conclusions |

IPS-32 The MTA shall provide spreadsheet as an annex with the following tables in:

- a. **Logistic Breakdown Report – LBR** : worksheet that hierarchically list the logistic breakdown and the link with the PBL containing at least the following information: Indenture level, Breakdown Element Identifier, Cage code, Part Number, Breakdown Element Name, Part as Designed Name, SMR Code, Qty, Qty for End Item, Unit of Measure (UM), MTBF, UM, MTTR, UM;

- b. **Maintenance Index Report – MIR** : worksheet that list all maintenance (scheduled and unscheduled) containing at least the following information: Indenture level, Breakdown Element Identifier, Cage code, Part Number, Breakdown Element Name, Part as Designed Name, SMR Code, Task Identifier, Task Name, Type, Task Frequency, UM, Task Duration, UM, MTBF, UM, MTTR, UM, Task Labour Time, UM;
- c. **Maintenance Report – MR** : worksheet that details all maintenance (scheduled and unscheduled) including all resources details (materials, personnel, facilities) with subtasks and duration details per skill and per subtask;
- d. **Material Resource Report – MRR** : shall include the following vistas:
 - i. Material Resource List : the list of all the resources with associated type (e.g.: spare, consumable, common tools, special tools);
 - ii. Material Resource Utilization: the list of all the resources with associated maintenance where the resource is used;
 - iii. Material Resource Annual Use: the list of all the resources with the calculated annual use based on the task frequency.
- e. **Personnel Report – PR** : shall include the following vistas (same as MRR but for personnel): Personnel List, Personnel Utilization, Personnel Annual Use;
- f. **Facilities Report – FR** : shall include the following vistas (same as MRR but for facilities): Facilities List, Facilities Utilization, Facilities Annual Use.

IPS-33 The MTA shall also provide summary tables for:

- a. Total Quantity of Maintenance Tasks as per Table 4-6.

Table 4-6 Total Quantity of Maintenance Tasks

| Level of maintenance | Scheduled | | | Unscheduled | | | Total | | |
|----------------------|-----------|----|-----|-------------|----|-----|-------|----|-----|
| | HW | SW | Sum | HW | SW | Sum | HW | SW | Sum |
| HL1/SL1 | | | | | | | | | |
| HL2/SL2 | | | | | | | | | |
| HL3/SL3 | | | | | | | | | |
| HL4/SL4 | | | | | | | | | |
| Total | | | | | | | | | |

- b. Mean Annual Downtime and Mean Annual Workload as per Table 12 (noting that one table for HW+SW Maintenance, one table for HW Maintenance, and one table for SW Maintenance).

Table 4-7 Maintenance Downtime and Workload

| Level of maintenance | Scheduled | | Unscheduled | | Total | |
|----------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Elapsed time (h) | Man workload (h) | Elapsed time (h) | Man workload (h) | Elapsed time (h) | Man workload (h) |
| HL1/SL1 | | | | | | |
| HL2/SL2 | | | | | | |
| HL3/SL3 | | | | | | |
| HL4/SL4 | | | | | | |
| Total | | | | | | |

- c. Scheduled maintenance grouped by periodicity using as many columns as periodicity defined; see Table 13, (noting that one table for HW+SW maintenance, one table for HW maintenance, and one table for SW maintenance).

Table 4-8 Scheduled Maintenance Record

| Level of maintenance | (e.g.: daily) | | | | | ... |
|----------------------|---------------|-----------------------|-----------------------|------------------------|---------------------|-----|
| | Quantity | Mean elapsed time (h) | Mean man workload (h) | Total elapsed time (h) | Total man hours (h) | |
| HL1/SL1 | | | | | | |
| HL2/SL2 | | | | | | |
| HL3/SL3 | | | | | | |
| HL4/SL4 | | | | | | |
| Total | | | | | | |

- IPS-34 The Contractor shall provide a **Product Support Database (PSDB)** as annex to each issue of the MTA down to the hardware LRU and firmware/software CSCI level that shall match the Product Baseline (PBL), shall be coherent with the relevant information contained in the Technical Publications and Training Materials and shall be fully compliant with ASD S3000L iss.2.0 as per NCIA instructions.
- IPS-35 The PSDB shall contain and collect all relevant information and data coming from the IPS reports and analysis coming from RAMT, FMECA, MTA, LORA and PHST.
- IPS-36 The PSDB shall provide a Logistics Database in .xls that shall match the PBL and shall include information fields required for each HW and SW (including Firmware) item to be provided/updated:
 - a. **Indenture level:** Level of indenture starting from the system that is the first level and classified as End Item;
 - b. **Breakdown Element Identifier (BEI):** String of characters used to uniquely identify a Breakdown Element and to differentiate it from other Breakdown Elements that comprise a product. Note: used to establish a hierarchical structure of the technical system;
 - c. Reference Designator (in accordance with ASME Y14.44);
 - d. Subsystem;
 - e. **Breakdown Element Name:** Word or phrase by which the breakdown element is known and can be easily referenced;
 - f. **Part Logistic Category;** these identifications can be used to define an item (HW or FW/SW) as designed in the context of product support:
 - i. EI - End Item and SS – System Subsystem;
 - ii. Hardware (HW) Maintenance Significant Items (MSI):
 - 1) LS - Statistical Life LRUs (e.g.: Computers, Power PCs, Switches, Routers, IF modules, RF modules, Breakers, Power Supplies, Monitors, Modems, Power Amplifiers);
 - 2) LL – Limited Life LRUs (e.g.: Batteries, flexible waveguides, oscillators);
 - 3) II – Insurance Items [e.g.: docking stations, Keyboards, Mice, Cables, mechanical parts (e.g. Racks, drawers), simple E/M parts (e.g. patch panels)];

- 4) C[T] – Technical Consumables (e.g.: fuse, gas discharger, surge protection devices, lamps, bulbs, led);
 - 5) C[NT] – Non-Technical Consumables [e.g.: POL (Petrol, Oils, Lubricants), water, gas];
 - 6) C[G] – Generic Consumables (e.g.: printer cartridges, toners, printers' paper);
 - 7) AP – Attaching Parts [e.g.: washers, gaskets (not EMI), nuts, bolts, screws].
- g. Software (SW):
- 1) SWA – Application Software [e.g.: Contractors' developed application SW, COTS application SW (e.g. MS Office, Adobe Acrobat)];
 - 2) SWO – Software Operating Systems (e.g.: Linux, Unix, MS Windows, LynxOS, Android, IOS);
 - 3) FW – Firmware;
 - 4) DD – Device drivers.
- h. **Support equipment and tools:** CHT (Common Hand Tool), CSE (Common Support Equipment), PSE (Peculiar Support Equipment);
- i. Manufacturer item data: Cage Code, Part Number, Part Nomenclature;
- j. Vendor/Contractor item data: Cage Code, Part Number, Part Nomenclature;
- k. Item characteristics: LRU (Y/N), Serialized Item (Y/N); Mean Time Between Failures (MTBF) (in hours); Mean Time To Repair (MTTR) (in hours); LRU Maintenance Level (HL/SL 1 to 3 included); HW part repairability (Y/N); NATO Stock Number (NSN); Unit Price and Currency; Provisioning Lead Time (PLT) (days); Turn Around Time (TAT) (days).
- l. **Quantity:** Qty per line item; Qty in Next Higher Assy; Qty in End item.

4.5 LEVEL OF REPAIR ANALYSIS

- IPS-37 The Contractor shall provide a **Level Of Repair Analysis (LORA)** down to the hardware LRU and firmware/software CSCI level compliant with ASD S3000L iss.=2.0.
- IPS-38 The Contractor shall provide the LORA to recommend the most cost efficient solution for the maintenance level at which each maintenance task should be performed and the decision to repair or discard unserviceable LRUs:
- a. Generating a LORA candidate list containing those items whose maintenance task is not clearly allocated as NATO Maintenance Task (NMT) or Industry Maintenance Task (IMT) as a consequence of the MTA and for which a repair/discard decision is not immediately evident;
 - b. Determining the level (HL1-4 or SL1-4) and the location at which each maintenance task should be performed, including detail on any NMT for which specific limited support by industry personnel is recommended.
- IPS-39 The Contractor shall provide the LORA detailing the relevant content to cover the following structure.

Table 4-9 LORA Content and Structure

| Structure | Content |
|-----------|--|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | System Breakdown Description |
| 4 | LORA Approach |
| 4.1 | LORA Candidate Item List (CIL) |
| 4.2 | Repair vs Discard Decision |
| 4.3 | Maintenance concept |
| 4.4 | Support concept |
| 4.5 | Logistics Support Scenario (Maintenance and support concept relations) |
| 4.6 | LORA CIL Fields |
| 5 | Conclusions |

IPS-40 The Contractor shall provide a **Repair Price List (RPL)** as an annex to the final issue of the LORA.

4.6 OBSOLESCENCE REPORT

IPS-41 The Contractor shall perform the Parts Obsolescence Management during the project execution up to the end of warranty period providing **Obsolescence Report** for hardware LRU and firmware/software CSCI to keep the Purchaser informed about any potential obsolescence problems or risks providing the end of sale, end of production, end of support, risk mitigation strategies and proposed risk recovery actions.

IPS-42 The Contractor shall recommend, as part of the Obsolescence Report:

- a. A replacement (if available), when the designation of a replacement item becomes necessary due to discontinuance of support;
- b. Either to implement an Off-The-Shelf (OTS) solution and modify the requirement accordingly or redesign a suitable alternative, when the recommended OTS item is not fully compliant with the Contract Requirements;
- c. Items with form, fit and function features will be given first preference to avoid development costs.

IPS-43 The Contractor shall provide a Obsolescence Report jointly with an .xls file that shall include information fields required for each hardware LRU and firmware/software CSCI to be provided/updated:

- a. **Breakdown Element Name:** Word or phrase by which the breakdown element is known and can be easily referenced;
- b. **Manufacturer item data:** Cage Code, Part Number, Part Nomenclature;
- c. **Vendor/Contractor item data:** Cage Code, Part Number, Part Nomenclature;
- d. **Quantity:** Qty in End item;
- e. **Product current status:** Cancelled without alternative Form Fit and Function (FFF) replacement, Off production but on the stock (last buy), On production, Cancelled with alternative FFF replacement;

- f. Product current status rationale/evidences:
- i. for HW [e.g.: production started in "year", last update in "year", support availability till "year" or End of life date (if any)]
 - ii. for FW/SW (e.g.: release date of the item, support of this version till "year")
- g. Warranty and Service:
- i. for HW (e.g.: warranty duration granted when procured, Provisioning Lead Time, Repair cycle time)
 - ii. for FW/SW (e.g.: software community (shareware/freeware), open source, ...)
- h. **Risk - Item criticality:** This risk category addresses the degree to which an item (whether or not it is an assembly or a component used to repair an assembly) is critical to the functionality of the system and ultimately the operational readiness of the unit employing that system. (e.g.: from FMECA criticalities 2 - red, 3 - yellow, 4 - green). Please note that FMECA criticality 1 shall require Fault Tree Analysis;
- i. **Risk - Supply chain vulnerability:** This risk category represents a key difference between electronic items and Materials and Structural, Mechanical and Electrical (MaSME) items
- i. Electronic items: often becomes obsolete because of technology changes (e.g.: red, yellow, green);
 - ii. MaSME items: obsolescence is usually related to a source going out of business or changing its product line (e.g.: red, yellow, green).
- j. **Risk - Time to implement a resolution:** This risk category addresses how long it will take to implement a resolution to an Obsolescence issue for an item or material in comparison to the stocks that the program has on hand. If there is more than enough stock on hand and the time to implement is short, then the risk to the program would be viewed as lower; however, if there is a long lead time to implement a resolution and the stocks on hand are not sufficient, then this indicates high risk. (e.g.: red, yellow, green);
- k. **Risk category rationale/evidences:** Narrative for each risk category rank;
- l. **Risk Level:** product of the above risk ranks;
- m. **Proposed mitigation:** FFF alternative (ECP type 1), Function alternative (ECP type 2), Redesign of higher level, To Be Defined, Not Applicable, Other;
- n. **Proposed mitigation rationale:** Narrative for the proposed mitigation.

4.7 SUPPLY, SUPPORT & PROVISIONING

- IPS-44 The Contractor shall ensure a minimum stock of the most critical spare parts (those failing the most, or with a higher impact on the facilities) necessary for emergency and urgent repairs tasks up to the end of warranty.
- IPS-45 The Contractor shall provide, as part of the bid, the budget quotation for the spares parts (LRUs, Insurance Items), technical and non-technical consumables to be

provided four (4) working weeks before the PSA in accordance with the requirements outlined below.

- IPS-46 The Contractor shall provide **Initial Provisioning List (IPL)** that shall detail the rationale and calculations, for determining the range and quantity of items (i.e., spares and repair parts, consumables, special tools, test equipment, and support equipment) and the associated lists required to support and maintain the system for an initial period of service as per the following:
- a. **Critical Items** using MTBCF, relevant Candidate Item List, 98% confidence level (non stock-out probability) of being able to replace any mission critical Maintenance Significant Item (MSI).
 - i. List #1 per relevant site: 60-day Closed-Door-Operation (CDO) in 24/7 continuous operation;
 - ii. List #2 per relevant site: 1-year logistic horizon in 24/7/365 continuous operation.
 - b. **Critical and Non-Critical Items** using MTBF, relevant Candidate Item List, 70% confidence level (non stock-out probability) of being able to replace any Maintenance Significant Item (MSI).
 - i. List #3 per relevant site: 1-year logistic horizon in 24/7/365 continuous operation;
 - ii. List #4 cumulative (one for all sites): 1-year logistic horizon in 24/7/365 continuous operation.
- IPS-47 The Contractor shall detail the technical approach and tools to be used for providing the IPL in the IPSP as per the N CIA Instructions: [AI 16.31.10] – Spare parts provisioning.
- IPS-48 The Contractor shall provide a fully detailed and priced **Recommended Spare Parts List (RSPL)** as annex to each issue of the IPL that shall detail all spares in a hierarchical breakdown including as a minimum the information of the table below for MDS.
- IPS-49 The Contractor shall provide a fully detailed and priced **Recommended Consumable Items List (RCIL)** as annex to each issue of the IPL that shall detail all consumables including as a minimum the information of the table below for MDS.
- IPS-50 The Contractor shall provide a fully detailed and priced **Recommended Tools and Test Equipment List (RTTL)** as annex to each issue of the IPL that shall detail all standard and special-to-type tools, test equipment and test fixtures, cables, connectors, support equipment (e.g. cranes, lifting platforms, etc.) including as a minimum the information of the table below for MDS.
- IPS-51 The Contractor shall organize a dedicated meeting (**Provisioning Conference**) to analyse the results of spare parts dimensioning and to agree on the final IPL that shall constitute the list of the initial spares and items to be provided for supply support.
- IPS-52 The Contractor shall provide the **Bill of Materiel (BoM)** as annex to each issue of the IPL for all the system according to the Product Baseline (PBL).
- IPS-53 The Contractor shall provide, as per Table 15, the full and complete Inventory/**Material Data Sheet (MDS)** of all items and documents to be delivered under this contract at least ten (10) working days before shipment. It shall contain the following information:

Table 4-10 Inventory/Material Data Sheet information

| Field | Description |
|---|---|
| CLIN | Contract Line Item Number (number-10 digits maximum). Sequence number assigned to a particular line item in a given contract. The combination CLIN-Contract No. shall always be unique. |
| Nomenclature | Short Item Description (text- 35 digits). Should always start with the main item name followed if possible by a technical specification, followed by the next higher assembly names in hierarchical order, separated by commas. E.g. for a coax connector of a television cable the nomenclature should read: CONNECTOR, COAX, CABLE, TELEVISION. |
| EQRE (XB/ND) | Code (text-2 digits). Defines whether an item is repairable (ND) or not (XB) from a technical point of view. |
| True Manufacturer Part Number | True Manufacturer P/N (text-32 digits). Part Number given to this item by the original manufacturer. |
| True Manufacturer Code (or complete name and address) | True Manufacturer Code (text-5 digits). Code of the Company that has manufactured this item. This is an internationally recognised 5-digit code which is unique to that company. It corresponds to the "cage code" in the USA. Manufacturer Codes and Cage Codes are obtainable from the national governmental authorities or, if it already exists, from the "NATO Master Cross-Reference List" (NMCRL) obtainable from NSPA. In case the code cannot be obtained, it will be sufficient to enter the complete name and address information of the true manufacturer. |
| Vendor/Contractor Code (or complete name and address) | Vendor (Contractor) (text-5 digits). Company which sells the item or the complete system to which this item belongs. The vendor is the company with which the contract is placed but is not necessarily the true manufacturer of the item. If the vendor company has also designed and integrated the complete system it is also known as Original Equipment Manufacturer (OEM). The company code is an internationally recognised 5-digit code which is unique to that company. It corresponds to the "cage code" in the USA. Manufacturer Codes and Cage Codes are obtainable from the national governmental authorities or, if it already exists, from the "NATO Master Cross-Reference List" (NMCRL) obtainable from NSPA. In case the code cannot be obtained, it will be sufficient to enter the complete name and address information. |
| Vendor/Contractor Part Number | Vendor (Contractor) P/N (text-32 digits). Part Number given to this item by the company which sells the item or the complete system to which this item belongs. The vendor is the company with which the contract is placed but is not necessarily the true manufacturer of the item. |
| QTY ordered | Item Quantity (number-5 digits). Shows the quantity of this item ordered as individual item in this contract, i.e. if it is not delivered built-in in another unit. In case the item is not ordered as individual item or as spare unit but is built-in in another assembly, enter "0" (zero) in this field and complete fields: "Part Number of next higher assembly" and "qty in next higher assembly". Serialized items shall only have a quantity of 1. |
| Order Unit | Order Unit (text-2 digits). Unit under which the item is sold, e.g. each, set, meter, etc. |
| Serialized Item Tag | Serialized Items Tag (text-1 digit). Add a "Y" if the item carries a serial number independently whether serial numbers is already known or not. If known, complete column "Serial Number". |
| Serial Number | Serial Number. If Serialized Item Tag is "Y" (yes) then add serial number here. (1 serial number per line). If system is already installed, then the Contractor shall indicate here the serial numbers installed at user site. For items to be delivered to depots the Contractor may not know the serial number in advance, in that case it will be completed by the receiving site. |
| Serial Number Software Revision Level | Software Revision Level (text- 30 digits but can be expanded as necessary) If item carries a serial number and field "serial number" is completed, add SW revision level / version here if appropriate. |
| Serial Number Hardware Revision Level | Hardware Revision Level (text- 30 digits but can be expanded as necessary) If item carries a serial number and field "serial number" is completed, add HW revision level / version here if appropriate. |
| Other Serial Number attributes | Other Serial Number Attributes (text-to be defined). This field will be used and defined on a case by case basis to be decided by NCIA System Manager, NCIA and the Contractor for other attributes which might be required for a particular system. |
| Subject to Property Accounting | NDSS-MRCS (text-1 digit). NCIA will decide whether or not item is subject to property accounting and is to appear on the customer balance lists. This field will be completed Y or N by NCIA. |
| Currency | Currency (text-3 digits). International 3-digit code (ISO) representing the currency in which the item purchase price (or the estimated value) is expressed. |
| Price | Item Price (number-11 digits). Unit price with 2 decimals. |

| Field | Description |
|---|---|
| Warranty Expiration Date | Warranty Expiration Date (date: DD/MM/YY). Shows the date on which the warranty of this item expires, which is usually N days after delivery of the item. If delivery is scheduled for a certain date, warranty expiration date = delivery date + warranty period in days. |
| Receiving / Inspection Depot | Receiving / Inspection Depot (TXT-2 digits). Information will be provided to Contractor by the Purchaser's ILS Officer. This is the depot to where the vendor ships the material. Normally this depot will receive, inspect and put the material in stock against Dues-In to be created in accordance with Qty in column "Qty Ordered". In case of a deviation from this rule, the Purchaser will inform the Contractor of the correct final Depot and through which depot the items shall have to transit. |
| Issue to customer | Customer Code (text-4 digits - to be completed by N CIA). Code representing the customer to which the item(s) shall be shipped by the receiving/ inspecting depot. |
| Extended Line Item Description | Extended Line Item Description (text-no limit). Any additional information concerning this item shall be entered here, e.g. technical specifications, configuration, reference to technical drawings or manuals etc.... |
| Part Number of next higher assembly | Part-Number of Next Higher Assembly (text-32 digits) If item is built-in another assembly, indicate part number of that assembly here. |
| Qty in next higher assembly | Quantity in Next Higher Assembly (number-3 digits max). This field shows the built-in quantity of the item in the next higher assembly. This information shall be provided for configuration control purposes. |
| Qty installed at Operating Unit (Customer Site) | Quantity installed. This field is only applicable when the delivery is direct to an operating unit (customer site). However in that case it is mandatory. For non-serial ised items it shows total quantity installed. For serial ised items quantity shall only be one per serial number. Use a new line for each serial number. |

IPS-54 The Contractor shall provide a detailed **Software Distribution List (SWDL)** as annex to each issue of the IPL, which shall detail comprehensively all Computer Software Configuration Items (CSCI) and associated software, firmware or feature/performance licenses provided under this Contract. The SWDL shall include, the following data elements:

- a. CSCI identification number;
- b. nomenclature;
- c. version number;
- d. license key (if applicable);
- e. license renewal date (if applicable);
- f. warranty expiration date;
- g. date of distribution;
- h. distribution location (geographically);
- i. distribution target (server); and
- j. Owner.

IPS-55 The Contractor shall make sure that all licenses are originally registered with the Customer as end-user.

4.8 PACKAGING, HANDLING, STORAGE & TRANSPORTATION

IPS-56 The Contractor shall provide a Packaging, Handling, Storage and Transportation (PHST) Report down to the hardware LRU.

IPS-57 The Contractor shall provide the PHST Report that summarises how the following relevant requirements are fulfilled, needs for special packaging, dimensions of the items and facilities required for storage.

4.8.1 PACKING, CODING AND PACKAGE LABELLING (PACKAGING)

- IPS-58 The Contractor shall provide all supplies packaged to withstand the shipping hazards applicable to the chosen mode of transportation.
- IPS-59 The Contractor shall provide any Special To Type (non-commercial) packaging materials required for the shipment of items at no extra cost to the Purchaser.
- IPS-60 The Contractor shall package, crate or otherwise prepare items in accordance with best commercial practices considering the destination and the mode of transportation. Any Special To Type (non-commercial) packaging will be retained by the Purchaser for return of the items under Warranty if necessary.
- IPS-61 The Contractor shall mark the packages, pallets and/or containers in which supplies are transported shall, in addition to normal mercantile marking, showing on a separate nameplate the name of this project, contract number and shipping address and clearly marked with the text "NATO PROPERTY".
- IPS-62 The Contractor shall provide a **Packing List** for each consignment to allow for easy identification of the content of each package:
 - a. One Packing List shall be affixed to the exterior of the consignment in a sealed, weatherproof envelope on the outside of each box, pallet and/ or container
 - b. A second copy shall be put inside each container/box.
 - c. A third copy should be emailed to the Purchaser PoC upon departure of the goods.
- IPS-63 The Packing List shall contain the following information.

Table 4-11 Packing List

| Serial | Requirement |
|--------|---|
| 1 | The shipping Address |
| 2 | Package number of number of packages |
| 3 | Contract Number |
| 4 | CLIN Number as per Schedule of Supply and Services |
| 5 | Item Description |
| 6 | Part Number |
| 7 | Serial Number |
| 8 | Quantity |
| 9 | Weight and Volume details |
| 10 | Box number and number of boxes in the consignment |
| 11 | Name and address of the Contractor, Purchaser and Consignor |
| 12 | Values of the goods |

- IPS-64 The Contractor shall provide the details of the labelling approach in the CM Plan for Purchaser approval. The Contractor shall provide its labelling for the items that are configured and/or modified after procurement from the OEM. For these items, the Contractor shall provide for review and approval before the start of the labelling activities, the format and content of the labelling.

- IPS-65 The Contractor shall deliver all the equipment labels including a machine-readable code (e.g. barcode) compliant with:
- STANAG 4280 - NATO Levels of Packaging;
 - STANAG 2828 - Military pallets, packages and containers;
 - STANAG 4281 - NATO Standard Marking for Shipment and Storage;
 - STANAG 4329 - NATO Standard Bar Code Symbologies – AAP-44(A); and
 - AAP-44(A) - NATO Standard Bar Code Handbook.
- IPS-66 The Contractor shall provide adequate identification for the Non-CIS components as well as the CIS components. This shall entail the labelling for the transit and transport cases, marking of the tents, nameplates on the containers etc

4.8.2 DELIVERY AND SHIPMENT (HANDLING AND STORAGE)

- IPS-67 The shipping address where all items, including goods exchanged or repaired under warranty, shall be delivered by default is:

Unidade de Apoio Geral de Material do Exercito (UAGME)
Estrada do Infantado
2890-403 Benavente
Portugal

- [128] The Purchaser Point of Contact (PoC) for issues related to shipment by default is:

Name Surname (Project Manager)
NATO Communication and Information Agency,
Code, City, Nation
Tel: XXX
name.surname@ncia.nato.int

- [129] The Purchaser's PoC and/or PoC of the Customer will inspect all packages, boxes and containers at final destination to ensure that no damage has occurred during transport and that all packages, boxes and containers detailed in the Packing List have been accounted for. The Purchaser will not open any packages, boxes or containers.

- [130] The system may be deployed at locations where there are no roads or other areas which are not easily accessible. Therefore there will be no forklift trucks or other lifting equipment to handle the transit cases. In such circumstances material handling equipment is needed to dismount the equipment from the vans and to take them to the end locations where they will be set up.

- IPS-68 The request for a Custom Form 302 shall be addressed to:

Name Surname (Project Manager)
NATO Communication and Information Agency,
Code, City, Nation
Tel: XXX
name.surname@ncia.nato.int

- [131] Following receipt of the request by the Purchaser, normally a maximum of three working days are required for the issue of the form.
- [132] Load planning is a critical exercise to ensure the equipment can be dis-assembled, packaged, loaded, transported and re-assembled at the end location with minimal damage and minimal effort.
- IPS-69 The Contractor shall deliver all equipment under this project in close coordination with the NCI Agency PoC at final destination.
- IPS-70 The Contractor shall deliver equipment pre-configured and adequately packaged on Euro pallets.
- IPS-71 The Contractor shall ensure secure fixation of pallets, cases and equipment during transportation.
- IPS-72 The Contractor shall notify all deliveries through issuing of a **Notice of Shipment** to the Purchaser's PoC, at least 10 working days in advance of each shipment with the information seen in Table 4-12.

Table 4-12 Notice of Shipment

| Serial | Requirement |
|--------|--|
| 1 | Purchaser Contract Number |
| 2 | Contract line Item Number (CLIN), designation and quantities |
| 3 | Destination |
| 4 | Number and gross weight |
| 5 | Consignor's and Consignee's name and address |
| 6 | Method of shipment, e.g., road, air sea, etc. |
| 7 | Date of shipment |
| 8 | Number of the Custom Form 302 used |

- IPS-73 The Notice of Shipment shall be accompanied by the relevant Packing List and the request for a Custom Form 302.
- IPS-74 The Contractor shall take back and replace any damaged items, and correct any discrepancies with the packing and inventory lists, at no additional cost to the Purchaser and, or the Customer, without delay to the project.
- IPS-75 The Contractor shall be responsible for the availability of proper storage space and availability of Material handling equipment that may be required for the equipment shipped to the destination/location. The Purchaser cannot be held responsible for any delays in implementation in the case of unavailability of facilities or materials, and the Contractor shall be solely responsible to acquire alternative facilities/material to assure proper storage, handling etc.
- IPS-76 The Contractor shall ensure that all required forms and certificates are provided and that all necessary procedures are followed for dangerous goods and goods requiring export licenses.
- IPS-77 The Contractor shall record all deliveries of equipment in the NCI Agency ITSM (IT Service Management) ticket system (for tracking by the Operations Centre).
- IPS-78 The Contractor shall make sure that all licenses are originally registered with the Customer as end-user.
- IPS-79 The Contractor shall provide material handling equipment that shall allow the transport of the system over rough terrain. This is especially important for the heavy transit cases.

IPS-80 The Contractor shall provide a **Load Plan** as annex of the PHST Report that shall take into account:

- a. The mission function (modules needed);
- b. The means of transport;
- c. Location of deployment (Building of Opportunity, Field deployment, etc.)

IPS-81 The Load Plan shall identify:

- a. The distribution of the load along the different loading platforms (containers, vans, etc.) and the internal distribution in each of those platforms taking into account weight distribution (for centre of gravity considerations);
- b. The required order of use during deployment by providing 3D models (format such as .stp that is acceptable and usable in Purchaser 3D modelling tools) that entail a full scope detailed load plan starting from the rough models of the equipment with detailed modelling of transit cases, Non-CIS material in the packed form and palletization;
- c. What needs to be loaded in terms of the number and dimensions of transit cases and other equipment, including all relevant the CIS and non-CIS;
- d. The load order to optimise weight loading, space utilization, and minimal damage; and
- e. The need for Load Plan Tool if standard loading tools will be not appropriate.

IPS-82 The Contractor shall be responsible for customs clearance of all shipments into the destination countries. It is the Contractor's responsibility to take into account delays at customs. The Contractor shall therefore consider eventual delays and arrange for shipment in time. Under no circumstances can the Purchaser be held responsible for delays incurred, even when utilising Purchaser provided Custom Forms 302.

IPS-83 The Contractor shall ensure that any requirements related to delivery and shipment of the equipment are obtained from NCI Agency in advance of shipments.

IPS-84 The Contractor shall be responsible for the timely request of Custom Forms 302 at least 10 working days in advance of each shipment, required for duty free import/export of supplies between certain countries.

IPS-85 The written request for a Custom Form 302 shall contain the following information:

Table 4-13 Information for Custom Form 302

| Serial | Requirement |
|--------|--|
| 1 | Purchaser Contract Number |
| 2 | Contract line Item Number (CLIN), designation and quantities |
| 3 | Destination |
| 4 | Number and gross weight |
| 5 | Consignor's and Consignee's name and address |
| 6 | Method of shipment, e.g., road, air sea, etc. |
| 7 | Name and address of the freight forwarder |

IPS-86 The Custom Forms 302 shall be original, shall be delivered by mail/express courier and shall accompany the shipment and therefore no fax or electronic copy will be used, nor provided to the Contractor. If an express courier has to be used, by the Purchaser, to ensure that the form is available on time before shipment, all associated costs shall be reimbursed by the Contractor.

- IPS-87 The Contractor shall be responsible to add the Custom Form 302 to the shipping documentation to include on the outside document envelope the contract number and the Purchaser PoC to contact upon reception.
- IPS-88 The Contractor shall ensure that forwarding agents are informed of the availability of the Custom Form 302 and how this form is utilised to avoid the payment of Customs Duties and that the carrier shall be fully conversant with the application and use of Custom Form 302.
- IPS-89 In case of a Country refuses to accept the Custom Form 302 and requires the payment of custom duties, the Contractor shall immediately inform the Purchaser by the fastest means available and obtain from the Custom Officer a written statement establishing that its country refuses to accept the Custom Form 302. Only after having received Purchaser's approval, the Contractor shall pay these customs duties and shall claim reimbursement to the Purchaser.

4.8.3 TRANSPORTATION

- [133] The Purchaser shall not be liable for any storage, damage or any other charges involved in such transportation of items and supplies prior to Acceptance. Any shipment loss shall be the responsibility of the Contractor.
- IPS-90 The Contractor shall be responsible to transport all items and supplies covered under this Contract to and from all destination addresses at no extra cost to the Purchaser and, or Customer until completion of the warranty period.
- IPS-91 The Contractor shall be responsible for transportation of unserviceable equipment to Contractor facility for warranty repair/replacement.
- IPS-92 The Contractor shall be responsible for transportation of all equipment furnished under this Contract from its site in a NATO nation to final destination.
- IPS-93 The Contractor shall be responsible for any insurance covering the shipment and delivery.
- IPS-94 The Contractor shall be responsible for transportation of repaired/ replacement items under warranty to the original location.
- IPS-95 The equipment shall be transportable in:
- a. ISO containers for aircraft cargo and trucks;
 - b. Transit cases on pallets for vans; and
 - c. HCU 463L Air Cargo Pallets (HCU-6/E) for aircraft cargo.
- IPS-96 The Contractor shall provide a **Transportation Report** (template to be provided as annex of the PHST Report) within two (2) weeks after each shipment has arrived at final destination. The Transportation Report shall include:
- a. A copy of the Packing List;
 - b. Date of arrival at final destination;
 - c. Date of delivery acceptance by the Purchaser's PoC at final destination;
 - d. Signature of delivery acceptance by the Purchaser's PoC at final destination.

4.9 TECHNICAL PUBLICATIONS

- IPS-97 The Contractor shall detail their approach and plans for Technical Publications in the IPSP, these plans are to be fully compliant with:
- a. [AI 16.31.07] – Guidance Document (GD) for ASD-AIA-ATA S1000D Technical Publications, with the associated S1000D Issue 4.0.1 Business Rules Decision Points (BRDP) Index.
 - b. [AI 16.31.12] – Writing Style Guide (WSG) for ASD/AIA/ATA S1000D Technical publications; and
 - c. [AI 16.31.13] – Illustration Style Guide (ISG) for ASD/AIA/ATA S1000D Technical publications.
- IPS-98 The Contractor shall provide **Operation Manuals (OM)** [including Deployment Instructions that shall include the Loading Plan results and System Administrator Guide (SAG)] and **Maintenance Manuals (MM)**. These manuals shall constitute the system technical publications in form of a **Common Source Data Base (CSDB)**, shall compliment each other with no conflicting information and shall include relevant information and instructions for all Contractor delivered Product (HW and FW/SW including COTS, Contractor customized items, modified items and fully developed items). The modularity of the system technical publications shall allow proper allocation for PFPs in an homogeneous breakdown structure.
- IPS-99 The Contractor shall provide Operation Manuals and Maintenance Manuals as per requirements of personnel operating and maintaining the equipment in accordance with the Maintenance Concept and the outcomes of Maintenance Task Analysis:
- a. Operation Manuals: is for the operation of the equipment and describes operation, settings and fine tuning of the equipment to achieve maximum performance including administration instructions (e.g.: guidance on how to show, edit and save the System Configuration Files on the respective devices, together with default user or administrator passwords, as required).
 - b. Maintenance Manuals: is for the maintenance of the equipment and includes:
 - i. Scheduled and Unscheduled Maintenance detailed instructions, Troubleshooting and fault finding techniques (including descriptions of all indicators, switches, switch positions, displays, menu's, settings etc), Installation and dismantling of the equipment (including as applicable physical, electrical, software, safety, RF aspects etc.), repair and test procedures for HL3/SL3 activities;
 - ii. Drawings of the mechanical, electrical and electronic assemblies and sub-assemblies that comprise the equipment in sufficient detail to allow technical staff to maintain the system at site level in accordance with the Maintenance Concept;
 - iii. As-built drawings (ABDs) for full details of how all of the major assemblies of the supplied equipment have been physically installed and mechanically/electrically integrated (e.g.: drawings of intra-rack and inter-rack cabling); and
 - iv. Detailed and lower level repair and maintenance of subassemblies and components shall be addressed by the Original Equipment Manufacturer's (OEM) manuals unless it has been agreed that specific activities are NMT.

- c. Physical, functional, performance, environmental data and descriptions (including support equipment/tools and interfaces to external systems).
- IPS-100 The Contractor shall provide **Original Equipment Manufacturer (OEM) Technical Manuals** for all the items from other manufacturers/vendors used into the system, equipment and test equipment assuring that they:
- a. Cover at least: Functional descriptions; Performance descriptions; Detailed specifications; Interfaces to external systems; Descriptions of all indicators, switches, switch positions, and displays; Installation instructions; Operating instructions; Corrective and preventive maintenance instructions; Fault isolation and fault finding techniques; Support equipment/tools description;
 - b. Provide detailed information necessary to disassemble and assemble the units down to the lowest Line Replaceable Unit (LRU) level of maintenance;
 - c. Provide the necessary drawings/schematics, specifications, wiring diagrams, etc., to allow the operators to troubleshoot, and fully understand, the design and operation of the particular equipment;
 - d. Supplement but do not substitute Operation Manuals and/or Maintenance Manuals and thus be expected to be referenced in the latter as a way of providing specific details on a particular piece of equipment; and
 - e. Are amended by preparation of supplemental data to make them fully acceptable for Purchaser use.
- IPS-101 For any developed software under this Contract the Contractor shall provide Software Build Instructions providing all information how to compile and build the Software. The instructions shall include but are not limited to:
- 1) The system modules, services and components;
 - 2) The interfaces;
 - 3) The file structure and files;
 - 4) How building the software, including: descriptions of project and system directory structures/ specification of the build environment/settings and configuration files.

4.9.1.1 SYSTEMS ADMINISTRATOR GUIDE (SAG)

- IPS-102 The Operation Manual shall include Systems Administrator Guide (SAG) to cover at least the following topics:
- 1) Rebuild a CIS Node Shelter and Trailer from a factory node state into an operational mission state;
 - 2) Facilitate the Sys Admin and Users to bounce-back from a Disaster Recovery powered-down situation;
 - 3) Access all relevant information regarding a deployment configuration, and administration of TDCIS;
 - 4) Have a detailed understanding of the system:
 - 5) All the tasks and activities that Staff will need to undertake;
 - 6) Determine the CIS Build Configuration;
 - 7) Determine any software, or active network infrastructure component configuration that needs to be undertaken;

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- 8) Understand any CIS Build Configurations and Instructions in compilation, build and deployment, to include:
 - a. System modules, services and components involved;
 - b. Any interfaces employed and how;
 - c. File structure and files;
 - d. How software/configuration is built, including:
 - e. Descriptions of project and system directory structures;
 - f. Specification of the build environment/settings;
 - g. Configuration files.
 - 9) Easily identify Build and Assembly Instructions covering all the tasks required for each node type to be installed and configured, rerolled, and uninstalled from the system, to include:
 - a. Configuration instructions as necessary, for each active system component used within each system node type. Every instruction shall be supported by textual or graphical illustration of the system's response to that instruction;
 - b. Component, module, service and, or system restoration instructions to be used following a power outage or system/node rebuild, for each active elements within every system node type. Each instruction shall be supported by textual and, or graphical illustration of the system's response to that instruction;
 - c. Provide detailed installation/uninstallation procedures for all services employed by the system, allowing system administrators to rebuild services from scratch;
 - d. Describe at least prerequisites for installing/uninstalling the system;
 - e. Detail procedures for the backup and recovery of every configuration file employed by the system's components, modules and services;
 - f. Detail configuration settings for all services, modules and components employed by the system, that are to be configured and, or reconfigured upon a system build or rebuild;
 - g. List how necessary modules and components are to be configured to enable the full and proper logging of system events to analyse system performance, utilisation and support system Cyber Defence activities;
 - h. Explain where log files outlined above are stored and how they can be recovered for exporting from the system;
 - i. Detail the usage of all third-party applications needed to configure, manage and maintain the system;
 - j. Include troubleshooting information providing a break-down of actions to solve a wide range of (potential) problems and, or provide workarounds to problems identified.
 - 10) Understand with depth step-by-step procedures, as an Administrators Operating Manual (AOM) on how to operate the system associated with that element, addressing all hardware and software items comprising the system, in addition:
 - a. Listing and describing all roles, operation tasks, and tools needed to operate the system from the associated element;
 - b. Using functional blocks, descriptions and appropriate drawings, the AOM shall

describe the system elements and their Configuration Items (CI) within the respective mechanical, electrical, and electronic assemblies and sub-assemblies.

- IPS-103 The AOM as a part of the SAG shall:
- 1) Take maximum advantage of the existing COTS Original Equipment Manufacturer (OEM) manuals and documentation, supplemented with adaptations, and additions relevant to the products furnished under this contract;
 - 2) Provide documentation dealing with the instructions and procedures for operators to handle, manage and support the system;
 - 3) Describe in detail all hardware and software items that comprise the system;
 - 4) Describe in detail the operational performance and the means of control for the operators;
 - 5) Be a system level document and shall describe the complete system by the explanation of functional blocks and Configuration Items;
 - 6) Provide information to interpret (computer aided-) diagnostics and measurements;
 - 7) Describe in detail all software features, menus, and supporting graphics.
- IPS-104 The Contractor shall provide a Role Based Access Control (RBAC) matrix as a part of the SAG. This crucial part of the authentication process should be an easy to refer to, and an automated function within the TDCIS to allow the system administrator to allocate TDCIS privileges and access.

4.9.1.2 DEPLOYMENT MANUAL

- IPS-105 ~~The Contractor shall provide a Deployment Manual for each node covering the specific needs for each node type. The Operation Manual shall include Deployment Guide for each node covering the specific needs for each node type.~~
- IPS-106 The Contractor shall provide the deployment scenario during CDR with the number of personnel, skill sets and task durations. The Contractor shall make necessary adjustments and improvements to the scenario based on Purchaser review and suggestions. Unless otherwise specified by the Purchaser, the deployment scenario and plan shall be created with following constraints:
- 1) Maximum time to deploy each node shall not exceed 8 hours with maximum 6 people simultaneously. This deployment shall be understood as unloading, unpacking, installation, testing and configuring to a mission ready state.
 - 2) The Contractor shall also propose a deployment scenario and a load plan where MS or NS domain is prioritized and maximum time to deploy this systems shall not exceed 2 hours with maximum 6 people including the corresponding critical Non-CIS infrastructure.
 - 3) Starting from a possible operational state, deployment preparation activities shall not exceed 24 hours with maximum 6 people simultaneously. Therefore the high level activities within this scope shall be read as data back-up, mission configuration, mission preparation tests, power-off, spare selection and configuration, packing and loading.

- IPS-107 The Contractor shall provide each task clearly indicating the steps, duration, number of personnel and their skilled levels to successfully complete the deployment.
- IPS-108 The Deployment **Guide Manual** shall at least include the following: Preparation for the deployment:
- 1) Preparing the deployment set based on the mission/exercise configuration (HW and SW configuration and functional check of the modules to be deployed);
 - 2) Container loading plan based on the mission priority (packing, stacking and loading to the containers):
 - a. Deployment;
 - b. Container unloading and unpacking;
 - c. Set-up, installation and connections;
 - d. Power-up;
 - e. Configuration and settings;
 - f. Functional check.
 - g. Operation (referring to the manuals);
 - h. End of Deployment:
 - i. Functional tasks (Configuration and data back-up etc.);
 - j. Controlled shut down;
 - k. Disconnecting and dismantling;
 - l. Container loading plan (packing, stacking and loading to the containers).
 - m. Post-deployment:
 - n. Post-deployment checks;
 - o. Back-up configuration and mission data;
 - p. Node-state configuration;
 - q. HW storage conditions.
- IPS-109 The Contractor shall ensure maturity of the MMs during the system's warranty period.
- IPS-110 The Contractor shall ensure that, for the purposes of Disaster Recovery (DR), Deployment, Switching between Mission states and Maintenance, the SAG, UOM and the MMs are suited for use within each of the Nodes; and should be specifically tailored for each of the Nodes
- IPS-111 The Contractor shall provide the SAGs, UOM and MMs in a configured and ease of use format:
- 1) Hard copies;
 - 2) Soft copies;
- IPS-112 All above shall be delivered as a configured set of documents and present within each of the Nodes; and to be specifically tailored for each of the Nodes.

4.10 TRAINING

- TRN-1 The development of training materials and courses (and manuals) shall be based on the outcomes of maintenance task analysis, as well as the TNA, and hence cover the right operation and maintenance tasks.
- TRN-2 The Contractor shall distinguish separate roles for the distinct operation and maintenance functions of the system. Training shall be provided in a highly modular fashion to ensure that the right mix of modules can be assembled into role-based courses that cover the various operation and maintenance roles within the Purchaser / Customer support organization.
- [134] The Purchaser will provide a serviced training facility, in coordination with the customer, in which the Contractor is to provide necessary equipment to deliver planned training.
- TRN-3 The Contractor shall detail approach and plans for Training in a relevant chapter into the IPSP. Updates shall be managed in a separate ad hoc document named **Training Plan (TP)** that shall include the **Training Needs Analysis (TNA)**. Training shall be through the most effective training option identified by the TNA. Options shall include: bespoke Contractor courses, commercial training courses, or a mix of bespoke and commercial courses. Courses shall be organised as self-study courses through the use of Computer Based Training (CBT), instructor-led classroom training, On-The-Job practical training (OTJ), or a combination thereof. The selected methods and their combination weight shall be proposed in the Training Plan for Purchaser approval.
- TRN-4 The Contractor shall develop the training materials and courses on the outcomes of Maintenance Task Analysis as well as the TNA.
- TRN-5 The Contractor shall be fully responsible for planning, organizing, installing, operating and maintaining all that is required to perform the training. This includes any training equipment used in the classroom.
- TRN-6 The Contractor shall assume that trainees and audience will have proficiency in the English language, knowledge of the Microsoft Windows Operating System and the audience shall be tailored for a maximum twelve (12) students plus maximum four (4) auditors.
- TRN-7 The Contractor shall provide Training and all related training documentation in the English language. Training shall be able to accommodate Purchaser students with an English language skill level of 2222 (STANAG 6001). Contractor trainers shall have English language skill level 3332.
- TRN-8 The Contractor shall provide evidence of the trainer, or a Subject Matter Expert (SME) supporting the trainer, qualifications and in particular to have at least two years practical experience with the installation and operation of the items under training.
- TRN-9 The Contractor shall provide Training on all CIS and Non-CIS components, CIS ancillaries and firmware/software (excluded on PFE). However, training shall cover the system specific interfaces to any external systems (e.g. external power system), PFE.

4.10.1 TRAINING NEEDS ANALYSIS (TNA)

- TRN-10 The Contractor shall develop for Purchaser acceptance, a Training Needs Analysis (TNA) with an appropriate Media Analysis. The Training Needs Analysis (TNA) shall be produced in accordance with the Bi-SC Directive 075-007, and include:
- 1) Operational Tasking Inventory (OTI);
 - 2) Site Surveys;
 - 3) Training Product Breakdown;
 - 4) Courseware Deliverables;
- TRN-11 The Contractors trainers shall have English language skill level 3332;
- TRN-12 The Contractor shall assume that Trainees and audience will have:
- 1) Proficiency in the English language;
 - 2) Knowledge of the Microsoft Windows Operating System.
- TRN-13 The Contractor shall develop as part of their TNA and TP:
- 1) A Target Audience Analysis. The Target Audience Analysis shall identify user and support categories, including end users, support staff (to perform Levels 1, 2 or 3) and Purchaser instructor personnel (for follow-on training);
 - 2) A Performance Gap Analysis. The Performance Gap Analysis shall assess the gap between the current skills of users, support staff or Instructor and the tasks they will be expected to perform in the use and support of the Operational Baseline;
 - 3) A Difficulty, Importance and Frequency (DIF) Analysis. The Difficulty, Importance and Frequency (DIF) Analysis shall identify the difficulty and importance of each major task to be performed by each category of users, support staff or Instructor and the frequency with which the task will be performed;
 - 4) A Training Options Analysis.
- TRN-14 For each task identified, the Contractor shall assess the knowledge and skill required to perform the task, determine performance objectives, and recommend how training should be provided to meet these requirements.
- TRN-15 The TNA shall identify which operation and maintenance tasks are required to operate and maintain the system at Level 1 / 2 / 3 of support. These tasks shall be documented in the Operation and Maintenance Manual, and listed in the TNA Report.
- TRN-16 Training delivery shall be through the most effective training option identified by the TNA. Options shall include: bespoke Contractor courses, commercial training courses, or a mix of bespoke and commercial courses. Courses shall be organised as self-study courses through the use of Computer Based Training (CBT), instructor-led classroom training and On-The-Job practical training (OTJ). The selected

methods and their combination weight shall be proposed in the Training Plan for Purchaser approval.

- TRN-17 The TNA shall also identify the course pre-requisites for all training courses. The pre-requisite training shall be described in such a way as to allow Host Nation to select students and organise Host Nation pre-requisite training, in time, before execution of the Contractor’s training programme commences.
- TRN-18 The results of the TNA shall be captured in a TNA report. The TNA report shall capture the results of the TNA. The structuring of training modules, role-based training programmes, and training material, as well as the training sequence, mode and duration shall be based on the outcomes of the TNA
- TRN-19 The Contractor shall provide the TNA detailing the relevant content to cover the following structure and the Bi-SC Directive 075-007.

Table 4-14 TNA Content and Structure

| Structure | Content |
|-----------|--|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | Analysis |
| 4.1 | Target Audience ¹⁰ |
| 4.2 | Performance Gap ¹¹ |
| 4.3 | Difficulty, Importance and Frequency (DIF) ¹² |
| 4.4 | Training Options |
| 5 | Results ¹³ |

4.10.2 TRAINING PLAN

TRN-20 The Contractor shall provide a Training Plan that explains in detail how the Contractor shall fulfil all training requirements in this Contract. The Training Plan and supporting PMS shall include the following for each course:

- 1) Description of the Contractor training organisation;

¹⁰ Target Audience Analysis: identification of user and support categories, including end users, support staff (to perform Levels 1, 2 or 3) and Purchaser instructor personnel (for follow-on training).

¹¹ Performance Gap Analysis: identification of the gap between the current skills of users, support staff or Instructor and the tasks they will be expected to perform in the use and support; identification of the course pre-requisites for all training courses to allow Host Nation to select students and organize Host Nation pre-requisite training, in time, before execution of the Contractor’s training.

¹² Difficulty, Importance and Frequency (DIF): identification of the difficulty and importance of each major task to be performed by each category of users, support staff or Instructor and the frequency with which the task will be performed assessing the knowledge and skill required to perform the task, determining performance objectives, and recommending how training should be provided to meet these requirements.

¹³ Structuring of training modules, role-based training programmes, and training material, as well as the training sequence, mode and duration.

- 2) Planning of the training stages and activities, including the TNA, development of training material and corresponding schedule for each training course material, organisation of courses, course execution, learning methods for each type of course;
- 3) Course description. This shall be a clear description of:
 - a. A narrative explanation of the subject matter of the specific course;
 - b. The course format, objectives, and training materials, described in sufficient detail to ensure the students will receive required training;
 - c. A proposed syllabus detailing the subject matter to be covered.
- 4) Any breakdown into modules shall be described, following the format of Course Control Documents (CCD) I, II, and III as of Bi-SC Directive 075-007.
- 5) Student prerequisites (if required);
- 6) Course length (including time devoted to each area of the course);
- 7) Method of presentation for each element of the syllabus (show breakdown of methods, i.e., lecture, demonstration, hands-on and directed study, online etc.);
- 8) Method of evaluation. Establish minimum acceptable written and performance standards and a method of evaluation of directed study. A plan shall be included to show that each student achieved at least minimum training objectives by written and performance tests;
- 9) List of training material, by Product Breakdown and training equipment required (Contractor-provided documents or materials shall be included). This shall include the appropriate standards for electronic data;
- 10) Description of the training equipment to be used including the functionality in terms of the operational and maintenance tasks;
- 11) Recommended maximum size of course. Recommended location of training and type of facility required (i.e., classroom, auditorium, site, etc.);
- 12) List of measurable objectives (tasks) required by graduates to demonstrate successful completion of course;
- 13) Proposed schedule for training courses;
- 14) Relationship to related programme milestones and to the equipment delivery schedule;
- 15) Number of hours of “hands-on” training to be provided to each student;
- 16) Training Site Survey and training system installation.

TRN-21 The Contractor’s Training Plan (TP) shall observe the Customer’s normal working routine.

TRN-22 The Contractor shall provide the TP detailing the relevant content to cover the following structure and the Bi-SC Directive 075-007.

Table 4-15 TP Content and Structure

| Structure | Content |
|-----------|------------------------|
| 1 | Introduction |
| 2 | Documents and Acronyms |

| Structure | Content |
|-----------|---|
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | Training Management |
| 4.1 | Training team |
| 4.2 | Training processes and procedure overview |
| 4.3 | Training RACI Matrix |
| 4.4 | Training tools |
| 4.5 | Learning Methods |
| 4.6 | Training constraints |
| 5 | Planning |
| 5.1 | TNA results |
| 5.2 | Training Material |
| 5.3 | Training Courses |
| 5.4 | Proposed time schedule |
| 6 | Organisation of courses |
| 6.1 | Course description ¹⁴ |
| 6.2 | Training objectives |
| 6.3 | Method of presentation |
| 6.4 | Method of evaluation |
| 6.5 | Training certificates |
| 6.6 | Feedback management |

4.10.3 TRAINING MATERIAL

TRN-23 The Contractor shall provide **Training Materials** and shall execute **Training Course** for test personnel, operators, maintainers and instructors:

- 1) based on the maintenance and support concept (Product Support Database);
- 2) based on technical publications (Common Source Database),
- 3) containing slides used during the training, and provide a hardcopy to each student in the requested format (e.g. NATO Academy presentation / handbook formats and style guides) for review and approval.

TRN-24 The Contractor shall deliver an Instructor Manual (included in the Training Materials) to enable the instructor to prepare, conduct, and conclude the training course to meet the learning objective within the allocated training period.

TRN-25 The Contractor shall prepare and provide all materials that will be used for the training. All documentation and training material delivered shall include an electronic

¹⁴ A proposed syllabus shall be included, detailing the subject matter to be covered. Any breakdown into modules shall be described, following the format of Course Control Documents (CCD) I, II, and III as of Bi-SC Directive 075-007. For each course there shall be also the following details:

- Student prerequisites (if required);
- Method of presentation for each element of the syllabus (show breakdown of methods, i.e., lecture, demonstration, hands-on and directed study, online etc.);
- Course length (including time devoted to each area of the course);
- Recommended maximum size of course;
- Recommended location of training and type of facility required (i.e., classroom, auditorium, site, etc.);
- List of measurable objectives (tasks) required by graduates to demonstrate successful completion of course;

- editable version. The training material shall be available in a Purchaser approved version and formatting before the start of the training course(s).
- TRN-26 The Contractor shall organise or develop and issue course material to ensure that each course provides all students / instructors with:
- 1) A student handbook;
 - 2) Slides to support the course;
 - 3) Instructor Manual;
 - 4) A Training Certificate, upon completion of the course; and
 - 5) A course evaluation feedback form.
- TRN-27 Training handbooks shall include all training content required to teach and comprehend the course. This includes an introduction to the training course; training course and lesson objectives; lesson overview and instructor / learning guide; course schedule; administrative and safety instructions; quick reference cards; and exercise material.
- TRN-28 All training material shall be provided to the Purchaser in the requested format (e.g. NCI Academy presentation / handbook formats and style guides) for review and approval. The review process shall be proposed in the Training Plan and organised by the Contractor in time to ensure training material is approved before start of the training programme
- TRN-29 The Contractor shall be responsible for the full installation, integration and validation of all training systems at the training location.
- TRN-30 The Contractor shall ensure that each student is instructed at the end of each course to complete and return the **Course Evaluation Feedback Form**.
- TRN-31 The Contractor shall consolidate and forward student feedback to the Purchaser following each training course in the form of a **Training Evaluation Report**. The report shall also recommend changes and improvements to the training courses based on the consolidated student feedback. The report shall also address student attendance, problems encountered and actions taken to resolve the problems.
- TRN-32 The Contractor shall revise/ refine and reissue any course material to reflect the consolidated student feedback and proposed improvements in the training evaluation report.
- TRN-33 Training courses shall include final theory and practical assessment tests that shall be graded based on the NCI Academy standards. However, no pass/fail decision shall be made by the Contractor.
- TRN-34 The Contractor shall produce **Training Certificates** for each training session and student. The certificates shall be issued to students at the end of each course
- TRN-35 The Instructor Manual shall follow the CCD II and III format include all fields on those control documents, including but not limited to:
- 1) A Course Overview;

- 2) Course organisation;
- 3) Course coordination;
- 4) Target audience;
- 5) Course Goals and outcomes;
- 6) Class size;
- 7) Host Agency responsibilities;
- 8) Audio-visual equipment requirements;
- 9) Room requirements;
- 10) Local coordinator's responsibilities;
- 11) Training site;
- 12) Participants and instructors;
- 13) Final arrangements;
- 14) Student requirements.
- 15) Course agenda;
- 16) For the instructor:
 - a. Presentation requirements:
 - b. Before the training event – preparation and device configuration list;
 - c. During the training event;
 - d. After the training event, to include resetting of devices.
 - e. Course evaluation templates.

4.10.4 TRAINING COURSES

TRN-36 The Contractor shall ensure the following for Training Courses:

- 1) All Contractor staff tasked to deliver training shall be security cleared for access to Restricted workplaces and data, in advance of the courses they are scheduled to deliver;
- 2) All training modules and courses required to enable all initially assigned the Purchaser personnel to operate and maintain the system at Level 1, 2 and 3. This shall include comprehensive and standalone hands-on training of load/unload, pack/unpack, and setup/dismantle of Nodes including a full-scale deployment scenario;
- 3) Sufficient hands-on, practical lessons on the actual system equipment provided through this Contract;
- 4) Training takes place in Portugal prior to the UAT(E). The Contractor shall be fully responsible for planning, organizing, installing, operating and maintaining all that is required to perform the training. This includes any training equipment used in the classroom;
- 5) Training and all related training documentation is provided in the English language. Training shall be able to accommodate Purchaser students with an English language skill level of 2222 (STANAG 6001). Contractor trainers shall have English language skill level 3332;

- 6) Where training is evaluated as being more suitable for On-The-Job-Training (OTJ), the Contractor shall provision the training course with OJT Type Training Activity;
- 7) Where training is evaluated as being more suitable for Classroom Environments, the Contractor shall provision and plan the training course with all Classroom training assets;
- 8) Where training is evaluated as being more suitable to be carried on on TDCIS Equipment, the Contractor shall provision and plan the training course with all Classroom training assets.

4.10.5 TRAINING EVALUATION

- TRN-37 The Contractor shall ensure that each student is instructed at the end of each course to complete and return the course evaluation feedback form.
- TRN-38 The Contractor shall consolidate and forward student feedback to the Purchaser following each training course in the form of a Training Evaluation Report. The report shall also recommend changes and improvements to the training courses based on the consolidated student feedback. The report shall also address student attendance, problems encountered and actions taken to resolve the problems.
- TRN-39 The Contractor shall revise/ refine and reissue any course material to reflect the consolidated student feedback and proposed improvements in the training evaluation report.

4.11 IN SERVICE SUPPORT DURING WARRANTY

- [135] The warranty period starts after successful completion of the FSA for each relevant batch and ends with the warranty end of each item (hardware and software) of relevant batch.
- [136] The In Service Support (ISS) during Warranty begin on successful completion of FSA for each relevant batch and run for a period of **two (2) consecutive, one (1) year periods** provided that the relevant batch is free of any defect in material, code or workmanship.
- [137] The Purchaser and/or Customer will operate and maintain the system after the FSA of each relevant batch
- [138] The Customer will be responsible at their own expenses for return of failed items, from deployed units to Customer's Mission Preparation Centre (MPC) within the Customer's home nation, from where the Contractor will collect these items.
- [139] Any support required for Purchaser Furnished Property (PFP) (which include Purchaser Furnished Equipment (PFE) and Purchaser Furnished Software (PFS)) will be provided through separate support contract provided with the PFP .
- IPS-113 The Contractor shall detail approach and plans for ISS during Warranty in a relevant chapter into the IPSP.
- IPS-114 The Contractor shall provide support to all items, ancillaries, and software provided under the Contract.
- IPS-115 The Contractor shall be responsible for supplying all COTS hardware and firmware/software upgrades and updates till the end of warranty period.

- IPS-116 The Contractor shall be responsible for the maintenance and repair of the system (except for PFE) until successful completion of FSA for each relevant batch and therefore shall provide its own spare parts, tools and test equipment to maintain the system (except for PFE) to the required performance level.
- IPS-117 The Contractor shall provide In Service Support during Warranty for:
- 1) Batch 1;
 - 2) Batch 2;
 - 3) Batch 3.
- IPS-118 The Contractor shall provide the following ISS during the Warranty to maintain the system to the required performance level, being responsible for:
- 1) Maintenance
 - a. Hardware corrective/unscheduled and preventive/scheduled maintenance: repair and/or re-placement of all defective technical installations/equipment;
 - b. Firmware/Software corrective/unscheduled and preventive/scheduled maintenance: remediation/resolution of all bugs, flaws, etc. of all software installations, provided as part of this contract.
 - c. Maintenance to be carried out at the Customer's MPC, prior to node deployment and at the Customer's establishment to where node equipment is recovered, following its deployment;
 - d. In the case of a failure could not be identified to an LRU level and/or could not be isolated within 3 business day (starting with the warranty request) even with on-call assistance from the Contractor, the Contractor shall dispatch a field engineer to provide a solution on-site.
 - 2) Repair: collection from, repair and return of defective and/or failed equipment to Customer's MPC with maximum Turn Around Time (TAT) twenty (20) calendar days. This shall include in-processing, troubleshooting, repair, check-out and shipment until delivery to the Customer's MPC;
 - 3) Any replaced part during the warranty period shall be under minimum 2 (two) years warranty beginning from the replacement date
 - 4) On-demand support and technical assistance at the Customer's MPC providing indication for HW and SW corrective/unscheduled and preventive/scheduled maintenance HL/SL 2 included and onwards to ensure that the response times specified can be met (e.g.: MTTR, TAT).
 - 5) Install and/or integrate Original Equipment Manufacturer (OEM) software application and operating system updates to node components at any point in a node's deployment cycle, to be carried out at the Customer's MPC only.
- IPS-119 All HW and FW/SW corrective/unscheduled and preventive/scheduled maintenance HL/SL 3 that will be the Contractor's responsibility (i.e.: IMT), shall be conducted in the most suitable geographical location for the optimisation and cost-effectiveness of its implementation.
- IPS-120 The Contractor shall warrant that all equipment, software, documents, system design, production and implementation provided under this Contract and all installation work performed under this Contract conform to the requirements and is free of any defect in material, code or workmanship and that all hardware (equipment) and software delivered under the Contract are genuine and free of any

malicious components, firmware and software, for a period of at least two (2) years after successful completion of last batch's FSA.

- IPS-121 The Contractor shall allow and support ad-hoc spot checks and audits by the Purchaser of any of thier supply chain security measures at any of the Contractor's locations and facilities used in the Contractor's supply chain relevant to this Contract.
- IPS-122 The Contractor shall provide Hardware and Firmware/Software corrective/unscheduled action within Next Business Day (NBD) after the initiation of the warranty request with the following constraints:
- a. In case of a failure could not be isolated to an hardware LRU and/or firmware/software CSCI level within 3 working days even with on-call assistance from the Contractor, the Contractor shall dispatch a field engineer to provide a solution on-site; and
 - b. In the case of a critical failure the warranty period is suspended after 3 working days starting with the warranty request and the warranty period is reactivated after successful resolution of the crifical failure.
- IPS-123 The Contractor shall repair repairable items received at the Contractor's plant in maximum Turn Around Time (TAT) twenty (20) calendar days. This shall include inprocessing, trouble shooting, repair, check-out and shipment at the expense of the Contractor until delivery to the Purchaser (i.e. to NATO CIS Sustainment Support Centre, at Brunssum) or to the Customer premises.
- IPS-124 The Contractor shall be responsible for the provision of any alternative or superseding items, should the original part be no longer available, ensuring compliance with the original design (e.g.: SRS and PBL) and System provided by this Contract. However, in such cases the Contractor shall propose the alternative item for the Purchaser approval. The alternative item shall conform to all the specified quality requirements within the scope of the contract and standards The Contractor shall be responsible for the provision of any alternative or superseding items, should the original part be no longer available ensuring SRS and PBL compliance.
- IPS-125 The Contractor shall submit a **Warranty Report**
- 1) At the end of every 3 month period during the warranty period, documenting all identified warranty cases, affected CI's, corrective actions, cost and schedule.
 - 2) At the end of the warranty period that cumulative report all identified warranty cases, affected CI's, corrective actions, cost and schedule
- IPS-126 The Contractor shall perform the Obsolescence Management during the warranty period providing the Obsolescence Report relevant information either in the Warranty Report or in an ad hoc report depending on the criticality.

4.12 IN SERVICE SUPPORT PLAN

- IPS-127 The Contractor shall establish, provide, execute and maintain an effective **In Service Support Plan (ISSP)** that describes in detail the practical instructions necessary for the Purchaser's In Service Support organisation to operate and maintain the system (hardware and software) delivered under this Contract.
- IPS-128 The ISSP shall describe the ISSP strategy and the detailed process and procedure to execute the ISS. This plan shall be detailed enough to form a comprehensive

- understanding of how the Contractor proposes to meet the support requirements of this SOW.
- IPS-129 The Contractor shall provide a description of how its proposed CM procedures shall continue to be implemented on the hardware and software/firmware during the ISS periods.
- IPS-130 The ISSP shall be considered a living document and as such shall be updated as necessary by the Contractor, with the Purchaser's concurrence, throughout the contracted post warranty ISS.
- IPS-131 The ISSP shall describe and detail the following:
- 1) Detailed description of the product baseline for the ISS (HW and SW)
 - 2) Contractor's proposed ISS Management Organisation and Structure, to carry out the ISS effort proving adequate experience in the maintenance and support of major defence systems including specialised software.
 - 3) Plan and methods for performing ISS activities (e.g.: intervention on each site, preventive maintenance, repair activities, spares replenishment) for the main three areas: Engineering Support (ES), Material Management (MM) and Field Engineering (FE) (i.e.: maintenance activities and field services) and evaluating the Contractor's performance during ISS through proposed Key Performance Indicators for each area.
 - 4) Details for Data Reporting Analysis and Corrective Action System (DRACAS) and its link to ECP and configuration change management [included in Engineering Support Area].
 - 5) Details for maintaining and updating the Technical Publications and the Logistics Database providing relevant input to training material for refreshing training courses [included in Engineering Support Area].
 - 6) Details for spare parts procurement, replenishment and repair including PHST (e.g.: strategy for replacing hardware that can no longer be economically supported by the Contractor or sub-contractors) [included in Material Management Area].
 - 7) Plan and methods for Configuration Management and Obsolescence Management specific for the ISS phase ; and
 - 8) Plan and methods for communication (e.g.: for site personnel to inform ISS Contractor when spares have been used and when assistance is needed) detailing also the use of Call centre and Collaborative environment and how any exceptions have to be handled.
- IPS-132 The Contractor shall provide a description of the proposed logistics and maintenance information processes. This description shall detail how the information from locations and the Contractor's maintenance facilities will be collected, stored and made available for evaluation. The term "Sites" refers to every physical location where systems or items under this contract are located when Contractor's activity is required.
- IPS-133 The Contractor shall provide a description of how the QA/QC Programme of the Prime Contractor and sub-contractors providing ISS services shall meet the provisions of this contract. The Contractor shall include applicable certificates (issued by National Governments or International Organisations such as ISO) that demonstrate that the sub-contractors Quality Programme conforms to the requirement of the Prospective ISS Contract. The Contractor shall also

demonstrate how the provisions of the Prospective ISS Contract regarding QA/QC shall be inserted in all subcontracts and enforced by the Prime Contractor.

IPS-134 The Contractor shall provide the ISSP detailing the relevant content to cover the following structure.

Table 4-16 ISSP Content and Structure

| Structure | Content |
|-----------|--|
| 1 | Introduction |
| 2 | Documents and Acronyms |
| 2.1 | List of Applicable Documents |
| 2.2 | List of Reference Documents |
| 2.3 | List of Acronyms |
| 3 | System Overview |
| 3.1 | Architecture |
| 3.2 | Operational scenario |
| 3.3 | Maintenance Concept |
| 3.4 | Support Concept |
| 4 | ISS Management |
| 4.1 | ISS team |
| 4.2 | ISS processes and procedure overview |
| 4.3 | ISS RACI Matrix |
| 4.3 | ISS constraints |
| 4.4 | ISS tools |
| 4.5 | ISS Contractual Documentation Requirements List (CDRL) |
| 5 | System Breakdown |
| 6 | Engineering Support (ES) |
| 6.1 | Framework and processes description |
| 6.2 | Data Reporting Analysis and Corrective Action System |
| 6.3 | Logistics deliveries update |
| 6.4 | Key Performance Indicators for ES |
| 6.5 | Supportability Evaluation and performance analysis |
| 7 | Material Management (MM) |
| 7.1 | Framework and processes description |
| 7.2 | Materials and maintenance concept |
| 7.3 | Stock |
| 7.4 | Key Performance Indicators for MM |
| 8 | Field Engineering (FE) |
| 8.1 | Framework and processes description |
| 8.2 | Manpower and support concept |
| 8.3 | Facilities |
| 8.4 | Key Performance Indicators for FE |
| 9 | Cost Model for ISS Activities |

4.13 HEALTH, SAFETY & ENVIRONMENTAL PROTECTION

IPS-135 The Contractor shall treat Health and Safety (H&S) as a continuous process which addresses all areas, including where the Contractor shall apply best practices in accordance with EU and respective national H&S legislation for all areas of design, installation, construction and build.

IPS-136 The Contractor shall identify all hazards that exist and shall, as part of this activity, ensure that all personnel (operators and maintainers etc.) are provided with suitably designed and constructed equipment and are trained and provided with any necessary additional equipment to minimise the risk of accidents or injury.

- IPS-137 The equipment and installations that are subject to this SOW shall be designed and constructed in such a way that they do not run in a hazardous condition or put human safety at risk.
- IPS-138 The Contractor shall conduct a hazard review, consider and evaluate the risks and put in place control measures required to produce a statement with supporting evidence that the risks are As Low As Reasonably Practical (ALARP).
- IPS-139 The Contractor shall apply engineering principles, criteria, and techniques to identify and eliminate safety hazards in the systems in accordance with MIL-STD-882E.
- IPS-140 The Contractor shall design and/or select all equipment on the basis of inherent safety features that protect not only the human operators and maintainers but also the equipment itself.
- IPS-141 The Contractor shall establish a System Safety Programme in accordance with "MIL-STD-882E, Section 4", to fulfil the safety requirements of the Contract.
- IPS-142 The Contractor shall provide, a **System Safety Program Plan (SSPP)** in accordance with MIL-STD- 882E.
- IPS-143 The Contractor shall describe in the SSPP the risk assessment method.
- IPS-144 The Contractor shall document the procedures to control design, selection, procurement and manufacture of parts and materials. Revisions to the SSPP shall incorporate Purchaser-agreed changes, additions or deletions that have evolved during the conduct of the Programme.
- IPS-145 Safety verification shall be conducted at each site prior to each SAT to ensure compliance with the SSPP. The safety verification shall verify the safety requirements for all types of hazards not eliminated by design. The Contractor shall document the safety verification process in the SSPP. The Contractor's responsibilities shall be defined in the SSPP.
- IPS-146 The SSPP shall also include **System Safety Hazard Analysis Report (SSHAR)** as mentioned in MIL-STD- 882E.
- IPS-147 The SSPP shall also define Environmental and Safety Requirements as defined at following sub-paragraphs:
- IPS-148 Environmental requirements shall be implemented and verified by the Contractor in accordance with National laws and regulations.
- IPS-149 The Contractor shall comply with the national legislation concerning job accidents, incident prevention and hygiene at work. The Contractor shall also make legal arrangements for protection of the life and security of all the personnel and to guarantee medical assistance whenever necessary due to job accidents. The same legal arrangements shall be applied to sub-Contractor personnel under Contractor's responsibility.
- IPS-150 Health and Safety Hazards: The physical presence, operation and maintenance of the system shall pose no health or safety hazards to personnel.
- IPS-151 Carcinogenic and Radio-active Materials, Mercury: Materials containing known carcinogenic substances, radio-active materials or mercury shall only be used with the prior authorisation of the Purchaser with the exception of Radium that is not to be used to achieve self-luminosity.
- IPS-152 Hazard Warning Labels: Equipment warning labels shall be attached wherever there is any potential heavy lifting, electrical, chemical, electromagnetic radiation

- or heat hazard or a potential hazard caused by human contact with materials, particularly when removal of covers will expose the hazard.
- IPS-153 Production of Toxic or Corrosive Fumes: Materials used, under the specified environmental and service conditions or as a result of heating due to conflagration, shall not liberate:
- 1) Gases that combine with the atmosphere to form an acid or corrosive alkali;
 - 2) Toxic or corrosive fumes that would be detrimental to the performance of the equipment or health of personnel;
 - 3) Gases that will produce an explosive atmosphere.
- IPS-154 Equipment shall not contain any asbestos material.
- IPS-155 Glass Fiber Materials: Glass fiber materials shall not be used as the outer surface or covering on cables, wire or other items where they may cause skin irritation to operating personnel.
- IPS-156 Moving Part Protection: Any rotating or other moving part such as ventilators, blowers, drive belts etc., shall be shielded or protected adequately to prevent accidental contact by and injury to any personnel during operation and maintenance.
- IPS-157 Equipment Edges: Projecting and overhanging edges of equipment items shall be kept to a minimum. Edges and corners shall be rounded.
- IPS-158 Environmental Conditions Indoors, temperature, humidity: Equipment shall function without degradation under the environmental conditions as specified.
- IPS-159 Noise generated by the system in operation shall not exceed the levels specified in the local regulations or Environmental Noise Directive (2002/49/EC) whichever it is more restrictive for operational, maintenance areas.
- IPS-160 Any safety related warnings and cautions shall be documented in the related sections of the manuals. Adequate labelling and marking shall be provided on the equipment and systems.
- IPS-161 All equipment and installations provided by the Supplier shall be:
- 1) ambient physicochemical and fluids resistant
 - 2) new, of high quality and standard manufacturing (unless bespoke product is required), and OEM with proven experience and feedback of supportability performances
- IPS-162 If lifting devices, ladders, safety equipment, special tools or harnesses are required, the Contractor shall provide them.
- IPS-163 The ladders shall be compliant with following standards:
- 1) EN 131-1:2015+A1:2019 Ladders. Terms, types, functional uses
 - 2) EN 131-2:2010+A2:2017 Ladders. Part 2: Requirements, testing, marking
 - 3) EN 131-3:2018 Ladders. Marking and user instructions
- IPS-164 Personal protective equipment (PPE) shall be compliant with Regulation (EU) 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC.
- IPS-165 No special or difficult techniques that require unusual dexterity or skill in removing or installing items can be assumed.

- IPS-166 The equipment and installations provided by the Contractor shall meet requirements stipulated in following publications (including but not limited to following publications), as applicable:
- 1) Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety
 - 2) Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety
 - 3) Directive 2014/30/Eu of The European Parliament and of The Council of 26 February 2014 – electromagnetic compatibility
 - 4) Directive 2014/35/Eu of The European Parliament and of The Council of 26 February 2014 – ‘low voltage directive’
 - 5) IEC 60950 series: Information technology equipment – Safety
 - 6) IEC 62821 series: Electric cables - Halogen-free, low smoke, thermoplastic insulated and sheathed cables of rated voltages up to and including 450/750V
 - 7) IEC 61000 series – Electromagnetic compatibility (EMC)
 - 8) IEC 60529 – Degrees of protection provided by enclosures (IP Code)
 - 9) EN 61340-5-1:2016 Electrostatics. Protection of electronic devices from electrostatic phenomena
 - 10) MIL-STD-882E – Systems Safety
 - 11) MIL-STD-1472G, DoD Design Criteria Standard, Human Engineering, dated 2012
- IPS-167 The above list of standards does not relieve the Contractor from the obligation to comply with other applicable National Standards.
- IPS-168 The Contractor shall clearly state which standards shall apply to each of the designed and installed deliveries.

4.14 TRANSFER OF OWNERSHIP

- IPS-169 The Contractor shall be liable with regard to the function and performance of the system during the entire lifecycle.
- IPS-170 Transfer of ownership of the system shall occur at FSA when the Purchaser has confirmed final acceptance in writing.
- IPS-171 During the period between PSA and FSA, the Contractor shall incrementally transfer the ability to conduct first, second and third level¹⁵ of support from the Contractor staff to the Customer.
- IPS-172 Liability for usage induced failures shall hence be transferred to the Customer on successful completion of the PSA.
- IPS-173 The Customer shall assume Intellectual Property of the TDCIS design and configuration on successful completion of the PSA. Liability with regard to the function and performance of the system shall remain with the Contractor.

¹⁵ The Customer will be responsible for a portion of the 3rd level support, with the remainder to be the Contractor’s responsibility. This will be clarified during production of the MTA.

- IPS-174 On successful completion of the FSA, ownership and responsibility of the following documents are to be handed over to the Customer:
- 1) All Technical Publications covered by Section 4.10;
 - 2) All Training Materials covered by Section 4.11.5;
 - 3) The Bill Of Materials (BoM) for all nodes and equipment therein, delivered by the Contractor to Customer, inclusive of PFE.
- IPS-175 The Contractor shall ensure all documents transferred to the Customer are labelled with the appropriate protective marking.

5 DOCUMENTATION

[140] This Section addresses the documentation requirements of the project. The purpose of these requirements is to ensure that the Contractor develops and provides high quality, comprehensive documentation. This covers all documentation to be provided under the Contract.

DOC-1 The Contractor shall ensure that all project documentation shall be compliant with the requirements identified in the SOW below.

5.1 DOCUMENTATION PLAN

DOC-2 As part of the PIP, the Contractor shall submit a Documentation Plan (DP). The DP shall explain in detail how the Contractor shall fulfil all documentation requirements in this Contract. The DP shall include:

- 1) List of all documentation deliverables to be provided and defined in this Contract and it's annexes (including SOW, SRS) , in the form of a Contract Data Requirements List (CDRL) and organised according to the Contract Line Item Number (CLIN) structure of the Schedule of Supplies and Services (SSS);
- 2) Schedule of release of all CDRL items, including draft versions (for review) and final versions (for the purpose of acceptance);
- 3) Detailed description of the file naming convention in accordance with the requirements in this Section;
- 4) Detailed description of the document review process in accordance with the requirements in this Section;
- 5) Detailed description of the change control and version control processes through which the Contractor proposes to manage and control change during the life cycle of each documentation deliverable.

DOC-3 Any deviation from the CDRL shall be coordinated with and requires approval by the Purchaser.

DOC-4 Should it be found that there are documentation requirements within the SOW and Annexes, that are not identified in the CDRL, the CDRL shall be updated to reflect this.

5.2 DOCUMENTATION FORMAT

DOC-5 The Contractor shall ensure that non-COTS documentation shall neither be marked with corporate logos nor contain warnings limiting the rights to use or reproduction.

DOC-6 The Purchaser reserves the right to make additional copies of any documentation (including the training documentation) provided under this Contract for their internal use.

DOC-7 All contractual documentation (e.g., change proposals, invoices, etc.) shall be delivered by the Contractor in electronic format unless specified otherwise by the Purchaser Contracting Officer. The Purchaser reserves the right to request printed versions of any project documentation.

DOC-8 Every document shall include a hyperlinked index.

- DOC-9 The Contractor shall ensure that the default software packages for managing projects and processing documentation deliverables are the versions which will be decided at Contract Award by the Purchaser:
- 1) Microsoft Office Professional;
 - 2) Microsoft Project;
 - 3) Microsoft Visio Enterprise.
- DOC-10 The Contractor shall submit documentation, intended for review by the Purchaser in electronic format:
- 1) In the native format compatible with the Purchaser's software packages above; or
 - 2) All project management documentation (e.g., plans, schedules, reports, etc.) shall be delivered by the Contractor as electronic, editable copies in MS Office format. This format shall be agreed with the Purchaser.
- DOC-11 The Contractor shall submit documentation, intended for review by the Purchaser, with each modification identified through the change tracking feature.
- DOC-12 The Contractor shall submit all final and accepted versions of documentation deliverables in electronic format, as PDF with Optical Character Recognition enabled (OCR), accompanied with a Microsoft Office version for editing purposes.
- DOC-13 The Contractor shall ensure that all documents produced under this Contract shall use sans-serif fonts (e.g. Arial, Helvetica, Calibri, etc.), and obey the following principles:
- 1) Headings shall be numbered and use bold font-types of sizes higher than the body text (the higher the Heading in the document hierarchy, the larger the font-sizes);
 - 2) No document shall use Headings below level 6 (i.e. 1.1.1.2.3.1 Heading Text);
 - 3) Body text (under the headings) shall not use fonts smaller than Arial 10 pt. (or equivalent size if another font type(s) is (are) selected);
 - 4) Any graphic material generated under this Contract, including network diagrams, shall not use font sizes smaller than Arial 8 (or equivalent size if another font type(s) is (are) selected).
- DOC-14 Larger font sizes other than those specified above shall be selected if the corresponding text or drawing is to be reduced in size when embedded in the document, in order to guarantee that the PDF output keeps the font size as specified.
- DOC-15 Every page shall include a header and footer indicating the highest classification of content in that document using one of the following labels: NATO CONFIDENTIAL, NATO RESTRICTED (sensitive information identifying e.g. a named location or security assessment), or NATO UNCLASSIFIED.
- DOC-16 The Contractor shall ensure that all documentation produced under this contract shall adhere to the same presentation style (cover pages, approval pages, headers, footers, headings and paragraphs, font types and sizes within headings and paragraphs), irrespective of the source of the document within the Contractor's team, including any except COTS equipment documentation.
- DOC-17 The Contractor shall ensure that one set of printed System Administrator Guides (SAG) printed on water-proofed paper shall be delivered for each Node and these

shall contain any deployment aspects for the Node and Trailer. In addition, all COTS Documentation, manuals and drawings shall be provided in electronic format, both in PDF (OCR) format and, for non-COTS documentation, in an editable Microsoft Office/Visio format.

- DOC-18 The Contractor shall ensure that Manuals shall take into consideration the information gained through the Training Needs Analysis (TNA) to ensure that all operation and maintenance tasks are identified and covered by the documentation.
- DOC-19 Manuals and As-built drawings shall be provided for all CIS-components, CIS ancillaries and software, such as tents, power distribution, HVAC, BC filters, compressors, and generators, but NOT on PFE (crypto equipment, general use software, etc.). Manuals on PFE will be delivered as PFE manuals together with the PFE. However, manuals and drawings shall cover all the system specific interfaces to/from PFE or any external asset.
- DOC-20 All electronic copies shall be delivered in a format which is best suited for review and maintenance by the Purchaser (e.g., Project Master Schedule in MS Project format, Project Progress Reports in MS Word). In general the following guidelines shall be used:
- 1) Microsoft Word shall be used for generating text document;
 - 2) Microsoft Excel shall be used for tabular or matrix data;
 - 3) Microsoft Visio shall be used for drawings;
 - 4) Microsoft Project shall be used for schedule;
 - 5) Microsoft PowerPoint shall be used for briefings;
 - 6) The rest of deliverables will be furnished as electronic copy of the agreed tools/media used.
- DOC-21 All documentation, such as COTS documentation, manuals, drawings and training materials shall be provided in English.
- DOC-22 The Contractor shall ensure that documentation convention follows:
- 1) For numbers appearing in textual documents shall be a comma to be the thousands separator and a period to be the decimal separator (e.g., 1,365,276.24).
 - 2) That dates appearing in free text (e.g., quoting dates of meetings) shall be day-month-year and not month-day-year.
 - 3) The first page shall show the document title, project title, contract number as well as version number and issue date, if applicable, and which shall also be shown on each subsequent page bottom.
 - 4) Developed documentation shall contain a Table of Contents. It shall be noted that depending on the type of document, a Table of Content might not be required. This shall be agreed between the Purchaser and Contractor beforehand.
 - 5) Documents shall contain a preface, containing details of related documents and information on how to navigate the document.
 - 6) Where documents contain many complex special used or strongly domain oriented terminologies these shall be defined in a glossary.

- DOC-23 Each document shall contain the following information for identification:
- 1) Version of the document and version history;
 - 2) Due date;
 - 3) Delivery date;
 - 4) CLIN number;
 - 5) Status (e.g., accepted/approved/draft).
- DOC-24 The Contractor shall remain responsible for updating the documentation that is affected by the changes in the system requirements, design, or support arrangements throughout the project.
- DOC-25 The Contractor shall use filenames for all documentation deliverables in compliance with the following filename convention:
- a. [NU|NR]_[Contract number]_[Contract Line Item number]_[Name of deliverable].[filename extension]
- DOC-26 Example of a compliant filename:
- a. NU_CO-14760-TDCIS_3.2.1_QA Plan.pdf.
- DOC-27 The fields used in the filename convention shall be used as follows:
- 1) [NU|NR] is the classification of the document: NATO Unclassified or NATO Restricted;
 - 2) [Contract number] is the official Purchaser contract number "CO-14760-TDCIS";
 - 3) [Contract Line Item number] is the CLIN used to identify the deliverable in the Schedule of Supplies and Services (SSS);
 - 4) [Name of deliverable] is the Contractor proposed, Purchaser agreed designation of the deliverable;
 - 5) [filename extension] is the standard filename extension, but ".zip" may be used to aggregate multiple files.
- DOC-28 The Contractor shall ensure that COTS documents, such as a vendor supplied user manual, shall retain their original filenames and shall hence not be renamed according to the above filename convention.

5.3 DOCUMENT ACCEPTANCE PROCESS

- DOC-29 All documentation shall be subject to Purchaser approval.
- DOC-30 Documentation shall be distributed as follows:
- 1) For all documents unless otherwise instructed: an electronic copy to the Purchaser's Project Manager;
 - 2) For contractual documents: in addition to one hard copy and an electronic copy to the Purchaser's Contracting Office;
 - 3) With the exception of contractual documents, an electronic copy to the Collaborative Environment.

Table 5-1 Documentation Review Process

| Actors Time | Contractor | Purchaser |
|-------------|---|--|
| T = 0 | Submit document to Purchaser | |
| T + 2 wks | | Review & send any comments to Contractor: otherwise document finalised. |
| T + 4 wks | Update document based on Purchaser comments | |
| T + 5 wks | | Document updates either finalized or if necessary further <u>minor</u> comments returned to Contractor |
| T + 6 wks | Further updates if required | |
| T + 7 wks | | Accepts minor comments and document accepted and finalised. |

- DOC-31 "One week" and multiples thereof shall be understood as 5 working days, Monday - Friday. This mainly applies to the period of Purchaser's review of a document, from the time the document is uploaded or delivered by the Contractor and vice versa.
- DOC-32 Approval of a document or other deliverable shall not be interpreted to imply any Purchaser endorsement of the content. It shall remain the sole responsibility of the Contractor to meet the full system performance requirements and to prove such performance through the regime of testing and other assurance mechanisms set forth in the Contract and it shall be the sole responsibility of the Contractor to remedy any performance shortfall in the event of any identified deficiency in terms of the contract functional and/or performance requirements. The Contractor's responsibility in this regard extends beyond FSA through warranty, responsibility for any latent defects.
- DOC-33 All the documentation within the scope of this project shall be consistent in terms of content. Any inconsistencies that are detected between documents at any time until the end of this project shall be corrected upon Purchaser notification.
- DOC-34 The Contractor shall provide a first draft (version 0.1) of each deliverable for Purchaser review by the date specified in the Schedule of Supplies and Services or as agreed between the Purchaser and Contractor.
- DOC-35 The first draft shall be substantially complete and correct, and delivered in accordance with the delivery dates specified in the Work Package and the Schedule of Supplies and Services. To ensure the completeness and correctness, the Contractor shall complete the internal review cycle between the related functions before presenting a version to the Purchaser.
- DOC-36 The Purchaser reserves the right to return without review a document that has significant deficiencies.
- DOC-37 The Contractor shall not rely on the Purchaser review to fill in deficiencies or obtain missing Purchaser information.
- DOC-38 The Contractor shall resubmit the document as a revised draft incorporating the Purchaser's comments within two weeks after receipt, unless specified differently in the Work Package.

- DOC-39 The Purchaser shall provide comments, corrections, and suggested changes to the Contractor within two weeks of receipt, unless specified differently in the Work Package. If the Contractor submits more than one document (or more than 400 pages of content in total) for review at the same time, the Purchaser will reserve the right to extend the review period accordingly.
- DOC-40 The Contractor shall provide the Final (version 1.0) document within two weeks of receipt of the Purchaser's comments on the revised draft, unless specified differently in the Work Package.
- DOC-41 The Contractor shall include and integrate all document review and acceptance activities in the overall Project Master Schedule (PMS) of the PMP in the PIP.

5.4 DRAWINGS

- DOC-42 The Contractor shall provide **Engineering Drawings** of all Computer Aided Design (CAD) drawings employed in the procurement and, or manufacture the following of TDCIS associated items:
- 1) Equipment and rack mounting brackets;
 - 2) Mechanical equipment interfaces;
 - 3) Proprietary cable sections;
 - 4) Proprietary mechanical cable connections and interfaces.
- DOC-43 The Contractor shall provide **As-Built Installation Drawings** that reflect the complete installation conducted by the Contractor for each type of system, they shall comprise:
- 1) Layout Plans showing the locations of all Contractor installed assets;
 - 2) Cabling Plans showing all Contractor installed cabling, per security classification, clearly identifying the location and labelling of each cable, together with the terminations at both ends and the use of the cable;
 - 3) Rack Layout Plans for all Contractor installed racks;
 - 4) System Configuration Plan showing all installed assets with all their interfaces and interconnections, both internal and external;
 - 5) Cross-referenced and consistent with each other and with any other documents provided under this Contract, such as manuals and training material.
 - 6) Representing technical networking and service configuration diagrams shall use layered views, as follows:
 - 7) One layer shall be created for the physical view, covering hardware, ports and cable-connections and associated identification markings (including also signal flow, electrical power and grounding);
 - a. One layer for the logical view, covering VLANs, virtual servers, logical links;
 - b. One layer for the addressing and routing information;
 - c. Service view schematics.
- DOC-44 Technical Installation drawings shall be precise, detailed and scaled drawing in accordance with applicable international norms (i.e. ISO 128, ISO 129, ISO 5455, inter alia).

- DOC-45 The technical drawings shall include elevations, plans, sections and 3D views. Dimensions and identification of most significant features are mandatory, and shall:
- 1) Provide the necessary drawings/schematics, specifications, wiring diagrams, etc., to allow the operators to troubleshoot, and fully understand, the design and operation of the particular equipment;
 - 2) Supplement but do not substitute User Manuals and/or Maintenance Manuals and thus be expected to be referenced in the latter as a way of providing specific details on a particular piece of equipment.

6 CONFIGURATION MANAGEMENT

- [141] This Section addresses the Configuration Management (CM) requirements of the project. The purpose of these requirements is to ensure that the Contractor establishes and executes NATO-compliant and effective configuration management during the execution of the project until the end of Warranty.
- CMG-1 The Contractor shall establish and maintain an effective Configuration Management (CM) organization to implement the CM program and manage the CM functions (configuration identification and documentation, configuration control, configuration status accounting, configuration audits) throughout the duration of the Contract.
- CMG-2 The Contractor shall establish and maintain the CM policies, processes and practices/procedures in conformance with [STANAG 4427 Ed.3] “Configuration Management in System Life Cycle Management” and underpinning ACMPs (ACMP-2000, ACMP-2009, ACMP-2100) and [ISO 10007:2017] “Quality Management System – Guidelines for Configuration Management”.
- CMG-3 The Contractor shall implement the CM activities for any HardWare (HW), SoftWare (SW) including FirmWare (FW) delivered, integrated, tested and/or customized and document provided, used or defined in the frame of the project and shall fully integrate the COTS elements-data in order to implement a unique CM framework.
- CMG-4 The Contractor shall provide the required CM deliveries in accordance with the following schedule that shall be included in the contractor’s Project Master Schedule (PMS) of the PMP in the PIP

Table 6-1 IPS Deliverables

| Title | Iss | Due date |
|--|-------------|--------------------|
| Configuration Management Plan (CMP) | Draft | EDC + 2w |
| | Final Draft | PDR - 4w |
| | Final | CDR + 4w |
| Functional Baseline (FBL) | Draft | SRR – 4w |
| | Final | SRR + 4w |
| Allocated Baseline (ABL) | Draft | PDR – 4w |
| | Final | CDR - 4w |
| Product Baseline (PBL) | Draft | CDR + 4w |
| | Final | FAT - 4w |
| Operational Baseline (OBL) | Draft | FSA – 4w |
| | Final | FSA + 4w |
| Configuration Management Database (CMDB) | Draft | Design review – 4w |
| | Final | Design review + 4w |
| FCA Report | | SAT + 4w |
| PCA Report | | FAT + 4w |

6.1 CONFIGURATION MANAGEMENT PLAN

- CMG-5 The Contractor shall provide, execute, and maintain an effective Configuration Management Plan (CMP) as a living document throughout the duration of the Contract. The Contractor shall organize review meetings for CM progress starting from the first draft of CMP.
- CMG-6 The CMP shall identify, document and justify the organizational structure, roles and responsibilities, tasks, milestones and procedures to be used by the Contractor to implement the CMP and fulfil the requirements of this Contract.
- CMG-7 The CMP shall assure the establishment and maintenance of configuration item records, configuration item life cycle records, and baselines throughout the duration of the contract and provide assurance that all changes to the baselines are performed through a formal change control process once a baseline has been established and agreed.
- CMG-8 The CMP shall be structured following the requirements set in the [ACMP-2009-SRD-40.1 ref. # 4.3.C] and subject to revisions and updates, as required.
- CMG-9 The Contractor shall provide in the CMP the rationale and criteria for the CI identification and CI numbering for the Purchaser approval, based on the criteria for selection of CIs detailed in [NATO ACMP 2009, 2017] "Guidance on Configuration Management".

6.2 CONFIGURATION IDENTIFICATION

6.2.1 ITEM IDENTIFICATION

- CMG-10 The Contractor shall identify and describe HW, SW (including FW) and documentation Configuration Items (CI's) as defined in [NATO ACMP 2009, 2017].
- CMG-11 The Contractor shall also identify any PFEs and PFSs provided for implementation as Configuration Items (CI's) and integrate them within their CM and related part of the CI structure.

6.2.2 BASELINES

- [142] The Purchaser reserves the right to modify the CI structure prior to its baselining.
- CMG-12 The Contractor shall define the CI trees (Baselines), hierarchically structured, clearly defining each node/leaf as Configuration Item (CI), Hardware Configuration Item (HWCI), Computer Software Configuration item (CSCI), Hardware Parts (HWP) or Computer Software Component (CSC) in accordance with the guidelines provided in the above defined ACMPs and ISO.
- CMG-13 The Contractor shall provide and maintain Baselines throughout the duration of the Contract.
- CMG-14 The Contractor shall provide the following baselines:
- 1) Functional Baseline (FBL);
 - 2) Allocated Baseline (ABL);
 - 3) Product Baseline (PBL); and
 - 4) Operational Baseline (OBL).

- CMG-15 The Contractor shall be responsible for the consistency between the baselines throughout the project. Any update or change shall be introduced formally and revision controlled.
- CMG-16 The Contractor shall develop, maintain and fully document all the baselines in the Contractor's Product Lifecycle Management (PLM) tool.
- CMG-17 The Contractor shall export the baselines in the form of CMDBs for each Baseline and relevant modifications, in accordance with the Change Request (CR), Engineering Change Proposal (ECP) and Engineering Change Order (ECO) processes, covering as a minimum the following relationships:
- 1) Contract functional/non-functional requirements to Functional elements of the FBL;
 - 2) Functional Elements of the FBL to Major CIs of the ABL;
 - 3) Major CIs of the ABL to Full CIs (CIs, HWCIs, CSCIs, HWPs, CSCs) tree (PBL); and
 - 4) Major CIs of the PBL to Services/Sub-Services delivered by the System (mapping of CIs vs Services and vice versa).
- CMG-18 The Contractor shall incorporate in the baselines, under a unique hierarchical tree, all the information relevant to the OEMs/COTS HW, SW and FW used and integrated in the System including PFEs and PFSs.

6.2.2.1 FUNCTIONAL BASELINE

- [143] The Functional Baseline (FBL) is a set of documents that specifies the functional and non-functional requirements of a service or product and that is used as the approved basis for comparison.
- CMG-19 The Contractor shall provide the final version of the FBL for Purchaser approval following the approval of Final SRR Report. Any changes on the approved FBL shall be requested through ECP.
- CMG-20 The Contractor's design in the FBL shall be derived from the SRS.
- CMG-21 The Contractor shall use an industry recognised requirements management tool to support requirements management.
- CMG-22 The Contractor shall provide access to the Requirements Management tool if requested by Purchaser to have an overview of the requirements management system of the Contractor.
- CMG-23 The Contractor shall provide the exported requirements lists from the Requirements Management tool in FBL documentation.
- CMG-24 The Contractor shall propose the format of FBL in the CMP for Purchaser's approval.

6.2.2.2 ALLOCATED BASELINE

- [144] The Allocated Baseline (ABL) is a set of documents that specifies the design of a service or product and is used as the approved basis for comparison. The ABL starts to be developed at the beginning of the design phase (PDR) and it is established and "frozen" at the end of the design phase (at CDR) - it is also known as "as-designed" baseline.

- CMG-25 The Contractor's design in the ABL shall meet the functional and non-functional requirements allocated in the FBL.
- CMG-26 The Contractor shall provide ABL, with incremental contents, using the NCI Agency template [AI 16.32.04] - ABL Template

6.2.2.3 PRODUCT BASELINE

[145] The Product Baseline (PBL) is a set of products and/or services, including supporting documents, which is used as the approved basis for comparison. The PBL starts to be developed at the beginning of the production phase. It is established and "frozen" at the end of the production phase (at factory integration/test) - it is also known as "as-built" baseline.

CMG-27 The Contractor's design in the PBL shall meet the functional and non-functional requirements allocated in the FBL and the design of the ABL.

CMG-28 The Contractor shall provide PBL, with incremental contents, using the NCI Agency template [AI 16.32.05] - PBL Template

CMG-29 Each element of the PBL shall include as minimum (but not be limited to) the following pieces of information (in accordance with the type of item):

- 1) Position in the structure (hierarchical level or indenture code);
- 2) Physical location (Reference Designator or similar positional code) coherent with the As-Built Drawings and manuals;
- 3) Type of Configuration Item (CI, HWCI, CSCI, HWP, CSC);
- 4) Type of MRI/MSI, coherent with the LBS/PBS;
- 5) Item identifiers (Part Number – P/N, Cage Code, Nomenclature, revision/issue, release etc.) coherent with the Contractor's defined CM numbering system, including OEMs/COTS data and their propagation in the CM tree;
- 6) Asset Data (SMR Code, Price, Price UOM, MOQ, start of warranty/licence validity etc.);
- 7) Inventory Data (Serial Number - S/N or Licence number if applicable etc.);
- 8) CI documentation:
 - a. For HWCI/HWPs: specifications, datasheet, Certificates of Conformity (CoC), Declaration of Conformity (DoC), Items Setting Documents (ISD – how to configure hardware, software and firmware) etc.;
 - b. For HWCI/CIs: interconnection diagrams, interface specifications/control documents, test procedures, test records, integration data, customization/setting procedures etc.; and
 - c. For CSCI/CSCs: software Release Notes (SRN), software test data records, software metrics (type of language, Line of Code, number of function points etc.), software Source Code (if specifically generated or modified/adapted/customised in the frame of the project), software Installation files, software Version Description Documents (VDDs), software installation/customization procedures, software settings, software operating manual etc..
 - d. Alternative (P/N, Cage Code, Nomenclature, revision/issue, release etc.); and

e. NATO Stock Number (NSN).

CMG-30 The Contractor shall provide the CMDB to reflect the PBL with all related documentation, software, hardware, configuration files, services and any other related information or deliverable necessary to establish the PBL completely.

6.2.2.4 OPERATIONAL BASELINE

CMG-31 The Contractor's developed Operational Baseline (OBL) shall be initially established after successful completion of the PSA and then finally established after successful completion of FSA. It reflects the "as-deployed" ("as-delivered") configuration of the system.

CMG-32 The Contractor shall provide the CMDB to reflect the OBL upon completion of FSA.

6.3 CHANGE CONTROL

CMG-33 The Contractor shall be fully responsible for the Configuration Change Control of all CI's and baselines throughout the duration of the Contract and in accordance with [NATO ACMP 2009, 2017].

CMG-34 The Contractor shall be responsible for issuing in a timely manner, as required by this SOW, all approved changes and revisions to all baseline documents included in the Contract. This includes changes originated both by the Contractor and the Purchaser.

CMG-35 The Contractor shall ensure that the change is properly reflected in all baseline documents affected by that change where a change affects more than one document, or affects documents previously approved and delivered.

CMG-36 The Contractor shall define the Configuration Baseline Change procedures and shall submit Notice of Revision or Requests for Concession when required and approved by the Purchaser. All proposed changes to the baselines (FBL, ABL, PBL, OBL) shall be submitted to the contractor's Configuration Control Board (CCB) prior to the submission to the Purchaser for approval. The Contractor's internal CCB process shall be defined in the CM Plan. Additionally, the Contractor shall propose an external CCB process to communicate and discuss the changes with Purchaser before officially presenting the changes for approval.

CMG-37 The Contractor shall submit change requests in the form of Engineering Change Proposals (ECP) or Request for Deviations/Waivers (RFD/W), when required. All requests shall be captured and logged in a change request register to be identified in CMP. Forms based on ACMP requirements designed by the Contractor for this purpose shall be submitted for approval by the Purchaser prior to use.

CMG-38 The Contractor shall use the instructions and templates provided by the purchaser to issue any ECPs and RFD/Ws in accordance with the following:

- [AI 16.32.02] – Preparation of ECP forms and relevant annex; and
- [AI 16.32.03] – Preparation of RFD/W forms and relevant annex.

6.3.1 ENGINEERING CHANGE PROPOSALS

CMG-39 The Contractor shall assign a priority rating of Emergency, Urgent or Routine Extensions to the target times for processing when submitting ECPs. Changes to the Contractor's baselined Cis shall be processed as:

- 1) Class I ECPs: these shall have to be mutually agreed upon by the Contractor and Purchaser. Extensions to the target times for processing Class I ECPs shall be mutually agreed upon by the Contractor and Purchaser.
 - 2) Class II ECPs: these shall be submitted by the Contractor to the Purchaser for review and classification concurrence prior to implementation.
- CMG-40 If the Purchaser's representative does not concur in the classification, Class I ECP procedures shall be applied by the Contractor and the ECP and then formally submitted to the Purchaser for approval or rejection.
- CMG-41 Any ECP shall include, as a minimum, the following information:
- 1) Reference Number;
 - 2) requirement affected;
 - 3) nature of change;
 - 4) rationale for the change;
 - 5) impact of change / CIs affected;
 - 6) Description of how the change will be reflected in the delivered system's cost, schedule, and/or performance. This description shall include any trade-offs that shall be considered;
 - 7) Status; and
 - 8) Priority.
- CMG-42 All design changes shall be appropriately reflected in the technical documentation by the issue of appropriate changes or revisions. Changes/revisions shall be provided for consideration and approval to the Purchaser by the Contractor in accordance with ECP procedures.
- CMG-43 Any ECP affecting FBL shall be submitted by the Contractor to the Purchaser for review, classification concurrence and approval. No Class I ECP affecting the FBL, including a change to a baseline document shall be implemented until it has been approved by the Purchaser.

6.3.2 REQUEST FOR DEVIATIONS/WAIVERS

- CMG-44 If required, the Contractor shall prepare, handle, and submit for Purchaser's approval, Request for Deviations/Waivers (RFD/W).
- CMG-45 The Contractor shall be aware that permanent departures from a baseline shall be accomplished by ECP action rather than by RFD/W.

6.3.3 DEFICIENCY REPORTS

- CMG-46 The Contractor shall establish and maintain a process for reporting, tracking, and resolving deficiencies in the relevant Baselines. Deficiency Reports (DRs) shall document problems during the design, configuration, implementation, or operation of the system.
- CMG-47 DRs shall be closed when the identified problem is resolved through procedure or other action that does not affect the system baselines, or when a corresponding Change Request is opened to correct the deficiency through a change to a baseline.
- CMG-48 The **Deficiency Report** shall contain the following information:

- 1) A serial number for each deficiency;
- 2) Description of the deficiency;
- 3) Test and test case or event under which the deficiency was first observed (e.g.: FAT);
- 4) Date of the observation of the deficiency and expected date of its correction;
- 5) The personnel raising and endorsing the observation;
- 6) Any clearance action taken such as repair and testing, notification, receipt of a written reply from the Contractor;
- 7) The authorized personnel endorsing the correction, and the date of correction;
- 8) The Contractor's proposed way forward, in case the deficiency remains, with target dates and description of the intended resolution strategy.

CMG-49 The Deficiency Log shall be first created at the time of First Article Acceptance Testing, and shall remain updated at PSA and then until FSA.

CMG-50 It shall be noted that during testing or other inspection procedures, the Purchaser may observe perceived deficiencies. These Purchaser observations shall be included in the Contractor's Deficiency Log, and appropriately documented.

CMG-51 The Contractor shall include and provide its Deficiency Report data as part of the Configuration Management Database (CMDB) throughout the duration of the Contract.

6.4 CONFIGURATION STATUS ACCOUNTING

CMG-52 The Contractor shall be fully responsible for the Configuration Status Accounting (CSA) for all baselines and CIs throughout the duration of the Contract and in accordance with [NATO ACMP 2009, 2017].

CMG-53 The Contractor shall propose the format of CSA Report in the CMP for Purchaser's approval.

CMG-54 The Contractor shall include and provide its CSA data as part of the Configuration Management Database (CMDB) throughout the duration of the Contract.

6.5 CONFIGURATION AUDITING

6.5.1 FUNCTIONAL CONFIGURATION AUDITS (FCA)

[146] Functional Configuration Audit (FCA): this is a formal examination to verify that a configuration item has achieved the functional and performance characteristics specified in its product configuration information. It is the Purchaser's formal audit of the equipment performance with regard to the contract's specifications

CMG-55 The Contractor shall organize and support at least one Functional Configuration Audit (FCA), to occur between FDR and the PSA.

CMG-56 The FCA shall be conducted upon the delivery of the first of each configuration type to be delivered by the Contractor.

CMG-57 The Contractor shall provide the Purchaser with all baseline documentation required to perform the FCA. At each audit, the Contractor shall make available the technical personnel capable of answering questions from the Purchaser's auditor.

- CMG-58 The Contractor shall demonstrate by means of the system design and test documentation that each of the technical requirements have been satisfied.
- CMG-59 The Contractor shall demonstrate, before each testing activity and after the changes based on the tests, the configuration documented is the same with the configuration installed in the physical system. This shall entail the demonstration of HW and SW/FW configuration.
- CMG-60 The Contractor shall undergo the FCA not later than 2 weeks after successful SAT. The outcome of the FCA shall be documented in the FCA report, to be delivered not later than 4 weeks after successful SAT.

6.5.2 PHYSICAL CONFIGURATION AUDITS (PCA)

[147] Physical Configuration Audit (PCA): this is a formal examination to verify that a configuration item has achieved the physical characteristics specified in its product configuration information.

CMG-61 The Contractor shall organize and execute Physical Configuration Audits (PCA) on site at each location, to occur before PSA. The PCA shall be witnessed by the Purchaser.

CMG-62 The PCA shall include:

- 1) A full inventory check of all equipment ,software and documentation delivered on site, including auditing of equipment and cable labelling and marking, safety marking and warnings, part numbers and serial numbers;
- 2) Verification of manuals and training material to assess consistency between documentation and equipment and software found on site;
- 3) Verification of design configuration specification against equipment and software found on site; and
- 4) Verification of all change requests against equipment and software found on site.

CMG-63 The Contractor shall provide the Purchaser with all baseline documentation required to perform the PCA. At each audit, the Contractor shall make available the technical personnel capable of answering questions from the Purchaser's auditor.

CMG-64 The Contractor shall solve any deficiencies found during a PCA within the agreed timeframe and update the baseline accordingly.

CMG-65 The Contractor shall undergo the PCA not later than 2 weeks after successful FAT. The outcome of each PCA shall be documented in the PCA report, to be delivered not later than 4 weeks after successful FAT.

CMG-66 The Contractor shall draft and deliver a PCA Report after each PCA, summarizing the results of the audit and for the Purchaser's approval not later than two weeks after the PCA.

6.6 CONFIGURATION MANAGEMENT DATABASE

CMG-67 The Contractor shall employ a Configuration Management System (CMS) incorporating the Configuration Management Database (CMDDB).

- CMG-68 The Contractor shall allow the Purchaser access to its CMDB and to the status of all baselines, Configuration Items, Configuration Item Records and Change Records at all times during the execution of the contract.
- CMG-69 The Contractor shall deliver a fully populated CMDB to the Purchaser before each design review and before PSA and FSA. The CMDB shall be in a non-proprietary format, unless otherwise stated by the Purchaser, and free of any use restrictions to the Purchaser.
- CMG-70 The Contractor shall provide its entire CMDB file set for Purchaser to be able to import to its CMDB tools and databases products if requested by the Contractor.
- CMG-71 The Contractor shall ensure that the CMDB can manage Configuration Items that are operational and Configuration Items that are non-operational or in development (i.e.: OBL vs. PBL, respectively).

7 QUALITY ASSURANCE AND CONTROL

7.1 OVERVIEW

- [148] This Section addresses the Quality Assurance (QA) and Quality Control (QC) requirements of the project. The purpose of these requirements is to ensure that the Supplier provides all deliverables on time and at the required level of quality by utilising a professional, best practice quality assurance framework and through internal quality control independent from the Supplier's project organisation. A second objective is to minimise the duration of the review cycles and decrease the review workload by ensuring that the Supplier provides mature deliverables only.
- [149] Quality Assurance (QA) is a process and set of procedures intended to ensure that a product or service, during its definition, design, development, test and deployment phases will meet specified requirements.
- [150] Quality Control (QC) is a process and set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria and meets the requirements of the customer.
- [151] Under this contract the "QA process" is intended as Quality Assurance and Control Process. The term Quality Assurance will include also the Quality Control process.
- [152] The Purchaser reserves the right to perform Reviews and Quality audits at any of the Contractor (or Sub-Contractor(s)) facilities. Audit activities at Sub-Contractor's facilities do not relieve the Contractor and Sub-Contractor from any contractual quality responsibilities.
- [153] Unless otherwise specified in the SOW, STANAG 4107 and underpinning AQAPs, ISO 9000:2015, PRINCE2 and ITIL definitions shall apply.
- [154] A "Project document" is a document developed and maintained to help in the management of the project. Typically the plans (amongst which, the Quality Assurance Plan (QAP)) are project documents.
- [155] The term "NATO Quality Assurance Representative" (NQAR) shall apply to any of the Purchaser appointed Quality Assurance Representative.
- [156] The term "Contractor Quality Assurance Representative" (CQAR) shall apply to any of the Contractor appointed Quality Assurance Representative.
- QAP-1 The Contractor's shall comply to its internal Quality Assurance process and systems with STANAG 4107 "Mutual Acceptance of Government Quality Assurance and usage of the Allied Quality Assurance Publications (AQAP)".
- QAP-2 If any sub-contracted quality resources are used, the Contractor's Quality Assurance Process shall describe the controls and processes in place for monitoring the sub-Contractor's work against agreed timelines and levels of quality.
- QAP-3 The Contractor shall transfer to the Purchaser's auditors all information deemed necessary to perform the activities, on his own initiative or on request by Purchaser's auditors.
- QAP-4 A non-exhaustive list of information that the Contractor shall transfer to the Purchaser's auditors includes minutes of meetings, planning documents, source code, requirements documents, and database, design, test and other technical documentation.

- QAP-5 Based on the Audit results if there are any disconformities or irregularities with the contract requirements, The Contractor shall immediately make necessary corrections and take necessary precautions to ensure the satisfaction of the requirements.
- QAP-6 The Contractor shall ensure that all QA activities and milestones are identified and included in the Project Master Schedule (PMS) of the PIP.
- QAP-7 The Contractor shall establish, execute, document and maintain an effective Quality Assurance (QA) programme throughout the Contract's lifetime.
- QAP-8 QA programme shall apply both the contractual requirements and the NATO requirements for quality identified by AQAP 2110, AQAP 2210 and AQAP 2310 and AQAP 2105, to provide confidence in the Contractor's ability to deliver products that conform to the Contractual requirements.
- QAP-9 If any inconsistency exists between the SOW requirements and the references, the SOW requirements shall prevail.
- QAP-10 The Contractor's QA effort shall apply to all services and products (both management and specialist) to be provided under the Contract. This includes all hardware, software, firmware and documentation being developed, designed, acquired, integrated, maintained, or used under the Contract (including deliverable and non-deliverable items like test and support hardware and software), without limitation.
- QAP-11 The Contractor's QA efforts shall ensure that procedures are developed, implemented and maintained to adequately control the design, development, production, purchasing, installation, inspection, testing, configuration management and customer support of all services and all products, in accordance with the requirements of this Contract.

7.2 ROLES AND RESPONSIBILITIES

- [157] During the entire Contract implementation, the NQAR(s) assures the Contractor's and Sub-Contractor's compliance with all Quality related contractual requirements. The Purchaser, through its NQAR(s), is the authority concerning all Quality related matters.
- QAP-12 The Contractor shall be responsible for assurance and control of quality for all deliverables and associated Contractual products, processes and services through the life-cycle of the Contract.
- QAP-13 The CQAR shall be accountable for the provision of the QA Plan and the compliance to the defined QA process.
- QAP-14 The CQAR(s) shall define the major quality checkpoints that will be implemented while executing the project and the quality process to be used at each checkpoint.
- QAP-15 The CQAR(s) shall be responsible for assessing that the Contractual requirements have been complied with, prior proposing the Contractual services and products.
- QAP-16 The CQAR shall report to a distinct manager within the Contractor's organisation at a level equivalent to or higher than the Project Manager.
- QAP-17 The CQAR shall be the point of contact for interface with and resolution of quality matters raised by the NCI Agency or its delegated NQAR.
- QAP-18 The Contractor shall support any NCI Agency or its delegated NQAR activity focused on monitoring Contractor activities at Contractor's facilities or other sites

related to the development, testing and implementation. In particular, the Contractor shall; a) Make himself/herself available to answer questions and provide information related to the project, b) Allow the Purchaser representatives to inspect and monitor testing activities, and management, technical and quality processes applicable to the project, and c) Transfer to the Purchaser representatives all information deemed necessary to perform the QA activities, on his/her own initiative or on request by the Purchaser representative.

- QAP-19 The Contractor shall ensure that CQAR(s) have the required qualifications, knowledge, skills, ability, practical experience and training for performing their tasks.
- QAP-20 The CQAR(s) shall have sufficient responsibility, resources, authority and independence to review and evaluate activities, identify problems and initiate or recommend appropriate corrective actions.
- QAP-21 The CQAR(s) shall participate in the early planning and development stages to ensure that all quality related requirements are specified in plans, standards, specifications and documentation.
- QAP-22 After establishment of attributes, controls and procedures, the CQAR(s) shall ensure that all elements of the QA Process are properly executed, including inspections, tests, analysis, reviews and audits.
- QAP-23 The Contractor, through its CQAR(s), shall be responsible for product quality control and for submitting to Purchaser acceptance products, supplies and services which conform to contractual requirements only.
- QAP-24 The Contractor shall maintain and, when required, deliver objective evidence of this conformance.
- QAP-25 The Contractor shall give written notice to the NQAR(s) at least four weeks in advance that the services and/or products are being presented for review, testing, verification, validation and acceptance.
- QAP-26 Testing shall only be permitted by using test procedures and plans approved by the Purchaser.

7.3 QUALITY MANAGEMENT SYSTEM (QMS)

- QAP-27 The Contractor shall establish, document and maintain a Quality Management System in accordance with the requirements of ISO 9001:2015.
- QAP-28 The Contractor's and Sub-Contractor's QMS relevant to performance under the Contract shall be subject to continuous review and surveillance by the cognizant NQAR(s).
- QAP-29 The Contractor shall include in orders placed with its Sub-Contractor(s) and Supplier(s), the QMS requirements necessary to ensure the supplies and services covered by the Sub-Contract(s) and/or Purchase Orders conform to the requirements of the prime Contract.
- QAP-30 The Contractor shall specify in each order placed with its Sub-Contractor(s) and Supplier(s), the Purchaser's and its NQAR(s) rights of access to all premises where contractual work is performed, in order to carry out audits, inspections, tests and other functions as may be required by the NQAR(s).

QAP-31 If sub-contracted quality resources are used, the Contractor's Quality Management process shall describe the controls and processes in place for monitoring the Sub-Contractor's work against agreed timelines and levels of quality.

7.4 QUALITY ASSURANCE PLAN

QAP-32 The Contractor shall establish, execute, and maintain as a living document an effective Quality Assurance Plan (QAP) throughout the period of performance of this Contract. The Contractor's QA Process shall be described in the QA Plan. The process is subject to approval by the Purchaser, or its delegated representative (NQARs), whenever it does not meet the Quality Assurance requirements that are stated in this contract.

QAP-33 The Contractor shall provide the QAP for review to the Purchaser in accordance with the requirements identified in the AQAP-2105 and the SOW requirements.

QAP-34 The acceptance of the QAP by the Purchaser only means that the Purchaser agrees to the Contractor's approach in meeting the requirements. This acceptance in no way relieves the Contractor from its responsibilities to meet the requirements stated in this Contract.

QAP-35 The Contractor shall organise QA Review meetings starting from the first draft of QAP.

QAP-36 The Contractor shall review his QA programme periodically and audit it for adequacy, compliance and effectiveness.

QAP-37 The Contractor shall ensure that all contractual requirements, including NATO supplements, are included in internal audits.

QAP-38 The Contractor shall inform the NQAR(s) of deficiencies identified during internal audit unless otherwise agreed between the NQAR and/or the Purchaser and the Contractor.

QAP-39 The Contractor shall maintain a QA Logbook during the lifetime of the project in which records are kept accounting for all QA-activities, most notably all QA reviews. All accounting shall be done through dating and sign off by the responsible QA person. The QA Logbook shall enable the Purchaser to verify if and when a deliverable has been QA reviewed and by whom and with what result.

QAP-40 The Contractor shall establish and maintain an effective QA organisation to implement the QAP and manage the QA independently of the management of the project.

QAP-41 The Contractor's designated Quality Assurance Manager shall ensure that all required roles, responsibilities, processes and control mechanisms are identified and implemented to make sure that all the functional, non-functional requirements within the scope of the contract are analyzed, planned and satisfied.

QAP-42 The QAP shall describe the Contractor's QA organisation, QA programme, roles and responsibilities and procedures to ensure that all activities are performed in accordance with the requirements of this Contract.

QAP-43 The QAP shall reference or document and explain the Contractor's QA procedures for analysis, software support, development, design, production, installation, configuration management, control of Purchaser furnished property, documentation, records, programming standards and coding conventions, library controls, reviews and audits, testing, corrective action and certification as specifically related to this project.

- QAP-44 The QAP shall apply to all hardware, software, documentation, activities, services and supplies that are designed, developed, acquired, maintained or used, including deliverable and non-deliverable items.
- QAP-45 The QAP shall also ensure that the exchange of deliverables from the Supplier to the Purchaser shall be adequately controlled, and that no deliverables shall be presented by the Supplier without adequate quality control and sign-off by the Supplier's QA Manager.
- QAP-46 The QAP shall be compatible and consistent with all other plans, specifications, standards, documents and schedules, which are utilized under this Contract.
- QAP-47 All Contractor's procedures referenced in the QA Plan shall either be submitted with the plan, or described in the plan and made available for review by the Purchaser upon demand.
- QAP-48 The QAP and all related QA procedures, and all their versions/revisions, shall be subject to the Purchaser approval based on an agreed checklist.
- QAP-49 The Contractor shall include a risk management section within the QAP including the risks connected to the sub-Contractors of the Contractor.
- QAP-50 The Contractor shall maintain a QA log during the lifetime of the project in which records are kept accounting for all QA-activities, most notably all QA reviews. All accounting shall be done through dating and sign off by the responsible QA person. The QA log shall enable the Purchaser to verify if and when a deliverable has been QA reviewed and by whom and with what result.
- QAP-51 The Contractor shall make its quality records, and those of its Sub-Contractors, available for evaluation by the NQAR(s) throughout the duration of the Contract.
- QAP-52 The Contractor shall update the document, as required, from the delivery date of the initial QAP through FSA, under Configuration control. The Contractor shall provide a copy of each new version of the QAP to the Purchaser for review and approval.

7.5 QUALITY ASSURANCE PROCESS

- QAP-53 The Quality Assurance (QA) implemented by the Contractor shall apply to all hardware, software (including firmware) and documentation being developed, designed, acquired, integrated, maintained, or used under the Contract. This includes non-deliverable test and support hardware and software.
- QAP-54 The Contractor's QA Process shall ensure that procedures are developed, implemented and maintained to adequately control the development, design, production, testing and configuration of all deliverables.
- QAP-55 The requirements for these processes shall be derived from the Contract, the QMS, the applicable AQAPs and referenced best practices, in that sequence of priority.
- QAP-56 The Contractor shall prepare, perform and document System Requirements Review (SRR), Preliminary Design Review (PDR) and Critical Design Review (CDR) according to the contractual requirements and IEEE 15288.2:2014.
- QAP-57 The Contractor shall perform verification and validation of the Contractual deliverables before proposing them for the Purchaser review and approval.
- QAP-58 Personnel performing QA functions shall have specific documented definitions of their assigned duties. In no case shall the QA personnel managing or performing

QA functions be the same personnel responsible for performing other tasks that are reviewed by QA.

- QAP-59 The Contractor shall demonstrate, with the Quality Assurance process, that the processes set up for design, develop, produce and maintain the product will assure the product will meet all the requirements.
- QAP-60 If sub-contracted quality resources are used, the Contractor's Quality Management Process shall describe the controls and processes in place for monitoring the sub-Contractor's work against agreed timelines and levels of quality.
- QAP-61 The Contractor shall assure that all the test and procedure used to demonstrate the requirements will be monitored and controlled under the QA process.
- QAP-62 The Contractor shall document all the identified risks in accordance with Risk Management.
- QAP-63 The Contractor shall periodically review the QA process and audit it for adequacy, compliance and effectiveness, and report any changes to the Purchaser POC.
- QAP-64 The Contractor shall on request provide the Purchaser with a copy of any subcontracts or orders for products related to the contract.
- QAP-65 The Contractor shall notify Purchaser if a subcontract or order has been identified as constituting or involving risk.
- QAP-66 The Contractor shall flow down the applicable contractual requirements to Sub-Contractors by referencing the stated contractual requirement, including relevant AQAP(s).
- QAP-67 The Contractor shall be responsible for ensuring that the procedures and processes required to fulfil contract requirements are fully implemented at the Sub-Contractor's facilities.
- QAP-68 The Contractor shall periodically review the QA process and audit it for adequacy, compliance and effectiveness, and report any changes to the Purchaser NQAR(s).
- QAP-69 The Contractor shall ensure that all contractual requirements, including NATO supplements, are included in internal audits.

7.6 AUDITING OF CONTRACTOR PERFORMANCE

- QAP-70 The Purchaser reserves the right to perform Reviews and Quality audits at any of the Contractor (or Sub-Contractor(s)) facilities.
- QAP-71 Audit activities at Sub-supplier's facilities do not relieve the Contractor and Subcontractors from any contractual quality responsibilities.
- QAP-72 The Purchaser may engage auditors to evaluate the performance of the Contractor (or Sub-Contractor(s)) and verify, validate Contractor (or Sub-Contractor(s)) deliverables. The auditors can also monitor, assess, and report any perceived problem areas.
- QAP-73 The auditors may be requested by the Purchaser to monitor Contractor activities at Contractors' facilities or other sites related to the development, testing and implementation of the contract. The Contractor shall fully support such activities and in particular:
- 5) Host inspection visits by Purchaser's auditors;
 - 6) Make himself available for answering questions and furnishing all the information related to the project;

- 7) Allow the Purchaser's auditors to inspect and monitor testing activities; and
- 8) Allow the Purchaser's auditors to inspect and monitor the Contractor's processes and tools applicable to this project.
- QAP-74 The Contractor shall transfer to the Purchaser's auditors all information deemed necessary to perform the activities, on his own initiative or on request by Purchaser's auditors.
- QAP-75 A non-exhaustive list of information that the Contractor shall transfer to the Purchaser's auditors includes minutes of meetings, planning documents, source code, requirements documents, and database, design, test and other technical documentation.
- QAP-76 Based on the Audit results if there are any disconformities or irregularities with the contract requirements, The Contractor shall immediately make necessary corrections and take necessary precautions to ensure the satisfaction of the requirements.

7.7 QUALITY FOR PROJECT DOCUMENTS

- QAP-77 A formal change management process shall be applied to all project documents, including documents naming conventions as defined by the Purchaser and coordinated with the Contractor.
- QAP-78 Project documents shall be configuration controlled. Each version of a project document is subject to Purchaser approval (unless otherwise specified).
- QAP-79 The Contractor shall ensure that any change related to the project documents are controlled, with the identity, approval status, version and date of issue are clearly identified.
- QAP-80 Project documents file names shall not contain any variable part, like version number, reviewer initials or maturity status. Version numbers and maturity status shall be marked in the document content and/or attributes.

7.8 SUPPORTING TOOLS

- QAP-81 All tools used by the Contractor in the context of project execution shall be available for demonstration to the Purchaser, upon Purchaser request.
- QAP-82 The Contractor shall also make available to the Purchaser for review upon request, associated records and documentation, including but not limited to, control, authorization for use, calibration, validation, qualification, as applicable, per respective Contract requirement.

7.9 CERTIFICATES OF CONFORMITY

- [158] A Certificate of Conformity (CoC) is a document, signed by the Supplier, Vendor of the Product or Contractor, stating that the product conforms to contractual requirements and regulations. A Certificate of Conformity template is available in AQAP-2070.
- [159] The CoC, provides evidence that the items produced or shipped comply with test procedures and quality specifications prescribed by the customer. It presents data derived from quality management information.

- QAP-83 The Contractor shall be solely responsible for the conformance to requirements of products provided to the Purchaser.
- QAP-84 The Contractor shall deliver all the Certificates of Conformity (CoCs) for all HW and SW released products, all COTS SW (including firmware) and all HW released by the COTS Vendors.
- QAP-85 Any CoC delivered by the Contractor shall be part of the acceptance data package of the product and shall be provided to the Purchaser before the start of any Site Acceptance Tests.
- QAP-86 The Contractor shall ensure that as an enabler for CoC, the qualification testing regime includes, as a minimum, the following:
- 1) TEMPEST Testing;
 - 2) Electro-Magnetic Compatibility (EMC) Testing;
 - 3) General Environmental Testing;
 - 4) Water/Dust Ingress Testing;
 - 5) Operational Robustness Testing;
 - 6) Mechanical Environmental Testing;
 - 7) Environmental Control Testing;
 - 8) Biological & Chemical Testing;
 - 9) Transportation Testing;
 - 10) Physical Functional System Testing;
 - 11) Product Safety Testing;
 - 12) User Interface Testing.

8 TEST, VERIFICATION & VALIDATION

8.1 INTRODUCTION

- [160] This Section details the Test, Verification, Validation (TV&V) principles, activities, processes and requirements to be applied and performed under the Contract, which are required for the verification and validation of the requirements set forth under the Contract by the Purchaser.
- [161] All Contract-related deliverables supplied by the Contractor will be verified and validated to ensure they meet the requirements of this Contract. Both fitness-for-use and fitness-for-purpose will be assessed using a quality-based approach.
- [162] The verification and validation approach will not only involve delivered equipment, but also interfaces and interoperability with existing NATO and/or national equipment, here considered as Purchaser Furnished Equipment (PFE).
- [163] The verification and validation of PFE is out of the scope of the Contract.
- [164] In this document, the term “deficiency” is considered to be an inadequacy or incompleteness process definition or execution, while the term “defect” is an error, a fault or a malfunction inside a Configuration Item.
- [165] Requirements verification methods, as defined in ISO/IEC/IEEE 29148, will be used in order to obtain evidence(s) that requirements have been fulfilled.
- [166] The project requires a set of TV&V activities to verify its compliance with the Contractual requirements set forth in the SOW and in the SRS (Annex to the SOW).

8.2 TEST, VERIFICATION & VALIDATION ACTIVITIES

- TVV-1. For each requirement, the Contractor shall select a verification method, which shall be approved by the Purchaser.
- TVV-2. All information items used during the verification and validation activities are to be handled according to their security classification. Guidance is provided in this SoW, under the security Section.
- TVV-3. The Contractor shall have the overall responsibility for meeting the TV&V requirements and conducting all related activities. This includes the development of all TV&V documentation required under the Contract, the conduct of all independent verification, validation and assurance events, and the evaluation and documentation of the results.
- TVV-4. All deliverables supplied by the Contractor under the Contract shall be verified and validated to meet the requirements of this contract.
- TVV-5. All document-based deliverables shall be produced in a manner compliant with the templates provided by the Purchaser.
- TVV-6. In particular the Contractor shall:
- 1) Perform the verification activities within each iteration and for each target environment (Contractor and Purchaser);
 - 2) Perform verification to confirm that each element properly reflects the specified requirements, design, code, integration and documentation;
 - 3) Support Purchaser led Validation Activities to confirm that the solution is fit for purpose.

- TVV-7. The Contractor shall be responsible for the planning, execution and follow-up of all TV&V events.
- [167] The Purchaser will assist in preparations by reviewing and providing feedback on all Contractor produced configuration items. The Purchaser will also provide testing and engineering Subject Matter Expertise (SME) during all TV&V events to witness and assist with these events.
- TVV-8. The Contractor shall demonstrate to the Purchaser that there is a testing process in place for the project, supported by Contractor Quality Assurance (QA).
- TVV-9. Where requested by the Purchaser, the Contractor shall provide test data to support all TV&V activities.
- TVV-10. The Contractor shall follow the Purchaser defined TV&V processes.
- TVV-11. If the Contractor wishes to propose a modification to the process, the proposal shall be approved by the Purchaser and documented accordingly.
- TVV-12. The Contractor shall ensure that rigorous testing, including regression testing when required, is performed at every stage of the Project lifecycle in order to identify and correct defects as early as possible and minimise impact on cost and schedule.
- TVV-13. All test, verification and validation material developed and used under the Contract shall be delivered to the Purchaser.
- TVV-14. The Contractor shall strictly follow the test process, document templates and guidance provided by the Purchaser unless officially agreed by the Purchaser.
- TVV-15. The Contractor shall provide an overall project Test Director for the phases defined in Table 8-1, who will work closely with the Purchaser’s assigned TV&V Manager and NATO Quality Assurance Representative (NQAR). Table 5 defines the test phases considered. It deemed necessary, the project may split the test phases defined in Table 5 into multiple events.
- [168] The Purchaser will provide subject matter experts (SME) during each test event, as well as TV&V Test Engineers and an NQAR.
- TVV-16. The Contractor shall use Key Performance Indicators (KPIs) to identify opportunities for quality improvement, provide solutions and update the plans, the achievement of defined objectives like coverage of risks, requirements, supported configurations, supported operational scenarios, etc.
- TVV-17. The Contractor shall have the overall responsibility for meeting the TV&V requirements and conducting all related activities defined in the Table 1-1Table 8-1 below, describing TV&V phases. Each phase may have one or more events to complete the full scope.

Table 8-1 TV&V Phases

| TV&V Phases | Scope | Purchaser Involvement |
|----------------------------|---|--|
| Engineering Phase | Internal contractor activities executed during development phase of the system to ensure the system/software conforms to their design specifications. | Review: Test Reports for Unit, Integration and System tests. Inspections |
| Qualification Phase | Activities executed to verify the design and manufacturing process, ensure the system meets necessary design requirements, and | Review: Event Test Plan, Test Cases/Scripts, Test Report, Test Data, Test Environment Baseline, |

| TV&V Phases | Scope | Purchaser Involvement |
|---|--|---|
| | <p>provide a baseline for subsequent acceptance tests.</p> <p><i>Activities:</i> <i>TEMPEST Testing</i> <i>Electro-Magnetic Compatibility (EMC) Testing</i> <i>General Environmental Testing</i> <i>Water/Dust Ingress Testing</i> <i>Operational Robustness Testing</i> <i>Mechanical Environmental Testing</i> <i>Environmental Control Testing</i> <i>Biological & Chemical Testing</i> <i>Transportation Testing</i> <i>Physical Functional System Testing</i> <i>Product Safety Testing</i> <i>User Interface Testing</i> <i>Component Testing</i> <i>Interface Testing</i> <i>Security Testing</i> <i>Integration Testing (internal to the project deliverables)</i></p> | <p>Existing defects. Demonstrations. Inspections</p> <p>Participate: Test Readiness Review (TRR), Test Execution, Event Review Meeting (ERM)</p> <p>Provide: Test Event Assurance Reports</p> |
| <p>Factory Acceptance Phase</p> | <p>To verify that production units comply with the requirement/design specifications and production can start.</p> <p>Confirm that all required engineering-level testing activities have been completed in accordance with the SOW.</p> <p>Determine if project deliverables are ready for subsequent TV&V activities.</p> | <p>Review: Event Test Plan, Test Cases/Scripts, Test Report, Test Data, Test Environment Baseline, Existing defects. Dry Run results. Certification</p> <p>Participate: Dry Run (Optional Purchaser participation), TRR, Test Execution, Event Review Meeting (ERM)</p> |
| <p>TV&V Assessment Phase</p> | <p>Independent assessment performed with Purchaser and led by Contractor to determine whether or not a system satisfies user needs, functionality, requirements, and user workflow processes etc. before it gets into operation.</p> <p>To ensure verification of quality criteria defined in figure 1 Product Quality Criteria, for the following tests:</p> <ul style="list-style-type: none"> - System Integration Test (SIT) – Requirements based testing, focused on verifying integration of the different components together and with any external interface as defined by the SOW | <p>Review: Event Test Plan, Security Test and Verification Plan (STVP), Test Cases/Scripts, Test Report, Test Data, Test Environment Baseline, Existing defects and Analysis thereof</p> <p>Participate: TRR, Test Execution, Event Review Meeting (ERM). User Reviews (including internal users)</p> |

| TV&V Phases | Scope | Purchaser Involvement |
|---|---|---|
| | <ul style="list-style-type: none"> - User Acceptance Test (UAT) – Scenario based testing, focused on validating the system as per user needs. - Security Tests – Tests focused on ensuring the security criteria are met. - System Acceptance Test (SAT) – Tests focused on ensuring compliance with the requirements outlined in the SOW. - RFC Evaluation – Review by Agency Change Managers and execution of any additional evaluation as requested by Change Managers. Under normal circumstances, all required inputs are generated from TV&V activities | |
| <p>Site Acceptance Phase (SiAT)</p> | <p>To ensure that the specific site/node is installed properly per site/node installation plan and the service meets the requirements stated in the SRS. Site Acceptance Testing is also to ensure compatibility and integration of the product with the site environment. Migration related tests are also covered under this tests. This includes integration with PFE.</p> | <p>Review: Event Test Plan, Test Cases/Scripts, Test Report, Test Data, Test Environment Baseline, Existing defects. Demonstration. Analysis.</p> <p>Participate: TRR, Test Execution, Event Review Meeting (ERM)</p> |
| <p>Operational Test and Evaluation</p> | <p>To ensure that all the Operational Acceptance Criteria (OAC) such as performance and availability have been successfully implemented. Sites are successfully integrated and tested on the network level. Demonstrate that all components of the System/Application have been integrated (including other systems) to meet all OACs as well as all security requirements defined in the Security Accreditation Documentation Package. Ensure end to end delivered system works as expected and can interoperate with other Purchaser equipment</p> | <p>Review: Event Test Plan, Test Cases/Scripts, Test Report, Test Data, Test Environment Baseline, Existing defects. Demonstrations. Analysis</p> <p>Participate: TRR, Test Execution, Event Review Meeting (ERM)</p> |

[169] The Purchaser reserves the right to monitor and inspect the Contractor’s TV&V activities to verify their compliance with the requirements set forth in this Contract.

[170] The Contractor shall ensure that their System Verification methodology and strategy of acceptance aligns to ISO/IEC/IEEE 29148 and the th e following verification methods:

- a. Inspection - an examination of the item against applicable documentation to confirm compliance with requirements. Inspection is used to verify properties best determined by examination and observation (e.g., - paint colour, weight, etc.). Inspection is generally non-destructive and typically includes the use of sight, hearing, smell, touch, and taste; simple physical manipulation; mechanical and electrical gauging; and measurement. The pass/fail criteria are simple accept/reject indications and shall be based on the visual inspection results or information content of the documentation. Inspection is conducted by experts in product design (i.e., software designers, hardware designers, test team members), who are not directly related to the development of the product being inspected. Inspection of certificates is considered another form of inspection. The Contractor is responsible for obtaining certificates from the relevant independent authorities, who are recognised and, or accredited by NATO, demonstrating that the equipment delivered under this project has been built and set-up in accordance with this SOW and applicable International and European norms. Certificates shall identify the equipment's approving independent authority and list the requirements against which it has been validated. All necessary TDCIS compliancy criteria, shall be validated using this method;
- b. Analysis - use of analytical data or simulations under defined conditions to show theoretical compliance. Used where testing to realistic conditions cannot be achieved or is not cost-effective. Analysis (including simulation) may be used when such means establish that the appropriate requirement, specification, or derived requirement is met by the proposed solution. Analysis may also be based on 'similarity' by reviewing a similar item's prior verification and confirming that its verification status can legitimately be transferred to the present system element. Similarity can only be used if the items are similar in design, manufacture, and use; equivalent or more stringent verification specifications were used for the similar system element; and the intended operational environment is identical to or less rigorous than the similar system element. Pass/fail criteria are objective and based on the analytical/simulation/analysis results versus the stated requirements and associated tolerances. Verification by analysis is applicable where demonstration or test is not feasible or economically viable;
- c. Demonstration - a qualitative exhibition of functional performance, usually accomplished with no or minimal instrumentation or test equipment. Demonstration uses a set of test activities with system stimuli selected by the supplier to show that system or system element response to stimuli is suitable or to show that operators can perform their allocated functions when using the system. Observations are made and compared with predetermined responses. Demonstration may be appropriate when requirements or specifications are given in statistical terms (e.g., mean time to repair, average power consumption, etc.). This method is used to demonstrate a capability to be provided by the requirement. Test procedures and their test cases will contain test steps which define specifically the inputs and pre-conditions necessary for verification of the subject requirement. Pass/fail criteria are simple yes/no indications of functional performance since no quantitative values are specified. The Contractor shows the performance of a product, service, system or feature in use, be they representative or operational conditions. The execution of these tests requires the presence of the Purchaser, and possibly accompanied by Customer representative;
- d. Testing - an action by which the operability, supportability, or performance

capability of an item is quantitatively verified when subjected to controlled conditions that are real or simulated. These verifications often use special test equipment or instrumentation to obtain very accurate quantitative data for analysis. This method is used when it is possible to make direct or indirect measurement of a specific numerical parameter to verify compliance with a stated requirement. Actual measured values are recorded, and pass/fail is determined by comparing the measured value with the specified value. Input data and results are provided in the test procedures. Controlled condition, configurations, and inputs are used in order to observe the response. Results are quantified and analyzed. This method can be used where user interaction is involved and when computations with input data are necessary. Two basic test approaches are black box and white box testing. In black box testing, the inner structure and design of the test object is unknown or not considered and the test cases are derived from the specification. White box techniques are based in the knowledge of the inner structure of the test object, require that the source code were available and flow-oriented test cases will be identified. In practice, these approaches are used to complement each other because they tend to detect different classes of errors. Black box techniques are useful for finding incorrect or missing functions, interface errors, errors in data structure, performance errors and initialization and termination errors. Black box techniques miss many other errors because they ignore important properties of items that are due to design and implementation factors and incomplete requirement descriptions. White box testing focuses on such errors. Test comprises the emulation and, or simulation of the operational environment in which a product, service or system, under a specific configuration, is expected to operate. Test procedures shall follow standards referred to with the TDCIS System Requirements Statements (SRS) document. Test execution requires the presence of the Purchaser. The Contractor shall submit respective test reports for review to, and approval by the Purchaser;

- e. Certification. The Contractor is responsible for obtaining certificates from the relevant independent authorities, who are recognised and, or accredited by NATO, demonstrating that the equipment delivered under this project has been built and set-up in accordance with this SOW and applicable International and European norms. Certificates shall identify the equipment's approving independent authority and list the requirements against which it has been validated. All necessary TDCIS compliancy criteria, shall be validated using this method.

TVV-18. The Contractor shall only proceed to the next formal TV&V activity, after the successful completion of the previous TV&V activity and after the agreement/approval by the Purchaser of it being fit for use and, or purpose.

8.3 DELIVERABLES

TVV-19. The Contractor shall provide a System Test Documentation Package, following documentation templates provided by the Purchaser, that is comprised of the following documents:

Table 8-2 Test Documentation

| Work Product Name | First Draft | Sent to Review/Approve |
|--|----------------------|--|
| The Master Test Plan (MTP) | During Bid | 4 weeks after Contract award |
| Defect Reporting and Management Plan | During Bid | 4 weeks after Contract award |
| Event Test Plans for individual test events (ETP) | During Bid (example) | 4 weeks before TV&V event |
| The Security Test & Verification Plans (STVP) | | as required per the NSAB |
| Any submitted test Waivers together with supporting material | | 4 weeks before TV&V event |
| The Test Cases/Scripts/Steps | During Bid (example) | 4 weeks before TV&V event. First draft 4 weeks after Contract award |
| Status Reports | | Periodically (to be defined in the MTP) |
| Test Completion Report | | 1 week after TV&V event |
| System under-test Documentation | | 2 weeks before TV&V event |
| The Requirements Traceability Matrix (RTM) updated with test-related information | During Bid | First with MTP and update per test event |

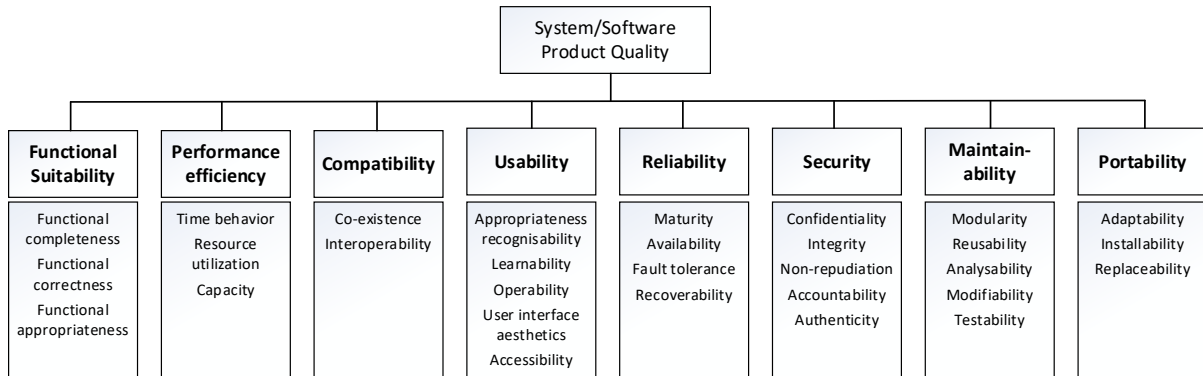
- TVV-20. If applicable, the Contractor shall develop and validate any Test Harnesses, simulators and stubs, including all script/code/data/tools required to execute the planned functional and non-functional tests in the Test Environment. The Test Harnesses for PFE will be provided by the Purchaser.
- TVV-21. Modification of inaccurate or inadequate TV&V deliverables and any subsequent work arising as a result shall be carried out at the Contractor's expense.
- TVV-22. Templates provided by the Purchaser are to be utilized by the Contractor as structure guides and for the content the Purchaser expects to be detailed. If the Contractor would like to propose a modification of the templates, it shall be approved by the Purchaser.
- TVV-23. All deliverables shall undergo as many review cycles are required, and shall be approved once all deficiencies have been corrected.

8.3.1 MASTER TEST PLAN (MTP)

- TVV-24. The Contractor shall identify and describe in the Master Test Plan (MTP) which best practices and international standards will be applied and how.
- TVV-25. The Contractor shall produce a Master Test Plan (MTP) to address the plans for each TV&V activities listed in this document. The Purchaser will monitor and inspect the Contractor's MTP activities to ensure compliance.
- TVV-26. The Contractor shall keep the MTP always up to date.

TVV-27. The Contractor shall describe how the Quality Based Testing is addressed and implemented in the MTP. is based on ISO 25010 and should be used as product quality criteria model.

Figure 8-1 Product Quality Criteria



TVV-28. The Contractor shall describe all formal TV&V activities in the MTP with a testing methodology and strategy that fit the development methodology chosen by the project.

TVV-29. The Contractor proposed testing methodology shall describe the method of achieving all the test phases, defined in Table 8-1 successfully.

TVV-30. The Contractor shall describe in the MTP how the following objectives will be met:

- 1) Compliance with the requirements of the Contract;
- 2) Verification that the design produces the capability required;
- 3) Compatibility among internal system components;
- 4) Compliance with the SRS requirements;
- 5) Compliance with external system interfaces and/or systems;
- 6) Confidence that system defects are detected early and tracked through to correction, including re-test and regression approach;
- 7) Compliance with Purchaser policy and guidance (i.e. security regulations, etc.);
- 8) Operational readiness and suitability;
- 9) Product Quality Criteria (Figure 8-1).

TVV-31. The Contractor shall describe the Contractor’s test organization and its relationship with the Contractor’s Project Management Office and Quality Assurance (QA) functions in the MTP.

TVV-32. The Contractor shall describe in the MTP “Entry and “Exit” criteria for each of the formal TV&V events. The Contractor shall seek approval of all criteria related to an event not later than the TRR of the event

TVV-33. The Contractor shall provide in the MTP the schedule, location and scope for all the events to be run, specifying to which phase they belong. When the contractor identifies that multiple events are required for a phase, this shall also be specified in the MTP.

TVV-34. Together with the MTP, the contractor shall provide a defect reporting and management process to be applied during the TV&V activities.

- TVV-35. The Contractor shall describe how defects/non-conformances encountered during TV&V events will be reported, managed and remedied.
- TVV-36. The MTP shall include the Contractor's approach to Test Reviews including Test Readiness Reviews and Event Review Meetings for each TV&V event.

8.3.2 TEST CASES AND TEST PROCEDURES

- TVV-37. Any updates required from the execution of test cases during each phase shall be incorporated into the relevant test cases by the Contractor for use during independent verification, validation and acceptance. If only certain sections are affected, then it shall be sufficient to up-date and re-issue those Section plus cover sheet with amendment instructions. Should major changes in contents or page re-numbering be needed, then the complete Section shall be re-issued by the Contractor. All changes shall be made with the agreement and approval of the Purchaser.
- TVV-38. The Contractor shall submit the draft test cases for the TV&V event to the Purchaser for approval no later than four (4) weeks prior to the execution of the tests, unless differently stated in a work package. The Purchaser shall provide comments or approval within four (4) weeks of receipt. The purchaser must have the final version of the test cases and Event Test Plan available one (1) week prior to the TRR for a specific TV&V event.
- TVV-39. The contractor shall develop test and use cases to verify and validate all requirements in the SOW, requirements specifications and final design. The test cases shall follow the template provided by the purchaser.

8.3.3 EVENT TEST PLAN

- TVV-40. The contractor shall create an Event Test Plan (ETP) per each event detailing all the information required for that event. The ETP shall follow the template provided by the Purchaser.
- TVV-41. The Contractor shall describe in the event test plan what training (if any) will be provided prior to formal TV&V events.
- TVV-42. The Contractor shall identify, in the ETP, which environment(s) to be used at each TV&V event and the responsibilities for configuration control, operation and maintenance of the environment.
- TVV-43. The ETP shall describe when an agreement shall be reached between the Contractor and the Purchaser on the defect categorization and defect priority of failures encountered, as well as a way forward (if either at the end of each day of a TV&V event or at the Event Review Meeting). If agreement is not reached, the disputed items shall be escalated to the Purchaser's and Contractors' Project Managers.

8.3.4 REQUIREMENTS ACCEPTANCE CRITERIA

- TVV-44. Requirement Acceptance criteria represent a condition that states whether the specified SRS requirements are fulfilled or not. Written in simple language, the Acceptance Criteria is complementary to each contractual requirement in the SRS and provides the basis of a shared understanding for what is to be delivered and what is required as objective evidence to assess that a requirement has been met. Acceptance Criteria for requirements with V&V Method of Test and Demonstration

for instance can be written in "Given/When/Then" format. It is meant to provide a logical description which actions would lead to meeting the requirements. It is not meant to provide detailed input or physical description (as this is the actual Test Case/Script).

- TVV-45. The Contractor shall translate each requirement in the SRS, in an acceptance criteria that will clearly detail how the requirement will be fully met (clear pass/fail or yes/no outcome).
- TVV-46. The Contractor shall address the Purchaser's comments and update the Acceptance Criteria accordingly.
- TVV-47. The Acceptance Criteria shall be agreed by both contractor and purchaser prior to the creation of the Test Cases/ Scripts.
- TVV-48. The agreed Acceptance Criteria shall be translated into Test Cases to provide details of full requirements coverage.

8.3.5 REQUIREMENT TRACEABILITY MATRIX

TVV-49. The Contractor shall produce and maintain the Requirement Traceability Matrix (RTM), which includes all functional and non-functional requirements, to track the TV&V status of all requirements throughout the Contract execution (especially during the TV&V activities). The RTM shall also trace the requirements to the design. It shall also define how the requirements will be validated or verified at each of the TV&V activities:

- 1) The verification method: Inspection, Analysis, Test or Demonstration;
- 2) Correspondent TV&V phase(s) for each requirement;
- 3) Coverage Status.

[171] The Purchaser will review and approve the proposed RTM.

- TVV-50. The contractor shall maintain the RTM updated during the project lifecycle.
- TVV-51. The RTM shall map the applicable Operational Acceptance Criteria (OAC) to the SoW and SRS requirements. The Contractor shall establish the OAC traceability at the requirements analysis stage and approve at design stage.
- TVV-52. The RTM shall be provided and maintain as an appendix to the SDS, extend this matrix to the Developmental Baseline, Product Baseline and the Management Test Plan (MTP) to ensure verification thought the project.
- TVV-53. The RTM shall guarantee the two way link between requirements (SRS) and technical specifications.
- TVV-54. The Contractor shall provide the Purchaser with updates (via the tools) to the RTM daily during the execution of an event, and following the conclusion of each event defined in the MTP. A workflow for updating the RTM shall be proposed by the Contractor and approved by the Purchaser.
- TVV-55. If the verification method per requirement is not provided beforehand, the verification method shall be test. Any deviation to this requirement is subject to Purchaser approval.

8.3.6 SECURITY TESTING VERIFICATION PLAN

- TVV-56. The Contractor shall produce an STVP, to ensure that the Security testing, including verification of compliance with NATO CIS security regulations is applied. This is an integral part of the TV&V process.
- TVV-57. The STVP shall support the accreditation of the System Platform. This document shall be approved by NATO Office of Security.

8.3.7 TEST COMPLETION REPORT

- TVV-58. The Test Completion Report provides a summary of the testing performed during the Test Event.
- TVV-59. The Contractor shall provide, in the Test Completion Report, a log/record of the event, including but not limited to individual test results, defects found (with a way forward for the ones remaining open), requirement coverage (planned and executed), test execution durations, deviations during execution and sign-off for each result by both the Contractor and Purchaser.

8.4 TOOLS

- TVV-60. The Contractor shall generate and deliver automated test procedures/cases compatible with Purchaser test management and automation tools.
- TVV-61. The Contractor shall make use of automated testing and supporting testing tools (test management, requirement coverage, defect management, etc.) to the maximum applicable extent, for all system development, implementation, internal and formal tests. The process and proposed supportive tools shall be described in the Master Test Plan (MTP). In areas where the Purchaser already uses specific tools, the Contractor shall make use of the tools in use by the Purchaser.
- TVV-62. Tools supporting requirements coverage, defect management and test management shall be selected and hosted by the Purchaser and used by the Contractor. For any internal work, the Contractor may use their own internal tools, but the tools used for the contractor's internal work shall be able to natively interface with the tools selected and hosted by the Purchaser in order to keep all TV&V related data for the project in the Purchaser tools.

8.5 TEST VERIFICATION & VALIDATION EVENTS AND RESULTS

- TVV-63. The Contractor shall conduct testing during the Project lifecycle compliant with the following requirements:
- TVV-64. The Contractor is responsible for conducting all testing during the Project lifecycle. The contractor shall provide evidence to the Purchaser of the results of these testing activities. The Contractor shall respond to any Purchaser clarification requests regarding test results or performance within two working days
- TVV-65. The Contractor shall conduct all testing activities for any architectural changes.
- TVV-66. The Contractor shall support post go-live activities during the Operational Acceptance phase, to evaluate the project capability performance and establish benchmarks for future enhancements, including any changes made to fulfil the requirements.

TVV-67. The Contractor shall provide status reports to the Purchaser regarding verification and validation activities during the planning/design and development phases, via the use of a dashboard report within the test management tool set and through meetings. The Contractor shall provide report(s) to the Purchaser following the completion of any TV&V event.

[172] The Purchaser will approve the report and its findings within two business days.

TVV-68. Progress and result measurement shall be approved by the Purchaser and focused on KPIs.

TVV-69. Test results shall be recorded in the test management tool set. All results of all formal acceptance testing performed during a given day must be recorded in the test management tool. The Contractor shall provide these test results for any given day by the starting of the next business day (0800 AM), but as a minimum not later than 24 hours following the execution of any test.

8.5.1 TEST READINESS REVIEW (TRR)

TVV-70. The Contractor shall conduct a Test Readiness Review (TRR) meeting at least one week prior to the events defined in the MTP. The TRR shall ensure that all entry criteria for the events have been met. Documentation that requires review by the Purchaser prior to a TRR, as defined in the Event Test Plan (ETP), shall be provided no less than 2 weeks prior to TRR.

TVV-71. The Purchaser has the right to cancel the TRR and/or any formal test event if the evidence demonstrates that execution of the test event will not be effective.

TVV-72. The Contractor shall demonstrate that all the internal tests and dry runs are successful with test reports and results delivered to the Purchaser at least 2 weeks prior to start of any Contractual test activities.

8.5.2 EVENT REVIEW MEETING

TVV-73. The start and/or ending of any test session shall be subject to the Purchaser approval. In the event that critical issues are encountered which impact the process of the testing or if the other functions depends on the failed test cases, the Purchaser has the right to stop the testing for Contractor's investigation. The tests can only re-start if Purchaser agrees to continue testing from the point of failure or re-start testing from the beginning.

TVV-74. The Contractor shall convene an Event Review Meeting (ERM) as defined in the ETP. The ERM shall ensure that the event results, defect categorization and a way forward to fixing the defects (if required) is agreed upon the Contractor and the Purchaser,. If agreement is not reached, the disputed items shall be escalated to the Purchaser's and Contractors' Project Managers.

8.5.3 TV&V EVENT

TVV-75. An event starts with the Test Readiness Review (TRR) and finishes off with the Event Review Meeting (ERM).

TVV-76. During formal TV&V phases, a daily progress debrief shall be scheduled. Participation to the daily progress debrief will be agreed between Purchaser and Contractor. The aim of the debrief is to get a common understanding on what tests were run, which passed, which failed, and whatever defects were reported during the day.

TVV-77. For each TV&V event, the Contractor shall provide log/record of the event, including but not limited to individual test results, defects found, requirement coverage, test execution durations, deviations during execution and sign-off for each result by both the Contractor and Purchaser.

TVV-78. At the end of the project, the Contractor shall provide the final version of all artefacts (regardless of format) created during the execution of all TV&V activities.

8.5.4 TEST WAIVERS

TVV-79. The Contractor may request a Test Waiver if the Contractor has previously successfully completed qualification testing to national, or international standards for assemblies, subassemblies components or parts. The Purchaser, after review of test waivers and analysis of their impact, reserves the right to require test and certification of the modified equipment at no cost to the Purchaser. The Purchaser has the right to reject any test Waiver.

TVV-80. In respect to a requested waiver, the Contractor shall certify that the test environment to be implemented is identical to that which was originally used for testing, or advise the Purchaser of design/construction changes which affect form, fit or function.

TVV-81. The Contractor shall record and log all waiver requests along with their resolution submitted for the Purchaser’s approval.

8.5.5 FAILED EVENTS

TVV-82. In the event of failed TV&V event and the need to return to a site for re-testing; travel and per diem expenses of NATO personnel shall be borne by the Contractor

8.6 TEST DEFECT CATEGORISATION

TVV-83. The Contractor shall use the Purchasers’ categorization nomenclature for all defects and non-compliances

TVV-84. Should a failure be identified during a TV&V event/activity, a defect shall be recorded in the Agency’s’ test management and defect management systems. Once the event has concluded, the defect shall be reviewed during the event review meeting to agree on the severity, priority and category. The event test report shall then report the disposition of all defects recorded during the event and the defect management system shall be updated accordingly. Classification shall follow the definitions in Table 8-3:

Table 8-3 Definitions for Defect Categorization

| Attribute s | Definition |
|----------------|--|
| Severity | The severity of a defect is the degree of impact that the failure has on the development or operation of a component, a system or a user function. |

| | |
|----------|---|
| | The severity shall initially be proposed by the tester but shall officially be set in agreement with all the stakeholders. When agreement cannot be reached, the Purchaser’s PM will set the severity. |
| Priority | The priority of a defect defines the order in which defects shall be resolved. The priority of the defect shall initially be proposed by the tester but shall officially be set in agreement with all the stakeholders. When agreement cannot be reached, the Purchase’s PM will set the priority. |
| Category | The type of observation identified during the execution of a test case. |

8.6.1 SEVERITY

TVV-85. According to their severity, defects shall be classified as one of the following in Table 8-4:

Table 8-4 Classification of defects based on severity

| Severity | Definition |
|----------|--|
| Critical | <p>The failure of testing of a requirement.</p> <p>The failure results in the termination of the complete system or one or more component of the system.</p> <p>The failure causes extensive corruption of data.</p> <p>The failed function is unusable and there is no acceptable alternative method to achieve the required results</p> |
| Major | <p>A significant failure that causes severely impaired functions but does not prevent operational processing. Applies to conditions under which the complete system or one or more component of the system are partially inoperative, but are still usable by the users. A work around may be available, but it may require manual intervention.</p> <p>Examples:</p> <ul style="list-style-type: none"> * Absence of expected modules/ object or Unit * failure of business operational process that affects a large group of users * complete failure of a module |

| Severity | Definition |
|----------|---|
| Moderate | The failure does not result in the termination and all functions are available but causes the system to produce incorrect, incomplete or inconsistent results. When resources are available and budgeted, should be resolved. |
| Minor | The failure does not result in termination and does not damage the functioning of the system. The desired results can be easily obtained by working around the failure. |
| Cosmetic | The failure is related to the look and feel of the application, typos in a document or user interfaces (amongst others), and not part of the immediate usability or contractual requirements. The failure does not adversely affect the overall system operation. |

8.6.2 PRIORITY

TVV-86. According to their priority, defects shall be classified as one of the following in Table 8-5:

Table 8-5 Priority Classes for Defect Classification

| Priority Class | Description |
|----------------|---|
| Urgent | The defect shall be resolved as soon as possible. Required to complete independent verification and validation activities. |
| Medium | The defect shall be resolved in the normal course of development activities. It can wait until a new build or version is created. |
| Low | The defect is an irritant which should be repaired, but repair can be deferred until after more serious defects have been fixed. |

8.6.3 CATEGORY

TVV-87. According to their category, deficiencies shall be classified with one of the values defined in Table 8-6:

Table 8-6 Deficiency Categories

| Category | Description |
|----------|---|
| Defect | An imperfection or deficiency in a work product where it does not meet its requirements or specifications. This category of defect could drive to the creation a Class II (Product Correction) Engineering Change Proposal (ECP). |

| Category | Description |
|---------------|---|
| Enhancement | This type of defect is used to record an Improvement to the product baseline. This category of defect would typically drive to the creation of a Class I (Product enhancement) ECP. |
| Document | This category is used to record deficiencies encountered in the system documentation (test cases, test procedures, RTM, test plan, manuals, design, procedures...). |
| Clarification | This category is used to record deficiencies encountered during the test execution, which must be clarified. |
| Waiver | This category is used to record when a waiver is required to address a specific observation or deficiency. |

9 Security Accreditation

9.1 INTRODUCTION

- [173] The Tactical Deployable CIS (TDCIS) needs to achieve security accreditation in order to be granted the authorisation for operational use at S*CR*T level. Therefore, the security accreditation process established by the appropriate Customer and Purchaser Security Accreditation Authorities (SAA) are to be followed.
- [174] The primary objective of security accreditation is to ensure that an adequate level of protection is achieved and maintained throughout the life cycle of the TDCIS. This includes ensuring that the TDCIS conforms to NATO Security Policies and Directives identified and SRD listed in this SoW.
- [175] The security accreditation of the TDCIS DCIS is to follow a structured process based on the high level requirements established in the Management Directive on CIS Security (ref. 9), as detailed in this document. Deviations from this structured process are to always be documented and can only be authorised by the appropriate SAA.
- [176] The Security accreditation is to be granted by the Purchaser's SAA for the TDCIS to store, process and/or transmit NATO information in its desired environment.

9.2 SECURITY ACCREDITATION REQUIREMENTS

- [177] This Section defines the requirements pertaining to the execution of WP3. This Section also describes the security accreditation process for the TDCIS project, in accordance with the current NATO Security Policies and Directives.
- [178] Security Accreditation for NATO Communications and Information Systems (CIS) is a structured process to ensure that an adequate level of protection is achieved and maintained throughout the life cycle of the CIS.
- SEC-1. Security Accreditation Process for TDCIS, as described in the NATO Security Policies and Directives shall be strictly followed by the Contractor and shall encompass overall development, production and implementation of the TDCIS DCIS.
- SEC-2. A verification that security measures (personnel security, physical security, security of information, CIS security controls), including security baselines identified in the respective System-specific Security Requirement Statements (SSRS) and SecOPs have been properly implemented in accordance with the requirements of the SAA is one of the primary bases for the security accreditation for the TDCIS.
- SEC-3. This verification is carried out by the SAA and typically supported by appropriate results of security testing conducted based upon agreed Security Test and Verification Plan (STVP) which is to cover all security requirements identified and approved in form of System-specific Security Requirement Statement (SSRS).
- SEC-4. Due to the TDCIS architecture and its operational purpose (DCIS), Electronic Security Environment (ESE) assessment process is to be decoupled from the assessment provided for the Global Security Environment (GSE) and Local Security Environment (LSE). This is because for the TDCIS, being deployable CIS, both target GSE and LSE are unknown and cannot be addressed in advance. As the opposite, appropriate evaluation of ESE for the TDCIS will be done before any deployment.

- SEC-5. It is the overall responsibility of the Contractor to develop an appropriate TDCIS system design and security-related documentation in order to achieve security accreditation of the TDCIS. The design and the SRD deliverables shall be compliant with Security Policies and Directives in this SoW.
- SEC-6. In support of producing the deliverables the Contractor shall closely engage directly with representatives of the Purchaser and/or SAA (through the Purchaser) in order to discuss particular security-related requirements but also to clarify and/or enhance the documentation to be provided as part of the Security Related Documentation.
- SEC-7. This process shall be organised in the form of one or several workshops that shall be attended by the Contractor and by representatives of the Purchaser. Location of the meetings and workshops will be defined by the Purchaser and will typically take place at a facility located in the Purchaser. The Contractor may be invited to provide briefings and/or technical expertise for meeting(s) with the SAA.
- SEC-8. The SAA may provide advice and instructions to the Contractor on any security implication, or any proposed change based on the findings and results of the assessments and/or security tests. The advice, instructions and guidance from the SAA shall be considered by the Contractor. The Contractor shall take action(s) to follow, carry out the necessary work and to implement the advice, instructions and guidance given by the SAA.
- SEC-9. The Contractor shall recognise the NATO Security Policies and supporting Directives, in order to take into account all related requirements in the resulting TDCIS system design and installation thereof.
- ~~SEC-10. NOT ASSIGNED The Contractor shall take into account the NATO CIS security requirements for the implementation and support of three security domains in the deployed environment, NATO S*CR*T (NS), Mission S*CR*T (MS), and NATO Unclassified (NU) respectively.~~
- SEC-11. The Contractor shall be responsible to develop and implement the TDCIS system in accordance with the NATO CIS security requirements and provide all required security-related documentation for TDCIS system (in English language) in order to achieve security accreditation of the TDCIS DCIS.
- [179] Security accreditation for TDCIS needs to be achieved before the system is to be put into the operation(s).
- [180] When there will be a requirement to test specific TDCIS node(s) or elements thereof, before use in the final operational environment, the SAA may grant an Approval for Testing (Aft) with caveats to be applied to its use. These caveats could include the scope of tests, the classification of information involved in the testing, the test plan and the timeframe for the Aft, etc.
- SEC-12. The Contractor shall coordinate with the Purchaser, all Aft requirements and provide filled Aft Request (based on the Purchaser provided template (ref. 9)) to the Purchaser as required. The Purchaser shall coordinate this request with SAA.
- [181] Approval for Testing is typically required (but not limited) to conduct necessary security testing in accordance with Security Test and Verification Plan (STVP).
- [182] Depending on the infrastructure involved, functional testing of TDCIS may also require Aft to be issued by the SAA.

9.3 SECURITY-RELATED DOCUMENTATION

- SEC-13. The Security-related Documentation (SRD) in support of the accreditation process, comprised of the following deliverables in English language, shall be provided by the Contractor:
- 1) CIS Description;
 - 2) Security Accreditation Plan (SAP);
 - 3) Security Risk Assessment (SRA);
 - 4) System Specific Security Requirement Statement (SSRS);
 - 5) Generic System Interconnection Security Requirement Statement (SISRS);
 - 6) Security Operating Procedures (SecOPs);
 - 7) Security Test and Verification Plan (STVP);
 - 8) Security Test and Verification Report (STVR); and
 - 9) Electronic Security Environment (ESE) Conformance Statement (ESECS).
- SEC-14. The Contractor shall produce key security-related documentation or inputs to documents in support of the TDCIS security accreditation, as detailed below.
- SEC-15. The Contractor shall produce required documentation or inputs to documents using templates, provided by the Purchaser, as listed in the Appendix B, Section B.2.8. These will be provided after contract award.

9.4 SECURITY ACCREDITATION PLAN (SAP)

- [183] The Security Accreditation Plan describes the steps to be taken to achieve security accreditation for TDCIS.
- SEC-16. Initial version of the Security Accreditation Plan for the TDCIS shall be developed by the Contractor and presented for the approval to the SAA.
- SEC-17. The Contractor shall deliver its Security Accreditation Plan (SAP) as a part of the initial Project Implementation Plan (PIP). All activities related with the security accreditation process shall be identified in the respective Project Implementation Plan (PIP) and in the Project Management Plan (PMP).
- SEC-18. The Contractor shall ensure the SAP describes:
- 1) How the Contractor shall meet all the guidelines and principles of Section **2.3 and 9e**;
 - 2) How the Contractor shall carry out its Site Survey Reports specific to Security;
 - 3) Clearly and succinctly, a description of the TDCIS;
 - 4) How the Security Accreditation process is to be pursued for this particular system;
 - 5) Facilitate and chair its security workshops and meetings;
 - 6) What adaptations are required based on NATO approved templates;
 - 7) All planning for dates, milestones and deliverables;
 - 8) Security descriptions.
- SEC-19. The Contractor shall ensure that the SAP is available for Purchaser review by PDR

noting that the PDR will serve to outline the documentation to be produced in relation to the security accreditation objective.

- SEC-20. Timeline specified in the SAP shall be maintained by the Contractor during the project to address changes in the PIP and PMP.
- SEC-21. Any other changes required by the Purchaser to be incorporated into the SAP shall be addressed by the Contractor and provided to the Purchaser who will coordinate this with SAA.
- SEC-22. The Contractor shall strictly adhere to the security accreditation activities described in the SAP as approved by the SAA. All activities related with the security accreditation process shall be identified in the respective Project Implementation Plan (PIP) and in the Project Management Plan (PMP).
- SEC-23. Timeline specified in the SAP shall be maintained by the Contractor during the project to address changes in the PIP and PMP.
- SEC-24. Any other changes required by the Purchaser to be incorporated into the SAP shall be addressed by the Contractor and provided to the Purchaser who will coordinate this with SAA.

9.5 CIS DESCRIPTION

- [184] The CIS Description for TDCIS is the first document in support to security accreditation to be developed after contract award.
- SEC-25. The CIS Description for TDCIS shall be developed by the Contractor based on Purchaser's provided template (Appendix B - A.2.7) and shall be approved by the SAA (through the Purchaser).
- SEC-26. The CIS Description shall be formulated at the earliest stage of the project (TDCIS planning stage) and shall be further enhanced as the project develops.
- SEC-27. The CIS Description document shall at a minimum include the following information:
- 1) Detailed technical description showing the main components and the high level as well as detailed information flows, and how these are protected, inclusive of any data flow from leveraged networks/infrastructure (if any);
 - 2) Description of all internal and external connections of the system;
 - 3) List of hardware and software components used;
 - 4) Overview of the security mechanism which are going to be implemented in the TDCIS DCIS and all its components.
- SEC-28. The Contractor developed CIS Description shall be submitted to the Purchaser for review before they will be provided to the SAA for approval.
- SEC-29. The Contractor shall take into account any comments from the reviewers and SAA and shall update the CIS Description document as many times as necessary in order to obtain SAA approval.
- SEC-30. The Contractor shall maintain and keep the CIS Description document up to date throughout the project.

9.6 SECURITY RISK ASSESSMENT

- [185] The Security risk assessment is the process of identifying security risks, i.e. the

threats and vulnerabilities to the CIS, determining their magnitude and identifying areas needing countermeasures. Security risk assessment serves to identify the risks that exist, identify the current security posture of the CIS in respect to handling information, and then assemble the information necessary for the selection of effective security countermeasures, based upon NATO Security Policy and supporting Directives and Guidance.

- [186] The Security risk assessment contributes to the decision on which security measures are required, and how the apportionment between technical and alternative security measures can be achieved, and gives an unbiased assessment of the residual risk.
- SEC-31. The Security Risk Assessment (SRA) for the TDCIS shall be conducted by the Contractor based on the information provided in the CIS Description document. SRA is to be approved by the SAA.
- SEC-32. SRA shall be conducted in accordance with AC/35-D/1017. Refer to Table 2-1, Section 2.3.5.
- SEC-33. The Contractor shall use the SRA application PILAR 8.1 version minimum (and utilising MAGERIT methodology) with the NATO profile for producing the Security Risk Assessment for the TDCIS.
- [187] Note access to the NATO Pilar application, with the NATO profile can be made available for the Contractor to produce the TDCIS SRA, if required.
- SEC-34. The Contractor shall use the NATO template "SRA Report (PILAR) Template", as listed in the Appendix B, Section B.2.8, to document the results of the SRAs.
- [188] Objective of the SRA is to define the security objectives of confidentiality, availability and integrity/authenticity of the designed TDCIS systems according/in tandem to the particular services to be provided by the resulting TDCIS system, the values of the traffic and information stored and transported over the TDCIS system, and the nature and levels of the particular threats being identified.
- SEC-35. The Contractor shall organise SRA workshop(s) at Purchaser facility. Respective Purchaser's Subject Matter Experts (SMEs) shall be invited to support proper assessment. It has been anticipated that at least 2 (two) up to 5 (five) days SRA workshops will be required.
- SEC-36. The Security Risk Assessment process for the TDCIS shall include the following stages:
- 1) Identification of the scope and objective of the security risk assessment (which shall be agreed with the Purchaser plus National and NATO SAA);
 - 2) Determination of the physical, personnel and information assets which contribute to the fulfilment of the mission of the TDCIS;
 - 3) Determination of the value of the physical and personnel assets;
 - 4) Determination of the value of the information assets against the following impacts: disclosure, modification, unavailability and destruction;
 - 5) Identification of the threats and vulnerabilities to the risk environment and their level;
 - 6) Identification of existing countermeasures;
 - 7) Determination of the necessary countermeasures and a comparison with existing measures; identifying those countermeasures which are already installed and identifying those countermeasures which are recommended.

- SEC-37. Based on the results of the Security Risk Assessment SRA, the Contractor shall identify areas of TDCIS DCIS requiring safeguards and countermeasures to comply with NATO Security Policy and supporting Directives. The decision on specific security mechanisms shall be based on evidence(s) and results produced by the Security Risk Assessment.
- SEC-38. Where the implementation of security measures results in the modification of the design (without introducing additional components), other documentation requirements, and changes to configuration of components, the Contractor shall consider these changes to be within the technical and financial scope of this Contract; no Engineering Change Proposal (ECP) shall be generated.
- SEC-39. Where the implementation of security measures results in a requirement for additional components to be procured for implementation that could not be reasonably foreseen beforehand, an ECP shall be raised by the Contractor.
- SEC-40. The Contractor shall take into account any comments from the SAA (provided to the Contractor through the Purchaser) and shall conduct update of SRA document as many times as necessary in order to obtain SAA approval.
- SEC-41. The SRA for the TDCIS shall be composed as a standalone document.

9.7 SYSTEMS-SPECIFIC SECURITY REQUIREMENT STATEMENT

- [189] The System-specific Security Requirement Statement (SSRS) is a complete and explicit statement of the security principles to be observed and of the detailed security requirements to be met.
- [190] SSRS specifies how security is to be achieved, managed and checked.
- SEC-42. The SSRS for TDCIS DCIS shall be developed by the Contractor based on Purchaser's provided template (Appendix B) and shall be approved by the SAA (through the Purchaser).
- SEC-43. The SSRS shall be formulated at the earliest stage of the project (TDCIS planning stage) and shall be further developed and enhanced as the project develops.
- SEC-44. The Contractor's developed SSRS shall:
- 1) Describe the minimum levels of security deemed necessary to countermeasure the risk(s) identified in a risk assessment;
 - 2) Have a unique identifier for each security requirement;
 - 3) Indicate mandatory and recommended Security Mechanisms (SMs).
- SEC-45. SSRS shall be based on NATO Security Policy and supporting Directives and the Security Risk Assessment. The SSRS for TDCIS shall also take into consideration parameters covering the operational environment such as the lowest level of personnel security clearance, the highest classification of information handled, the security mode of operation and other Purchaser's specific requirements.
- SEC-46. The Contractor shall take into account any comments from the SAA (provided to the Contractor through the Purchaser) and shall conduct update of SSRS document as many times as necessary in order to obtain SAA approval.

9.8 SYSTEM INTERCONNECTION SECURITY REQUIREMENT STATEMENT

- SEC-47. The Contractor shall develop a generic SISRS for TDCIS DCIS in order to cover security requirements for the interconnection of the TDCIS DCIS with other CIS (based on scenario types provided by the Purchaser).
- SEC-48. The generic SISRS shall cover all identified interfaces to other system(s).
- SEC-49. The generic SISRS for TDCIS DCIS shall be developed by the Contractor based on Purchaser's provided template, as listed in the Appendix B, Section B.2.8, and shall be approved by the SAA (through the Purchaser).
- SEC-50. The Contractor shall take into account any comments from the SAA (provided to the Contractor through the Purchaser) and shall conduct update of the generic SISRS document as many times as necessary in order to obtain SAA approval.

9.9 SECURITY OPERATING PROCEDURES

- [191] Security Operating Procedures (SecOPs) are a description of the implementation of the security measures to be adopted, the operating procedures to be followed and the responsibilities of the personnel.
- SEC-51. SecOPs for TDCIS DCIS shall be developed by the Contractor based on Purchaser's provided template (shall be approved by the SAA (through the Purchaser)).
- SEC-52. SecOPs for the TDCIS shall contain separate chapters for personnel performing security management as well as administrative functions (e.g. Core Administrators, Local Administrators, and CIS Security Officer) and TDCIS users¹⁶.
- SEC-53. SecOPs for the TDCIS, as a minimum, shall include following sections:
- 1) Administration and organisation of security, including points of contact;
 - 2) Personnel security, physical security, security of information;
 - 3) CIS Security;
 - 4) Incident and emergency procedures;
 - 5) Configuration management;
 - 6) Acceptable use policy.
- SEC-54. SecOPs shall also cover all security requirements identified in the SRA and SSRS which are not fully fulfilled by technical countermeasures. For example, following security procedures should be addressed (not exhaustive list) :
- 1) System configuration and maintenance;
 - 2) System backup;
 - 3) System recovery, etc.
- SEC-55. The Contractor shall take into account any comments from the SAA (provided to the Contractor through the Purchaser) and shall conduct update of SecOPs document as many times as necessary in order to obtain SAA approval.
- SEC-56. While the remainder of the TDCIS documentation is to be in English language, the

¹⁶ If required separate SecOPs for different groups of users might be developed.

Contractor shall take into account that the SecOPs is a user/admin facing official document, that must be signed by users and administrators prior to their operation of the TDCIS. Therefore, the Contractor shall offer a bilingual approach to the development of the SecOPs, wherein both the English and Portuguese languages will be used.

9.10 SECURITY TEST AND VERIFICATION PLAN (STVP)

- [192] A Security Test and Verification Plan (STVP) is a description of the security testing and verification of the CIS Security measures to be implemented for the TDCIS.
- SEC-57. The STVP for TDCIS DCIS shall be developed by the Contractor based on Purchaser's provided template and shall be approved by the SAA (through the Purchaser).
- SEC-58. The STVP shall describe in details the tests which will demonstrate compliance with the security requirements for the TDCIS DCIS identified in the respective SSRS, generic SISRS and SecOPs.
- SEC-59. The Contractor shall ensure that the STVP defines a complete and detailed sequence of steps to be followed to prove that the security mechanisms designed into TDCIS enforce the security requirements identified in the TDCIS SSRS.
- SEC-60. For each security test the following details shall be identified:
- 4) The objective of the security test;
 - 5) An outline description of the security test;
 - 6) A description of the execution of the security test (too include technical instructions how to conduct the test);
 - 7) The pass criteria for the security test.
- SEC-61. The Contractor shall ensure that each and every security test is cross-referenced to the corresponding security requirements from the TDCIS SSRS (identified by the unique identifier) as well as to the tested security mechanisms (SMs).
- SEC-62. The Contractor shall ensure all security requirements and security mechanisms identified for the TDCIS are planned for testing.
- SEC-63. The Contractor shall execute the STVP for the TDCIS DCIS and develop respective Security Test and Verification Report (STVR).
- SEC-64. Execution of STVP conducted at Purchaser's shall be witnessed by the Subject Matter Expert (SME) designated by the Purchaser. He/She is to countersign respective STVR(s).
- SEC-65. The Contractor shall also develop, provide and maintain the initial and any updated Security Implementation Verification Procedures (SIVP) for the TDCIS DCIS as part of Security Tests.
- SEC-66. These procedures shall consist of a set of software scripts and inspection procedures that shall allow a CIS Security Officer to verify that all components of the TDCIS DCIS have been installed and configured property and comply with the SSRS and SecOPs.
- SEC-67. The Contractor shall take into account any comments from the SAA (provided to the Contractor through the Purchaser) and shall conduct update of STVP and/or SIVP documents as many times as necessary in order to obtain SAA approval.

9.11 SECURITY TEST AND VERIFICATION REPORT (STVR)

- [193] A Security Test and Verification Report (STVR) is a description of the results for the every instance of security testing conducted based on STVP.
- SEC-68. The Contractor shall develop STVR for every instance of security testing conducted based on STVP.
- SEC-69. The STVR template for the TDCIS DCIS shall be developed by the Contractor.
- SEC-70. For each security test the following details shall be identified in the STVR:
- 1) Test ID;
 - 2) An outline description of the security test;
 - 3) The pass criteria for the security test;
 - 4) The results of the security tests;
 - 5) Test status (e.g. in progress, passed, failed)
 - 6) Test completion (in per cent);
 - 7) Failure severity (e.g. critical, high, medium, low, none);
 - 8) Test date;
 - 9) An info about who conducted the test;
 - 10) An information about who witness the test.
- SEC-71. STVR shall contain overall test summary details:
- 1) Identification of the element under tests (TDCIS deployable kit(s));
 - 2) Tests starting date;
 - 3) Tests finishing date;
 - 4) Amount of all tests to be conducted;
 - 5) Amount of tests executed;
 - 6) Tests passed;
 - 7) Tests failed;
 - 8) Tests still in progress;
 - 9) Amount of findings with clear distinguish of their severity (e.g. critical, serious, major, less important).
- SEC-72. As the part of the STVR preparation, the Contractor shall also fill the Electronic Security Environment (ESE) Conformance Statement (ESECS) based on the Purchaser provided template, as listed in the Appendix B, Section B.2.8. ESECS after the Purchaser approval (signature) will be provided together with the test results (in form of the STVR) to the SAA as required for Deployable CIS.
- SEC-73. Detailed TDCIS deployable kit configuration shall be depicted in the associated ESECS. If virtual infrastructure is to be used, all deployed virtual machines shall be also identified.
- SEC-74. A separate ESECS shall be filled be the Contractor for each TDCIS kit.
- SEC-75. The Contractor shall take into account any comments from the SAA (provided to the Contractor through the Purchaser) and shall conduct update of STVR (this

might require some security tests to be re-conducted) and ESECS as many times as necessary in order to obtain SAA approval.

10 SYSTEM ACCEPTANCE

10.1 PROVISIONAL SYSTEM ACCEPTANCE (PSA)

- [194] The concept of Provisional System Acceptance (PSA) is based upon the knowledge that complex and technically sophisticated systems may not be delivered without some deficiencies in the compliance with the totality of the Contract requirements.
- SAC-1 To progress to PSA the Contractor shall have to have successfully completed all of WPs 1 to 7; see Section 2.
- SAC-2 Should there be any outstanding deficiencies, the Contractor shall be handle these as detailed in Section 6.3.3.
- SAC-3 The Contractor shall identify, document and maintain a complete Deficiency Log, listing of all deficiencies discovered during the testing leading up to its request for PSA and those which otherwise may exist at the time that the systems are offered to the Purchaser for PSA.
- SAC-4 In order to request PSA of the systems delivered under this Contract, the Contractor shall have completed the following actions:
- 1) All deliverables under the Contract, have been supplied;
 - 2) Approval of the SAT reports by the Purchaser;
 - 3) The training courses and delivery of all training materials;
 - 4) The delivery of all required special tools and test equipment, all spares and consumable items;
 - 5) The delivery of all required documentation;
 - 6) A deliverables inventory has been provided which details all the deliverables to be supplied under the terms of the contract;
 - 7) The design documents have been supplied with updates to accurately reflect the "As Built" configuration and verification of the accuracy of the Documentation has taken place;
 - 8) Certificates of Conformity (CoC) have been supplied that the equipment conforms to the contractual standards and applicable manufacturing standards;
 - 9) A complete list of cryptographic keys, such as activation keys, feature keys, password lists and any other password and/or codes necessary for the Purchaser to operate the system from day to day, has been supplied to the Purchaser.
- SAC-5 At such time as the Contractor has completed the prerequisites defined above, he shall notify the Purchaser in writing that the systems are offered for PSA.
- SAC-6 This notification shall be accompanied by the PSA Report for the systems being offered.
- [195] The process of PSA review starts with the delivery of the PSA Report.
- SAC-7 The PSA Reports submitted to the Purchaser for PSA (one report for each of the systems delivered under this Contract, i.e. Operational (Batch 1) and shall include the following information:

- 10) Status of each individual equipment, sub-systems i.e. installation, integration, notification, operation;
 - 11) Complete test reports, for each of the all testing and acceptance events leading to PSA;
 - 12) Reliability Maintainability and Availability (RMA) Analysis Report;
 - 13) Status of inventory;
 - 14) Status of documentation relevant to the acceptance e.g. as-built drawings, handbooks, quality assurance reports;
 - 15) Status of codification action;
 - 16) Status of training package;
 - 17) The Deficiency Log, listing all the open deficiencies, and describing the resolution strategies and target dates, as agreed with the Purchaser.
- [196] Within 4 weeks of receipt of the PSA Report, the Purchaser will schedule a PSA Review Meeting.
- SAC-8 The PSA Meeting will be chaired by the Purchaser with the objectives of:
- 1) providing a review of the status of each system, specifically reviewing and discussing the status of all observed deficiencies, as listed in the system's specific Deficiency Log;
 - 2) establishing a list of all observed deficiencies which have yet to be corrected by the Contractor;
 - 3) evaluating the list of outstanding deficiencies in relation to their combined effect on the suitability of the system for hand-over for actual operation, service delivery;
 - 4) Providing an initial determination as to whether PSA may be granted. If PSA is not granted, establishing the basis for such determination. If PSA is granted, establishing the final list of deficiencies which shall be corrected by the Contractor prior to Final System Acceptance and a schedule for such corrections to take place.
- SAC-9 The Contractor shall prepare a written record of the PSA Review in the form of PSA Meeting minutes and submit to the Purchaser, within 1 week of the meeting.
- SAC-10 This PSA Review minutes shall be completed and signed by the representatives of the Contractor and Purchaser respectively.
- SAC-11 The PSA Review Minutes shall be forwarded to the Purchaser's Contracting Authority who will formalise the decisions of the PSA Meeting in writing and officially notify the Contractor of such decisions within two (2) weeks of receipt of the PSA Minutes.
- SAC-12 The Contractor shall note that any Certificate of Conformity provided at the time of the PSA meeting is considered to also be provisional pending correction of noted deficiencies before Final System Acceptance.

10.2 FINAL SYSTEM ACCEPTANCE (FSA)

- [197] Final System Acceptance (FSA) is the act by which the Purchaser has evaluated and determined that the implemented TDCIS System meets the requirements of the Contract, and that the Contractor has fully delivered all requirements.
- SAC-13 To achieve FSA, the Contractor shall demonstrate the following:

- 1) The Contractor has met all of the PSA milestone requirements to be implemented under this contract;
 - 2) The Customer has successfully completed OpTEval, with Contractor support;
 - 3) The Contractor has executed all milestones and all implementation activities in accordance with this document to be implemented under this contract;
 - 4) The Contractor has delivered a complete and updated set of documents;
 - 5) The Contractor has executed all agreed test cases, and all tests shall have a status "PASS";
 - 6) All the identified deficiencies are either fixed or waived by the Purchaser;
 - 7) All training sessions have been conducted to the satisfaction of the Purchaser's staff participating in the sessions;
 - 8) Any regression testing of any changes resulting from OpTEval activities has been completed;
 - 9) The Contractor has delivered all deliverables, and conduct all activities, as specified in this contract;
 - 10) The Contractor shall close to the satisfaction of the Purchaser all outstanding issues, failures, and deficiencies;
 - 11) The Contractor shall update the training material as required, based on the Training Evaluation report and the training feedback from the OpTEval.
- [198] A FSA meeting will be conveyed and chaired by the Purchaser when he considers that the deliverables are ready for Final Acceptance.
- [199] The achievement of FSA is subject to the Purchaser approval.
- SAC-14 The FSA Report shall include the following documentation:
- 1) FSA Meeting Agenda;
 - 2) OpTEval Report;
 - 3) FSA Observations sheet;
 - 4) Final In-Service Support Plan (ISSP);
 - 5) Final Support case;
 - 6) Final System Inventories;
 - 7) Final Software Distribution List (SWDL);
 - 8) Final Quality Assurance Log;
 - 9) Final Configuration Status Accounting (CSA) Reports;
 - 10) Configuration Management Database (CMDB), containing the Final Baseline Configuration (FBC), down to component-level configuration files (part of the TDCIS OBL);
 - 11) Complete Requirements Management Database, in electronic form (e.g. USB or CD/DVD).
- SAC-15 The FSA Observations sheet shall be the log of any discrepancies and omissions carried over from PSAs and/or raised during the OpTEval, and not qualifying as off-specifications. These shall be listed together with a statement on the proposed

resolution and resolution timeline (for discrepancies) or rationale for accepting them (for omissions), prior to declaring FSA.

APPENDIX A REFERENCE DOCUMENTS

A.1 APPLICABLE DOCUMENTS

A.1.1 INTEGRATED PRODUCT SUPPORT

The Contractor shall apply policies and standards contained within following documents in matters relating to the project's Integrated Product Support (IPS).

- 1) STANAG 4728 System Life Cycle Management – Ed.2 (2015).
- 2) AAP-20 NATO Programme Management Framework (NATO Life Cycle Model) – Ed.C, Ver.1 (2015)
- 3) AAP-48 NATO System Life Cycle Processes – Ed.B, Ver.1 (2013)
- 4) STANAG 4597 Obsolescence management – Ed.2 (2010)
- 5) STANAG 6001 Language Proficiency Levels – Ed.5 (2014)
- 6) STANAG 4280 NATO Levels of Packaging - Ed.2 (1999)
- 7) STANAG 4281 NATO Standard Marking for Shipment and Storage - Ed.3 (2016)
- 8) STANAG 4329 NATO Standard Bar Code Symbologies – AAP-44(A) – Ed.4 (2010)
- 9) STANAG 4329 NATO Standard Bar Code Symbologies – AAP-44(A) – Ed.4 (2010)

A.1.2 CONFIGURATION MANAGEMENT

The Contractor shall apply policies and standards contained within following documents matters relating to the project's Configuration Management (CM).

- 1) STANAG 4427 Configuration Management in System Life Cycle Management – Ed.3 (2014)
- 2) ACMP-2000 Policy on configuration management – Ed.A, Ver.2 (2017)
- 3) ACMP-2009 Guidance on Configuration Management – Ed.A, Ver.2 (2017)
- 4) ACMP-2100 The Core Set of Configuration Management Contractual Requirements – Ed.A, Ver.2 (2017)
- 5) ISO 10007:2003 Quality Management System – Guidelines for Configuration Management. Second edition, 2003

A.1.3 QUALITY MANAGEMENT

The Contractor shall apply policies and standards contained within following documents in matters relating to the project's Quality Assurance (QA).

- 1) AQAP-169 NATO Guidance on the Use of AQAP-160 Edition 1, Edition 1, July 2001, NU
- 2) AQAP-160 NATO Integrated Quality Requirements for Software throughout the Life Cycle, Edition 1, July 2001, NU

- 3) STANAG 4107, Ed.11 Mutual Acceptance of Government Quality Assurance and Usage of the Allied Quality Assurance Publications. Ed.11, 2019
- 4) AQAP-4107 Mutual Acceptance of Government Quality Assurance and Usage of the Allied Quality Assurance Publications (AQAP). Ed. A, Ver.2, 2018
- 5) STANAG 4107, Ed.11 Mutual Acceptance of Government Quality Assurance and Usage of the Allied Quality Assurance Publications. Ed.11, 2019
- 6) AQAP-4107 Mutual Acceptance of Government Quality Assurance and Usage of the Allied Quality Assurance Publications (AQAP). Ed. A, Ver.2, 2018
- 7) NATO AQAP-2009 NATO – Allied Quality Assurance Publication 2009, “NATO guidance on the use of the AQAP 2000 series”, Edition 3, 2010
- 8) AQAP-2070 NATO Mutual Government Quality Assurance (GQA). Ed.B, Ver.3, 2015
- 9) AQAP-2105 NATO Requirements for Quality Plans. Ed.C, Ver.1, 2019
- 10) AQAP-2110 NATO Quality Assurance Requirements for Design, Development and Production. Ed.D, Ver.1, 2016
- 11) NATO AQAP-2120 NATO – Allied Quality Assurance Publication 2120, “NATO QA requirements for production”, Edition 3, 2010
- 12) AQAP-2131 NATO Quality Assurance Requirements for Final Inspection and Test. Ed.C, Ver.1, 2017
- 13) AQAP-2210 NATO Supplementary Software Quality Assurance Requirements to AQAP-2110 or AQAP-2310. Ed.A, Ver.2, 2015
- 14) AQAP-2310 NATO Quality Assurance Requirements for Aviation, Space and Defence Contractors. Ed.B, Ver.1, 2017
- 15) IEEE 12207 Systems and Software Engineering – Software Life Cycle Processes International Standard For Software Lifecycle Processes
- 16) IEEE 15288.2-2014 Standard for Technical Reviews and Audits on Defence Programs

A.1.4 DCIS CUBE ARCHITECTURE

The Contractor shall apply policies and standards contained within following documents in matters relating to the project’s DCIS Cube Architecture.

- 1) DCIS Cube ADD Main, 2018 DCIS Cube Architecture Definition Document”, Version 1.0, NCIA/TR/2018/02530, NCI Agency, The Hague, Netherlands, 8 May 2018
- 2) DCIS Cube ADD Annexes, 2018 DCIS Cube Architecture – Annexes, DCIS Cube CBB and Dependencies on External ABB, Version 1.0, Annex to NCIA/TR/2018/02530, NCI Agency, The Hague, Netherlands, 8 May 201

A.1.5 VM WARE SECURITY

The Contractor shall apply policies and standards contained within following document in matters relating to the project’s Security.

- 1) VMware ESXi 6.5 Security Settings, 2018 Security Settings for VMware ESXi 6.5 Description and Values, Version 1.0, June 2018, NCI Agency, Mons, Belgium (NATO Unclassified)

A.2 REFERENCE DOCUMENTS

A.2.1 INTEGRATED PRODUCT SUPPORT

The Contractor shall refer to guidance and instructions contained within following documents in matters relating to the project's IPS.

- 1) ISO/IEC 15288, 2015, Systems and software engineering -- System life cycle processes
- 2) ISO/IEC 12207, 2008, Systems and software engineering -- Software life cycle processes
- 3) ISO/IEC 25010, 2011, Systems and software engineering — Systems and Software Quality Requirements and Evaluation (SQuaRE) — System and software quality models
- 4) IEC 60050, International Electrotechnical Vocabulary (IEV) (www.electropedia.org)
- 5) IEC 61078:2016, Reliability Block Diagrams
- 6) IEC 60706-3:2006, Maintainability of equipment - Part 3: Verification and collection, analysis and presentation of data
- 7) IEC 60812:2018, Failure modes and effects analysis (FMEA and FMECA)
- 8) IEC 62550:2017, Spare parts provisioning
- 9) AIA/ASD SX000i, International specification for Integrated Product Support (IPS) – Issue 3.0 (2021)
- 10) AIA/ASD S3000L, International procedure specification for Logistics Support Analysis (LSA) – Issue 2.0 (2021)
- 11) AIA/ASD S2000M, International Specification for Material Management. Issue 7.0 (2021)
- 12) AIA/ASD S1000D, International Specification for Technical Publications. Issue 4.0.1 (2009)
- 13) MIL-HDBK-338B, Electronic Reliability Design Handbook
- 14) MIL-STD-756B, Reliability Modeling and Prediction
- 15) MIL-HDBK-470A, Designing and Developing Maintainable Products and Systems
- 16) MIL-STD-1629A, Procedures for performing a Failure Mode, Effects and Criticality Analysis
- 17) Telcordia SR-332, Reliability Prediction Procedure for Electronic Equipment
- 18) HDBK-217Plus, Reliability Prediction Models
- 19) ANSI VITA51, Reliability Prediction MIL-HDBK-217F2 Subsidiary Specification
- 20) ASME Y14.44 - 2008, Reference Designations for Electrical and Electronics Parts and Equipment
- 21) Bi-SC Directive 075-003, Collective Training and Exercise Directive, 02 October 2013, NU

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- 22) Bi-SC Directive 075-007, Education and Individual Training Directive, 10 September 2015, NU
 - 23) NATO C3 Taxonomy Enclosure 1 to AC/322-D(2016)0017, "C3 Taxonomy Baseline 2.0", 10 November 2015
 - 24) AI 16.31.10, NCIA Agency Instruction – Spare parts provisioning
 - 25) AI 16.31.07, NCIA Agency Instruction – Guidance Document (GD) for ASD-AIA-ATA S1000D Technical Publications, with the associated S1000D Issue 4.0.1 Business Rules Decision Points (BRDP) Index
 - 26) AI 16.31.12, NCIA Agency Instruction – Writing Style Guide (WSG) for ASD/AIA/ATA S1000D Technical publications
 - 27) AI 16.31.13, NCIA Agency Instruction – Illustration Style Guide (ISG) for ASD/AIA/ATA S1000D Technical publications

A.2.2 APPROVED FIELDED PRODUCT LIST

The Contractor shall refer to guidance and instructions contained within following documents in matters relating to the project's Approved Fielded Products.

- 1) AFPL, Approved Fielded Product List, relevant to the NGCS (also known as NGCS AFPL), "NGCS AFPL 06 July 2022.xls".
- 2) AAP-44(A), NATO Standard Bar Code Handbook, September 2010, NATO non-classified

A.2.3 TESTING

- 1) ISO/IEC/IEEE 29119-1:2013, Software and systems engineering — Software testing — Part 1: Concepts and definitions
- 2) ISO/IEC/IEEE 29119-2:2013, Software and systems engineering — Software testing — Part 2: Test processes
- 3) ISO/IEC/IEEE 29119-3:2013, Software and systems engineering — Software testing — Part 3: Test documentation
- 4) ISO/IEC/IEEE 29119-4:2015, Software and systems engineering — Software testing — Part 4: Test techniques
- 5) ISO/IEC 25010-2011, Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models
- 6) IEEE Standard 15288.2:2014, IEEE Standard for Technical Reviews and Audits on Defense Programs
- 7) IEEE Standard 1016-2009, IEEE Standard for information technology - systems design - software design descriptions

A.2.4 CONFIGURATION MANAGEMENT

The Contractor shall refer to guidance and instructions contained within following documents in matters relating to the project's CM.

- 1) SAE ANSI/EIA-649C, Configuration Management Standard (2019-02-07)
- 2) AI 16.32.04, NCIA Agency Instruction – ABL Template
- 3) AI 16.32.05, NCIA Agency Instruction – PBL Template
- 4) AI 16.32.02, NCIA Agency Instruction – Preparation of ECP forms and relevant annex
- 5) AI 16.32.03, NCIA Agency Instruction – Preparation of RFD/W forms and relevant annex

A.2.5 TRAINING

The Contractor shall refer to guidance and instructions contained within following documents in matters relating to the project's Training Products.

- 1) Bi-SC Directive 075-003, Collective Training and Exercise Directive, 02 October 2013, NU
- 2) Bi-SC Directive 075-007, Education and Individual Training Directive, 10 September 2015, NU
- 3) NATO C3 Taxonomy, Enclosure 1 to AC/322-D(2016)0017, "C3 Taxonomy Baseline 2.0", 10 November 2015

A.2.6 NATO SECURITY

The following NATO Security documents shall be applicable:

- 1) Security within the North Atlantic Treaty Organisation (C-M(2002)49), COR 12, dated 14 September 2015;
- 2) Directive on Personnel Security (AC/35-D/2000-REV7), dated 07 January 2013;
- 3) Directive on Physical Security (AC/35-D/2001-REV2), dated 07 January 2008;
- 4) Directive on Security of Information (AC/35-D/2002-REV4), dated 17 January 2012;
- 5) Directive on Classified Project and Industrial Security (AC/35-D/2003-REV5), dated 13 May 2015;;
- 6) Primary Directive on CIS Security (AC/35-D/2004-REV3), dated 15 November 2013
- 7) Management Directive on CIS Security (AC/35-D/2005-REV3), dated 12 October 2015;
- 8) INFOSEC Technical & Implementation Directive on Cryptographic Security and Cryptographic Mechanisms (AC/322-D/0047-REV2 (INV), NATO RESTRICTED, dated 11 March 2009;
- 9) INFOSEC Technical & Implementation Directive for Computer and Local Area network (LAN) Security (AC/322-D/0048-REV3), NATO RESTRICTED, 18 November 2019;
- 10) INFOSEC Technical & Implementation Directive on Emission Security (AC/322-D(2007)0036), NATO RESTRICTED, dated 12 July 2007;
- 11) Guidelines for the Security Accreditation of CIS (AC/35-D/1021-REV3), dated 31 January 2003;

- 12) Guidelines for Security Risk Management (SRM) of Communication and Information Systems (CIS) (AC/35-D/1017-REV3), dated 29 June 2017;
- 13) Guidelines for the Development of Security Requirement Statements (SRSs) (AC/35-D1015-REV3), NATO RESTRICTED, 31 January 2012;
- 14) Guidelines for the Structure and Content of Security Operating Procedures (SecOPs) for CIS (AC/35-D/1014-REV3), dated 31 January 2012;
- 15) Guidelines for the Security Evaluation and Certification of Communication and Information Systems (CIS) (AC/35-D/1019-REV1), dated 12 December 2008;
- 16) INFOSEC Technical & Implementation Directive for the Interconnection of Communication and Information Systems (CIS) (AC/322-D/0030-REV5), NATO RESTRICTED, dated 23 February 2011;
- 17) INFOSEC Technical & Implementation Guidance for the Interconnection of Communication and Information Systems (CIS) (AC/322-D(2005)0040), dated 17 October 2005;
- 18) INFOSEC Technical and Implementation Directive on the requirement for, and the Selection, Approval and Implementation of Security Tools (AC/322-D(2004)0030, NATO RESTRICTED, dated 17 May 2004;
- 19) INFOSEC Technical and Implementation Guidance for the Protection of CIS from Malicious Software (AC/322-D(2004)0019(INV), dated 09 March 2004;
- 20) INFOSEC Technical and Implementation guidance on Identification and Authentication (AC/322-D(2005)0044), NATO RESTRICTED, dated 26 October 2005;
- 21) INFOSEC Technical & Implementation Directive for Transmission Security (AC/322-D/0049), NATO RESTRICTED, dated 29 April 2002;
- 22) INFOSEC Technical and Implementation Guidance for Electronic Labelling of NATO Information (AC/322-D(2004)0021), dated 16 March 2004;
- 23) NATO Public Key Infrastructure (NPKI) Certificate Policy (AC/322-D(2004)0024-REV2-AS1), dated 18 January 2008;
- 24) Security Configuration Catalogue, NCI Agency Cyber Security Service Line, v.1.10, dated April 2018¹⁷;
- 25) NATO S*CR*T CIS Security Reference Baseline, Security Mechanisms (SMs) Requirements for Core and Site Services, version 2.0, dated 05 July 2017.

A.2.7 NATO TEMPLATES

The following NATO Templates are applicable:

- 1) Security Accreditation Plan Template, version 4.0, dated 08 July 2016;
- 2) CIS Description Template, version 2.1, dated 02 May 2017;
- 3) Security Risk Assessment (SRA) Report (NATO PILAR) Template, version 1.0, dated January 2013;

¹⁷ New version might be provided upon contract award if available.

- 4) System Security Requirements Statement (SSRS) Template, version 5.0, dated 12 January 2018;
- 5) Abbreviated System Interconnection Security Requirements Statement (A-SISRS) Template, version 1.0, dated 19 September 2017;
- 6) Secure AIS Generic SecOPs, version 1.0 dated 20.05.2014;
- 7) Generic Security Test & Verification Plan, version 1.0, dated 17 February 2014;
- 8) Electronic Security Environment Conformance Statement (ESECS) Template, dated 05.02.2018;
- 9) Approval for Test Request Template, dated 23.01.2017.

APPENDIX B PURCHASER FURNISHED EQUIPMENT

Table Annex 14 – Equipment to be provided to the Contractor – **Refer to Annex A herein**

Table Annex 15 - Antenna to be provided to the Contractor – **Refer to Annex A herein**

- [1] The design, production, testing and acceptance phases will include the integration of, and the interaction with, Purchaser Furnished Equipment (PFE) equipment.
- [2] PFE is the general term used throughout this document. PFE includes Purchaser Furnished:
 - a. Equipment;
 - b. Information;
 - c. Software;
 - d. Configuration;
 - e. Connectivity;
 - f. SMEs (Access to); and
 - g. Facilities (e.g. Office space during CCT).
- [3] Two classes of PFE are considered:
 - a. PFE that is handed over by the Purchaser to the Contractor, for integration INTO systems delivered under this contract.;
 - b. PFE staged and operated by the Purchaser, in the context of FAT, IV&V Assessment, SAT and OpTEval, for integration WITH the system delivered under this contract.
- [4] The following table provides the list of PFE. The following paragraphs provide additional details on the integration aspects (for both the INTO and WITH variants described above)

Appendix Table 1 PFE Integration Approach

| PFE | Parent System | Integration | Remarks |
|-----------------------|---------------|-------------|---|
| IP crypto | CNM | INTO | Integrated prior to FAT and after delivery of Batch 1 and Batch 2 |
| End User Phones | UAM | WITH | Phones other than System Administrator Phones |
| End User Workstations | UAM | WITH | Workstations other than |

| PFE | Parent System | Integration | Remarks |
|--|------------------------------|-------------|--|
| | | | System Administrator Workstations |
| Military SATCOM bandwidth | Military SATCOM | WITH | Provides SATCOM connectivity for SAT and OpTEval |
| Commercial SATCOM bandwidth | Commercial SATCOM | WITH | Provides SATCOM connectivity for SAT and OpTEval |
| Business Support Services (applications) | ISM | INTO | SRS identified PFE Applications to be loaded into the ISM |
| COI Services (applications) | ISM | INTO | SRS identified PFE Applications to be loaded into the ISM |
| CIS Security Services (applications) | ISM SysAdmin Workstations | INTO | SRS identified PFE Applications to be loaded into the ISM and SysAdmin Laptops |
| Transport Vehicles | All | WITH | Includes motor vehicles and pallets, containers. Includes OLRT vehicle. |
| Iridium PTT integration station | Nodes appointed in the SRS | INTO | N/A |
| IP HF Radio | Nodes appointed in the SRS | INTO | Including ancillaries |
| CNR Radio | Nodes appointed in the SRS | INTO | Including ancillaries |

B.1 INTEGRATION OF PFE

[5] Delivery and integration of PFE crypto devices will occur over the life of the Project;

-
- a. Upon CDR approval, for PFE integration into the First Articles subject of Qualification Testing (QT) and Factory Acceptance Testing (FAT);
 - b. Upon approval of the FAT, for PFE integration into Batch 1 and Batch 2 units, for Site Acceptance Testing (SAT) and Operational Test and Evaluation (OpTEval).

B.2 INTEGRATION WITH PFE

- [6] Integration of the systems delivered under this Contract with PFE systems configured and operated by the Purchaser is required for verification of system-level interfaces, encompassing physical connectivity and end-to-end connectivity.
- [7] System-level integration and verification of end-to-end connectivity with or over the PFE systems shall be sought with the following:
 - a. PRT National Anchor Station;
 - b. The NATO Deployable Operations Gateway (DOG), to terminate links from the NS Kit;
 - c. All end user appliances (NU, NS and MS), all equipped with 1 GbE interfaces.

B.3 ACCESS TO DCIS SMEs

- [8] The Purchaser will enable knowledge transfer process during the CCAP sessions, by providing access to PRT and NCIA Subject Matter Experts (SME), and to documentation.
- [9] Coordination for the provision of the PFE – SMEs, shall be agreed with the Purchaser.

B.4 ACCESS TO IVV TOOLS

- [10] Requirements Coverage, Defect Management and Test Management tools to be used in this project will be hosted by the Purchaser.
- [11] The Purchaser will grant access to the above tools to an agreed number of individuals nominated by the Contractor.
- [12] Details of the tools will be made available after Contract Award.

APPENDIX C MAINTENANCE AND SUPPORT CONCEPTS

C.1 MAINTENANCE CONCEPT AND MAINTENANCE LEVELS DEFINITION

C.1.1 Definitions

In accordance with [ASD SX000i], Maintenance is an activity that retains or restores a physical item to a specified condition or level of performance.

Training is linked to the Logistic Support Analysis (LSA) discipline through the Operational Task Analysis (OTA) and Maintenance Task Analysis (MTA), the former being determined by the Concept of Operation (CONOPS) and the latter being determined by the Maintenance Concept applicable to the specific product under acquisition.

A maintenance concept is a statement of maintenance considerations, constraints, and strategy for the operational support that governs the maintenance levels and type of maintenance activities to be carried out for the product under analysis. The maintenance concept is generated in the IPS element, "Maintenance".

The Maintenance concept, in turn, is derived from the Concept of Operations (CONOPS, see paragraph 6.4) and is a major driver in product design and support.

In accordance with [IEC 60050]:

- 1) Level of maintenance/maintenance level: set of maintenance actions to be carried out at a specified indenture level;
- 2) Indenture level: level of sub-division within a system hierarchy.

Maintenance, maintenance levels and maintenance tasks are product-related (linked to the system hierarchy¹⁸) and are defined in accordance with the complexity of the task, the required resources and tools, independently from the maintenance organization.

Maintenance supports (sustains) operation: any action required to restore the operation of a system or to ensure operational status can be maintained over time is a maintenance task; a maintenance task becomes a support task when it is associated to an organizational element of the support organization in charge of that task at the defined level.

Further definitions follow (IEC 60050):

- 1) Maintenance – (191-07-01): The combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function.
- 2) Maintenance policy – (191-07-03): A description of the interrelationship between the maintenance echelons, the indenture levels and the levels of maintenance to be applied for the maintenance of an item.
- 3) Indenture level – (191-07-05): Level of sub-division within a system hierarchy from the point of view of a maintenance action. E.g.: System, subsystem, assembly, and component (see

¹⁸ The different types of systems' hierarchies (physical, functional, hybrid) are defined in [ASD S3000L] as Product Breakdown Structures (PBS).

also MIL-HDBK-505). [Note: from the maintenance perspective, the indenture level depends upon various factors, including the complexity of the item's construction, the accessibility of sub items, skill level of maintenance personnel, test equipment facilities, and safety considerations.]

- 4) Maintenance echelon or line of maintenance – (191-07-04): A position in an organization where specified levels of maintenance are to be carried out on an item.
- 5) Level of maintenance or maintenance level – (191-07-06): Set of maintenance actions to be carried out at a specified indenture level

C.1.2 Maintenance Concept

A Maintenance Concept is a definition of the maintenance objectives, line of maintenance, indenture levels, maintenance levels, maintenance support and their interrelationships.

A Maintenance Concept is applied for both HardWare (HW) and SoftWare (SW) and produces maintenance tasks that will be performed on site, at civil or military maintenance facilities, at industry (Original Equipment Manufacturer, Contractor) maintenance facilities.

The Maintenance Concept identifies who-does-what-at-what-level in accordance with the maintenance levels and definitions defined below.

Maintenance levels, indenture levels, maintenance echelons (etc.) are always product-related.

C.1.3 Maintenance echelon (line of maintenance)

A Maintenance echelon is the position in an organization where specified levels of maintenance are to be carried out. The line of maintenance is characterized by the skill level of the personnel, the facilities and tools provided, the location, etc.

Four (4) maintenance echelons are generally defined to ensure the highest possible availability of the Product.

- 1) Level 1: implies fast and easy activities on MSIs/MRIs (see [ASD S3000L]) performed on-site for preventative or corrective actions on the acquired System/Capability;
 - a. Typology: without the need to remove the item from its existing installations on the Product;
 - b. Accessibility: easy (e.g.: general visual inspection for hardware, launch of common routines or macros for software);
 - c. Location: operating location (e.g. on-site, deployed location, on-ship);
 - d. Tools: common hand tools and/or common test equipment;
 - e. Facility: nil.
- 2) Level 2: implies more complex activities on MSIs/MRIs performed on-site including the replacement of modules using standard and special-to-type tools, BITE, limited troubleshooting on the acquired System/Capability;
 - a. Typology: it may be necessary to remove the item from its existing installation on the Product;

-
- b. Accessibility: may be difficult (e.g.: rear access or tight plug and unplug for hardware, backup and restore for software);
 - c. Location: operating location (e.g. on-site, deployed location, on-ship);
 - d. Tools: common hand tools, common support equipment, and/or peculiar support equipment;
 - e. Facility: nil
- 3) Level 3: implies the repair of subassemblies, modules and MSIs/MRIs after their replacement at maintenance Level 1 and Level 2; testing on test-benches or integration tests can be included. This maintenance level can be performed either on product (e.g. on-site) or at specific repair shops/facilities (off-site);
- a. Typology: it is necessary to remove an item from its existing installation on the Product;
 - b. Accessibility: item dismounted from its existing installation on the Product and available for any kind of manipulation;
 - c. Location: NATO maintenance location that may be either located or not located in proximity of the operating location;
 - d. Tools: as required by the NATO maintenance location;
 - e. Facility: specialized repair shop, software reference systems, etc
- 4) Level 4: includes repairs and overhaul activities beyond Level 1 to Level 3 capabilities (e.g.: repair of subassemblies, modules and MSIs/MRIs after their replacement at maintenance Level 1 to Level 3; major modifications to improve the design and/or operational activities will be prepared and, if necessary, embodied at this level). Level 4 is always off-site (generally at OEMs facilities).
- a. Typology: it is necessary to remove an item from its existing installation on the Product;
 - b. Accessibility: item dismounted from its existing installation on the Product and available for any kind of manipulation;
 - c. Location: Contractor/OEM maintenance location located at Industry premises;
 - d. Tools: as required by the Contractor/OEM maintenance location;
 - e. Facility: repair centre, software development laboratory, etc.

While performing the Maintenance Task Analysis (MTA), each maintenance task shall be analysed to determine the echelon at which the task shall be performed.

C.1.4 Hardware Maintenance

Hardware maintenance is generally categorised/grouped as follows

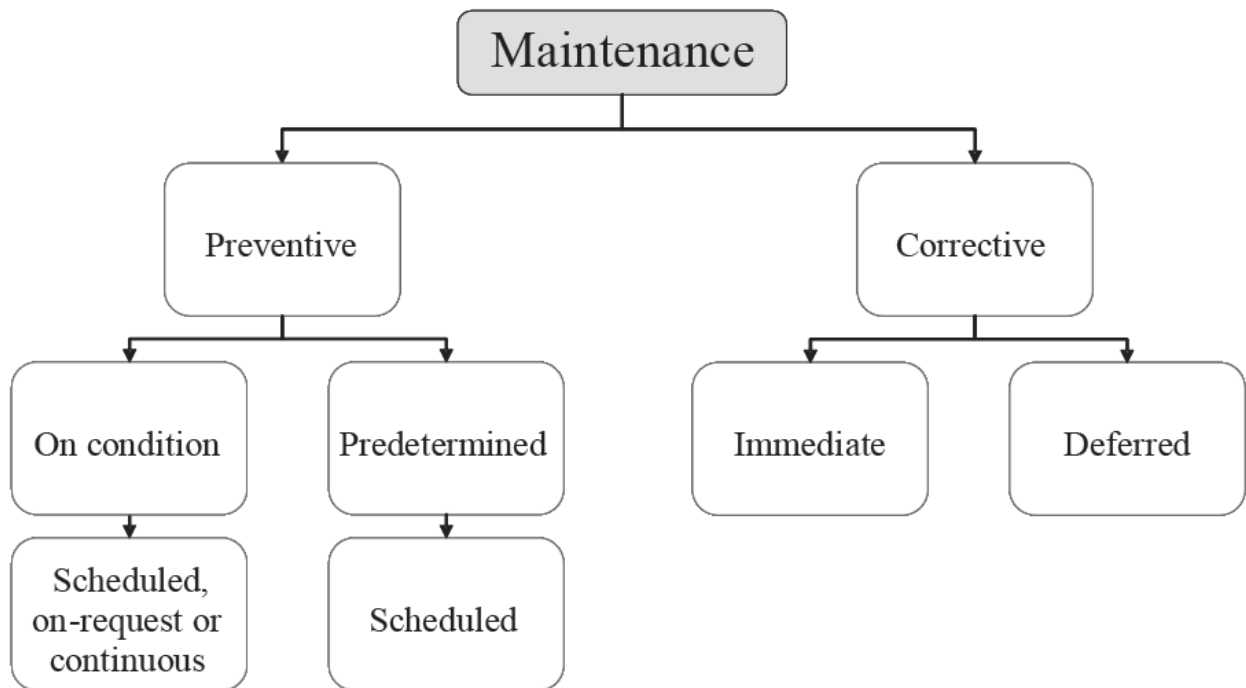


Figure Maintenance types (source: EN 13306:2001)

- 1) Preventative/Scheduled (HW maintenance):
 - a. On-condition: maintenance carried out to mitigate degradation and reduce the probability of failure after analysis of system conditions through defined indicators assessed on a periodic basis.
 - b. Scheduled (planned): maintenance carried out on a periodic basis (time-related or number-of-occurrences-related).
- 2) Corrective/Unscheduled (HW maintenance):
 - a. Run-to-failure: maintenance carried out to perform a Remove & Replace action of a faulty item affecting system operation (critical failure). The action is done as soon as all the resources (skills, tools and spares) are available to minimise the System downtime.
 - b. Deferred: maintenance carried out to perform a Remove & Replace action of a faulty item not affecting system operation. It is done in a time slot that does not further impact the Operational Availability (e.g. during a schedules maintenance downtime period) or on “live” equipment if this is possible (e.g. when active redundancy or hot stand-by are implemented).

The hardware maintenance is classified in four levels generally known as HL1, HL2 HL3 and HL4.

- 1) **Hardware Organizational Maintenance Level 1 (HL1)** is Hardware maintenance capable of being carried out:
 - a. On-site;
 - b. By relatively low technical skill level personnel performing preventive maintenance, and replacing LRUs and IIs on the basis

-
- of diagnostic outputs;
- c. Using BIT systems for start-up and on-line diagnostics, by referring to main equipment TM;
 - d. No Special Tools and Test Equipment (TTE) are envisioned to be used;
 - e. Typical tasks will include visual inspection, preventative maintenance tasks, manual reconfiguration if necessary, external adjustments, removal and replacement of LRUs/IIs;
 - f. Includes system failure recovery by the application of simple on-line diagnostics or technician initiated restart of the system and the use of off-line diagnostics which do not require external test module support;
 - g. By generation of equipment failure reports, supply requisitions and other pertinent maintenance and supply records.
- 2) **Hardware Organizational Maintenance Level 2 (HL2)** is Hardware maintenance capable of being carried out:
- a. On-site;
 - b. By higher technical skill level personnel performing preventive maintenance and replacing LRUs and IIs on the basis of diagnostic outputs;
 - c. Using BIT systems for start-up and on-line diagnostics, simple TTE (standard and special-to-type) in addition to BIT as a means for on-line and off-line diagnostics, and by referring to main equipment TMs to perform exhaustive fault isolation;
 - d. Simple either commercial or special-to-type TTE are envisioned to be used (e.g.: screwdrivers, multi-meters, oscilloscope, adapters, peculiar support equipment);
 - e. Where the fault is beyond the capabilities of HL1 technical support, HL2 activities will be performed by Support Site personnel (through on-site intervention);
 - f. Where remote fault management is not feasible, technicians from the host site will travel to the remote site hand carrying relevant spares to perform maintenance tasks;
 - g. By generation of equipment failure reports, supply requisitions and other pertinent maintenance and supply records.
- 3) **Hardware Intermediate Maintenance Level 3 (HL3)** is Hardware maintenance capable of being carried out:
- a. At maintenance facilities and through technical support and assistance or on-site intervention/work by maintenance personnel with skills enabling tasks to be accomplished within the relevant technologies;
 - b. By higher technical skill level personnel performing:
 - i. Repairing, testing and calibrating LRU, Shop Replaceable Units (SRU) and Secondary Spare Parts (SSP);

- ii. On-site investigations and major scheduled servicing/overhaul, detailed inspection, major equipment repair, major equipment modification, complicated adjustments, system/equipment testing;
 - iii. Failure trend analysis including reporting to relevant Purchaser authorities and Post Design Services (PDS);
 - iv. Repair tasks will be performed using Automatic Test Equipment (ATE), general purpose and special-to-type TTE, calibration equipment, any applicable support software, and the necessary equipment TMs and a Technical Data Package (TDP);
 - v. Where the fault is beyond the capabilities of HL1/2 technical support, HL3 activities will be performed by support site personnel (through on-site intervention) or by the Contractor, depending on the maintenance concept;
 - vi. It includes generation of equipment failure reports, supply requisitions and other pertinent maintenance and supply records.
- 4) **Hardware Depot Maintenance Level 4 (HL4)** is Hardware maintenance capable of being carried out:
- a. At maintenance facilities (industry or military, original equipment manufacturers) and through technical support and assistance or on-site intervention/work by maintenance personnel with skills enabling tasks to be accomplished within the relevant technologies;
 - b. Where the fault is beyond the capabilities of HL1-3 technical support, HL4 activities will be performed by the Contractor;
 - c. It includes generation of equipment failure reports, supply requisitions and other pertinent maintenance and supply records.

C.1.5 Software Maintenance

The software maintenance is a task for the purposes of software fault removal, adaptation to a new environment, or improvement of performance.

The software maintenance for the purposes of software fault avoidance, identification and/or removal can be:

- 1) **Preventative/Scheduled (SW maintenance)**: it refers to tasks necessitated for detecting potential errors in a software product or anticipate and avoid potential failures (daily checks, DBs clean up/integrity checks, cache cleaning, rebooting/restarting etc.). The task can lead, if latent failures are discovered, to a modification of a software product after delivery to detect and correct latent faults in the software product before they become effective faults (leading to a deferred corrective action).
- 2) **Corrective/Unscheduled (SW maintenance)**: it refers to tasks necessitated by actual errors in a software product. If the software product

does not meet its requirements, corrective maintenance is performed. It is a Reactive modification of a software product performed after a new version is made available (patch/update) to correct the discovered problem(s). This activity is linked to Configuration Management, change management (contractor initiated Engineering Change Proposals - ECP), new SW release(s) and Product baseline (PBL) change.

The software maintenance for the purposes of software adaptation to a new environment, or improvement of performance is a software change that enhances the software product. These changes are those that were not in the original design specifications or in the originally released software and are subject to purchaser initiated ECP:

- 1) **Adaptive maintenance:** software maintenance for the purposes of adaptation to a new environment (e.g.: a new environment could be a new type of hardware or a new operating system on which the software is to be run). Adaptive refers to a change necessary to accommodate a changing environment. Adaptive changes include changes to implement new system interface requirements, new system requirements, or new hardware requirements. This is a modification of a software product performed after delivery to keep a software product usable in a changed or changing environment.
- 2) **Perfective maintenance:** software maintenance performed to improve the performance, maintainability, or other attributes of a computer program (e.g.: maintenance that adds new required functions is often referred to as enhancement). Perfective refers to a change that improves the software product's performance. A perfective change might entail providing new functionality improvements for users or reverse engineering to create maintenance documentation that did not exist previously or to change existing documentation. This is a modification of a software product after delivery to improve performance or maintainability.

The software maintenance is classified in four levels generally known as SL1, SL2 SL3 and SL4.

- 1) Software Organizational Maintenance Level 1 (SL1) is software maintenance carried out with the same characteristics highlighted for HL1. SL1 are those functions/tasks in support of the on-site software that are within the capabilities of site maintenance personnel. This includes software failure recovery by the application of simple diagnostics, or site maintenance personnel initiated restart.
- 2) Software Organizational Maintenance Level 2 (SL2) is software maintenance carried out with the same characteristics highlighted for HL2. E.g.: software settings, simple software customizations (per site/instance), software reloading/installation with automated or detailed procedures reported in the TMs, execution of scripts, and management of users/profiles. SL2 are those functions/tasks in support of the on-site software that are within the capabilities of a System Administrator.
- 3) Software Intermediate Maintenance Level 3 (SL3) is software maintenance carried out with the same characteristics highlighted for HL3. E.g.: software/firmware fine tuning (per site/instance), software/firmware bugs recording and reporting, software/firmware troubleshooting including Operating Systems. SL3 (on-site intervention)

comprises those functions/tasks in support of the on-site software that require specialist intervention (software System architects, SW programmers, experienced Systems' Administrators, Network specialists). The tasks can be performed either by software personnel visiting the site or by remote diagnostics if enabled by the product.

- 4) Software Depot Maintenance Level 4 (SL4) is software maintenance carried out with the same characteristics highlighted for HL4. E.g. software/firmware debugging, re-coding and testing (both in simulated and emulated environments), software/firmware patches creation and deployment. The tasks can be performed by software engineers in properly configured environments (software development and testing facilities) under strict Configuration Control.
- a) HL and SL are generally combined for HW intensive systems: when HW maintenance is required and SW shall be reloaded/set on replaced MSI/MRI, the maintenance level associated to the HW (HL) is also associated to the relevant SW (SL) and the activities are combined, detailed in the TMs and associated to the same personnel in the Support organization.

C.2 SUPPORT CONCEPT AND SUPPORT LEVELS DEFINITION

C.2.1 Definitions

The Support Concept is linked to the Maintenance concept and operation under the constraints dictated by the support organization (e.g. how NCI Agency is organised).

| Maintenance concept | Support Concept | Product Support |
|---|--|---|
| Product related | Maintenance organization related | Project related |
| Level of maintenance (HW and SW) | Level of support | Maintenance policy |
| HL1-4 / SL1-4 | <i>typically</i> LoS1-4 | |
| Complexity of the maintenance task related to actions of different technical complexity | Roles and responsibilities of the different support stakeholders | Maintenance levels carried out at different positions of the maintenance organization |

The support concept is organization-related operation and maintenance: support and support levels indicate the different roles, skills and tools and the escalation process in place in an organization.

The interrelationship between the support levels/activities (maintenance organization-related) and the maintenance levels/activities (product-related) to be applied for the maintenance of each item into the system is the maintenance policy.

When capabilities are procured, the Contractor is able to design, develop and deliver the relevant system and apportion the maintenance tasks in accordance with their inherent complexity and in accordance with the maintenance concept; this apportionment, driven by the NCI Agency provided maintenance concept, shall then be allocated to NCI Agency support organizational elements.

If the Support Levels are not fully mapped/linked with the Maintenance Levels (e.g. the Contractor provided Maintenance Task Analysis), then “what shall be done by whom” in NCI Agency organization will be unknown.

The allocation of maintenance tasks to the support tasks (and therefore to the support organization at different levels of responsibility) is partially done by the contractor but shall be under the NCI Agency coordination among the main stakeholders involved in the delivery of training services.

Contractors generally define, tailor (design), develop and implement/deliver capabilities based on industry standards and eventually by customising products they have already in their catalogues: the “general” maintenance and operation activities are linked to the complexity of the capability and to the main functions such capability can deliver, therefore Industry is linked to Maintenance and Operation and not to Support and Use.

Being IPS product related, all the aspects relevant to support training (support organization related) will be defined jointly with other NCI Agency organizational elements (e.g. NCI Academy, NCIA Centres) in order to correctly allocate the maintenance tasks to the right support organization teams.

Further definitions follow [IEC 60050]:

- 1) Support Concept – a description that provides general considerations, constraints, and plans for interim and long-term sustainment of the item under analysis. The support concept is generated in the IPS element, "Product Support Management".
- 2) Maintenance support performance (execution of support) – 191-02-08: the ability of a maintenance organization, under given conditions, to provide upon demand, the resources required to maintain an item, under a given maintenance policy. [Note: the given conditions are related to the item itself and to the conditions under which the item is used and maintained.]

C.2.2 Support concept

A Support Concept is a definition of the support objectives (scenarios) in relation with maintenance levels, maintenance support and their interrelationships.

The support concept has the scope to translate the product-centric complexity, constraints and limitations into a fully sustainable support organization and System/Capability.

For specific “products”, support organizations might be quite similar if defined and developed following known frameworks (e.g. ITIL) or standards (e.g. ISO 20000); however, support organizations might be quite heterogeneous if the systems/capabilities to be maintained (supported) are of different types (e.g. encompassing the full C4ISR products family).

In addition, even applying consolidated support concepts based on pre-defined support levels, what shall be done in any case is the mapping of the organizational support teams to the support levels that, in turn, shall be mapped with the maintenance levels (see Annex A).

What follows below defines the support levels in accordance with ITIL V.3 framework and ISO 20000 and applies to NCI Agency for IT-intensive (centric) products.

There are four support levels and a level zero performed by the users that normally initiate the troubleshooting for the corrective maintenance.

- 1) **First level support** (on-site, non-specialised):
 - i. It consists of simple routine administration and activities. This level is user facing and is the first line of technical support. A single point of contact inside the NCI Agency central Service Desk is provided to customers for the implemented services. The Service Desk will log, categorise, prioritise, diagnose and resolve incidents within the boundaries of their training and permissions. The pertinent NCI Agency CIS Support Units (CSUs) carry out this level of support, in coordination with the NCI Agency Centralised Service Desk.
 - ii. The 1st Level Support Process implements the Incident Management process in accordance with the ISO/IEC 20000 and ITIL framework or equivalent;
 - iii. As part of the Incident Management, the Service Desk receives the issue from the user, puts it into a standard format (Trouble Ticket, TT), performs an initial assessment and distributes it to the predefined actors to solve it.
- 2) **Second level support** (centralised)
 - a) It provides escalated technical support to incident investigation and diagnosis. This level delivers advanced expertise to process services related to centralised system operations, fault isolation, system administration, management of maintenance services, system configuration, including reconfiguration of data sources and data connectivity to restore operations, assistance to first level and on-site support. This level performs end-to-end service monitoring and takes actions to resolve the incident and recover the services impacted.
 - b) The 2nd Level Support Process implements the Problem Management process in accordance with the ISO/IEC 20000 and ITIL framework or equivalent;
 - c) The Problem Management process receives the TT from the Service Desk and performs the following tasks:
 - d) Re-evaluation of TT category, criticality and priority,
 - e) Identification of the root cause of the issue (e.g. by issue replication testing),
 - f) Identification of workarounds,
 - g) Identification and initial planning of possible short, medium and long-term solutions (e.g. Workarounds, Patches, or new Baseline or CI Releases),
 - h) Create Problem Analysis Report and Change Request (CR) incl. schedule of implementation, and synchronisation with the Baseline Maintenance process;
 - i) Presentation of the Problem Analysis Report and CR to the Change Control Board (CCB) for approval,
 - j) Monitor and Control the approved CR during implementation,
 - k) Trigger 3rd Level Support and/or 3rd Level Maintenance process to

implement the CR;

- l) Perform the post- CR implementation review.
- 3) Third level support (centralised)
 - a) consists of central service management, central problem isolation and resolution, system-level maintenance, local repairs or spares provision, and management of deficiencies and warranty cases, beyond the capability of the second level support.
 - b) The 3rd Level Support Process implements the Deployment and Release Management process in accordance with the ISO/IEC 20000 and ITIL framework or equivalent.
 - c) The Deployment and Release Management process receives the approved Change Request from the 2nd Level Support and performs the following tasks:
 - d) Release of the solution (release unit/record)
 - e) Development of the solution (e.g. new CI Fix, Repair, Replacement, Patch, or Release),
 - f) Testing of the solution (e.g. Regression testing, issue/deficiency replication testing),
 - g) Update of Baseline content and status,
 - h) Delivery and deployment of the solution.
- 4) Fourth level support (OEM/vendor)
 - b) It consists of off-site factory/vendor problem resolution and maintenance, beyond the capability of third level support.

C.3 MAINTENANCE POLICY

NCIA and the contractor will contribute to the following mapping to correlate the support levels/activities (maintenance organization-related) and the maintenance levels/activities (product-related) to be applied for the maintenance of each item.

Appendix Table 2 Maintenance vs Support Mapping

| System name: | [SystemName] | Support | | | | | Use |
|--------------|--------------|---------------|---------------|---------------|---------------|--|-----|
| | | Level 1 (L1S) | Level 2 (L2S) | Level 3 (L3S) | Level 4 (L4S) | | |
| | | Junior Tech | Senior tech | System Admin | OEM | | |

| Operation | | | | | | | | |
|-------------|---------|-------------------------|--|--|--|--|--|--|
| Maintenance | Level 1 | Hardware Level 1 (HL1M) | | | | | | |
| | | Software Level 1 (SL1M) | | | | | | |
| | Level 2 | Hardware Level 2 (HL2M) | | | | | | |
| | | Software Level 2 (SL2M) | | | | | | |
| | Level 3 | Hardware Level 3 (HL3M) | | | | | | |
| | | Software Level 3 (SL3M) | | | | | | |
| | Level 4 | Hardware Level 4 (HL4M) | | | | | | |
| | | Software Level 4 (SL4M) | | | | | | |

C.3.1 Operation and operators

In accordance with (IEC 60050), operation is the combination of all technical and administrative actions intended to enable an item to perform a required function, recognizing necessary adaptation to changes in external conditions.

To this extent operation is an enabling function and not a restoration function (is it not maintenance); in addition operation focuses on the (system/capability) required functions in a changing “environment” therefore it is intended to act on such functions by enabling, disabling, tuning, tweaking, optimising, changing and adapting such functions if and when required to answer, for example, to service demand changes.

So, in general, an operator (implementing the operation role) ensures that a capability is properly delivering its functions by monitoring, controlling, responding and setting the system in accordance with the required functions and current conditions.

In certain organizations (especially IT), this role is often associated to systems Administrators but generally a SysAdmin role is different and falls in the maintenance domain and not in the

operation domain: a SysAdmin is able to administer the System and not (necessarily) to work on its functions.

Example: for a Surveillance Radar, the operator is the role responsible for enabling/disabling sectors, changing thresholds, changing operational modes etc. using an operator console (most of the times remoted w.r.t the Radar) where all the functions of the radar can be modified and optimised.

The system/capability operator is quite different from the system/capability user as well. The user benefits (directly or indirectly) from the functions delivered by the capability but is not an operator and might not know anything about the system functions optimization.

Being IPS product related, all the aspects relevant to operators training (system functions related) will be defined jointly with other NCI Agency organizational elements (e.g. NCI Academy, NCI Agency Centres).

C.3.2 Users and users' needs

Although apparently linked to operators, the main document describing the users' needs is the CONOPS (Concept of Operations).

A CONOPS "describes the proposed system in terms of the user needs it will fulfil, its relationship to existing systems or procedures, and the ways it will be used. CONOPS can be tailored for many purposes, for example, to obtain consensus among the acquirer, developers, supporters, and user agencies on the operational concept of a proposed system. Additionally, a CONOPS may focus on communicating the user's needs to the developer or the developer's ideas to the user and other interested parties" [Data Item Description DI-IPSC-81430].

CONOPS are complex documents that shall describe one or more systems composing one or more capabilities, their mission, operational scenario, interfaces, constraints, functionalities, quality elements, support organization associated to maintenance concept etc.

Not always a CONOPS is available or can be provided to contractors or is worth to be used by contractors for certain systems (or part of): in these cases, the contractual documents shall either provide an excerpt of the CONOPS or describe the essential elements required by the Contractors for building the right system (fit for use) and not only the system right (fit for purpose).

It shall be noted that there is a clear line of demarcation between operators and users: users are those elements in an organization that take benefit from the services delivered by the capability or benefit from its functions.

Example: for a Surveillance Radar, the Users are the Air Traffic Controllers (ATC) that generally have no knowledge about Radar Operation (e.g. how to set different radar modes, enable/disable functionalities etc.) or Radar maintenance or support.

Being IPS product related, all the aspects relevant to users' training (doctrinal) will be left to other NCI Agency organizational elements (e.g. NCI Academy).

APPENDIX D KEY PERSONNEL REQUIREMENTS

- [1] The table below lists the required certification and minimum experience that is to be met by Suitably Qualified and Experienced Personnel (SQEP) required to fill the Key Roles.
- [2] In exceptional circumstances, extensive relevance experience may be considered instead of formal certification.

Appendix Table 3 Key Personnel Requirements

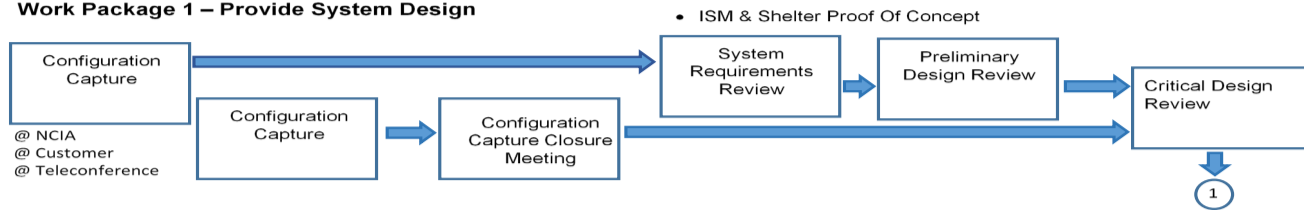
| SER | KEY PERSONNEL | REQUIREMENTS |
|-----|------------------------|---|
| 1 | Project Manager | Responsible for project management, performance and completion of tasks and delivery orders. Establishes and monitors project plans and schedules and has full authority to allocate resources to insure that the established and agreed upon plans and schedules are met. Manages costs, technical work, project risks, quality, and corporate performance. Manages the development of designs and prototypes, test and acceptance criteria, and implementation plans. Establishes and maintains contact with Purchaser, Subcontractors, and project team members. Provides administrative oversight, handles contractual matters and serves as a liaison between the Purchaser and corporate management. Ensures that all activities conform to the terms and conditions of the Contract and Work Package procedures. |
| 1.1 | Certification | Master's degree in management, engineering, or business administration. Formal certification through Project Management Institute or equivalent source. |
| 1.2 | Experience | Must have experience of deployed systems with at least seven years in information systems design and project management. At least two years as the project manager for an effort of similar scope, preferably including the application of a formal project management methodology such as PRINCE2. |
| 2 | Technical Lead | Performs complex engineering tasks and multiple tasks simultaneously. Assists with or plans major research and engineering tasks or programs of high complexity. Directs and co-ordinates all activities necessary to complete a major, complex engineering program or multiple smaller tasks or programs. Performs advanced engineering research, hardware or software development. |
| 2.1 | Certification | Master's degree in engineering |
| 2.2 | Experience | Must have experience of deployed systems with at least seven years in engineering positions associated with the review, design, development, evaluation, planning and operation of electrical or electronic components, subsystems, or systems for government or commercial use. Member of recognised professional body. |

| SER | KEY PERSONNEL | REQUIREMENTS |
|-----|-----------------------------|---|
| 3 | Test Director | Directs test planning, design and tools selection. Establishes guidelines for test procedures and reports. Co-ordinates with Purchaser on test support requirements and manages Contractor test resources. |
| 3.1 | Certification | Bachelor's degree in engineering. |
| 3.2 | Experience | Must have experience of deployed systems with at least seven years in the design and execution of information systems tests. |
| 4 | CIS Security Manager | Analyses and develops network systems and information security practices to include: operating systems, applications, TCP/IP, security architecture, multi-level security, intrusion detection, virus detection and control, PKI, vulnerability assessment. Documents findings and recommend changes in procedures, configuration, or design. |
| 4.1 | Certification | Bachelor's degree. |
| 4.2 | Experience | At least three years in information systems security. At least five years in information systems integration, implementation, or operation. |
| 5 | IPS Manager | Provides support in the development of support documentation to include as a minimum, elements such as support equipment, technical orders, supply support and computer resources support, process of evolving and establishing maintenance/support concepts. Creates, coordinates and helps execute plans for the Integrated Product Support (IPS) of complex systems during the entire life-cycle. Analyses adequacy and effectiveness of current and proposed logistics support provisions. Supervises the efforts of other logistics personnel in the execution of assigned tasks. |
| 5.1 | Certification | Bachelor's degree in engineering. |
| 5.2 | Experience | Must have experience of deployed systems with at least seven years in supply and support of information systems. At least five years in Integrated Product Support of distributed systems in more than one NATO nation. |
| 6 | Quality Manager | Expected to develop quality control processes, ensuring deliverables are specified and designed with adherence to contractual requirements, legal and safety standards. Responsible for monitoring and evaluating internal production processes, examining products to determine their quality, engaging with the Purchaser and gathering product feedback. Identify opportunities to improve production efficiencies. Evaluating the quality of final products output and producing statistical reports on standards achieved. Products not achieving necessary standards are to be identified and rejected, prior to delivery to the Purchaser. |
| 6.1 | Certification | Bachelor's degree in business or engineering, plus certification with internationally recognised Quality Assurance or Control Institute |
| 6.2 | Experience | Must have experience of deployed systems with at least seven years in information systems design and quality management. At least two years as the quality manager for an effort of similar scope. |

| SER | KEY PERSONNEL | REQUIREMENTS |
|-----|------------------------------|---|
| 7 | Training Manager | <p>Conducts the research necessary to identify training needs based on performance objectives and existing skill sets; prepares training strategies and delivery methodology analyses; and prepares cost/benefit analyses for training facilities and deliverables. Develops training delivery plan, instructional guidelines, and performance standards and assessment mechanisms. Plans and directs the work of training material developers and coordinates activities with system development staff. Supervises the implementation and adaptation of training products to customer requirements.</p> <p>Conducts the research necessary to develop and revise training courses and prepares training plans. Develops instructor (course outline, background material, and training aids) and student materials (course manuals, workbooks, handouts, completion certificates, and course feedback forms). Trains personnel by conducting formal classroom courses, workshops, seminars, and/or computer based/computer-aided training. Provides daily supervision and direction to staff.</p> |
| 7.1 | Certification | Bachelor Degree. |
| 7.2 | Experience | Must have experience of deployed systems with at least 5 years in the design and development of training for information systems using an Instructional Systems Design approach such as the Systems Approach to Training, Performance-Based Training, Analysis, Design, Development, Implementation, and Evaluation (ADDIE), or Criterion Referenced Instruction. |
| 8 | Configuration Manager | Establishes and maintains a process for tracking the life cycle development of system design, integration, test, training, and support efforts. Maintains continuity of products while ensuring conformity to Purchaser requirements and commercial standards. Establishes configuration control forms and database. |
| 8.1 | Certification | Bachelor's degree. |
| 8.2 | Experience | At least five years' experience in specifying configuration management requirements, standards, and evaluation criteria in acquisition documents, and in performing configuration identification, control, status accounting, and audits. At least three years in computer and communication systems development, including physical and functional audits and software evaluation, testing and integration. |

APPENDIX E PROJECT ACTIVITY FLOW

Work Package 1 – Provide System Design



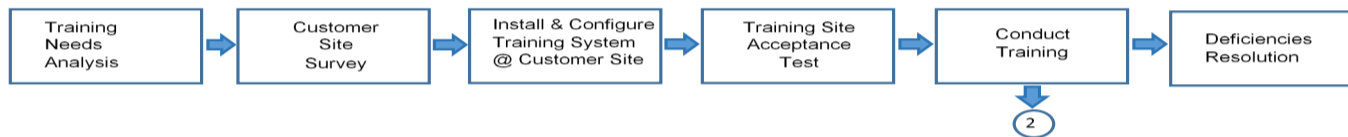
Work Package 2 – Qualify First Articles



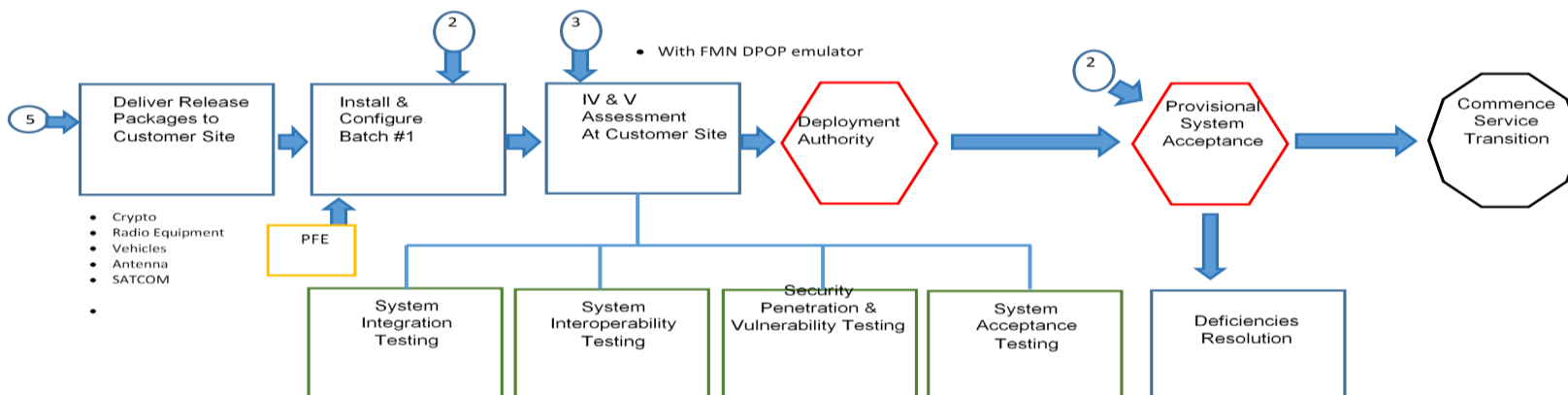
Work Package 3 – Support Security Accreditation



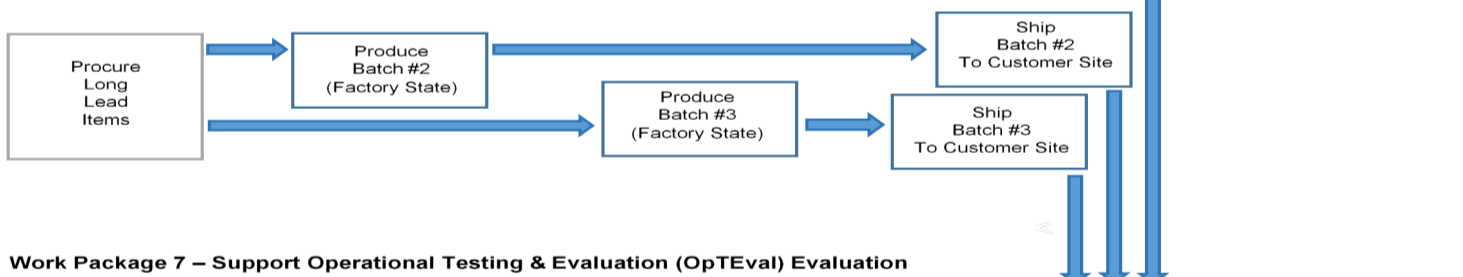
Work Package 4 – Conduct Training



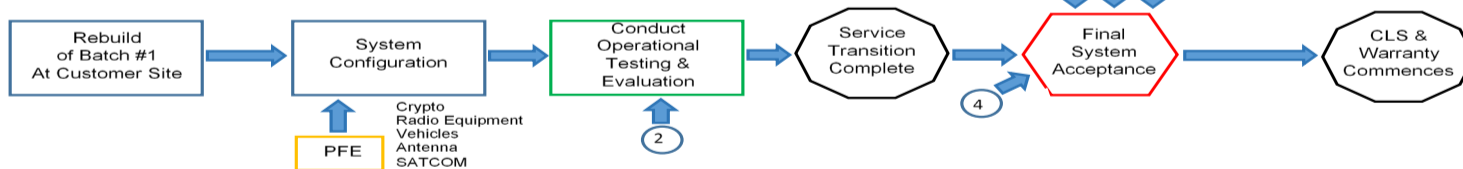
Work Package 5 – Conduct User Testing and PSA



Work Package 6 – Provide Production Units



Work Package 7 – Support Operational Testing & Evaluation (OpTEval) Evaluation



APPENDIX F TABLE OF ABBREVIATIONS

| Abbreviation | Meaning |
|--------------|---|
| GPP | 3rd Generation Partnership Project |
| 5G NR | 5G New Radio |
| 5GC | 5G Core |
| AAA | Authentication, Authorisation & Accounting |
| ABB | Architectural Building Blocks |
| ABD | As Built Drawings |
| ABL | Allocated Baseline |
| ABS | Anti-lock Braking System |
| AC | Alternating Current |
| ACU | Antenna Control Unit |
| AD | Active Directory |
| ADFS | Active Directory Federation Service |
| AECTP | Allied Environmental Conditions and Test Publications |
| AES-NI | AES New Instructios |
| Ai | Intrinsic Availability |
| AN | Access Node |
| API | Application Programming Interface |
| APN | Access Point Name |
| AQAPs | Allied Quality Assurance Publications |
| ARM | Availability & Reliability Maintenance |

| Abbreviation | Meaning |
|--------------|---|
| ATE | Automated Test Equipment |
| ATU | Antenna Tuning Unit |
| AVR | Automatic Voltage Regulator |
| BC | Biological and Chemical |
| BCC | Battalion Communication Centre |
| BGP | Border Gateway Protocol |
| BIT | Built In Test |
| BLK | Black Transport Network |
| BLOS | Beyond Line of Sight |
| BMC | Baseboard Management Controller |
| BMS | Battlefield Management System |
| BoB | Breakout Box |
| BPS | Boundary Protection System |
| C2 | Command & Control |
| C4ISR | Command, Control, Communications, Computers Intelligence, Surveillance and Reconnaissance |
| CA | Carrier Aggregation |
| CAC | Call Admission Control |
| CARC | Chemical Agent Resistant Coating |
| CAS | Compute and Storage |
| CAW | Contract Award |
| CBRN | Chemical, Biological, Radiological and Nuclear |

| Abbreviation | Meaning |
|--------------|--|
| CBT | Computer Based Training |
| CCA | Coloured Cloud Access |
| CCAP | Configuration Capturing |
| CCC | Company Communication Centre |
| | |
| CD | Compact Disc |
| CDR | Critical Design Review Call Detail Record |
| CDRL | Contract Deliverables Requirement List |
| CES | Core Enterprise Service |
| CI | Configuration Item |
| CIS | Communication and Information System |
| CIWG | Capability Integration Working Group |
| CLIN | Contract Line Item Number |
| CLS | Contracted Logistic Support |
| CLSP | Contract Logistics Support Plan |
| CM | Configuration Management |
| CMDB | Configuration Management Database |
| CMP | Configuration Management Plan |
| CNM | Core Network Module |
| CNR | Combat Net Radio |
| CoC | Certificate of Conformity |

| Abbreviation | Meaning |
|--------------|--|
| CoG | Center of Gravity |
| COI | Community Of Interest |
| CONEMP | Concept Of Employment |
| COP | Continuous Operating Power |
| COTS | Commercial Off The Shelf |
| CQAR | Contractor Quality Assurance Representative |
| CR | Change Request |
| CRP | Change Request Plan |
| CSA | Configuration Status Accounting |
| CSC | Computer Support Centre |
| CSCI | Computer Software Configuration Item |
| CUBE | Cisco Unified Border Element |
| CUCM | Cisco Unified Call Manager |
| DC | Direct Current |
| DCIS | Deployable Communication and Information System |
| DCIS CA | DCIS Cube Architecture |
| DDM | Data Diode Module |
| DHCP | Dynamic Host Configuration Protocol |
| DMSMS | Diminishing Manufacturing Sources and Material Shortages |
| DNS | Domain Name Server |
| DP | Documentation Plan |

| Abbreviation | Meaning |
|--------------|---|
| DPOP | Deployable Point Of Presence |
| DR | Deficiency Report |
| DRACAS | Data Reporting Analysing & Corrective Action System |
| DRS | Deployable Removable Storage |
| DSCP | Differentiated Services Code Point |
| DSMS | Domain Specific Management System |
| DSS | dismounted soldier situational awareness software |
| DVD | Digitised Video Disc |
| DWPD | Drive Writes Per Day |
| E2E | End-to-End |
| ECCRP | External Commercial Communication Roof Panel |
| ECP | Engineering Change Proposals External Communications Panel |
| ECU | Environmental Control Unit |
| EDC | Effective Date of Contract |
| EIRP | Effective Isotropic Radiated Power |
| ELOS RP | External Line of Sight Roof Panel |
| EMC | Electro-Magnetic Compatibility |
| EMI | Electromagnetic Interference |
| EMM | Element Management Module |
| EMSEC | Emission Security |
| EPC | Evolved Packet Core |

| Abbreviation | Meaning |
|--------------|---|
| EPP | External Power Panel |
| ERFP | External RF Panels |
| ERM | Event Review Meeting |
| ES | Engineering Support |
| ESATRP | External SATCOM Roof Panel |
| ESP | Encapsulating Security Protocol |
| ETE | Estimated Time to Empty |
| ETP | Event Test Plan |
| EU | European Union |
| EUD | End User Devices |
| E-UTRA | Evolved Universal Terrestrial Radio Access |
| FAAT | First Article Acceptance test |
| FAS | Functional Application Service Functional Area Service |
| FAT | Factory Acceptance Test; this is another term for FAAT above |
| FBL | Functional Baseline |
| FCA | Functional Control Audits; or Functional Configuration Audit |
| FD | Fault Detection |
| FDR | Final Design Review |
| FfP | Fit for Purpose |
| FI | Fault Isolation |

| Abbreviation | Meaning |
|--------------|--|
| FIPS | Federal Information Processing Standards |
| FMECA | Failure Mode Effect & Criticality Analysis |
| FMN | Federated Mission Network |
| FO | Fibre Optic |
| FQDN | Fully Qualified Domain Name |
| FSA | Final System Acceptance |
| FTA | Fault Tree Analysis |
| GAR-T | Tactical Towable Support Group |
| GRE | Generic Routing Encapsulation |
| H & S | Health & Safety |
| HCLOS | High Capacity Line Of Sight |
| HDS | High Density Switching |
| HFO | Hydrofluoroolefines |
| HL | Hardware Level |
| HLD | High Level Design |
| HTTP | HyperText Transport Protocol |
| HW | Hardware |
| IA | Information Assurance |
| IaaS | Infrastructure as a Service |
| IATA | International Air Transportation Association |
| ICAO | International Civil Aviation Organization |

| Abbreviation | Meaning |
|--------------|---|
| IDU | Indoor Unit |
| IEC | International Electrotechnical Commission |
| IER | Information Exchange Requirements |
| IETF | Internet Engineering Task Force |
| IF | Intermediate Frequency |
| IGP | Interior Gateway Protocol |
| IK | Installation Kit |
| iLO | Integrated Lights-Out |
| IMP | Issue Management Plan |
| IMS | Informal Messaging Service |
| IMT | Industry Maintenance Task International Mobile Telecommunication |
| IMT-CN | IMT Core Network |
| IMT-UE | IMT User Equipment |
| IOPS | Input/output Operations Per Second |
| IP | Internet Protocol |
| IPDV | IP packet Delay Variation |
| IPL | Initial Provisioning List |
| IPLR | IP packet Loss Rate |
| IPMI | Intelligent Platform Management Interface |
| IPS | Integrated Product Support Intrusion Prevention System |

| Abbreviation | Meaning |
|--------------|---|
| IPSP | Integrated Product Support Plan |
| IPTD | IP packet Transfer Delay |
| IRFP | Internal RF Panels |
| IRR | Infra-Red Reflective |
| ISM | Information Service Module |
| ISPCP | Initial Spare Parts & Consumables Package |
| ISS | In Service Support |
| ISSP | In Service Support Plan |
| ITS | Issue Tracking System |
| ITSM | Information Technology Service Management |
| ITU | International Telecommunication Union |
| IV&V | Integration Verification & Validation |
| KOM | Kick Off Meeting |
| KVM | Keyboard Video Mouse |
| LAN | Local Area Network |
| LC2IS | Land Command and Control Information System |
| LDP | Label Distribution Protocol |
| LED | Light Emitting Diode |
| LHCP | Left-Hand Circular Polarization |
| LLD | Low Level Design |
| LMM | Local Management Module |

| Abbreviation | Meaning |
|--------------|--|
| LogA | Log Aggregation |
| LORA | Level Of Repair Analysis |
| LOS | Line of Sight |
| Low-PIM | Low Passive Intermodulation |
| LRU | Line Replaceable Unit |
| LSA | Logistics Support Analysis |
| LSP | Label-Switched Path |
| LTE | Long-Term Evolution |
| MAN | Metro Area Network |
| MCU | Multipoint Control Unit |
| MHE | Material Handling Equipment |
| MIL-STD | Military Standard |
| MIMO | Multiple Input Multiple Output |
| Mini-LOS | Mini-Line of Sight |
| MLPP | Multi-Level Precedence Pre-emption |
| MM | Multi-Mode |
| MMA | Multimedia Access |
| MNO | Mobile Network Operators |
| MNP | Mission Network Partner Mission Network Participant |
| MOU | Memorandum Of Understanding |
| MP | Maintenance Plan |

| Abbreviation | Meaning |
|--------------|---|
| MPC | Mission Preparation Centre |
| MPLS-TE | Multiprotocol Label Switching – Traffic Engineering |
| MPT | Multi-Purpose Tires |
| MR | Mission RESTRICTED |
| MS | Mission SECRET |
| MSDP | Multicast Source Discovery Protocol |
| MSDS | Material Safety Data Sheet |
| MTA | Maintenance Task Analysis |
| MTBCF | Mean Time Between Critical Failures |
| MTBF | Mean Time Between Failures |
| MTP/TRP | Media Termination Point / Trusted Relay Point |
| MTTR | Mean Time To Repair |
| MTTRS | Mean Time To Restore Service |
| MTV | Medium Tactical Vehicle |
| MU | Mission UNCLASSIFIED |
| NAC | Network Access Control |
| NATO | North Atlantic Treaty Organisation |
| Nat-R | National RESTRICTED |
| Nat-S | National SECRET |
| Nat-U | National UNCLASSIFIED |
| NBD | Next Business Day |

| Abbreviation | Meaning |
|--------------|--|
| NCI AGENCY | NATO Communication & Information Agency |
| NDN | National Defence Network |
| NIAPC | NATO Information Assurance Product Catalogue |
| NIC | Network Interface Card |
| NIDS | Network Intrusion Detection System |
| NIP | Network Interconnection Point |
| NMCD | Network Management and Control Device |
| NQAR | NATO Quality Assurance Representative |
| NPKI | NATO Public Key Infrastructure |
| NR | NATO RESTRICTED |
| NRF | NATO Reaction Force |
| NS | NATO Secret |
| NSPA | NATO Supply & Procurement Agency |
| NTP | Network Time Protocol |
| NU | NATO Unclassified |
| OAS | OpenAPI Specification |
| OBL | Operational Base Line |
| OCR | Optical Character Recognition |
| ODU | Outdoor Unit |
| OEM | Original Equipment Manufacturer |
| OJT | On Job Training |

| Abbreviation | Meaning |
|--------------|--|
| OpTEval | Operational Technical Evaluation |
| OS | Operating System |
| OTA | Over The Air |
| OTI | Operational Task Inventory |
| OTS | Off The Shelf |
| OVA | Online Vulnerability Assessment |
| P2P | Peer-to-Peer |
| PBL | Product Base Line |
| PBR | Policy-Based Routing |
| PBS | Product Breakdown Structure |
| PCA | Physical Configuration Auditing Protected Core Access |
| PCN | Protected Core Network |
| PDF | Portable Document Format |
| PDR | Preliminary Design Review |
| PDU | Power Distribution Units |
| PE | Provider Edge |
| PFE | Purchaser Furnished Equipment |
| PGU | Power Generator Unit |
| PHST | Packaging Handling Storage & Transportation |
| PIP | Project Implementation Plan |
| PKI | Public Key Interface |

| Abbreviation | Meaning |
|--------------|----------------------------------|
| PM | Project Manager |
| PMP | Project Management Plan |
| PMS | Project Master Schedule |
| PNA | Portuguese National Army |
| POAP | Plan On A Page |
| PoC | Point of Contact |
| PoE | Power over Ethernet |
| POL | Petroleum, Oil and Lubricant |
| PoP | Point of Presence |
| POTS | Plain Old Telephone System |
| PRM | Project review Meeting |
| PRT | Portugal Portuguese |
| PRT MOD | Portuguese Ministry Of Defence |
| PSA | Preliminary System Acceptance |
| PSD | Power Spectral Density |
| PTP | Precision Time Protocol |
| PTT | Push To Talk |
| QA | Quality Assurance |
| QAP | Quality Assurance Plan |
| QAR | Quality Assurance Representative |
| QC | Quality Control |

| Abbreviation | Meaning |
|--------------|--|
| QMP | Quality Management Plan |
| QMS | Quality Management System |
| QoS | Quality of Service |
| RAIDO | Risks Assumptions Issues Dependencies Opportunities |
| RAML | RESTful API Modeling Language |
| RAMT | Reliability Availability Maintainability Testability |
| RAN | Radio Access Network |
| RAP | Radio Access Point |
| RAT | Radio Access Technology |
| RBD | Reliability Block Diagram |
| RCB | Residual Current Breakers |
| RCIL | Recommended Consumables Items List |
| RCM | Reliability Centred Maintenance |
| RDP | Remote Desktop Protocol |
| RF | Radio Frequency |
| RFC | Request for Change |
| RFD | Request For Deviation |
| RFW | Request For Waiver |
| RHCP | Right-Hand Circular Polarization |
| RL | Rear Link |
| RMP | Risk Management Plan |

| Abbreviation | Meaning |
|--------------|---|
| RNM | Remote Network Module |
| ROADS | Record of Actions & Decisions |
| RPL | Repair Price List |
| Rs | Symbol Rate |
| RSPCL | Recommended Spare Parts & Consumables List |
| RT | Real Time |
| RTM | Requirement Traceability Matrix |
| RtR | Real Time Replication |
| RTTL | Recommended Tools & Test Equipment List |
| RU | Rack Unit |
| SAG | System Administration Guide |
| SAN | Storage Area Network |
| SAT | System Acceptance Test; this is another name for the FAST above |
| SATCOM | Satellite Communications |
| SBC | Session Border Controller |
| SDC | Software Defined Compute |
| SDDC | Software-Defined Data Centre |
| SDN | Software Defined Networking |
| SDS | Software Defined Storage |
| SFF | Safe Failure Fractions |
| SFP | Small Form-Factor Pluggable |

| Abbreviation | Meaning |
|--------------|--|
| SFTP | Shielded Foil Twisted Pair |
| SGS | Satellite Ground Station |
| SHDSL | Symmetric High speed Digital Subscriber Line |
| SIC-T | Sistema de Informação e Comunicações - Tático |
| SIM | Subscriber Identity Module |
| SIT | System Integration Test |
| SIVP | Security Implementation Verification Procedure |
| SL | Software Level |
| SM | Single Mode |
| SMB | Server Message Block |
| SMC | Service Management and Control |
| SME | Subject Matter Expert |
| SMTP | Simple Mail Transfer Protocol |
| SNMP | Simple Network Management Protocol |
| SOC | State of Charge |
| SOS | System Of Systems |
| SOW | State Of Work |
| SPD | Surge Protective Devices |
| SQEP | Suitably Qualified and Experienced Personnel |
| SRR | System Requirements Review |
| SRS | Systems Requirement Specification |

| Abbreviation | Meaning |
|--------------|--|
| SRST | Survivable Remote Site Telephony |
| SRU | Shop Replaceable Units |
| SSH | Secure Shell Protocol |
| SSPP | System Safety Program Plan |
| SSR | System Safety Review |
| SSS | Schedule of Supplies & Services |
| STANAG | Standard NATO Agreement |
| STE | Special to Type Equipment |
| STP | Shielded Twisted Pair |
| STVP | Security Test & Verification Plan |
| SW | Software |
| TA | Target Architecture |
| TAT | Turn Around Time |
| TB | Terabyte |
| TBW | TB Written |
| TCP | Transmission Control Protocol |
| TD | Test Director |
| TDCIS | Tactical Deployable Communication and Information System |
| TDM | Time Division Multiplexing |
| TFS | Traffic Flow Security |
| THD | Total Harmonic Distortion |

| Abbreviation | Meaning |
|--------------|--|
| TIWG | Test Integration Working Group |
| TLS | Through Life Support |
| TM | Technical Manual |
| TN | Transit Node |
| TNA | Training Needs Analysis |
| TP | Training Plan |
| TPDP | Technical Publication Development Plan |
| TPM | Trusted Platform Module |
| TRR | Test Readiness Review |
| TSGT | Tactical Satellite Ground Terminal |
| TTR | Time To Recover |
| TV&V / TV&V | Test, Verification, Validation |
| TV&VP / MTP | Test, Verification & Validation Plan. This is another name to the Project Master Test Plan (MTP) |
| TXT | Trusted Execution Technology |
| UAM | User Access Module |
| UAT | User Acceptance Test |
| UAT(E) | User Acceptance Test of Equipment |
| UCC | Unified Communication and Collaboration |
| UDP | User Datagram Protocol |
| UMTS | Universal Mobile Telecommunications System |
| UPS | Uninterrupted Power Supply |

| Abbreviation | Meaning |
|--------------|---------------------------------------|
| UTRAN | UMTS Terrestrial Radio Access Network |
| UV | Ultra Violet |
| V2 | Voice and Video |
| vCPU | virtual CPU |
| VCU | Virtual Crypto Unit |
| VLAN | Virtual Local Area Network |
| VM | Virtual Machine |
| vRAM | virtual RAM |
| VRF | Virtual Routing and Forwarding |
| VSWR | Voltage Standing-Wave Ratio |
| VTC | Video Teleconference |
| WAN | Wide Area Network |
| WAP | Wireless Access Point |
| WBS | Work Breakdown Structure |
| WGS | Wideband Global SATCOM |
| WinRM | Windows Remote Management |
| WLC | Wireless LAN Controller |

APPENDIX G GLOSSARY OF TERMS

| | |
|-----------------------------|--|
| | |
| Attaching Parts | These are the items reported in the Corrective and Preventative Maintenance Procedures and in the Illustrated Parts Breakdown such as screws, gaskets, nuts, bolts, washers etc. |
| Consumables: Technical | This category of consumables includes (but it's not limited to) Fuses, Bulbs, Lamps, Gaskets, o-rings, EMI/Tempest seals, Surge Protectors, gas dischargers, Batteries and, in general, any other item replaced in case of preventive or corrective maintenance on the System etc. |
| Consumables: Non-Technical | This category of consumables includes (but it's not limited to) all POLs (Petrol, Oils, Lubricants), adhesive, sealing paste, gas and, in general, any other item replaced in case of preventative or corrective maintenance on the System etc. |
| Consumables: Generic | This category of consumables includes (but it's not limited to) ink cartridges, toners, printing paper, print ribbons, generic cleaning material and in general all the materials whose consumption cannot be predicted (e.g. is not associated to any preventative or corrective maintenance on the System) etc. |
| Installation | Attaching facilities and, or equipment to a unit's infrastructure, being installed in robust manner, preventing their subsequent removal or movement within their mount. |
| Integration | The process of bringing together component sub-systems, or equipment, ensuring their combined functionality in forming a coherent system, meets the expected system requirements. |
| Level 0 Schedule | A single line representation of a project's lifecycle containing major milestones |
| Level 1 Schedule | A bar chart representation of the project's lifecycle illustrating major components and associated milestones. |
| Level 2 Schedule | Major components in the Level 1 schedule are subdivided and shown in a bar chart format, where further milestones are shown also. |
| Level 3 Schedule | Further sub-divisions are illustrated in a Gantt chart, which is to be used in monitoring and managing the project's execution. This Gantt chart will identify. |
| Line Replaceable Unit (LRU) | <ol style="list-style-type: none"> a. Its failure can be detected and indicated by a BIT (Built In Test System) system or by abnormal condition/failure display/alarm, in conjunction with Technical Manuals (TMs) and general-purpose test equipment and troubleshooting procedures b. It is easily accessed for replacement purposes c. It is easy to replace, through the use of a plug-in connector, screwed terminal, nut/bolt fixing or similar connector |

| | |
|--|--|
| | |
| | <p>d. It has minimal adjustment/alignment requirements, such as voltage level settings, Software (SW) and Firmware (FW) installations/adaptations etc.</p> <p>e. Adjustments may be carried out with the BIT or with general-purpose Hardware (HW)/ Software (SW) tools and test equipment</p> <p>f. When only one LRU has failed, its replacement returns the system/equipment to full operational status.</p> |
| Line Replaceable Unit: Statistical (LS) | A category of LRU includes, but not limited to items subject to faults that occur with a statistical probability e.g. IF/RF strips/boards, SBCs, PPCs, Computers/Servers/Workstations and their components/peripherals, Networking equipment (Routers, switches), Power Supplies, electric/electronic components in general etc. |
| Line Replaceable Unit: Limited Life (LL) | This sub-category of LRU includes, but not limited to the items whose faults are due to ageing e.g. TWTs, Rotary Joints, Slip Rings, Engines, T/R switches, Fans and Fan Assemblies, etc |
| Roadmap | <p>A term applicable to projects and systems.</p> <p>A Project roadmap provides a strategic overview of the major elements of a project, illustrating its objectives, milestones, deliverables, resources, and planned timeline.</p> <p>A system roadmap is a flexible planning technique to support strategic and long-range planning, by matching short-term and long-term goals with specific technology solutions</p> |
| Service Provision Authority | Being suitably skilled and experienced, this authority ensures that the service provided by a contractor to the end user is as required by a commercial agreement between the two parties. A service's provision may be governed by a Service Level Agreement, outlining the extent and degree of service to be provided by a contractor to the end user. |
| Support Concept | <p>A definition of the support objectives (scenarios) in relation with maintenance levels, maintenance support and their interrelationships and shall be implemented in conjunction and coordination with the Maintenance Concept.</p> <p>The support concept is the apportionment of maintenance activities:</p> <ul style="list-style-type: none"> • PRT Maintenance Task (PMT) will be performed by PRT MOD personnel (military or civilian), • Industry Maintenance Task (IMT) will be performed by industry personnel under Warranty or Post Warranty Arrangement. <p>Refer to Appendix H in this document for detailed information regarding Support Concept</p> |
| Support Scenario: NONO | NATO Owned / NATO Operated. The solution would be procured as a system and would be operated and maintained by NATO. The responsibilities for NATO maintenance levels are defined in the Maintenance Concept. |
| Support Scenario: COCO | Contractor Owned / Contractor Operated. NATO would have the solution delivered by a contractor as a Service. |

| | |
|---------------------------|---|
| | |
| Support Scenario: NOCO | NATO Owned / Contractor Operated. With this approach NATO would procure a system, but would “outsource” the Operation and Maintenance of it. |
| Support Scenario: CONO | Contractor Owned / NATO Operated. This approach exists and is usually called “Final NCI Agency leasing”. |
| Technical Authority | <p>Technical authorities ensure that engineering documents and drawings are checked, reviewed, and approved by appropriately qualified, competent, and experienced expert engineers, within the NCI Agency and, or the selected contractor. Technical Authorities ensure that the technical decisions made are consistent with the appropriate level of competence, quality and consistency, in order to assure the technical integrity of the final product.</p> <p>NCI Agency will be the Technical Authority for the contract issued to The Contractor selected for the TDCIS project.</p> |





Portuguese Republic Ministry of Defence Tactical Deployable Communication and Information System

Short Title: PRT TDCIS

Book II - Part IV

Statement of Work (SoW)

Annex A – System Requirements Specification (SRS)

| | |
|-------------------|---|
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1 Introduction

NOTE (PRTTDCIS-1108)

This System Requirements Specification (SRS) document provides the Functional and Technical requirements, together with the Implementation Constraints for The Tactical Deployable Communication and Information System (TDCIS) for the Portuguese (PRT) Army to be used up to Brigade level, for National, NATO or other multinational deployment scenarios in Portuguese National and/or International territory. TDCIS is designed to operate on military and civilian operational scenarios and to support Joint and/or Combined operations.

SRS (PRTTDCIS-1109)

This SRS defines the sizing, standards, quality and design requirements, and constraints that shall be adhered to in the design (or modification of a COTS design) and implementation of this project.

NOTE (PRTTDCIS-1110)

The SRS does not discuss Node quantities. These are covered under the scope description in the Statement of Work (SOW) Main Body.

NOTE (PRTTDCIS-1667)

This SRS is structured as follow:

- 1) **Introduction** (this chapter) covers the *Purpose* of the document; then,
- 2) **Conventions and Standards** covers all Conventions, Definitions, NATO and other Standards which are applicable all this document long; then,
- 3) **High Level Specifications** covers
 - 1) The TDCIS in *General* and the architecture which supports it,
 - 2) The *Nodes* and *Housing* elements TDCIS is composed of,
 - 3) The *Performance Targets* TDCIS has to meet,
 - 4) The TDCIS level *Implementation Constraints*; then,
- 4) **Services** covers all services (*Business Support, CIS Security, etc.*) TDCIS has to provide; then,
- 5) **Modules** covers in details the *Functional and Technical Requirements*, together with the *Implementation Constraints* applicable to the different Modules and Subsystems which are used to build the TDCIS; then,
- 6) **Transmission Systems** covers in details the *Specifications* of all Transmission Systems (such as SATCOM, Radio, etc.) present in TDCIS; then,
- 7) **Housing Elements** covers in details the *Specifications* of all Housing elements (such as Shelter, Trailer and Casing) present in TDCIS; finally,
- 8) **User Appliances** covers in details the *Specifications* of all End User Devices (such as Workstations, Phones, etc.) present in TDCIS.

2 Conventions and Standards

2.1 SRS Document

NOTE (PRTTDCIS-1119)

Information and requirements contained under a "General" heading are applicable to all the elements covered by the corresponding upper section.

NOTE (PRTTDCIS-1120)

All statements are identified with a Unique Reference called the Key.

NOTE (PRTTDCIS-1121)

Mandatory requirements are identified as **SRS**.

NOTE (PRTTDCIS-1122)

General informational, descriptive text is identified as **NOTE**.

SRS (PRTTDCIS-1123)

Statements in numbered lists (i= 1 to n) under a **SRS** requirement shall be considered individual requirements under the "shall" statement of the parent requirement.

NOTE (PRTTDCIS-3041)

The acronyms and abbreviations used in this SRS are defined in in the applicable Annex or Appendix of the SOW.

NOTE (PRTTDCIS-3042)

No meaning is associated with the order of serial numbering. There could be gaps in numbering and requirement identifiers in a group do not have to be sequential.

NOTE (PRTTDCIS-3247)

All Conventions defined in the SOW are equally applicable to the SRS.

2.2 Definitions

NOTE (PRTTDCIS-1124)

"-xx" is the generic suffix denoting either:

- Black Transport Network (BLK); or
- NATO Unclassified (NU);
- Mission Unclassified (MU);
- National Unclassified (Nat-U);
- NATO Restricted (NR);
- Mission Restricted (MR);
- National Restricted (Nat-R);
- NATO Secret (NS);
- Mission Secret (MS); or,
- National Secret (Nat-S).

NOTE (PRTTDCIS-3089)

"-xU" is the generic suffix denoting both NU and/or MU and/or Nat-U.

NOTE (PRTTDCIS-3088)

"-xR" is the generic suffix denoting both NR and/or MR and/or Nat-R.

NOTE (PRTTDCIS-1125)

"-xS" is the generic suffix denoting both NS and/or MS and/or Nat-S.

SRS (PRTTDCIS-1126)

Requirements stating a capability to be "supported" (i.e. "shall support") shall be understood as the ability of the Purchaser to configure the capability to be active or not active at his discretion. This means that the capability is not necessarily implemented upon delivery, but shall be available in its full extent, without restrictions.

SRS (PRTTDCIS-1127)

Requirements stating a capability to be "implemented" (i.e. "shall implement") shall be understood as requiring the capability to be implemented and configured for use in the delivered system.

SRS (PRTTDCIS-1128)

Requirements stating to be supported or implemented "fully conformant" to an architecture shall be understood as requiring full correspondence between architecture specification and implementation, where all features of this specific requirement are implemented in accordance with the architecture specification and there are no features of this specific requirement implemented that are not covered by the architecture specification.

NOTE (PRTTDCIS-1129)

The term "including" is never meant to be limiting - the list that follows is always non-exhaustive.

SRS (PRTTDCIS-1130)

Any requirements using the term "target" shall be interpreted as hard constraints to be respected during the design process, with any deviation being subject of agreement by the Purchaser. Any such constraints are currently motivated by:

- 1) Compliance with the DCIS TA; or
- 2) Federated Mission Network (FMN) compliance; or
- 3) Interoperability; or
- 4) Lessons Learned; or
- 5) Specific operational constraints.

NOTE (PRTTDCIS-1131)

The DCIS TA is neither an Applicable nor a Reference document in this SRS. The interpretation of the TA and its translation into requirements in the specification is the responsibility of the Purchaser.

NOTE (PRTTDCIS-1133)

The use of the term "notional" is to be interpreted as guidance only.

SRS (PRTTDCIS-1134)

When specifications and/or quantities are specified as "Design Driven", it shall be understood as being subject to design decisions and thus not prescribed by this specification.

NOTE (PRTTDCIS-1135)

Availability requirements are formulated in terms of Operational Availability. Assumptions are made for mean logistics delays based on positioning spares locally, at intermediate depots, or at centralized depots.

SRS (PRTTDCIS-4025)

The term "Withstand" shall be understood as that the equipment under specified climatic and environmental conditions is stored, transported, handled and shall operate without suffering degradation of system performance (gain, pattern type, sensitivity, etc.) and without suffering permanent mechanical damages.

SRS (PRTTDCIS-1523)

The term "enable" (or enabled) shall be understood as an enabling function; i.e. the capability needs to be implemented for, but no CIS equipment is to be installed or delivered. For example, if a rack needs to be "enabled" for the integration of a Radio Transmitter, it means that the rack is equipped with the radio transmitter integration kit (cabling, mounting shelves...), but the radio transmitter itself is not to be delivered.

SRS (PRTTDCIS-1846)

"Open" shall be understood as enabling the basic functionality to be modified or extended through mechanisms such as API and plugins without any proprietary constraints.

NOTE (PRTTDCIS-2109)

Housing elements are defined as the Non-CIS assets hosting the CIS components. Shelters, Cases (transit and transport) and Trailers are housing elements.

NOTE (PRTTDCIS-2917)

The term "User" refers to any personnel member accessing the DPOP and consuming its Services.

NOTE (PRTTDCIS-2918)

The term "End User" refers to any personnel member accessing the DPOP and consuming its Services and who is not a System Administrator.

SRS (PRTTDCIS-3235)

End-User Devices (EUD) is a naming convention and shall be understood as a generic term to refer to any user (End User or System Administrator) appliance such as Workstations, Phones, Printer, etc.

SRS (PRTTDCIS-3844)

The acronym HDD (Hard Disk Drive) shall be understood as a generic term to define a storage device, irrelevantly of the technology it is implemented with (e.g. Solid State).

NOTE (PRTTDCIS-3120)

The implementation of any given DPOP information security domains is called a Colour Cloud.

2.3 Architecture

NOTE (PRTTDCIS-2309)

All architecture diagrams are modeled using Archimate 3.1 modelling language.

NOTE (PRTTDCIS-1111)

The infrastructure supporting the DCIS capability is a system-of-systems and is broken down as follows:

- 1) *Deployable Point Of Presence (DPOP)* is a collection of Nodes; and,
- 2) *Node* is a collection of Modules built into Housing Elements, associated with Transmission Systems and User Appliances; and,
- 3) *Module* is a collection of Subsystems; and,
- 4) *Subsystem*, is a Functional blocks which provides Services; and,
- 5) *Components*, are the building blocks of the Subsystems; and,
- 6) *Element* is a generic term which can refer to any of blocks described above.

SRS (PRTTDCIS-1112)

The detailed system design shall adhere to, and shall be structured around, the system breakdown structure presented in the following figure.

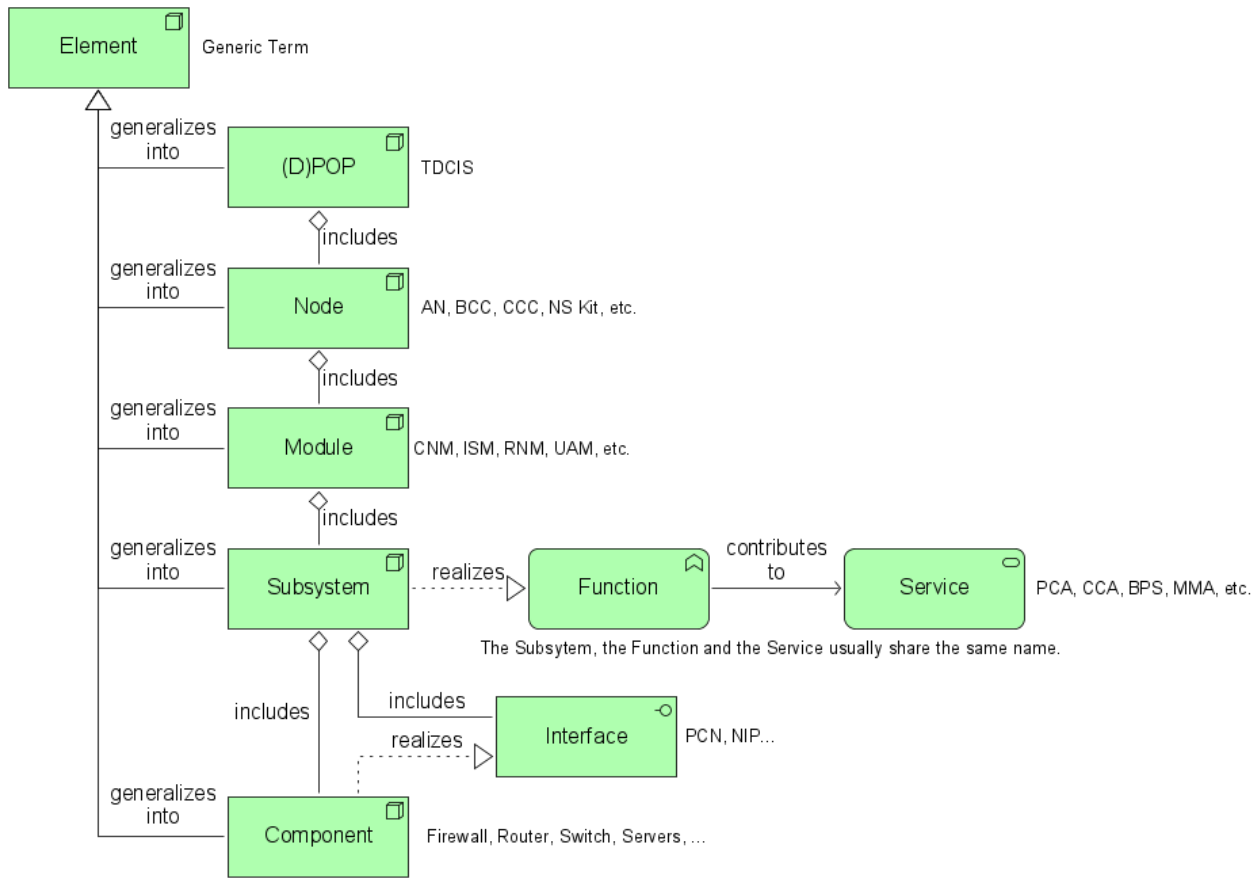


Figure 1 - Architecture Taxonomy

NOTE (PRTTDCIS-1113)

The TDCIS Nodes are built from Modules, Transmission Systems, and Housing elements.

NOTE (PRTTDCIS-1163)

The TDCIS System is considered as a DPOP, therefore TDCIS and DPOP terminology will be consistently and commonly used.

NOTE (PRTTDCIS-1114)

For each CIS Module, the functional and technical requirements will be:

- firstly provided at a Module level; then,
- by the requirements specific to each of the identified subsystems as a part of the preliminary design conveyed in this specification.

SRS (PRTTDCIS-1115)

Within this document the Functional Requirements are provided at module level, whereas the Technical (non-functional) Requirements are provided down to subsystem-level. The latter are derived from existing architectures and systems, which are proven and in operation, and detail the DPOP nodes where interoperability is critical. This specification contains Implementation Constraints which the Contractor shall adhere to when preparing the Low Level Design (LLD) specification.

SRS (PRTTDCIS-4019)

As illustrated in the following diagrams, a Variant Element shall be understood as a specialization of a Source Element.

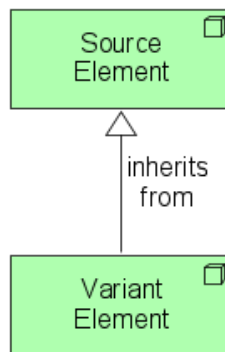


Figure 2 - Variant specialization

SRS (PRTTDCIS-4020)

Any set of specifications defined for a certain Element shall be automatically inherited by all its Variants. For instance, what is specified as to be implemented in xx shall be implemented in all Security Domains, what is specified as to be implemented in xU shall be implemented in all UNCLASSIFIED Domains, etc.

SRS (PRTTDCIS-4021)

Any set of specifications defined for a Variant Element shall supersede those from the Source it specializes from.

SRS (PRTTDCIS-4022)

What is specified as to be implemented in an Element, shall be implemented in all its Variants. For instance (non-exhaustive): what is specified to be implemented in xx shall be implemented in all Security Domains, what is specified as to be implemented in xU shall be implemented in all UNCLASSIFIED Domains, etc.

SRS (PRTTDCIS-4023)

A statement defined at a higher level shall automatically be applicable to all its composing elements unless specified otherwise at the element level. For instance: an Environmental Endurance target such as IPxx defined at (D)POP level is automatically applicable to all its composing elements; if the SATCOM Antenna Subsystem states a different IPzz (higher or lower) than the (D)POP level one, this IPzz will take precedence over the IPxx but only for the SATCOM Antenna Subsystem.

SRS (PRTTDCIS-2092)

An Element specific SRS statement shall always supersede global conventions.

NOTE (PRTTDCIS-4237)

Relationships between building blocks are complemented with text providing additional information. This textual information does not supersede the relationship definition as per Archimate standard.

NOTE (PRTTDCIS-1116)

Diagrams representing building blocks are coloured using standard Archimate 3.1 color scheme. The additional following conventions apply:

- 1) Coloured block with continuous border identifies Architectural Building Blocks which are in scope of the project and are project deliverables; and,
- 2) White block with dashed border identifies Architectural Building Blocks which relates to, influences or impacts the project but do not constitute project deliverables (e.g. Purchaser existing infrastructure or systems).

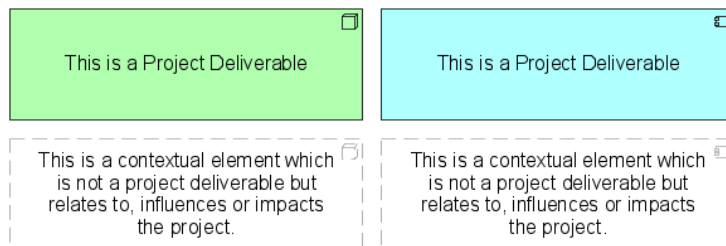


Figure 3 - Block styling convention

NOTE (PRTTDCIS-4024)

Purchaser Furnished Equipment (PFE) elements are identified with an additional PFE marking as illustrated on the following diagram.

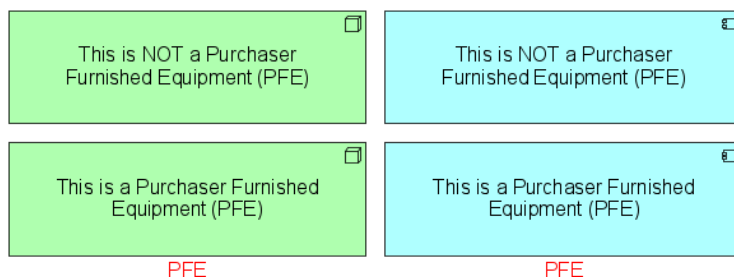


Figure 4 - PFE marking convention

SRS (PRTTDCIS-1117)

When calling for implementations conformant with the DCIS Cube Architecture (DCIS CA), it shall be understood as being in accordance with and conformant to the principles described in *DCIS Cube ADD Main, 2018*, and its *DCIS Cube ADD Annexes, 2018*, hereafter referred to as the DCIS CA Annexes. Where conformance to a specific DCIS CA Annex is required, in addition conformance to the DCIS CA as a whole is implicit.

SRS (PRTTDCIS-3090)

Implementation examples depicted in DCIS CA and its Annexes shall not be considered as an implementation constraint to deliver specific hardware and software; neither shall it exempt the Contractor from any acquisition regulation constraint.

NOTE (PRTTDCIS-1160)

This specification is based on the extant DCIS Target Architecture (TA) and it provides the foundation and the boundary conditions upon which this specification is built.

NOTE (PRTTDCIS-1161)

Boundary conditions are formulated as Technical Requirements and Implementation Constraints. In particular, Implementation constraints are introduced:

- 1) To minimize implementation risk, based on lessons learned; and,
- 2) To assure interoperability; and,
- 3) To minimize total cost of ownership across the entire pool of DCIS assets.

SRS (PRTTDCIS-1842)

Unless stated specifically, lines interconnecting elements in any figures (context, architecture, illustrative implementation...) are not intended to be representative of the actual number of interfaces/links between any pair of components. Those quantities shall be derived from the design, which shall in turn implement the minimum quantity of interfaces presented in the subsystem interface tables.

SRS (PRTTDCIS-3249)

The elements shall be modular in their construction to maximise commonality of components.

SRS (PRTTDCIS-3250)

As far as possible, the elements shall be implemented with Commercial Off-The-Shelf (COTS) solutions, field-proven in the Armed Forces of a NATO partner country or in a comparable industry, under similar geographical and climatic conditions.

SRS (PRTTDCIS-3251)

The DPOP shall be flexible and adaptable to meet the mission demands, but fundamentally, it shall be technologically robust and stable.

SRS (PRTTDCIS-3252)

The DPOP shall also have integrity and resilience and, where appropriate, have inbuilt redundancy.

SRS (PRTTDCIS-3253)

The design shall use modern software process and tooling that reduces the burden on the DPOP User and Administrators.

2.4 Units of Measurements

SRS (PRTTDCIS-4461)

The DPOP shall use metric system for all elements and documentation.

2.5 Computations

SRS (PRTTDCIS-1136)

The router throughput performances shall assume the following constant packet size distribution, representative of NATO DCIS traffic over the Wide Area Network (WAN):

- 1) IP packets sized ≤ 64 bytes is 25%; and,
- 2) IP packets sized $64 < x < 127$ bytes is 20%; and,
- 3) IP packets sized $128 < x < 255$ bytes is 9%; and,
- 4) IP packets sized $256 < x < 511$ bytes is 5%; and,
- 5) IP packets sized $512 < x < 1023$ bytes is 18%; and,
- 6) IP packets sized larger than 1024 bytes is 23 %.

SRS (PRTTDCIS-1503)

With respect to User Port quantities, the rule-set for modelling the design shall be as follows:

- 1 User requires 2.25 switch ports, noting that 1 User consists of:
 - 1 data-port; and,
 - 1 VoIP port, and,
 - Access to a printer at 0.25 port; and,
- Maximum port utilization is 90% on any given access switch; for example: for 48 port switches, a reserve of 5 ports shall be considered as per design.

SRS (PRTTDCIS-4271)

With respect to Virtual Compute and Storage, the design rule-set for oversubscription shall be as follows:

- vCPU: maximum 3 to 1 oversubscription; and,
- vRAM: maximum 1.2 to 1 oversubscription; and,
- Storage: no oversubscription.

2.6 Interfaces and Cables

SRS (PRTTDCIS-2091)

Unless stated otherwise, Ethernet Network Termination Equipment shall be Small Form-Factor Pluggable (SFP)-based connectivity providing following variants:

- *Eth-Cu*: 100/1000 Copper RJ45 (Cat. 6 or better) Ethernet Interface;
- *Eth-FO-SR*: 1G/10G Multimode Fiber Optic (FO) Interface (Short Range);
- *Eth-FO-LR*: 1G/10G Single Mode Fiber Optic Interface (Long Range).

SRS (PRTTDCIS-4262)

Ethernet interfaces shall support Virtual Local Area Network (VLAN) tagging in accordance with IEEE802.1Q:2011.

SRS (PRTTDCIS-4265)

Copper Ethernet SFPs, where used, shall be able to operate at 100 Megabits per second (Mbps) and 1 Gigabits per second (Gbps).

SRS (PRTTDCIS-4266)

10Mbps and 100Mbps Ethernet interfaces shall support both half-duplex and full-duplex, both configured through auto-negotiation and through manual configuration.

SRS (PRTTDCIS-4267)

All 1000BASE-T interfaces shall support 1Gbps auto-negotiation and shall support manual configuration of the speed to 1000Mbps, to 100Mbps and to 10Mbps.

SRS (PRTTDCIS-3822)

Ethernet Ports providing Power over Ethernet (PoE) shall not be of SFP type.

SRS (PRTTDCIS-2093)

All physical connections shall have clear indication of the security domain that they are assigned with respect to the following coloring convention:

- Black label for BLK;
- Green label for xU;
- Blue label for xR;
- Red label for xS.

SRS (PRTTDCIS-2385)

Labels shall be applied using a method that provides a legible, durable and non-fading result capable of withstanding exposure to the environmental conditions during operation, storage, transport and handling.

SRS (PRTTDCIS-2386)

Whenever possible, the labels shall be applied in such a manner that allows them to be visible after installation.

SRS (PRTTDCIS-2388)

The labels shall withstand the same environmental conditions as the equipment they are attached on (both for indoor and outdoor use).

SRS (PRTTDCIS-2387)

The labels shall be subject to the same environmental testing regime as the equipment they are attached on (both for indoor and outdoor use).

SRS (PRTTDCIS-4026)

Robust shielded cables, designed for tactical environment, shall be used to interconnect (D)POP elements.

SRS (PRTTDCIS-4027)

Insulating and sheathing compounds of all outdoor cables shall have minimum tensile strength of 12 N/mm² in compliance with IEC 60811-501:2012.

SRS (PRTTDCIS-4028)

All outdoor power and data cables shall be: water, rodent, trampling and Ultra Violet (UV) resistant according to EN 50289-4-17:2015 or its IEC, ISO equivalent.

SRS (PRTTDCIS-4029)

All outdoor data cables, as the minimum, shall meet following requirements:

- 1) Tensile load during installation: 1800N; and,
- 2) Tensile load during operation: 600N; and,
- 3) Impact resistance: 200 impacts (according to EIA/TIA-455-25 Military req. or equivalent standard); and,
- 4) Crush resistance: 440 N/cm (according to EIA/TIA-455-41 Military req. or equivalent standard).

SRS (PRTTDCIS-4030)

The regulations of ISO/IEC 11801-1:2017 or equivalent shall be followed for the dimensioning of the bending radius of cables.

SRS (PRTTDCIS-4031)

In Case MIL-DTL-38999 series III based connectors are used for Copper Ethernet interfaces, they shall have an internal RJ45 connector and a MIL-DTL-38999 series III shell.

SRS (PRTTDCIS-4032)

All data cables used for Ethernet Copper connections shall be CAT6 Shielded Foil Twisted Pair (SFTP).

SRS (PRTTDCIS-4577)

The Contractor shall apply industry best practices for cable routing, fixing, etc. when integrating Elements in racks.

2.7 Environmental Endurance

2.7.1 General

NOTE (PRTTDCIS-2390)

This section contains the maximum severities that equipment provided under this contract can be exposed to. When the equipment is not able to satisfy those severity levels (especially for solar radiation, rain/snow/hail, wind and humidity), the contractor can make use of enclosures to partially isolate the materiel from the most demanding conditions. When these sheltering enclosures are used, the equipment becomes part of an assembly, and the contractor is responsible to guarantee compliance of the complete assembly (including electrical and electronic equipment, enclosures, fixing and mounting hardware, and all supporting subsystems like heating or cooling) with the totality of the required climatic, environmental, mechanical, biological and chemical parameters and severities.

NOTE (PRTTDCIS-1137)

NC3A Technical Note TN-1078, 2008 (hereafter referenced as TN-1078) defines minimal requirements with respect to: High temperature, Low temperature, Change of temperature (temperature shock), Solar radiation, Humidity, Rainfall, Ice, Hail, Snow load, Wind, Dust/sand particle size and concentration, Min/max elevation, Max/min atmospheric pressure, Shock, Vibration, Acceleration, Bump, Drop and topple, Free-fall, Ingress Protection Rating, Salt mist, Acid atmosphere, Contamination by fluids, Mould growth and Electro-Magnetic Compatibility (EMC).

SRS (PRTTDCIS-1138)

TN-1078 shall be considered as the reference for all subjects it covers.

SRS (PRTTDCIS-1139)

Any deviation from TN-1078 in this SRS will be clearly articulated, in that instance the deviation shall prevail.

NOTE (PRTTDCIS-1140)

Clarifications can be sought from; *NATO Standardization Agreement 4370, "Environmental Testing", Edition 7* - hereafter referenced as STANAG 4370 - and its associated NATO Allied Environmental Conditions and Test Publications, latest edition - hereafter referenced as AECTPs.

SRS (PRTTDCIS-2391)

For defining design and test criteria, the contractor shall address all climatic and environmental conditions as stipulated in TN-1078.

SRS (PRTTDCIS-3108)

The climatic and environmental conditions are divided into following specifications, where all modes (operation, transport, storage and handling) shall be addressed:

- Climatic specification; and,
- Mechanical specification; and,
- Sealing specification; and,
- Biological and Chemical specification.

SRS (PRTTDCIS-3109)

Proof of compliance to all specifications (climatic, mechanical, sealing, biological and chemical) stipulated in TN-1078 shall be demonstrated by testing performed in accordance with STANAG 4370 edition 7 and its all associated AECTPs or equivalent national or commercial standards.

SRS (PRTTDCIS-2394)

The environmental tests shall include series of tests conducted in EU or NATO country certified climatic chambers including following tests:

- High temperature; and,
- Low temperature; and,
- Change of temperature (temperature shock); and,
- Solar radiation; and,
- Humidity; and,
- Wind load; and,
- Ingress protection; and,
- Salt mist; and,
- Acidic atmosphere; and,
- Altitude, pressure; and,
- Combined stress testing.

SRS (PRTTDCIS-3110)

The mechanical tests shall include series of tests conducted in EU or NATO country certified laboratory/testing plant including following tests:

- Shock; and,
- Vibration; and,
- Acceleration; and,
- Bump; and,
- Drop and topple; and,
- Free fall.

SRS (PRTTDCIS-1141)

Where the requirements for testing methods specified in TN-1078 and STANAG 4370 and all its associated AECTPs are in conflict, STANAG 4370 and all its associated AECTPs shall prevail.

SRS (PRTTDCIS-3111)

Where the requirements for testing parameters (for example high and low temperature, temperature shock, humidity, pressure etc.) specified in TN-1078 and STANAG 4370 and all its associated AECTPs are in conflict, TN-1078 shall prevail.

SRS (PRTTDCIS-3112)

The (D)POP shall be able to withstand the Climatic specification with following additional comments on Test Conditions when packaged as designed during transportation, storage and handling:

- 1) High temperature: test methods according AECTP-300 Edition D, version 1, method 302; and,
- 2) Low temperature: test methods according AECTP-300 Edition D, version 1, method 303; and,
- 3) Change of temperature (temperature shock): test methods according AECTP-300 Edition D, version 1, method 304; and,
- 4) Solar radiation: test methods according to AECTP-300 Edition D, version 1 method 305; and,
- 5) Humidity: test methods according to MIL-STD-810H METHOD 507.6 ; and,
- 6) Rainfall: test methods according to AECTP-300 Edition D, version 1 method 310; and,
- 7) Ice: test methods according to AECTP-300 Edition D, version 1 method 311; and,
- 8) Dust/sand particle size and particle concentration: test methods according to AECTP-300 Edition D, version 1 method 313; and,
- 9) Maximum elevation and atmospheric pressure: test methods according to
 - 1) AECTP-300 Edition D, version 1 method 301; or,
 - 2) MIL-STD-810G, 2008, Method 500.5; or,
 - 3) MIL-STD-810G w/Change 1, 2014, Method 500.6; or,
 - 4) MIL-STD-810H, 2019, Method 500.6.

SRS (PRTTDCIS-3113)

The (D)POP shall be able to withstand the Mechanical specifications with following additional comments on Test Conditions when packaged as designed during transportation, storage and handling:

- 1) According to STANAG 7213, Edition 1 and its associated ATP-3.3.4.1 Edition A, Version 1 (Tactics, Techniques and Procedures for NATO Air Movements) all cargo, whether or not on pallets or platforms, when carried in aircraft, shall be restrained to the following minimum ultimate factors:
 - 1) Forward 3.0g; and,
 - 2) Side 1.5g; and,
 - 3) Aft 1.5g; and,
 - 4) Vertical (up) 2.0g; and,
- 2) Shock: 10 G peak value (11 ms, half sine mechanical shock) according to
 - 1) AECTP-400, Edition D Version 1 , Method 403; or,
 - 2) IEC 60068-2-27:2008; or,
 - 3) MIL-STD-810G, 2008, Method 516.6, Procedure I; or,
 - 4) MIL-STD-810G w/Change 1, 2014, method 516.7, Procedure I; or,
 - 5) MIL-STD-810H, 2019, method 516.8, Procedure I; or,
 - 6) AECTP-400, Edition D Version 1, method 403; or,
 - 7) IEC 60068-2-27:2008; and,
- 3) Vibration as per TN-1078 with the following additional comment: test methods according to
 - 1) AECTP-400, Edition D, Version 1, Method 401; or
 - 2) IEC 60068-2-64:2008 +AMD1:2019 CSV; or,
 - 3) MIL-STD-810G, 2008, Method 514.6; or
 - 4) MIL-STD-810G w/Change 1, 2014, Method 514.7; or
 - 5) MIL-STD-810H, 2019, Method 514.8; and,
- 4) Acceleration as per TN-1078 with the following additional comment: with $\leq 10g$ for transport and $\leq 2g$ for storage and handling; and, test methods according to
 - 1) IEC 60068-2-7:1983+AMD1:1986 CSV; or,
 - 2) MIL-STD-810G, 2008, Method 513.6; or,
 - 3) MIL-STD-810G w/Change 1, 2014, method 513.7; or,
 - 4) MIL-STD-810H, 2019, method 513.8; and,
- 5) Bump as per TN-1078 with the following additional comment: with 10g, 6 ms, 1000 pulses for transport, storage and handling and test methods according to IEC 60068-2-27:2008; and,
- 6) Drop and topple as per TN-1078 with the following additional comment: test methods according to
 - 1) IEC 60068-2-31:2008; or,
 - 2) ISO 8768; or,
 - 3) MIL-STD-810G, 2008, Method 516.6, Procedure IV; or,
 - 4) MIL-STD-810G w/Change 1, 2014, method 516.7, Procedure IV; or,
 - 5) MIL-STD-810H, 2019, method 516.8, Procedure IV; and,
- 7) Free fall as per TN-1078 with the following additional comment: test methods according to IEC 60068-2-31:2008.

SRS (PRTTDCIS-4033)

A component defined as Semi-Rugged shall

- Withstand a drop to concrete surface from the height of 75 cm, without any additional protective accessory (i.e. case, rubber boot, etc.) beyond those belonging to the component itself, while being operated. The component shall be dropped on all sides to verify its ability to withstand shock from any direction. Particularly, the display, and other sensitive components shall be tested to verify if they withstand the shock and operate properly; and,
- Have an ingress protection rating of IP 53 as a minimum; and,
- Withstand High Temperature of +49 degree Celsius while being operated; and,
- Withstand Low Temperature of -20 degree Celsius while being operated; and,
- Withstand road test condition while being docked in the vehicle and being operated.

SRS (PRTTDCIS-2484)

The DPOP shall be subject to the acceptance road test.

SRS (PRTTDCIS-2485)

If not otherwise specified, all tests shall be performed according to commonly used practices for material test methods or standards (e .g. DIN, ISO and/or MIL-STDs).

SRS (PRTTDCIS-2486)

The acceptance road test shall be a rugged road test over the distance of 100km including 10km off-road.

SRS (PRTTDCIS-2487)

The equipment under the acceptance road test shall be capable of withstanding the shocks and vibrations induced by ground transport equipment over the mobility courses described for Type V mobility in SAE-AS8090.

SRS (PRTTDCIS-2488)

The (D)POP under road test shall be towed by or mounted on a vehicle on all-roads: motorway at 80 km/h, unpaved road (e.g. a gravel road) at 50 km/h and country road at 25 km/h, without sustaining any damage. This shall be demonstrated by a test in which the (D)POP attached to a vehicle will be driven over test tracks. For the verification of these requirements, the following procedures shall be applied in addition to the roadworthiness test:

- Road test over a level hard surface (asphalt or concrete) with a specially prepared course; and,
- The course shall have twelve 10 x 20 cm boards placed 7.5 m apart on the 20 cm face and with the 10 cm face fully above the ground. The edges shall have a 2.5 x 2.5 cm bevel. The sixth and twelfth boards shall be placed 45° to the direction of travel; all the other ones will be placed perpendicular to the direction of travel. The boards shall be long enough to span the vehicle/trailer and shall be anchored securely; and,
- The DPOP shall be subjected to ten (10) laps of the course (one lap is defined as traversing the course in one direction) at each of the following speeds: 8 km/h, 15 km/h, 25 km/h and 30 km/h:
 - After the road test, all (D)POP elements will be inspected using methods defined in the SOW; and,
 - After the test there shall be no evidence of permanent deformation, delamination, buckling or any damage to any of the (D)POP elements.

SRS (PRTTDCIS-3114)

The (D)POP shall be able to withstand the Sealing specifications with following additional comments on Test Conditions when packaged as designed during transportation, storage and handling:

- 1) for immersion test methods according to AECTP-300 Edition D, version 1 method 307; and,
- 2) other requirements according to IEC 60529:1989+AMD1:1999+AMD2:2013 CSV.

SRS (PRTTDCIS-3115)

The (D)POP shall be able to withstand the Biological and Chemical specification with following additional comments on Test Conditions when packaged as designed during transportation, storage and handling:

- 1) Salt mist: test methods according to AECTP-300 Edition D, version 1 method 309 or IEC 60068-2-52:2017 RLV; and,
- 2) Acid atmosphere: test methods according to AECTP-300 Edition D, version 1 method 319 or MIL-STD-810H method 518.2; and,
- 3) Contamination by fluids: test methods according to AECTP-300 Edition D, version 1 method 314 or MIL-STD-810H method 504.3; and,
- 4) Mould growth: test methods according to AECTP-300 Edition D, version 1 method 308.

SRS (PRTTDCIS-3245)

When (D)POP elements are packaged as designed during transportation, storage and handling, all outdoor exposed materials (painted surfaces, sealing, etc.) shall be resistant to Biological and Chemical (BC) contaminants and decontamination agents according to STANAG 4521 edition 2 - NATO AEP-7, edition 5: Chemical, Biological, Radiological and Nuclear (CBRN) contamination survivability factors in the design, testing and acceptance of military equipment.

SRS (PRTTDCIS-2110)

All Housing Elements, when exposed to climatic and environmental conditions as defined in TN-1078 (climatic, mechanical, sealing, biological and chemical) shall assure that equipment housed in them meets respective manufacturer climatic and environmental specifications for:

- Operation; and,
- Transport; and,
- Storage and handling.

SRS (PRTTDCIS-2481)

The design of Housing Elements and components to be housed in them shall assure that no active heating and cooling is required for transport, storage, and handling.

SRS (PRTTDCIS-2455)

Shelter shall be capable of being submerged for a minimum of 2cm from the bottom of the entry door while all drain caps are fully submerged, for 30 minutes without the use of additional external sealing, caulking, taping, and so forth. No water ingress shall be detected.

SRS (PRTTDCIS-2564)

Equipment shall meet IP Rating, stipulated in TN-1078, without the use of additional external sealing, caulking, taping, and so forth.

SRS (PRTTDCIS-3117)

The IP ratings, stipulated in TN-1078, shall be in compliance with IEC 60529:1989, AMD1:1999 and AMD2:2013.

SRS (PRTTDCIS-2420)

All outdoor assemblies and sub-assemblies (Housing Elements, CIS Components (e.g. Antenna, Mast, ODU ...)...) under full operational configuration, shall be capable of withstanding ice accumulation without suffering degradation of system performance (gain, pattern type, sensitivity) and without suffering permanent mechanical damage.

SRS (PRTTDCIS-3116)

All outdoor assemblies and sub-assemblies (Housing Elements, CIS Components (e.g. Antenna, Mast, ODU ...)...) under full operational configuration, shall not permit water accumulation in pockets, creases, fissures or depressions that could cause structural damage upon freezing.

NOTE (PRTTDCIS-4034)

TN-1078 does not contain a Climatic and Environmental Conditions State (i.e. OPE-xx) fitting all PRT TDCIS Operational Use Cases. To that end, OPE-1c is defined in the next section.

2.7.2 Climatic and Environmental Specification for Deployable CIS Assets to be used in tactical exposure conditions (OPE-1c)

SRS (PRTTDCIS-4035)

OPE-1c State, as defined in this section, shall be considered the same as any other OPE-xx from TN-1078.

SRS (PRTTDCIS-4036)

OPE-1c compliant Elements shall withstand High Temperature as follow:

- +60 degree Celsius for operation; and,
- +78 degree Celsius for transport, storage and handling.

SRS (PRTTDCIS-4037)

OPE-1c compliant Elements shall withstand Low Temperature as follow:

- 0 degree Celsius for operation; and,
- -20 degree Celsius for transport, storage and handling.

SRS (PRTTDCIS-4038)

OPE-1c compliant Elements shall withstand Change of Temperature (temperature shock) as follow:

- For heat radiating devices, 13.4 degree Celsius/min during equipment switch-on. For non-heat radiating devices, or during steady operation, 0.12 degree Celsius/min; and,
- 0.12 degree Celsius/min for natural conditions during transport. 3.5 degree Celsius/min if equipment may be subject to air drops. When moved from open environment into an acclimatised area, the equipment in the applicable storage /transport packaging shall withstand the maximum expected temperature variation of 63 degree Celsius; and,
- 0.12 degree Celsius/min for natural conditions during storage and handling. When moved from open environment into an acclimatised area, the equipment in the applicable storage/transport packaging shall withstand the maximum expected temperature variation of 63 degree Celsius.

SRS (PRTTDCIS-4039)

OPE-1c compliant Elements shall withstand Solar Radiation up to 1120 W/m² for operation, transport, storage and handling.

SRS (PRTTDCIS-4040)

OPE-1c compliant Elements shall withstand Humidity from 5% to 95% for operation, storage, transport and handling with the applicable change of temperature.

SRS (PRTTDCIS-4041)

OPE-1c compliant Elements shall withstand Rainfall up to 2.38 mm/min for storage, transport and handling, with short duration peaks of up to 41.5 mm/min.

SRS (PRTTDCIS-4042)

OPE-1c compliant Elements shall withstand Ice up to 37 mm for transport, storage and handling.

SRS (PRTTDCIS-4043)

OPE-1c compliant Elements shall withstand Hailstones up to 25 mm diameter, 0.9 g/m³ density and 58 m/s terminal velocity for transport, storage and handling.

SRS (PRTTDCIS-4044)

OPE-1c compliant Elements shall withstand Snow Load up to 50 kg/m² for transport, storage and handling.

SRS (PRTTDCIS-4045)

OPE-1c compliant Elements shall withstand Dust and Sand particle size and concentration as follow:

- Up to 2.0 g/m³ of 150 micrometer particles for operation, transport, storage and handling. Sedimentation rate as high as 2.0 g/m²/day; and,
- Average particle hardness of 7 in the Mohs scale, occasionally reaching 9 on that scale.

SRS (PRTTDCIS-4046)

OPE-1c compliant Elements shall withstand Maximum elevation as follow:

- 4,570 m for operation, storage and handling; and,
- 12,000 m for transport.

SRS (PRTTDCIS-4047)

OPE-1c compliant Elements shall withstand Maximum and minimum atmospheric pressure from 1,087 mbar to 154 mbar for operation, transport, storage and handling.

SRS (PRTTDCIS-4048)

OPE-1c compliant Elements shall withstand Shock at a minimum peak value of 10G and pulse duration of 11ms for operation, transport, storage and handling.

SRS (PRTTDCIS-4049)

OPE-1c compliant Elements shall withstand Vibration as defined for OPE-1a.

SRS (PRTTDCIS-4050)

OPE-1c compliant Elements shall withstand Acceleration as defined for OPE-1a.

SRS (PRTTDCIS-4051)

OPE-1c compliant Elements shall withstand Bump at 10g, 6ms, 1000 pulses for operation, transport, storage and handling.

SRS (PRTTDCIS-4052)

OPE-1c compliant Elements shall withstand Drop and topple at a 30 degree angle face and corner during operation, transport, storage and handling.

SRS (PRTTDCIS-4053)

OPE-1c compliant Elements shall withstand Free Fall for operation, transport, storage and handling as follow:

- 1000 mm for items <2 kg; and,
- 500 mm for items from 2 kg to <5 kg; and,
- 250 mm for items from 5 kg to <10 kg; and,
- 100 mm for items from 10 kg to <50 kg.

SRS (PRTTDCIS-4054)

OPE-1c compliant Elements shall comply with IP rating as follow:

- IP67 for operation, transport, storage and handling for outdoor cables and connectors; and,
- IP65 for operation, transport, storage and handling for outdoor enclosures; and,
- IP54 for outdoor antennas and associated electronics/ mechanisms, when in operation, and IP55 when in transport, storage and handling; and,
- IP42 for outdoor portable terminals when in operation, and IP55 when in transport, storage and handling; and,
- IP41 for outdoor use handheld terminals when in operation, and IP55 when in transport, storage and handling.

SRS (PRTTDCIS-4055)

OPE-1c compliant Elements shall withstand Salt mist environments at severity level 4, as described in TN-1078, Section K.3.1.5, for all operation, transport, storage and handling.

SRS (PRTTDCIS-4056)

OPE-1c compliant Elements shall withstand, in the pertaining operating configuration (i.e., when properly mounted in the intended assembly), occasional exposure to the acid rainfall conditions existing in heavily industrialized areas or in the proximity of fuel burning machinery or vehicles exhaust systems.

SRS (PRTTDCIS-4057)

OPE-1c compliant Elements shall withstand occasional contamination by exposure to the contaminant fluids listed in MIL-STD-810H, Table 504.3-I.

2.8 CIS Security

SRS (PRTTDCIS-1155)

All the CIS equipment involving firmware and software, and integrated into or directly supporting the (D)POP, shall be hardened in accordance with the Purchaser's standard security hardening settings, to be provided after Contract Award (CAW).

SRS (PRTTDCIS-1156)

Each CIS Module shall be implemented with distinct physically independent elements per security domain.

SRS (PRTTDCIS-1227)

The (D)POP shall employ technology solutions that conforms to the NATO Technical and Implementation Directive on CIS Security AC/322-D/0048-REV3 (hereafter referenced as D48Rev3).

SRS (PRTTDCIS-4320)

User Password credentials shall comply with NATO approved password hashing algorithms as per AC/322-D(2012)0022, 2020 policy.

SRS (PRTTDCIS-4073)

Any element including passwords shall allow modification of these passwords.

NOTE (PRTTDCIS-4319)

The NATO Information Assurance Product Catalogue (NIAPC - <https://www.ia.nato.int/niapc/>) provides NATO nations, and NATO civil and military bodies with a catalogue of Information Assurance (IA) Products, Protection Profiles and Packages that are in use or available for procurement to meet operational requirements.

2.9 EMC and EMSEC

NOTE (PRTTDCIS-1142)

Electromagnetic Compatibility (EMC) is a measure of a device's ability to operate as intended in its shared operating environment while, at the same time, not affecting the ability of other equipment within the same environment to operate as intended.

NOTE (PRTTDCIS-4058)

Electromagnetic Interference (EMI), is a disturbance generated by an electrical device, an electronic device or natural sources that can adversely affect (by electromagnetic induction, electrostatic coupling, or conduction) the performance of other electrical or electronic device located within the same environment.

NOTE (PRTTDCIS-2389)

Emission Security (EMSEC) is an analysis of a system's vulnerability to unauthorized access and subsequent exploitation as a result of issues with electromagnetic emanations from hardware.

NOTE (PRTTDCIS-1143)

TEMPEST concerns preventing attacks using compromising radio frequency emanations.

SRS (PRTTDCIS-1144)

All CIS Nodes, Modules and their electric and electronic components shall comply with the EMC requirements as contained in the *MIL-STD-461G*, latest edition (hereafter referred to as MIL-STD-461G).

SRS (PRTTDCIS-3336)

All CIS Nodes, Modules and their electric and electronic components shall comply with the Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

SRS (PRTTDCIS-1145)

All CIS Nodes, Modules and their electric and electronic components (inc. EUD) shall be compliant with *SDIP-29/2*, (hereafter referred to as SDIP-29/2).

SRS (PRTTDCIS-1146)

SDIP-29/2 compliance shall take into consideration the RED/BLACK separation on power lines, equipment and associated data lines (i.e. filters on power lines, minimum distance between RED and BLACK lines, and between RED and BLACK equipment, when operated).

SRS (PRTTDCIS-4059)

All CIS Nodes, Modules and their electric and electronic components shall be compliant with *CIS Security Technical and Implementation Directive on Emission Security, AC/322-D(2019)0021(INV)*, latest edition.

NOTE (PRTTDCIS-2396)

Unless stated otherwise, Fiber cables will be preferred on xS to avoid the need for separation.

SRS (PRTTDCIS-2469)

TEMPEST testing and certification shall only be performed by approved providers listed on the NIAPC.

SRS (PRTTDCIS-1150)

When not implemented at Component level, all CIS Nodes and Modules shall implement power filter within their housing element (e.g. transit case or shelter) as per SDIP 29/2.

SRS (PRTTDCIS-2470)

The contractor shall implement Power filters with a minimum attenuation of 60 dB over the frequency range from 100 kHz to 1 GHz (as per SDIP-29/2). Power filters shall be sourced from approved vendors listed in the NIAPC.

SRS (PRTTDCIS-1151)

It shall be possible to restore TEMPEST sealing, in theatre, following the replacement of one or more components.

SRS (PRTTDCIS-2471)

~~If Copper cables are used on xS, then shielding shall be carried out.~~

2.10 International Mobile Telecom

NOTE (PRTTDCIS-4060)

Different International Mobile Telecommunication (IMT) terms and names, referring to technology elements, families and generations, are utilized throughout this document. The following are the terminology conventions followed throughout this Document.

NOTE (PRTTDCIS-4061)

The 3rd Generation Partnership Project (3GPP) is a worldwide recognized specifications body, whose specifications meet the International Telecommunication Union (ITU) targets for IMT systems. 3GPP specifications ensure multinational and multi-manufacturer interoperability. When accepted by ITU, 3GPP specifications are adopted as ITU standards.

SRS (PRTTDCIS-4062)

Public Mobile Network Operators (MNO) or Private Provider shall be understood as the entity responsible for the procurement, operation and maintenance of IMT networks and enabling services and applications to users.

SRS (PRTTDCIS-4063)

IMT User Equipment (IMT-UE) shall be understood as the mobile device, which can take the form of several instantiations (smart personal devices, terminals, dongles, embedded devices, etc.) and provides access to the public MNO or private provider services and applications.

SRS (PRTTDCIS-4064)

Radio Access Network (RAN) shall be understood as the fixed infrastructure, owned and operated by a public MNO or private provider, with the role to wirelessly connect IMT-UE and the public MNO / private provider fixed network.

SRS (PRTTDCIS-4065)

Radio Access Technology (RAT) shall be understood as the underlying technology, typically operating at the physical and data link layers, which enables the wireless connection between IMT-UEs and the RAN.

SRS (PRTTDCIS-4066)

IMT Core Network (IMT-CN) shall be understood as the fixed infrastructure, owned and operated by a public MNO or private provider, with the role to provide network functions (control, management, billing ,etc.) and data transport services, connecting the IMT-UE to a data network (usually the Public Internet).

SRS (PRTTDCIS-4067)

UMTS shall be understood as 3GPP's Universal Mobile Telecommunications System (UMTS) family of technologies with:

- UMTS Terrestrial Radio Access Network (UTRAN) being the radio interface technology of the UMTS system; and,
- UMTS Core Network being the infrastructure providing the network functions and data transport services of the UMTS system.

SRS (PRTTDCIS-4068)

LTE shall be understood as the 3GPP's Long-Term Evolution (LTE) family of technologies with:

- Evolved Universal Terrestrial Radio Access (E-UTRA) being the radio interface technology of the LTE system; and,
- Evolved Packet Core (EPC) being the infrastructure providing the network functions and data transport services of the LTE system.

SRS (PRTTDCIS-4069)

A 5G system shall be understood as 3GPP's technologies superseding LTE technologies with:

- 5G New Radio (5G NR) being the radio interface technology of the 5G system; and,
- 5G Core (5GC) being the infrastructure providing the network functions and data transport services of the 5G system.

SRS (PRTTDCIS-4070)

3G shall be understood as the 3rd generation technologies meeting the IMT2000 standards from ITU, from UMTS-family of 3GPP releases (3GPP Release 99 to 7) up to early LTE-family of releases (3GPP Release 8 and 9) .

SRS (PRTTDCIS-4071)

4G shall be understood as the 4th generation technologies meeting the IMT-Advanced standards from ITU, from LTE-family of 3GPP Release 10 onwards.

SRS (PRTTDCIS-4072)

5G (as a generation) shall be understood as the 5th generation technologies meeting the IMT-2020 standards from ITU, by LTE-family of 3GPP releases and by 5G family of 3GPP releases from Release 15 onwards.

2.11 Timing

SRS (PRTTDCIS-1157)

Elements requiring timing shall primarily rely on the Network Time Protocol (NTP) feed from the static infrastructure when available.

SRS (PRTTDCIS-4074)

The Contractor shall design the (D)POP in such a way that its Elements will continue to operate without performance degradation even if NTP feed becomes unavailable.

2.12 Electricity**2.12.1 General****SRS** (PRTTDCIS-2310)

Electrical design and installation shall be compliant with following publications:

- Directive 2014/35/EU of The European Parliament and of The Council of 26 February 2014 – ‘low voltage directive’ ; and,
- EN 50110-1:2013 Operation of electrical installations. General requirements ; and,
- IEC 60364 series - Low-voltage electrical installations ; and,
- IEC 60309 series - Plugs, socket-outlets and couplers for industrial purposes ; and,
- IEC 61508:2010 - Functional safety of electrical/electronic/programmable electronic safety-related systems – Parts 1 to 7.

SRS (PRTTDCIS-3106)

Trailer electrical design and installation shall comply with STANAG 2601 edition 4 and associated Allied Engineering Publication (AEP) – 2601 Edition A, version 1.

SRS (PRTTDCIS-3829)

230VAC shall be understood as per IEC 60038 standard.

SRS (PRTTDCIS-3818)

All 230VAC power plugs shall be of CEE 7/7 type, compatible with both type E (French) and type F (Schuko) power sockets.

SRS (PRTTDCIS-2149)

Electrical distribution shall be in accordance to Portuguese National Regulations.

2.12.2 Electrical Grounding**SRS** (PRTTDCIS-4082)

The power distribution and conditioning shall implement a grounding and potential equalization system, which shall provide effective protection for personnel.

SRS (PRTTDCIS-4083)

All metallic frames, transformers and electrical apparatus shall be connected to the frame ground.

SRS (PRTTDCIS-4084)

All metallic panels and covers shall be fastened or connected to the associated frame, in a manner that ensures that they are securely grounded.

SRS (PRTTDCIS-4085)

Safety grounding and potential equalization shall be implemented in accordance with safety regulations, including IEC 60364-5-54:2011 and AMD1:2021 CSV.

2.12.3 Uninterruptible Power Supply

SRS (PRTTDCIS-1792)

Uninterruptible Power Supply (UPS) shall provide protection against data loss and CIS components damage due to power failures, voltage dips, voltage spikes, under voltage, overvoltage, switching spikes, interference voltages, frequency changes and harmonic distortion.

SRS (PRTTDCIS-4075)

UPS shall be compliant with:

- 1) IEC 62040-1:2017/COR1:2019 Corrigendum 1 - Uninterruptible power systems (UPS) - Part 1: Safety requirements; and,
- 2) IEC 62040-2:2016 Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements; and,
- 3) IEC 62040-3:2011 Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements; and,
- 4) IEC 62040-4:2013 Uninterruptible power systems (UPS) - Part 4: Environmental aspects - Requirements and reporting.

SRS (PRTTDCIS-4076)

UPS shall meet following requirements:

- 1) On line, double conversion type; and,
- 2) Power factor: 0.9; and,
- 3) Total Harmonic Distortion (THD): < 5% in accordance with IEC TS 61000-3-4; and,
- 4) System efficiency: > 90% at full load; and,
- 5) Soft start; and,
- 6) Zero transfer time; and,
- 7) Surge suppressor; and,
- 8) Static bypass for overload; and,
- 9) Manual bypass for maintenance; and,
- 10) Battery monitoring; and,
- 11) Protection against deep discharge of batteries; and,
- 12) Hot swappable (replacement of the batteries shall be possible without powering down the UPS), rechargeable and user replaceable batteries; and,
- 13) The sound pressure level shall not exceed 65 dB(A) at 1 meter distance in accordance with ISO 3746:2010.

SRS (PRTTDCIS-4077)

UPS batteries shall be provided with Material Safety Data Sheet (MSDS) as required by International Civil Aviation Organization (ICAO), and International Air Transportation Association (IATA) for air transportation of dangerous goods.

SRS (PRTTDCIS-4078)

The battery MSDS shall confirm the batteries testing and certification according to United Nations publication: *Manual of Tests and Criteria for Transportation of Dangerous Goods, part III, subsection 38.3, transport class 9.*

SRS (PRTTDCIS-4079)

UPS batteries shall be capable of operating safely in a low ventilation environment.

SRS (PRTTDCIS-4080)

Minimum operating life-time of UPS batteries shall be FIVE (05) years.

SRS (PRTTDCIS-4081)

UPS shall take single phase Mains/Generator TN-S Supply in accordance with the International Electrotechnical Commission, (IEC) 60038 standard, to power and operate Elements.

NOTE (PRTTDCIS-4509)

In architecture diagrams, UPS are shown as included in housing elements. However, UPS implementations are Design Driven. e.g. it may be implemented as a single system supporting multiple elements in the same housing solution, as an embedded or extension of a single element or any combination of those, as long as the UPS implementation does not impact any Functional and Technical Requirements, Implementation Constraints and Performance Targets.

2.13 Lightning Protection

SRS (PRTTDCIS-2198)

The contractor shall design the most suitable solution for the (D)POP to ensure lightning protection of (D)POP Elements and human life.

SRS (PRTTDCIS-2202)

The Elements shall not be damaged and shall continue to operate without degradation when subjected to the lightning waveforms conforming to STANAG 4370 edition 7, AECTP 250 - leaflet 254 atmospheric electricity and lightning.

SRS (PRTTDCIS-2203)

Appropriate Surge Protection Devices (SPD) and other lightning protection measures shall be compliant with following publications:

- IEC 61643-11:2011 ; and,
- IEC 62305:2022 SER ; and,
- IEC 61643-21:2000+AMD1:2008+AMD2:2012 CSV ; and,
- IEC 61643-22:2015.

SRS (PRTTDCIS-2204)

Where applicable, the earth electrode (e.g. wire and penetration rods) system shall be able to handle the lightning current for dispersal into the ground.

SRS (PRTTDCIS-2199)

The Lighting Protection System and Grounding System shall be in in compliance with IEC 62305:2022 SER and IEC 60364 series.

SRS (PRTTDCIS-3212)

SPD shall be provided of at least T1+T2 class for Alternating Current (AC) supply systems and T3 for sensitive communication systems.

SRS (PRTTDCIS-4632)

SPD shall be provided of at least T2 class for Direct Current (DC) supply systems.

SRS (PRTTDCIS-4086)

The (D)POP Lightning Protection and EMI/EMC measures shall be compatible with each other.

SRS (PRTTDCIS-4087)

The grounding cable for Lightning Protection, where applicable, shall be minimum 10 meters long.

2.14 Environmental Control

SRS (PRTTDCIS-3101)

Environmental Control Units (ECU) design and implementation shall be compliant with following publications:

- Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 (on substances that deplete the ozone layer); and,
- Pressure Equipment Directive 2014/68/EU, CE marked and provided with EC Declaration of Conformity; and,
- Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006; and,
- EN – 378 series: Refrigerating systems and heat pumps. Safety and environmental requirements.

SRS (PRTTDCIS-3102)

The ECU shall be of so called “on/off”-design avoiding use of inverter.

SRS (PRTTDCIS-3103)

The ECU refrigerant shall be NON-flammable according to EN 378-3:2016+A1:2020.

SRS (PRTTDCIS-3104)

Hydrofluoroolefines (HFO) refrigerants shall not be used.

2.15 Road Regulation

SRS (PRTTDCIS-2264)

Trailers shall comply with all applicable regulations of Portugal.

SRS (PRTTDCIS-2483)

Trailer shall be designed and manufactured to comply with applicable European Union (EU) safety regulations, standards and requirements.

SRS (PRTTDCIS-3118)

Trailer shall be compliant with the following publications:

- Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefor; and,
- Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC.

SRS (PRTTDCIS-2490)

With its delivery each trailer shall be provided with expert reports by competent test organizations to prove the compliance with public road traffic and public road traffic licensing regulations, safety regulations and accident preventing regulations in accordance with EU Directives mentioned below.

SRS (PRTTDCIS-2491)

Trailers shall be supplied with the necessary documents required for its registration in Portugal.

SRS (PRTTDCIS-2493)

Trailers shall be provided with:

- EU Type-approval Certificate, EU Certificate of Conformity in accordance with Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC; and,
- Roadworthiness Certificate in accordance with Directive 2014/45/EU of the European Parliament and of the Council of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailers and repealing Directive 2009/40/EC; and,
- ADR Certificate in accordance with Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) applicable as from 1 January 2021.

2.16 Transportation

SRS (PRTTDCIS-2265)

When in the Storage/Transportation mode, the trailer and the shelter weight with all the equipment it carries shall be distributed as evenly as possible over the trailer frame in accordance with STANAG 2236 Multimodal Transport Issues - AMovP-5.

SRS (PRTTDCIS-2494)

Trailers and shelters shall be designed and manufactured to be towed and transported by road (paved and unpaved), rough terrain, railway, sea (on and under deck of merchant or navy vessels), and air (e.g. C130H, KC 390).

SRS (PRTTDCIS-2498)

All equipment and components shall be sufficiently robust to remain undamaged when correctly secured and transported across country on trailers and vehicles, on board of vessels or aircraft.

SRS (PRTTDCIS-2492)

An authorized technical surveillance authority shall approve the mechanical and electrical safety of Trailers. This includes the allowance for transport of the fully equipped trailer (with Power Generators, Antenna...) on public roads, aircrafts, trains and ships.

SRS (PRTTDCIS-2495)

Trailer equipped with its payload (Power Generators, Antenna ...) shall be capable to Roll On/Roll-Off (RO-RO) during loading/off-loading a C-130 and KC 390 for air transportation.

SRS (PRTTDCIS-2497)

In order to meet RO-RO requirements, the trailer equipped with its payload (Power Generators, Antenna ...), shall be able to negotiate the maximum required ramp angle and shall comply with the applicable weight, dimensions and stowage criteria.

SRS (PRTTDCIS-2496)

The preparations of the trailer before loading on the aircraft shall be limited to activities that can be executed in not more than 60 minutes by a trained crew of two (2) without any specialized equipment. This stipulated time limit includes preparation activities for RO-RO of complete configuration of the trailer equipped with its payload (Power Generators, Antenna, etc.).

2.17 Supportability

2.17.1 General

NOTE (PRTTDCIS-3308)

The system will represent the simplest design consistent with functional requirements and expected operational conditions and will be capable of being operated and maintained in its operational environment by personnel with a minimum of training.

NOTE (PRTTDCIS-3309)

For Reliability, Maintainability, Testability and Availability definitions and methods please refer to:

- MIL-HDBK-338B : Electronic Reliability Design; and,
- IEC 61078:2006 : Analysis techniques for dependability - Reliability block diagram and Boolean methods; and,
- MIL-STD-756B : Reliability Modelling and Prediction; and,
- SR-332 : Reliability Prediction Procedure for Electronic Equipment; and,
- MIL-HDBK-781 : Reliability test methods, plan and environments for engineering development, qualification and production; and,
- MIL-HDBK-470A : Design and developing of maintainable systems; and,
- IEC 60812:2018 : Failure modes and effects analysis (FMEA and FMECA); and,
- MIL-STD-1629A : Failure Mode Effect and Criticality Analysis.

NOTE (PRTTDCIS-3310)

For Maintenance Level definitions please refer to the *Maintenance and Support Concepts* Annex of the SOW.

NOTE (PRTTDCIS-3311)

For Human Engineering design criteria for supportability please refer to MIL-STD-1472G.

2.17.2 Reliability

SRS (PRTTDCIS-3312)

The system shall be designed such that a failure or removal of a component or item in the entities equipment does not cause a physical and, or functional failure of another component or item.

SRS (PRTTDCIS-3313)

The TDCIS Mean Time Between Failures (MTBF) shall be greater than 800 hours in Ground Fixed environment (ref. MIL-HDBK-338B) using certified failure rates data at component level.

SRS (PRTTDCIS-3314)

The TDCIS Mean Time Between Critical Failures (MTBCF) shall be greater than 1200 hours in Ground Fixed environment (ref. MIL-HDBK-338B) using certified failure rates data at component level.

2.17.3 Maintainability**SRS** (PRTTDCIS-3315)

Mean Time To Repair (MTTR) per relevant Maintenance Levels both Hardware (HLs) and Software including Firmware (SLs) shall be:

- 1) MTTR for HL/SL1 and HL/SL2 < 30 min; and,
- 2) MTTR for HL/SL3 < 120 min.

SRS (PRTTDCIS-3316)

Mean Time To Restore Service (MTTRS) per relevant Maintenance Levels both Hardware (HLs) and Software including Firmware (SLs) shall be:

- 1) MTTRS for HL/SL1 and HL/SL2 < 20 min
- 2) MTTRS for HL/SL3 < 60 min

2.17.4 Testability**SRS** (PRTTDCIS-3317)

Fault Detection (FD) rate shall be greater than 95% through Built-In Test (BIT) capable of on-line detection of failure modes.

SRS (PRTTDCIS-3318)

Fault Isolation (FI) rate without ambiguity shall be greater than 90% through Built-In Test (BIT) capable to isolate the detected internal function/component in failure.

SRS (PRTTDCIS-3319)

The Built-in-Test (BIT) shall give a fault indication down to at least the level of Line Replaceable Unit (LRU).

SRS (PRTTDCIS-3320)

BIT fault detection and isolation resultant information shall be recorded in electronic logs.

2.17.5 Product Support

SRS (PRTTDCIS-3321)

Maintenance Levels apportionment for hardware and software including firmware for corrective and unscheduled maintenance tasks weighted with the relevant failure rate shall be:

- 1) (Critical + Non-Critical) Failures for HL1-2/SL1-2 > 80%; and,
- 2) Critical Failures for HL1-2/SL1-2 > 94%; and,
- 3) (Critical + Non-Critical) Failures for HL3/SL3 < 15%; and,
- 4) Critical Failures for HL3/SL3 < 6%; and,
- 5) (Critical + Non-Critical) failures HL4/SL4 < 5%; and,
- 6) Critical Failures for HL4/SL4 = 0%.

SRS (PRTTDCIS-3322)

The annual average hours workload for preventive and scheduled maintenance (up to HL3/SL3) shall not exceed (x10) 10 times the relevant annual average hours workload for corrective and unscheduled maintenance (up to HL3/SL3). To be considered for critical and non-critical failures.

SRS (PRTTDCIS-3323)

Maintenance tasks shall not involve more than TWO (02) persons for Organizational Maintenance (Level 2) HL/SL2 or lower.

SRS (PRTTDCIS-3324)

The SW updates and setting shall be Software Organizational Maintenance (Level 2) SL2 or lower.

SRS (PRTTDCIS-3325)

Removable items shall weigh:

- 1) less than 16.8 kilograms (37 pounds) for more than 99% of LRUs with direct accessibility; and,
- 2) less than 11.3 kilograms (25 pounds) for more than 99% of LRUs accessible through removal of part or component that is functioning.

SRS (PRTTDCIS-3326)

Items over 16.8 kilograms (37 pounds) shall be designed for two-person handling.

SRS (PRTTDCIS-3327)

The combination of BIT and troubleshooting in Technical Publications shall allow for the fault isolation of 100% of detected failures.

SRS (PRTTDCIS-3512)

The maximum allowable down time when the equipment is deployed shall not exceed 8 hours to fix a fault (i.e. Unscheduled/Corrective Maintenance due to one critical failure or sequence of non-critical failures that lead to a loss of critical function).

SRS (PRTTDCIS-3513)

The maintenance plan shall consider ad hoc pre deployment and post deployment maintenance actions to allow no down time (i.e. zero hours) due to scheduled maintenance and preventive maintenance during deployment.

2.17.6 Parts Obsolescence**SRS** (PRTTDCIS-3328)

The system shall be designed for a service life of at least 15 years with mid-life upgrade to allow enhancements and obsolescence removal activities with relevant design change with a planned and controlled level of risk and cost.

SRS (PRTTDCIS-3329)

The system design shall permit to change a specific functional block while maintaining the overall architecture unchanged.

2.18 Availability**NOTE** (PRTTDCIS-1507)

Services are organised as follow:

- 1) Communications Services, consisting of:
 - 1) Transmission Services;
 - 2) Transport Services;
 - 3) Protected Core Access (PCA) Services;
 - 4) Coloured Cloud Access (CCA) Services, at xU, xR and xS levels, including interworking with Mission Network Participants (MNP) (on xU and xS);
 - 5) Multimedia Access (MMA) Services, at xU, xR and xS level, including interworking with MNP (on xU and xS).
- 2) Infrastructure Services, in turn enabling:
 - 1) Business Support Services, including Local Cross-Domain Services;
 - 2) Community Of Interest (COI) Services;
 - 3) Service Management and Control (SMC) Services;
 - 4) CIS Security Services.

NOTE (PRTTDCIS-2923)

DPOP Availability Targets are formulated for Communications Services and Infrastructure Services provided by the various CIS elements of the DPOP.

NOTE (PRTTDCIS-2924)

Intrinsic availability calculation methods are taken into consideration for the assigned system availability targets.

NOTE (PRTTDCIS-2925)

Availability Targets assume the following:

- 1) No outages related to misconfiguration or misuse of the systems concerned; and
- 2) Mean logistics delay time is zero; and
- 3) Availability targets of the enabling services, as formulated here.

NOTE (PRTTDCIS-2926)

Availability Targets for Service Management and Control and CIS Security are not separately specified. Instead, they are subsumed into Communications services, as they are enabling/transversal to them.

NOTE (PRTTDCIS-2927)

From the assumptions above, service continuity and recovery from outages are solely contingent upon the intrinsic availability of the hardware and firmware supporting those systems, including any non-CIS elements related to the integration and operation of the integrated hardware.

SRS (PRTTDCIS-2928)

The design shall be driven by the intrinsic availability targets for the hardware and firmware, in order to achieve the stated minimum DPOP availability levels.

2.19 Paint and Corrosion

SRS (PRTTDCIS-1367)

All external visible surfaces of outdoor assemblies and subassemblies of Housing Elements, Nodes, Modules and Components (e.g. Shelters, Trailers, Cases, Antenna, Mast, ODU ...) shall be painted in RAL 840R 6014, non-gloss or equivalent.

SRS (PRTTDCIS-1368)

The exterior paint finish shall be guaranteed for a minimum of ten (10) years without signs of deterioration.

SRS (PRTTDCIS-3845)

The exterior paint finish shall ensure an anti-corrosion protection of a minimum C5I (Very High) as per ISO 12944-5:2019.

SRS (PRTTDCIS-3182)

There shall be no shiny, reflective, bright color or light visible on the equipment, this applies during transit, transport and operation. When surfaces cannot be treated by painting, an alternative solution shall be provided (i.e. protection by a specific cover).

SRS (PRTTDCIS-3183)

Paint of all external surfaces for all outdoor assemblies and sub-assemblies (Housing Elements, CIS Components (e.g. Antenna, Mast, ODU, etc.) shall meet requirements of STANAG 4360, Edition 3 and its associated AEPs:

- AEP-64, Edition A, Version 1: Performance requirements for paint systems resistant to chemical agents and decontaminants, for the protection of land military equipment; and,
- AEP-65, Edition A, Version 1: Performance requirements and test method for paint systems resistant to chemical warfare agents.

SRS (PRTTDCIS-4088)

Elements shall be made of non-corroding metallic materials.

SRS (PRTTDCIS-4089)

Dissimilar metals shall not be used in intimate contact unless suitably protected against electrolytic corrosion.

3 High Level Specification

3.1 General

NOTE (PRTTDCIS-1213)

The TDCIS is a modular system that can support operations up to Brigade level. It can also support smaller deployments with a subset of the full system, to both Battalion or Company level operations.

NOTE (PRTTDCIS-1216)

The TDCIS will not support any deployment larger than a full Brigade.

NOTE (PRTTDCIS-1214)

The operations to be supported are either within the National or Multi-national environment, in response to an agreed level of support with NATO or other allied countries.

NOTE (PRTTDCIS-1217)

The TDCIS is layered in following meshes:

- Brigade level (highest tactical command) to National Defence Network (NDN) over SATCOM with an HF fallback capability;
- Internal Brigade and Brigade towards Battalion over the tactical backbone mesh network;
- Internal Battalion over the tactical backbone mesh network;
- Battalion to Company and Company to Company over direct radio based connection;
- Company to Platoons over tactical radios.

NOTE (PRTTDCIS-1218)

Each echelon will have typical Functional Application Services (FAS) relative to their Information Exchange Requirements (IER).

NOTE (PRTTDCIS-1445)

The TDCIS will be configured with an initial mission data set prior to the deployment. This will be done in the garrison Mission Preparation Center (MPC).

NOTE (PRTTDCIS-1188)

The TDCIS is composed of different Nodes installed in shelters. The shelters are mounted on all-terrain vehicles so that they can be located in the operational scenario as per the mission requirements. Vehicles are not in scope of this project.

NOTE (PRTTDCIS-1189)

The TDCIS operates as a stand-alone system, as a NDN extension or any combination of both.

NOTE (PRTTDCIS-1200)

The TDCIS can work either as a whole system, or in smaller subsets; e.g. a subset that supports a Battalion deployment, in this latter case the required nodes for the Battalion being a subset of the full TDCIS.

NOTE (PRTTDCIS-3248)

The TDCIS, or some of its sub-elements, will be configured with a Mission Data Set, specific to the mission and prior to the deployment. This will be performed by PRT staff in the Mission Preparation Centre (MPC). MPC is not a deliverable of this project.

NOTE (PRTTDCIS-1201)

As illustrated on the following figure, six different node variants build up the full system capability. These nodes are:

- **Access Node (AN):** Provides Brigade echelon users with a set of communications and information systems required to support the command and control action of the respective Commander;
- **Battalion Communication Centre (BCC):** Provides Battalion echelon users with the set of communications and information systems required to support the command and control action of the respective Commander;
- **Company Communication Centre (CCC):** Provides Company echelon users with the set of communications and information systems required to support the command and control action of the respective Commander;
- **Transit Node (TN):** Provides a backbone network node. Assures the automatic routing of information through a set of redundant connections and different types of physical media in order to create the tactical network backbone;
- **Radio Access Point (RAP):** Provides full integration of tactical mobile user in TDCIS communications infrastructure;
- **Rear Link (RL):** Provides reach-back capability to the static infrastructure.

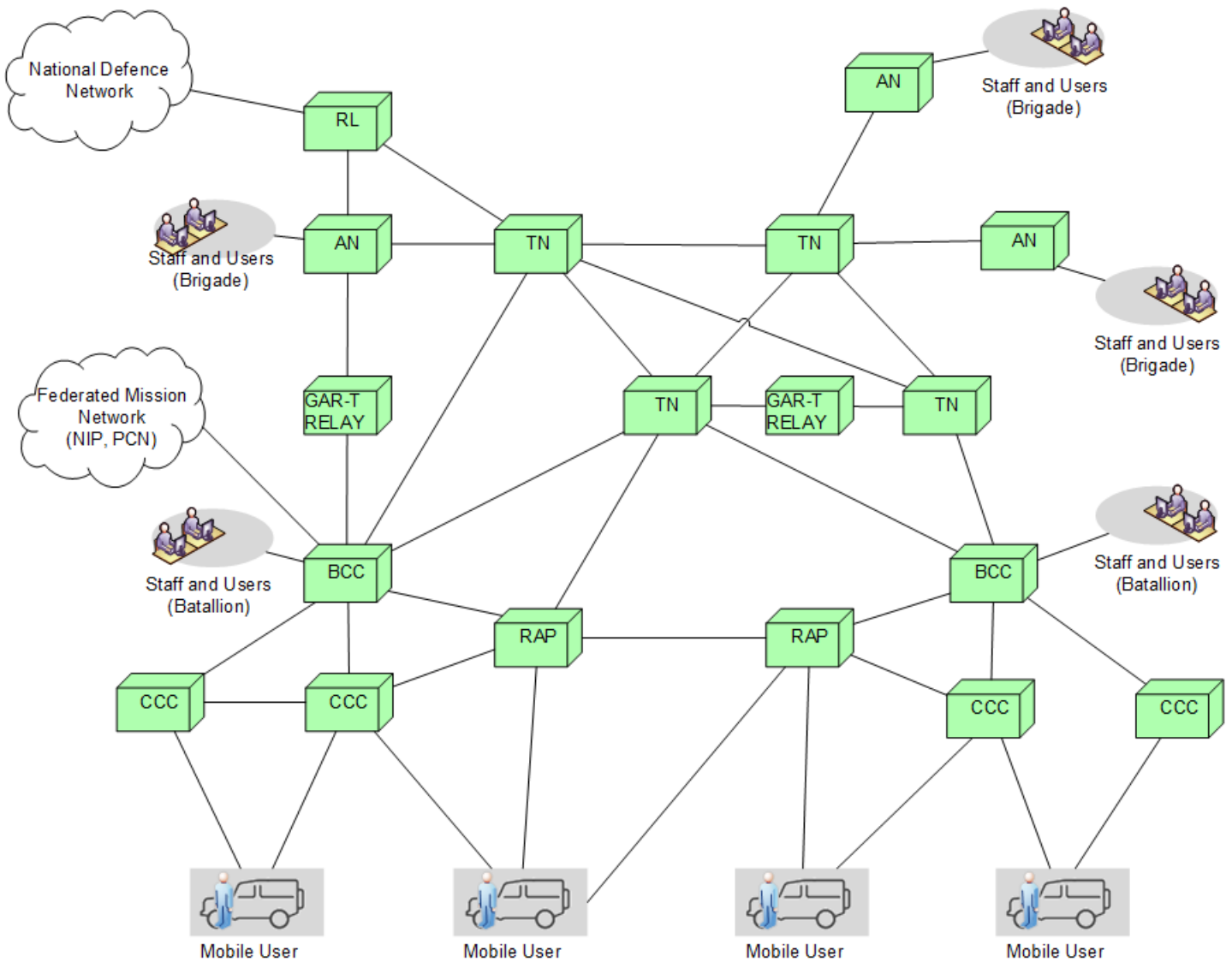


Figure 5 - TDCIS Nodes in context

NOTE (PRTTDCIS-1190)

The backbone of the TDCIS is composed of TN that create an independent wireless and/or wired network infrastructure that interconnects AN, BCC, RAP, CCC and RL nodes.

NOTE (PRTTDCIS-1191)

In the lower level backbone of the network, the BCC connects to the CCC and to the RAP over direct wireless and/or wired links.

NOTE (PRTTDCIS-1192)

Side-standing CCC can connect with each other through wired or wireless links.

NOTE (PRTTDCIS-1443)

The wireless node to node connection is ensured by

- The High Capacity Line Of Sight (HCLOS) radio system between AN, BCC, TN, RAP and RL; and,
- The Mini-Line of Sight (Mini-LOS) radio system between BCC and CCC; and,
- The Broadband IP Radio system for AN, BCC, CCC and RAP nodes.

NOTE (PRTTDCIS-1193)

Mobile Users (vehicles other than the TDCIS vehicles) and dis-mounted soldiers are connected to the TDCIS through the RAP or through the CCC, using the Combat Net Radio (CNR) or The Broadband IP Radio System.

NOTE (PRTTDCIS-1194)

The reach back to the NDN of Portugal from TDCIS is achieved through the RL node, which can be wire-connected to either an AN, TN, BCC, RAP or CCC. This will allow PRT to deploy standalone Battalions and Companies. The RL connects to the NDN through SATCOM or HF Transmission Systems.

NOTE (PRTTDCIS-4633)

The connectivity concept described in this section is not meant to be limitative. Ultimately, any TDCIS Node can connect to any other TDCIS Node as long as they share compatible Transmission Systems.

NOTE (PRTTDCIS-1204)

AN, BCC and CCC are nodes supporting users directly connected to them. TN, RAP and RL are nodes which create the required TDCIS network connectivity.

NOTE (PRTTDCIS-1202)

Besides the nodes, the TDCIS also includes a pool of GAR-T HCLOS Relay variant trailers that can either:

- be assigned to any node to enable or augment its HCLOS capacity; or
- be used to extend the reach of a HCLOS links.

NOTE (PRTTDCIS-4467)

Besides the nodes, the TDCIS also includes a NS Kit which extends the TDCIS and its Nodes with access to NS services hosted in the Theatre but also from the Federation with Mission Partners.

NOTE (PRTTDCIS-4386)

The TDCIS includes Pooled Elements to be used by the Customer to augment, upgrade or enable TDCIS Nodes with more functionalities.

NOTE (PRTTDCIS-2932)

The breakdown of the TDCIS is illustrated in the following figure.

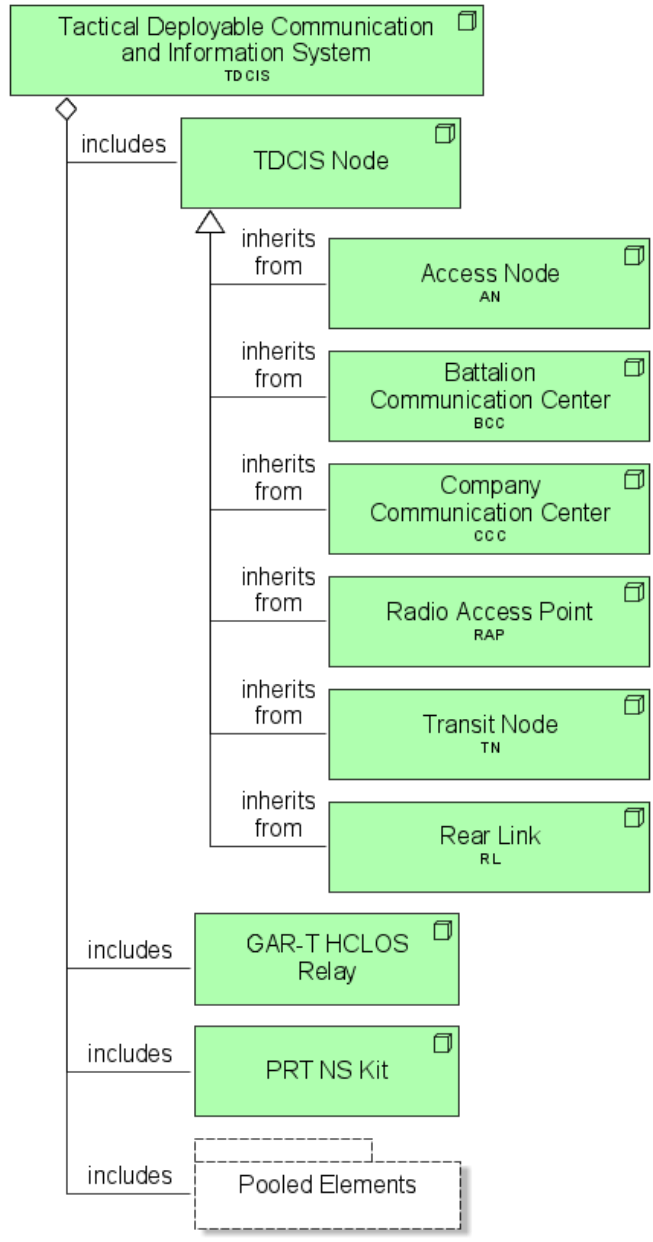


Figure 6 - TDCIS breakdown

3.2 TDCIS Nodes

3.2.1 General

SRS (PRTTDCIS-1239)

Each TDCIS node architecture shall adhere to the architecture depicted on following figure:

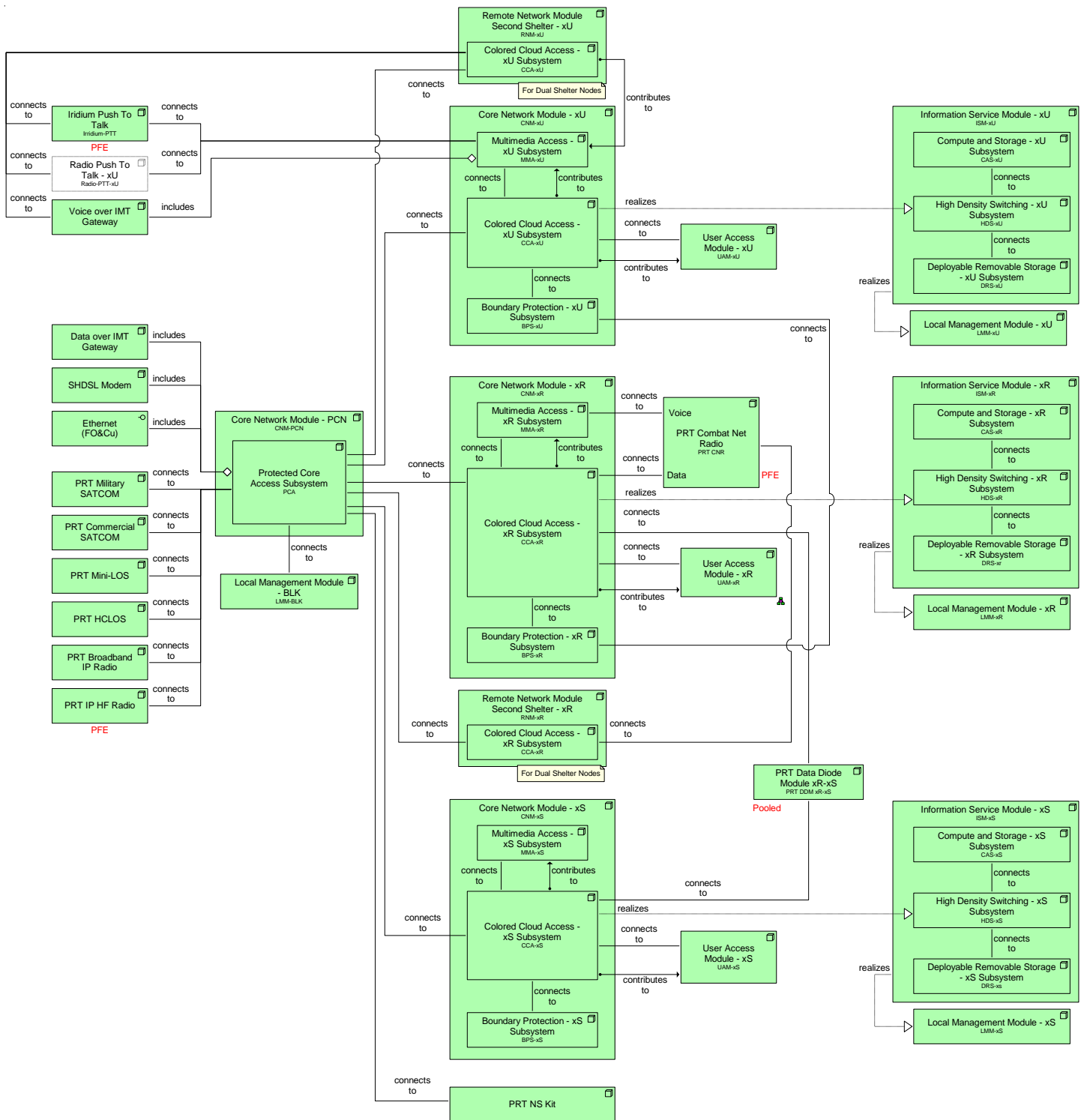


Figure 7 - Generic Node Architecture

SRS (PRTTDCIS-1195)

The TDCIS shall supports three (3) security domains, each with variants as follow:

- UNCLASSIFIED (xU) with National UNCLASSIFIED (Nat-U) as the single variant; and,
- RESTRICTED (xR) with the National RESTRICTED (Nat-R) as the single variant; and,
- SECRET (xS) with MISSION SECRET (MS) and National SECRET (Nat-S) as variants.

SRS (PRTTDCIS-3021)

Each security domain shall be prepared and configured specific for the mission prior to the deployment.

SRS (PRTTDCIS-3022)

When a security domain is configured in a Nat-X variant, it shall act as a PRT NDN extension and integrate with it.

SRS (PRTTDCIS-2548)

TDCIS subsets planned for different missions shall be isolated from each other. Therefore, the subsets shall not share any configuration parameters nor exchange any data with each other, not even between domains of same classification level.

SRS (PRTTDCIS-1206)

At the end of each mission, data will be archived and the TDCIS will be returned to the non-configured-state, ready for a new deployment configuration. This de-configuration shall be performed in accordance with national and/or NATO regulations.

SRS (PRTTDCIS-1209)

The TDCIS shall have Protected Core Network (PCN) capabilities as per *STANAG 5637*, namely PCN-1 and PCN-2 Interfaces as well as E-Node and P-Function functionalities.

SRS (PRTTDCIS-1450)

The breakdown of the AN is illustrated in the following figure. It identifies the required Modules, Transmission Systems and housing elements it is composed of. Each AN shall be built upon the building blocks as identified in this AN Breakdown.

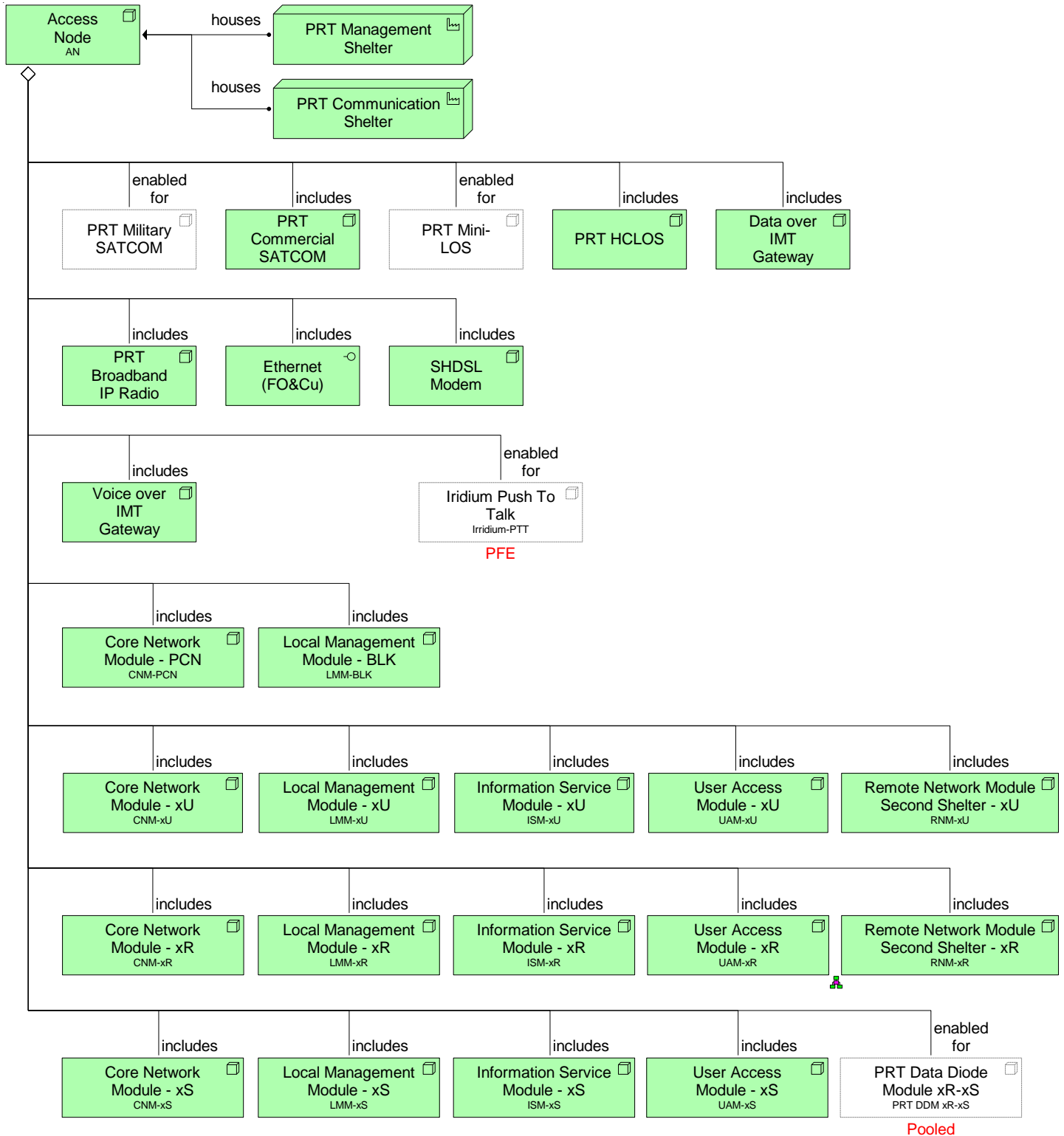


Figure 8 - Access Node breakdown

SRS (PRTTDCIS-1451)

The breakdown of the BCC is illustrated in the following figure. It identifies the required Modules, Transmission Systems and housing elements it is composed of. Each BCC shall be built upon the building blocks as identified in this figure.

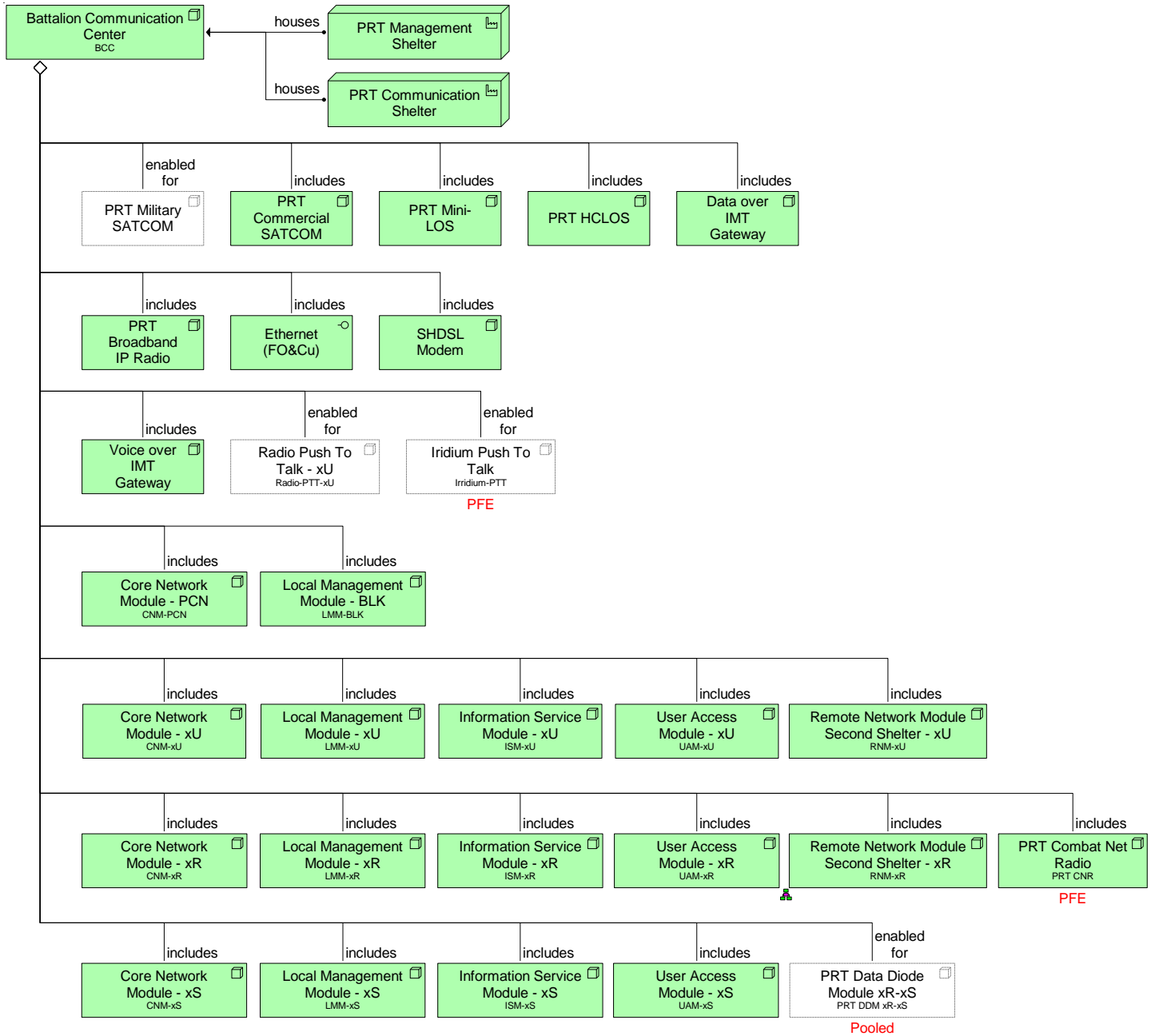


Figure 9 - Battalion Communication Center breakdown

SRS (PRTTDCIS-1452)

The breakdown of the CCC is illustrated in the following figure. It identifies the required Modules, Transmission Systems and housing elements it is composed of. Each CCC shall be built upon the building blocks as identified in this figure.

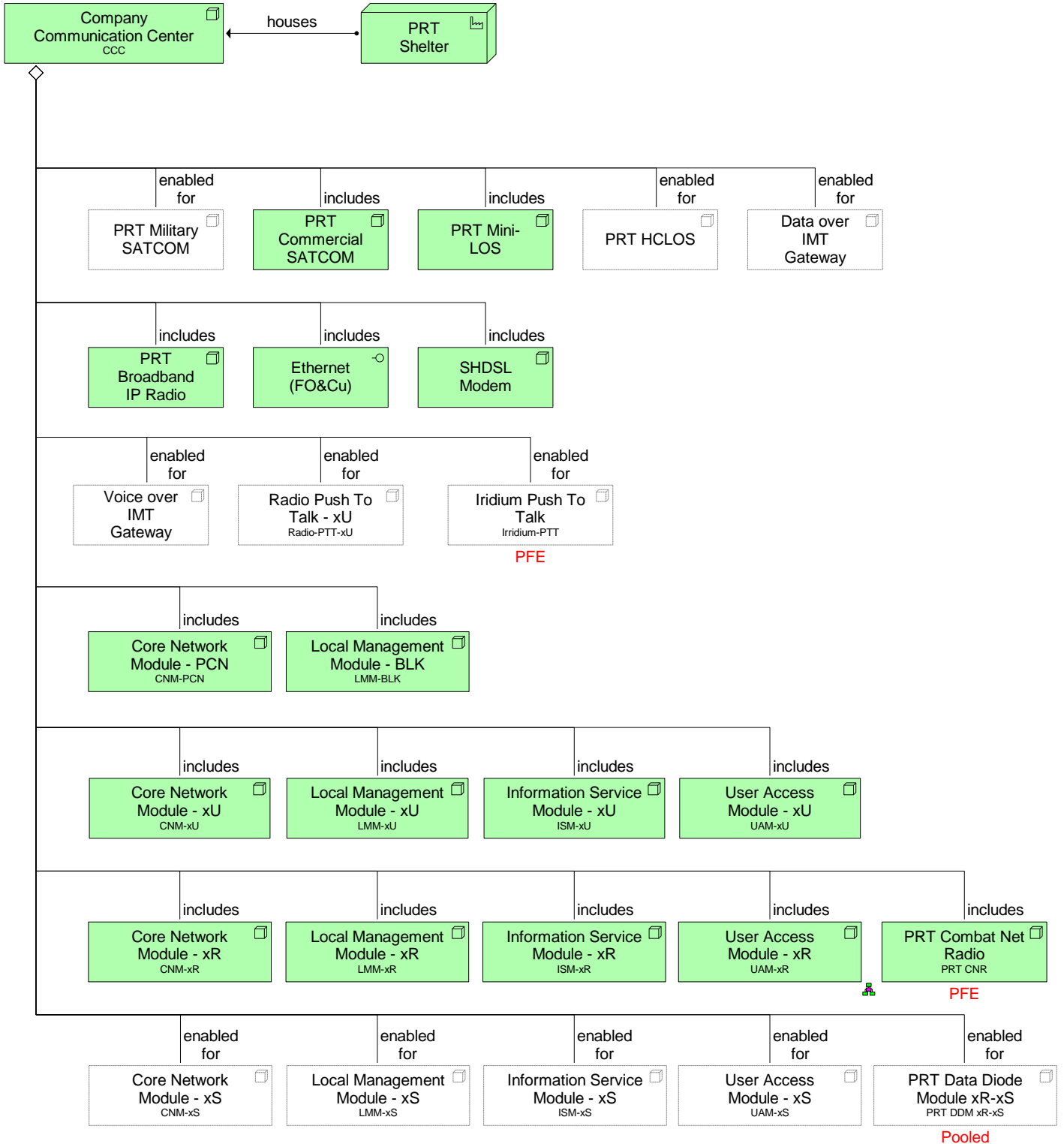


Figure 10 - Company Communication Center breakdown

SRS (PRTTDCIS-1453)

The breakdown of the TN is illustrated in the following figure. It identifies the required Modules, Transmission Systems and housing elements it is composed of. Each TN shall be built upon the building blocks as identified in this reference.

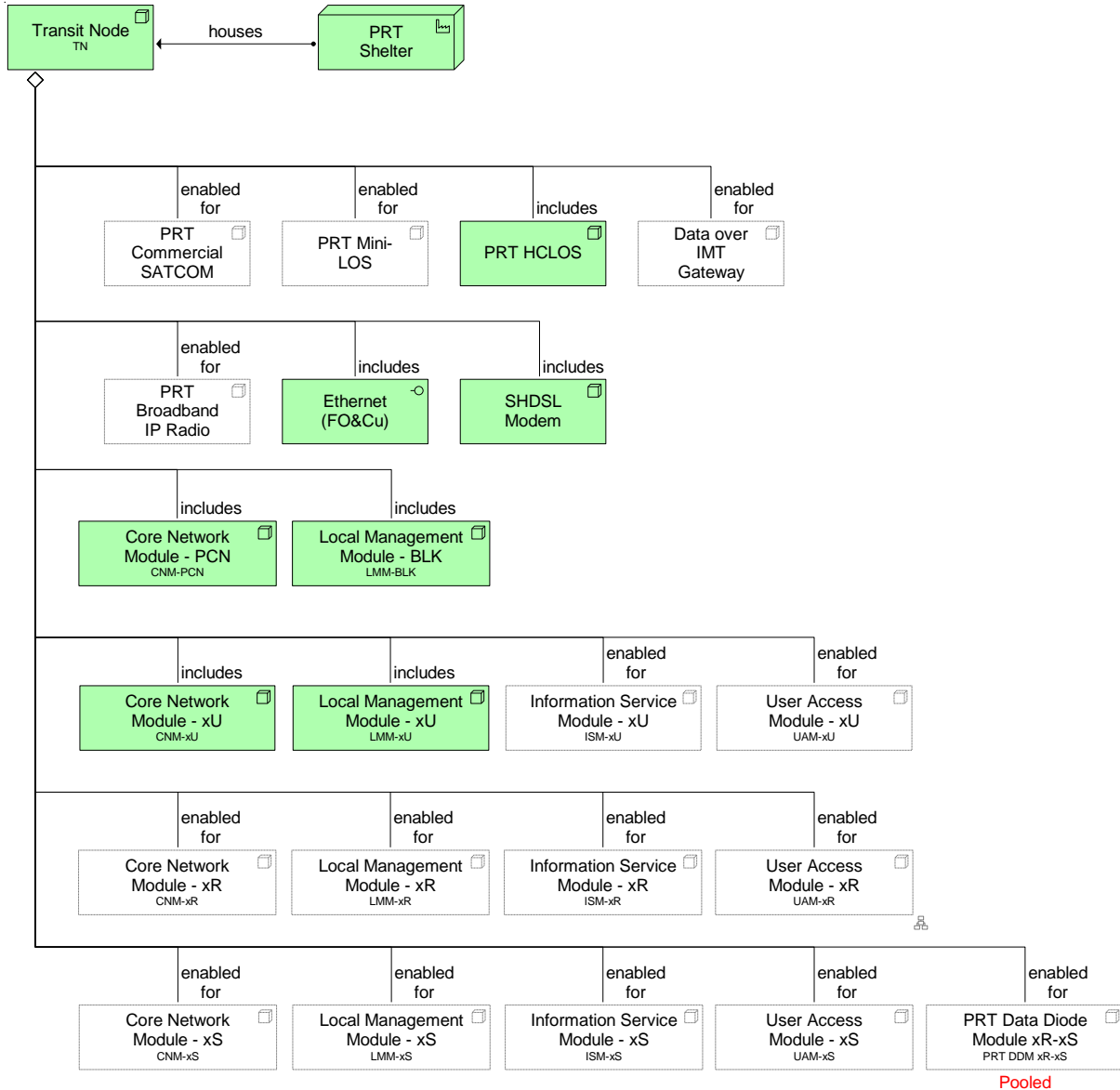


Figure 11 - Transit Node breakdown

SRS (PRTTDCIS-1454)

The breakdown of the RAP is illustrated in the following figure. It identifies the required Modules, Transmission Systems and housing elements it is composed of. Each RAP shall be built upon the building blocks as identified in this reference.

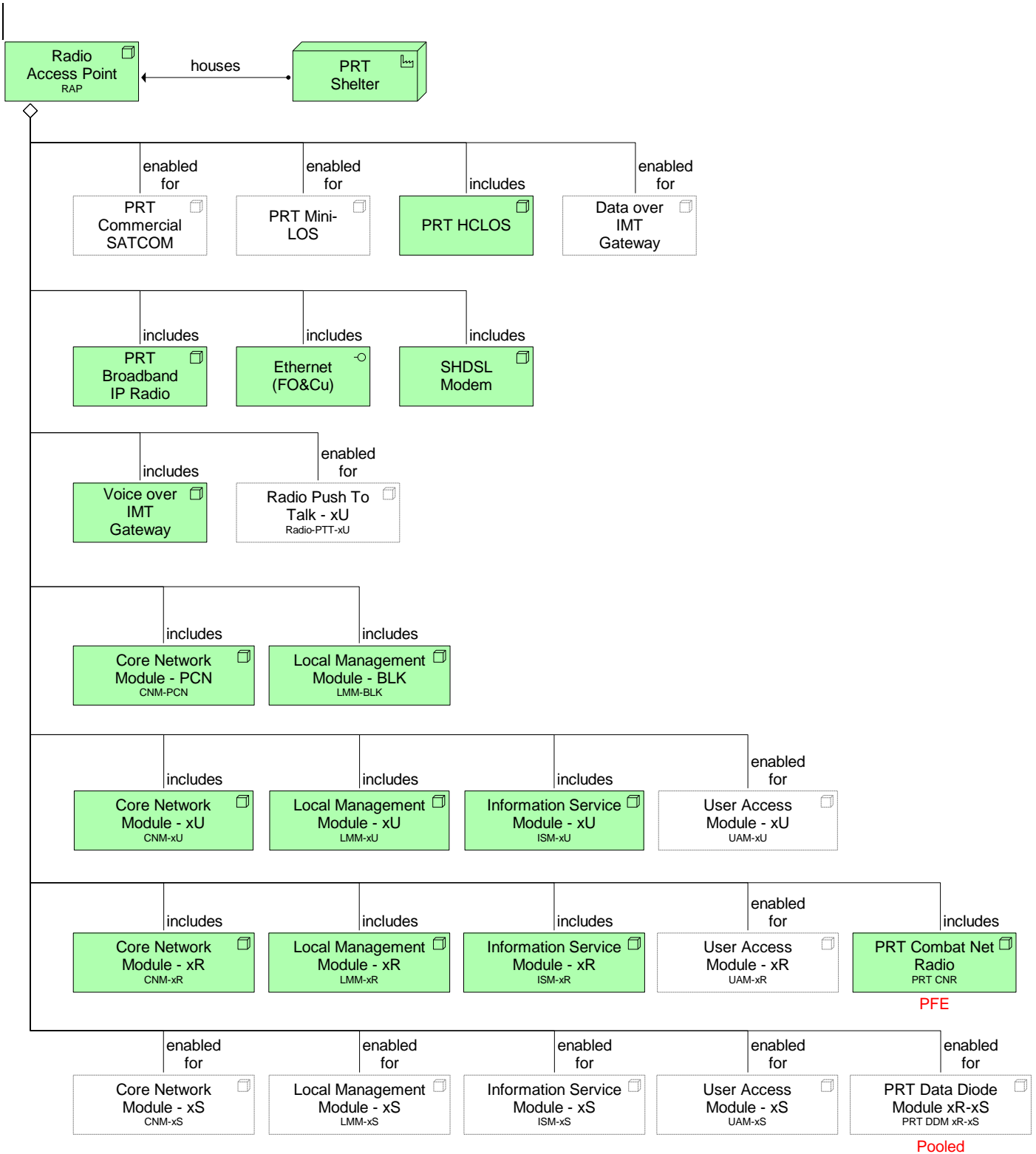


Figure 12 - Radio Access Point breakdown (updated)

SRS (PRTTDCIS-1455)

The breakdown of the RL is illustrated in the following figure. It identifies the required Modules, Transmission Systems and housing elements it is composed of. Each RL shall be built upon the building blocks as identified in this reference.

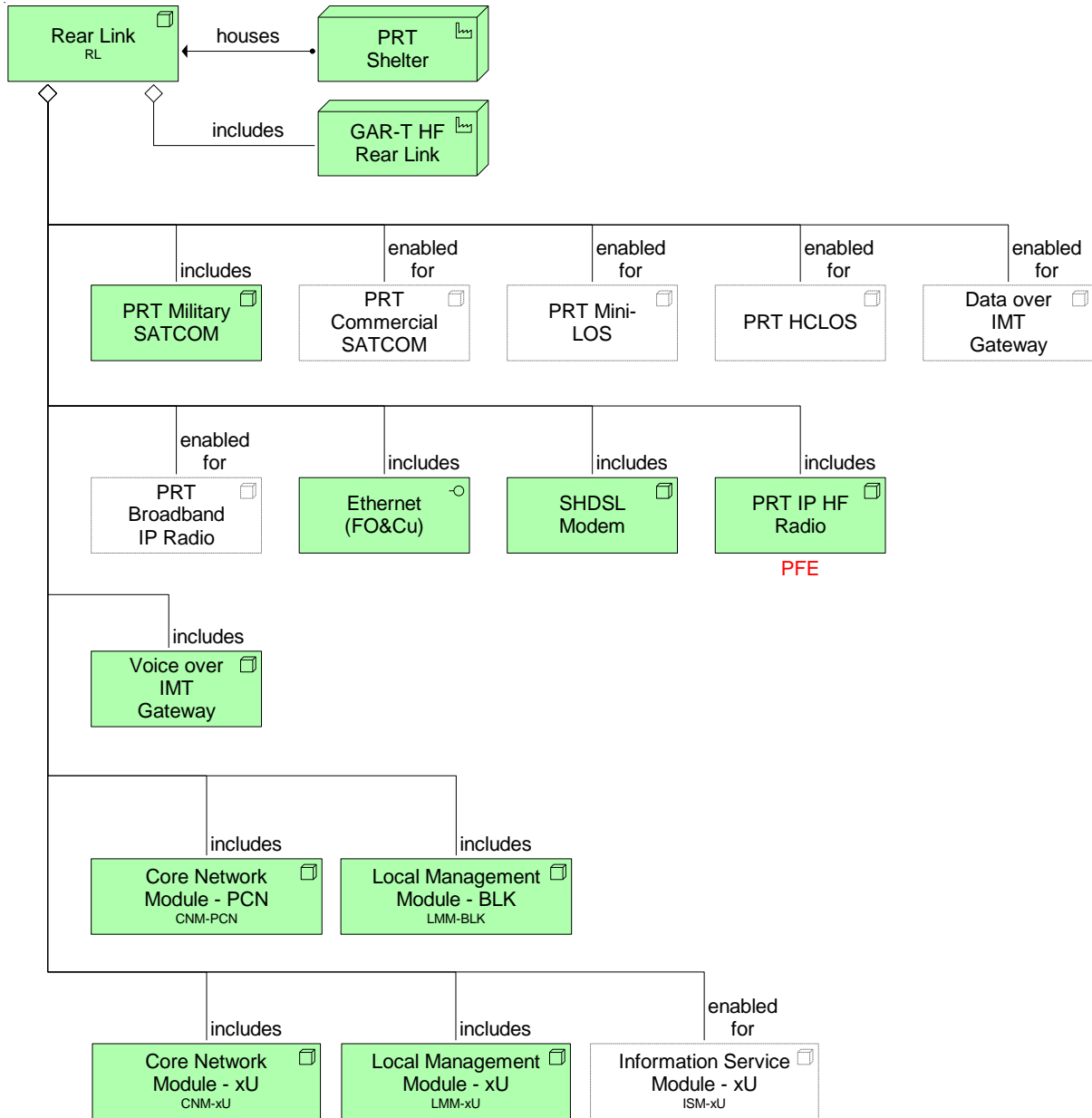


Figure 13 - Rear Link breakdown

3.2.2 Services

NOTE (PRTTDCIS-2921)

TDCIS Nodes host:

- 1) Communications Services; and
- 2) CIS Security Services; and
- 3) Infrastructure Service and
- 4) Business Support Services; and
- 5) COI Services; and
- 6) Service Management and Control Service.

SRS (PRTTDCIS-2461)

TDCIS Nodes shall provide following services on xU to their directly connected End Users and System Administrators as per following table:

Legend:

- *Local*: Service is locally hosted in the Node
- *Remote*: Service is remotely consumed from another deployed TDCIS Node (AN, BCC or CCC)
- *NDN*: Service is remotely consumed from the PRT NDN.

| Service | Service Category | AN | BCC | CCC | RAP | TN | RL |
|----------------------------------|-----------------------|-------|-------|-------|-------|-----------------------------------|-----------------------------------|
| Functional Area Services | Community of Interest | Local | Local | Local | Local | - | - |
| Email | Business Support | NDN | NDN | NDN | NDN | NDN | NDN |
| Collaborative Information Portal | Business Support | NDN | NDN | NDN | NDN | NDN | NDN |
| Video Teleconference | Business Support | NDN | NDN | NDN | NDN | NDN | NDN |
| Voice Collaboration (IP) | Business Support | Local | Local | Local | Local | Local <u>Remote</u> | Local <u>Remote</u> |
| Voice Collaboration (Analogue) | Business Support | Local | Local | Local | Local | Local | Local |
| Printing and Scanning | Business Support | Local | Local | Local | - | - | - |
| Interconnection to Nations | N/A | - | Local | - | - | - | - |
| Antivirus | CIS Security | Local | Local | Local | Local | Local | Local |
| Network Access Control | CIS Security | Local | Local | Local | Local | Local <u>Remote</u> | Local <u>Remote</u> |
| Encryption | CIS Security | Local | Local | Local | Local | Local | Local |
| Log Aggregation | CIS Security | - | - | - | - | - | - |
| Online Vulnerability Assessment | CIS Security | - | - | - | - | - | - |

Table 1 - Services per Node on xU

SRS (PRTTDCIS-4234)

TDCIS Nodes shall provide following services on xR to their directly connected End Users and System Administrators as per following table:

Legend:

- *Local*: Service is locally hosted in the Node
- *Remote*: Service is remotely consumed from another deployed TDCIS Node (AN, BCC or CCC)
- *NDN*: Service is remotely consumed from the PRT NDN.

| Service | Service Category | AN | BCC | CCC | RAP | TN | RL |
|----------------------------------|-----------------------|-------|-------|--------|--------|----|----|
| Functional Area Services | Community of Interest | Local | Local | Local | Local | - | - |
| Email | Business Support | Local | Local | Local | Remote | - | - |
| Collaborative Information Portal | Business Support | Local | Local | Local | Remote | - | - |
| Video Teleconference | Business Support | Local | Local | Remote | Remote | - | - |
| Voice Collaboration (IP) | Business Support | Local | Local | Local | Local | - | - |
| Printing and Scanning | Business Support | Local | Local | Local | - | - | - |
| Interconnection to Nations | N/A | - | - | - | - | - | - |
| Antivirus | CIS Security | Local | Local | Local | Local | - | - |
| Network Access Control | CIS Security | Local | Local | Local | Local | - | - |
| Encryption | CIS Security | Local | Local | Local | Local | - | - |
| Log Aggregation | CIS Security | - | - | - | - | - | - |
| Online Vulnerability Assessment | CIS Security | - | - | - | - | - | - |

Table 2 - Services per Node on xR

SRS (PRTTDCIS-4235)

TDCIS Nodes shall provide following services on xS to their directly connected End Users and System Administrators as per following table:

Legend:

- *Local*: Service is locally hosted in the Node
- *Remote*: Service is remotely consumed from another deployed TDCIS Node (AN, BCC or CCC)
- *NDN*: Service is remotely consumed from the PRT NDN.

| Service | Service Category | AN | BCC | CCC | RAP | TN | RL |
|----------------------------------|-----------------------|-------|-------|-----|-----|----|----|
| Functional Area Services | Community of Interest | Local | Local | - | - | - | - |
| Email | Business Support | Local | Local | - | - | - | - |
| Collaborative Information Portal | Business Support | Local | Local | - | - | - | - |
| Video Teleconference | Business Support | Local | Local | - | - | - | - |
| Voice Collaboration (IP) | Business Support | Local | Local | - | - | - | - |
| Printing and Scanning | Business Support | Local | Local | - | - | - | - |
| Interconnection to Nations | N/A | - | Local | - | - | - | - |
| Antivirus | CIS Security | Local | Local | - | - | - | - |
| Network Access Control | CIS Security | Local | Local | - | - | - | - |
| Encryption | CIS Security | Local | Local | - | - | - | - |
| Log Aggregation | CIS Security | - | - | - | - | - | - |
| Online Vulnerability Assessment | CIS Security | - | - | - | - | - | - |

Table 3 - Services per Node on xS

SRS (PRTTDCIS-4368)

TDCIS Nodes shall provide following Cross Domain Services to their directly connected End Users and System Administrators as per following table:

Legend:

- *Implemented:* Service is implemented in the Node
- *Pooled:* Service is ready to be deployed using pooled appliances.

| Service | Service Category | AN | BCC | CCC | RAP | TN | RL |
|--------------------|------------------|-------------|-------------|-------------|-------------|----|----|
| Cross Domain xU-xR | CIS Security | Implemented | Implemented | Implemented | Implemented | - | - |
| Cross Domain xR-xS | CIS Security | Pooled | Pooled | - | - | - | - |

Table 4 - Cross Domain Services per Node

NOTE (PRTTDCIS-1526)

TDCIS Nodes will have multiple Voice service integration options by means of following gateways:

- On the xU security domain:
 - **Voice over IMT** for integration with the telephony of an IMT network; and,
 - **Iridium PTT** for integration to the Iridium Satellite Phone Service; and,
 - **Radio PTT - xU** for integration with a PTT based radio transmitter; and,
- On the xR security domain:
 - **Radio PTT - xR** for integration of the PTT based Voice functionality of the CNR.

SRS (PRTTDCIS-1435)

TDCIS nodes shall be equipped or enabled with Voice Gateways quantities, as per the table below:

| | AN | BCC | CCC | RAP | TN | RL |
|----------------|---------|---------|---------|---------|----|----|
| Voice over IMT | 1 | 1 | Enabled | 1 | - | 1 |
| Iridium PTT | Enabled | Enabled | Enabled | - | - | - |
| Radio PTT - xU | - | Enabled | Enabled | Enabled | - | - |
| Radio PTT - xR | - | Enabled | Enabled | 1 | - | - |

Table 5 - xU Voice Gateways quantities

SRS (PRTTDCIS-1528)

The Voice over IMT gateway functionality shall be integrated in the MMA-xU of each node equipped with this Voice Gateway.

NOTE (PRTTDCIS-2244)

The Satphone terminal is an Iridium 9575 PTT Extreme terminal, which is PFE.

NOTE (PRTTDCIS-2678)

Any Radio PTT integration on xU and xR will be IP based and the Radio over IP gateway will be provided together with the radio to connect to.

NOTE (PRTTDCIS-1207)

A dismounted soldier uses situational awareness software (called DSS) that is connected to the vehicle's situational awareness software (called BMS) and to the TDCIS xR security domain over an integrated CNR. The TDCIS situational awareness software running in the xR security domain will merge information coming from the Mobile Users and xU data (i.e. meteo) fed from the xU security domain over the xU-xR cross domain solution. The BMS/DSS in the xR security domain will feed over the xR-xS DDM the NATO situational awareness software (LC2IS) with all the situational awareness data. Information from the LC2IS that needs to be fed into the BMS/DSS has to be transferred over an air-gap.

3.2.3 Users

SRS (PRTTDCIS-1431)

TDCIS Nodes shall support End Users, as per the table below:

| Security Domain | AN | BCC | CCC | RAP | TN | RL |
|-----------------|----|-----|-----|-----|----|----|
| xU | 34 | 16 | 4 | - | - | - |
| xR | 34 | 16 | 4 | - | - | - |
| xS | 22 | 10 | - | - | - | - |

Table 6 - End Users per security domain and node type

SRS (PRTTDCIS-2555)

TDCIS Nodes shall support System Administrators, as per the table below:

| Security Domain | AN | BCC | CCC | RAP | TN | RL |
|-----------------|----|-----|-----|-----|----|----|
| BLK | 2 | 2 | 2 | 2 | 2 | 2 |
| xU | 2 | 2 | 2 | 2 | 2 | 2 |
| xR | 2 | 2 | 2 | 2 | - | - |
| xS | 2 | 2 | - | - | - | - |

Table 7 - System Administrators per security domain and node type

NOTE (PRTTDCIS-1817)

End-User Devices (e.g. Phones, Workstations, Printer/Scanners, VTC appliances), are PFE at the exception of System Administrator devices.

SRS (PRTTDCIS-1440)

The TDCIS nodes shall be equipped with xU Wireless VoIP Telephone for System Administrator as listed in following table:

| | AN | BCC | CCC | RAP | TN | RL |
|-------------------------|----|-----|-----|-----|----|----|
| Wireless VoIP Telephone | 3 | 3 | 1 | 1 | 1 | 4 |

Table 8 - System administrator Devices quantities per node

SRS (PRTTDCIS-2683)

Each TDCIS Node shall be equipped with two (2) System Administrator Workstations per security domain present in the Node.

SRS (PRTTDCIS-3119)

Each TDCIS Node shall be equipped with two (2) System Administrator Workstations dedicated to the management of the BLK.

SRS (PRTTDCIS-4469)

The composition of System Administrator Workstations shall comply with the breakdown illustrated in the following figure.

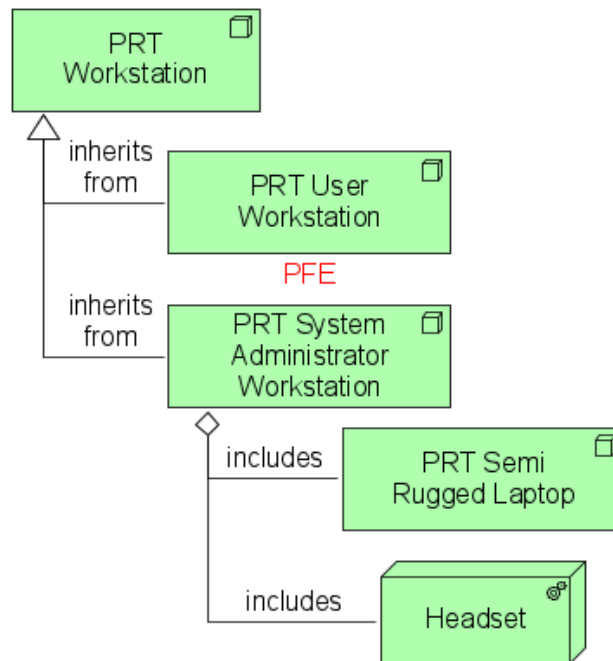


Figure 14 - System Administrator Workstation Breakdown

SRS (PRTTDCIS-2684)

Each TDCIS shelter shall be equipped with TWO (02) System Administrator wired VoIP Phones per security domain present in the Node.

SRS (PRTTDCIS-1810)

The TDCIS nodes shall be equipped with a number of UAM as listed in following table:

| | AN | BCC | CCC | RAP | TN | RL |
|---------------|----|-----|-----|-----|----|----|
| Medium UAM-xU | 2 | 1 | 1 | - | - | - |
| Small UAM-xU | 4 | 4 | 2 | 2 | 2 | 2 |
| Medium UAM-xR | 2 | 1 | 1 | - | - | - |
| Small UAM-xR | 4 | 4 | 2 | 2 | - | - |
| Medium UAM-xS | 2 | 2 | - | - | - | - |
| Small UAM-xS | 2 | 2 | - | - | - | - |

Table 9 - UAM quantities per node

SRS (PRTTDCIS-2462)

Beside any other tools as specified in other sections and emerging from the design, all Workstations shall be installed with latest available version of following software:

- Adobe Acrobat Reader; and,
- Microsoft Windows; and,
- Microsoft Office.

3.2.4 Transmissions

NOTE (PRTTDCIS-1525)

TDCIS Nodes will be equipped with different Transmission Systems:

- On the BLK, connected to the PCA Subsystem:
 - **Mini LOS** as Point-to-Point Line of Sight transmission between BCC and CCC; and,
 - **HCLOS** as Point-to-Point Line of Sight transmission to build the Tactical backbone (TN, AN, BCC, RAP); and,
 - **Broadband IP Radio**, as radio network for AN, BCC, CCC and RAP; and,
 - **Commercial SATCOM** as fallback mean of communication; and,
 - **Military SATCOM** as rear-link transmission to PRT static infrastructure; and,
 - **Ethernet (FO and Cu)** as primary mean of interconnection between node; and,
 - **SHDSL** as an alternative mean of connection between node; and,
 - **Data over IMT** as a fallback mean of communication by connecting to an International Mobile Telecommunication (IMT) network (GSM/UMTS/LTE (4G)); and,
 - **IP HF Radio** as a fallback mean of communication for the rear-link transmission to PRT static infrastructure and for intra-theatre transmissions; and,
- On the xR security domain, connected to the CCA-xR Subsystem:
 - **Combat Net Radio** as a Mobile Tactical Forces (Vehicles and Soldiers) integration mean of communication.

NOTE (PRTTDCIS-4634)

Node to Node connectivity concept is illustrated on following diagram:

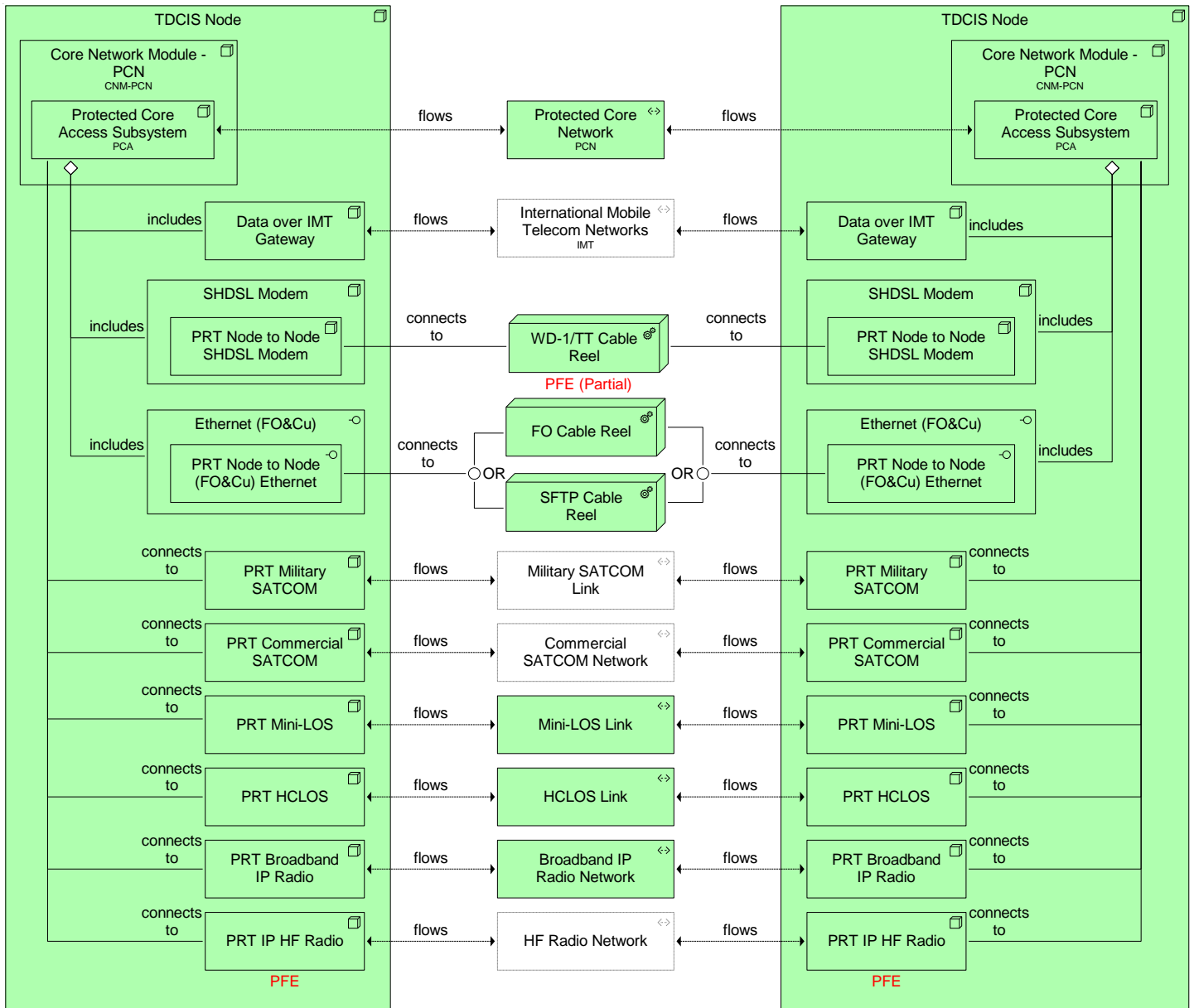


Figure 15 - Node to Node connectivity concept

SRS (PRTTDCIS-1527)

The Data over IMT functionality shall be integrated in the PCA of each node equipped with this Transmission System.

NOTE (PRTTDCIS-3074)

The HCLOS datalink will establish a High bandwidth and long distance wireless backbone network infrastructure connecting Access nodes, BCC nodes and RAP nodes through TN nodes.

SRS (PRTTDCIS-1434)

TDCIS nodes shall be equipped or enabled with Transmission Systems quantities, as per the table below:

| | AN | BCC | CCC | RAP | TN | RL | GAR-T HCLOS |
|----------------------|---------|---------|---------|---------|---------|---------|----------------|
| Mini LOS | Enabled | 3 | 1 | Enabled | Enabled | Enabled | Enabled |
| HCLOS | 3 | 1 | Enabled | 2 | 4 | Enabled | 2 |
| Broadband IP Radio | 1 | 1 | 1 | 1 | Enabled | Enabled | - |
| Commercial SATCOM | 1 | 1 | 1 | Enabled | Enabled | Enabled | - |
| Military SATCOM | Enabled | Enabled | Enabled | - | - | 1 | - |
| Ethernet (FO and Cu) | 8 | 8 | 4 | 4 | 4 | 4 | - |
| SHDSL | 4 | 4 | 2 | 2 | 2 | 2 | - |
| Data over IMT | 1 | 1 | Enabled | Enabled | Enabled | Enabled | - |
| IP HF | - | - | - | - | - | 1 | - |

Table 10 - Transmission Systems quantities per Node

SRS (PRTTDCIS-2563)

All Nodes identified as Enabled shall be ready (mechanical, wiring...) to accommodate the associated Transmission System.

3.2.5 Housing

SRS (PRTTDCIS-1499)

The physical configuration of a TDCIS node shall comprise of:

- a single shelter; or,
- a single shelter and a trailer; or,
- a combination of two shelters.

SRS (PRTTDCIS-1365)

The TDCIS Nodes shall each be composed as in following table:

| Node | Composition |
|---------------------------------|---|
| Access Node | 1 Management Shelter 1 Communication Shelter |
| Battalion Communications Centre | 1 Management Shelter 1 Communication Shelter |
| Company Communications Centre | 1 Shelter |
| Radio Access Point | 1 Shelter |
| Transit Nodes | 1 Shelter |
| Rear Links | 1 Shelter 1 GAR-T Trailer - Rear Link HF Variant |
| GAR-T HCLOS Relay | 1 GAR-T Trailer - HCLOS Relay Variant |

Table 11 - TDCIS Nodes Shelter and Trailer composition

SRS (PRTTDCIS-1500)

In the case of dual shelter Nodes, the first shelter (Management Shelter) shall contain the Colour Clouds Elements and the second shelter (Communication Shelter) shall contain the Transmission Elements.

SRS (PRTTDCIS-4635)

The distribution of Node Elements between the Management and the Communication Shelter and the connectivity between those shelters shall adhere to the concept illustrated on the following diagram:

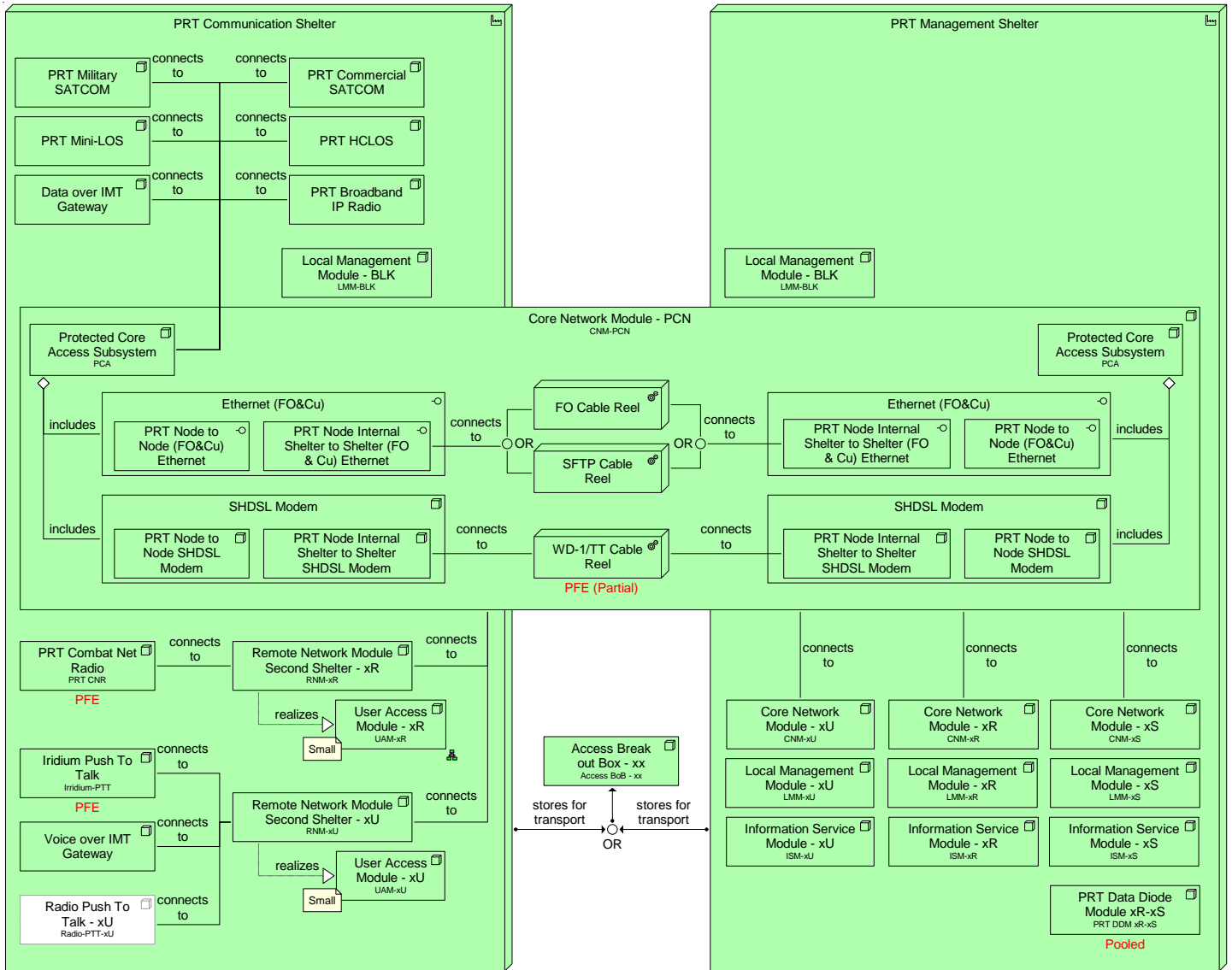


Figure 16 – Elements distribution and Shelter connectivity concept in dual shelter Nodes

NOTE (PRTTDCIS-2261)

The Tactical Towable Support Group trailer (GAR-T), provides support to the TDCIS Nodes Shelters.

NOTE (PRTTDCIS-2262)

The GAR-T forms the basis for the TDCIS two trailer variants, namely the “GAR-T HCLOS Relay” and “GAR-T Rear Link”

SRS (PRTTDCIS-1505)

Transit cases shall be used to host and support CIS assets built in it.

SRS (PRTTDCIS-1506)

Transport cases shall be used to store and transport non-PFE EUD and ancillaries.

SRS (PRTTDCIS-3091)

Transit and Transport Cases shall be fixed inside the Node Shelter for transport.

SRS (PRTTDCIS-2158)

Beyond the Cable reels specifically mentioned in element breakdowns, TDCIS Nodes shall include additional cable reels as per following table.

| | AN | BCC | CCC | RAP | TN | RL |
|--------------------|----|-----|-----|-----|----|----|
| FO cable reel | 4 | 4 | 2 | 2 | 2 | 2 |
| SFTP cable reel | 2 | 2 | 1 | 1 | 1 | 1 |
| WD-1/TT cable reel | 2 | 2 | 1 | 1 | 1 | 1 |
| Backpack harness | 2 | 2 | 1 | 1 | 1 | 1 |

Table 12 - Additional Cable Reels per node

SRS (PRTTDCIS-4636)

Cable reels and Backpack harnesses quantities shall be evenly distributed between shelters for dual shelters Nodes.

3.2.6 Purchaser Furnished Equipment

SRS (PRTTDCIS-1522)

The table below contains Crypto Purchaser Furnished Equipment (PFE) assets quantities that shall be considered for integration in the TDCIS nodes

| Asset | AN | BCC | CCC | RAP | TN | RL |
|-----------------|----|-----|-----|-----|----|----|
| TCE 621B Crypto | 1 | 1 | - | - | - | - |

Table 13 - Crypto PFE Quantities for TDCIS Nodes

SRS (PRTTDCIS-2679)

The table below contains CNR PFE assets quantities that shall be considered for integration in the nodes

| Asset | AN | BCC | CCC | RAP | TN | RL |
|-------------------------------|----|-----|-----|-----|----|----|
| CNR Double Vehicle Module | - | 2 | 1 | 3 | - | - |
| CNR Single Vehicle Module | - | - | 1 | - | - | - |
| CNR Transceiver TR-525AH | - | 2 | 1 | 2 | - | - |
| CNR Transceiver TR-525AU | - | 1 | 1 | 3 | - | - |
| CNR Transceiver TR-525AU HQII | - | 1 | 1 | 1 | - | - |
| CNR 150W HF Power Amplifier | - | 1 | 1 | 1 | - | - |
| CNR 150W Antenna Tuning Unit | - | 1 | 1 | 1 | - | - |
| CNR 50W V/UHF Power Amplifier | - | 1 | 1 | 1 | - | - |
| CNR RoIP Gateway | - | - | - | 1 | - | - |

Table 14 - CNR PFE Quantities

SRS (PRTTDCIS-2680)

The table below contains PFE CIS assets quantities that shall be considered for integration in the nodes

| Asset | AN | BCC | CCC | RAP | TN | RL |
|--|----|-----|-----|-----|----|----|
| IP HF Radio Rack - Single | - | - | - | - | - | 1 |
| IP HF Transceiver TR-525AH | - | - | - | - | - | 1 |
| IP HF 500W Power Amplifier and Antenna Tuning Unit | - | - | - | - | - | 1 |
| IP HF Log-Periodic HF Antenna | - | - | - | - | - | 1 |
| IP HF Whip Antenna | - | - | - | - | - | 1 |

Table 15 - IP HF Radio PFE Quantities

NOTE (PRTTDCIS-4637)

The HF Whip Antenna will not be mounted nor used at the same time as the Military SATCOM Terminal in the RL Node.

NOTE (PRTTDCIS-1524)

TN has no CIS PFE to be integrated.