
APPENDIX C PURCHASER FURNISHED EQUIPMENT

Table 40 – Equipment to be provided to the Contractor – **Refer to Annex A herein**

Table 41 - 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)

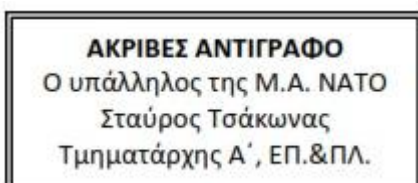


Table 42 – PFE Integration Approach

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 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

C.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).

C.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.

C.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

C.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 D MAINTENANCE AND SUPPORT CONCEPTS

D.1 MAINTENANCE CONCEPT AND LEVELS

- [APD-2] A Maintenance Concept is a definition of the maintenance objectives, line of maintenance, indenture levels, maintenance levels, maintenance support and their interrelationships.
- [APD-3] 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.
- [APD-4] The Maintenance Concept identifies who-does-what-at-what-level in accordance with the maintenance levels and definitions defined below.
- [APD-5] A Maintenance Level (ML) is the position in an organization where specified levels of maintenance are to be carried out.
- [APD-6] There are four ML, characterised as follow:
- a. ML1: maintenance tasks performed at the operating location by personnel with limited maintenance skills and without the need of special tools. ML1 is character ised by:
 - i. Typology: without the need to remove the item from its existing installations on the Product;
 - ii. Accessibility: easy (e.g.: general visual inspection for hardware, launch of common routines or macros for software);
 - iii. Location: operating location (e.g. on-site, deployed location, on-ship);
 - iv. Tools: common hand tools and/or common test equipment;
 - v. Facility: nil.
 - b. ML2: maintenance tasks performed at the operating locations by maintainers that may use special tools. ML2 is character ised by:
 - i. Typology: it may be necessary to remove the item from its existing installation on the Product;
 - ii. Accessibility: may be difficult (e.g.: rear access or tight plug and unplug for hardware, backup and restore for software);
 - iii. Location: operating location (e.g. on-site, deployed location, on-ship);
 - iv. Tools: common hand tools, common support equipment, and/or peculiar support equipment;
 - v. Facility: nil
 - c. ML3: maintenance tasks performed at NATO maintenance shops. ML3 is character ised by:
 - i. Typology: it is necessary to remove an item from its existing installation on the Product;
 - ii. Accessibility: item dismounted from its existing installation on the Product and available for any kind of manipulation;
 - iii. Location: NATO maintenance location that may be either located or not located in proximity of the operating location;
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- iv. Tools: as required by the NATO maintenance location;
 - v. Facility: special ised repair shop, software reference systems, etc.
- d. ML4: maintenance tasks performed at Industry maintenance shops. ML4 is character ised by:
- i. Typology: it is necessary to remove an item from its existing installation on the Product;
 - ii. Accessibility: item dismantled from its existing installation on the Product and available for any kind of manipulation;
 - iii. Location: Contractor/OEM maintenance location located at Industry premises;
 - iv. Tools: as required by the Contractor/OEM maintenance location;
 - v. Facility: repair centre, software development laboratory, etc.
- e. While performing the Maintenance Task Analysis (MTA), each maintenance task shall be analysed to determine the ML at which the task shall be performed.

D.2 Hardware Maintenance Tasks and Levels

[APD-7] The hardware maintenance is:

- a. Corrective:
- 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).
- c. 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.
- d. Preventative:
- e. 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.
- f. Scheduled (planned): maintenance carried out on a periodic basis (time-related or number-of-occurrences-related).

[APD-8] The hardware maintenance is classified in four levels generally known as HL1, HL2 HL3 and HL4.

D.2.1 HARDWARE ORGANIZATIONAL MAINTENANCE (LEVEL 1): HL1

[APD-9] HL1 is hardware maintenance 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;

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- 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.

D.2.2 HARDWARE ORGANIZATIONAL MAINTENANCE (LEVEL 2): HL2

[APD-10] HL2 is hardware maintenance 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.

D.2.3 HARDWARE INTERMEDIATE MAINTENANCE (LEVEL 3): HL3

[APD-11] HL3 is hardware maintenance 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:
- c. Repairing, testing and calibrating LRU, Shop Replaceable Units (SRU) and Secondary Spare Parts (SSP);
- d. On-site investigations and major scheduled servicing/overhaul, detailed inspection, major equipment repair, major equipment modification, complicated adjustments, system/equipment testing;
- e. Failure trend analysis including reporting to relevant Purchaser authorities and Post Design Services (PDS);

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- f. 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);
 - g. 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;
 - h. It includes generation of equipment failure reports, supply requisitions and other pertinent maintenance and supply records.

D.2.4 HARDWARE DEPOT MAINTENANCE (LEVEL 4): HL4

[APD-12] HL4 is hardware maintenance 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.

D.3 Software Maintenance Tasks and Levels

[APD-13] The software maintenance is a task for the purposes of software fault removal, adaptation to a new environment, or improvement of performance.

[APD-14] The software maintenance for the purposes of software fault removal can be:

- a. Corrective/Unscheduled - 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.
- b. Preventative/Scheduled – 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).

[APD-15] The software maintenance for the purposes of 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:

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- a. 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.
 - b. 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.

[APD-16] The software maintenance is classified in four levels generally known as SL1, SL2 SL3 and SL4.

D.3.1 SOFTWARE ORGANIZATIONAL MAINTENANCE (LEVEL 1): SL1

[APD-17] Software Organizational Maintenance (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.

D.3.2 SOFTWARE ORGANIZATIONAL MAINTENANCE (LEVEL 2): SL2

[APD-18] Software Organizational Maintenance (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.

D.3.3 SOFTWARE INTERMEDIATE MAINTENANCE (LEVEL 3): SL3

[APD-19] Software Intermediate Maintenance (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.

D.3.4 SOFTWARE DEPOT MAINTENANCE (LEVEL 4): SL4

[APD-20] Software Depot Maintenance (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.

D.4 Support Concept and Support Levels

[APD-21] A Support Concept is a definition of the support objectives (scenarios) strictly related to the maintenance levels and the support availability in terms of personnel, skills, tools and facilities.

[APD-22] There are four support levels and a level zero performed by the operators that normally initiate the troubleshooting for the corrective maintenance.

D.4.1 FIRST LEVEL SUPPORT: ON-SITE, NON-SPECIALISED

[APD-23] The First Level of support 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.

[APD-24] The 1st Level Support Process implements the Incident Management process in accordance with the ISO/IEC 20000 and ITIL framework or equivalent.

[APD-25] 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.

D.4.2 SECOND LEVEL SUPPORT: CENTRALISED

[APD-26] The Second Level of support 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.

[APD-27] The 2nd Level Support Process implements the Problem Management process in accordance with the ISO/IEC 20000 and ITIL framework or equivalent.

[APD-28] The Problem Management process receives the TT from the Service Desk and performs the following tasks:

- a. (Re-)evaluation of TT category, criticality and priority;
- b. Identification of the root cause of the issue (e.g. by issue replication testing);
- c. Identification of workarounds;

- d. Identification and initial planning of possible short, medium and long-term solutions (e.g. Workarounds, Patches, or new Baseline or CI Releases);
- e. Create Problem Analysis Report and Change Request (CR) incl. schedule of implementation, and synchronisation with the Baseline Maintenance process;
- f. Presentation of the Problem Analysis Report and CR to the Change Control Board (CCB) for approval;
- g. Monitor and Control the approved CR during implementation;
- h. Trigger 3rd Level Support and/or 3rd Level Maintenance process to implement the CR;
- i. Perform the post- CR implementation review.

D.4.3 THIRD LEVEL SUPPORT: CENTRALISED

- [APD-29] It 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.
- [APD-30] The 3rd Level Support Process implements the Deployment and Release Management process in accordance with the ISO/IEC 20000 and ITIL framework or equivalent.
- [APD-31] The Deployment and Release Management process receives the approved Change Request from the 2nd Level Support and performs the following tasks:
- a. Release of the solution (release unit/record);
 - b. Development of the solution (e.g. new Configuration Item Fix, Repair, Replacement, Patch, or Release);
 - c. Testing of the solution (e.g. Regression testing, issue/deficiency replication testing);
 - d. Update of Baseline content and status;
 - e. Delivery and deployment of the solution.

D.4.4 FOURTH LEVEL SUPPORT: ORIGINAL EQUIPMENT MANUFACTURER (OEM) / VENDOR

- [APD-32] It consists of off-site factory/vendor problem resolution and maintenance, beyond the capability of third level support.

D.5 Support Levels scenarios and Maintenance Levels

- [APD-33] The support concept is the apportionment of maintenance activities:
- a. NATO Maintenance Task (NMT): performed by NATO personnel (military or civilian);
 - b. Industry Maintenance Task (IMT): performed by industry personnel under warranty or post warranty arrangements.
- [APD-34] There are four possible scenarios as described in the following paragraphs.
- a. NATO Owned / NATO Operated (NONO): NATO procures the solution as a system, NATO operates the system, the responsibilities for maintenance are defined in the Support Concept.

- b. Contractor Owned / Contractor Operated (COCO): NATO procures the solution as a service (operation and maintenance) provided by a Contractor.
- c. NATO Owned / Contractor Operated (NOCO): NATO procures the solution as a system, the Operation and Maintenance of it is “outsourced”.
- d. Contractor Owned / NATO Operated (CONO): NATO procures the solution as “Financial Agency leasing”.

[APD-35] For NONO and CONO scenario the Contractor needs to agree with the NATO Contracting Authority on maintenance levels commitments and develop a tailored logistics support concept based on a blend sharing of maintenance levels. E.g.:

- a. Hardware Maintenance (Levels HL1, HL2) + Software Maintenance (Levels SL1) are NMT;
- b. Hardware Maintenance (Level HL3) + Software Maintenance (Level SL2) are IMT with a learning curve versus NMT;
- c. Hardware Maintenance (Levels HL4) + Software Maintenance (Levels SL3, 4) are IMT.

[APD-36] For NOCO and COCO scenario the Contractor is responsible for the following maintenance levels when developing the logistics support concept:

- a. Hardware Maintenance (Levels HL1, HL2, HL3 and HL4); and
- b. Software Maintenance (Levels SL1, SL2, SL3 and SL4)

APPENDIX E 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.

Table 43 – Key Personnel Requirements

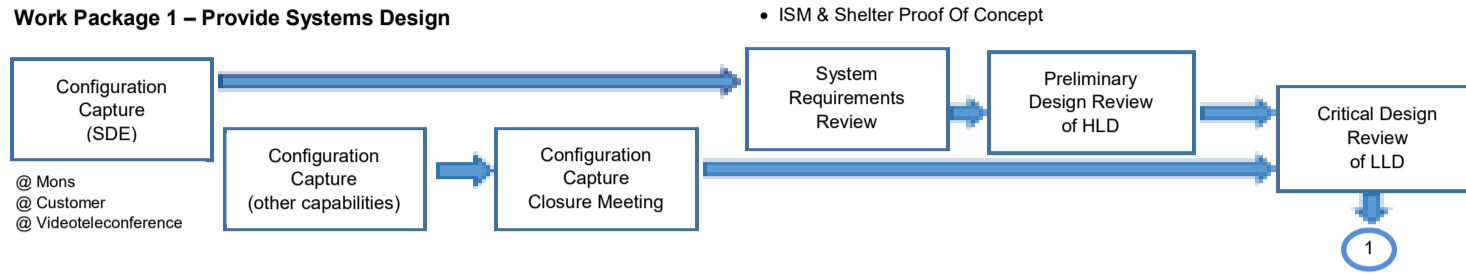
SER	KEY PERSONNEL	REQUIREMENTS
1	Project Manager	Responsible for project management, performance and completion of tasks and delivery orders. Establishes and monitors project plans and schedules and has full authority to allocate resources to insure that the established and agreed upon plans and schedules 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.
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.

SER	KEY PERSONNEL	REQUIREMENTS
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	ILS 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 and helps execute plans for the Integrated Product Support (ILS) of complex systems. 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.
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 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.

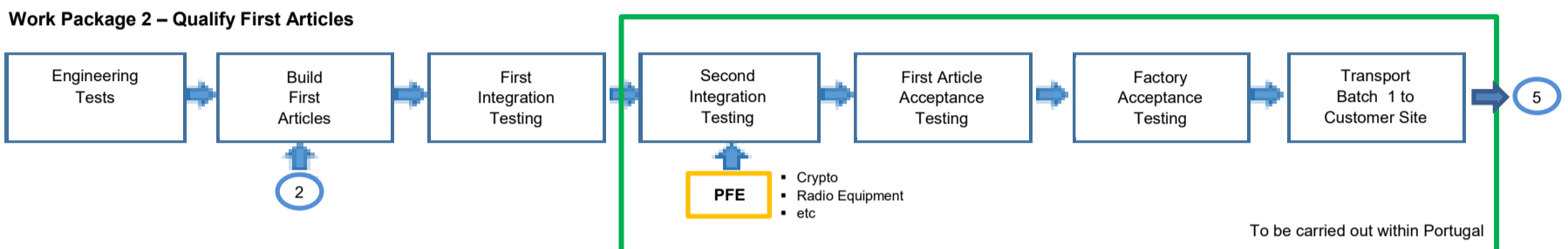
SER	KEY PERSONNEL	REQUIREMENTS
7	Training Manager	<p>Conducts the research necessary to identify training needs based on performance objectives and existing skill sets; prepares training strategies and delivery methodology analyses; and prepares cost/benefit analyses for training facilities and deliverables. 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 F PROJECT ACTIVITY FLOW

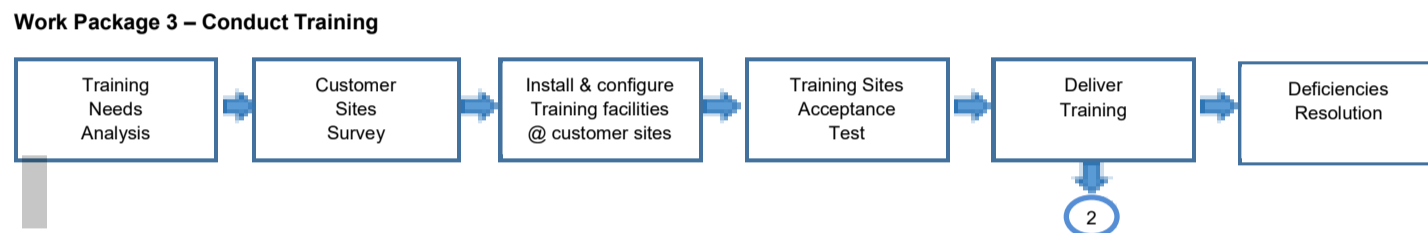
Work Package 1 – Provide Systems Design



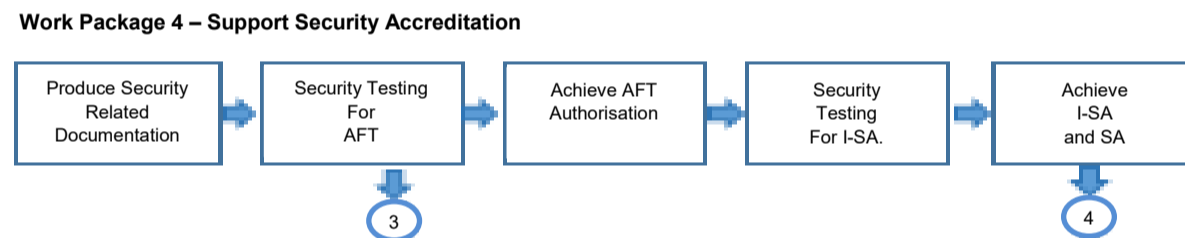
Work Package 2 – Qualify First Articles



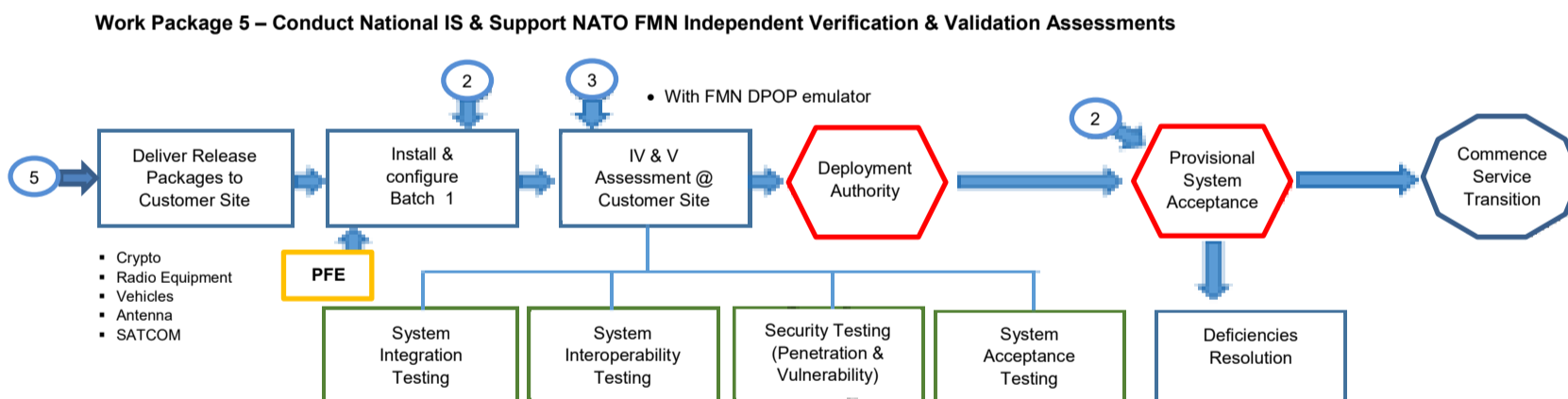
Work Package 3 – Conduct Training



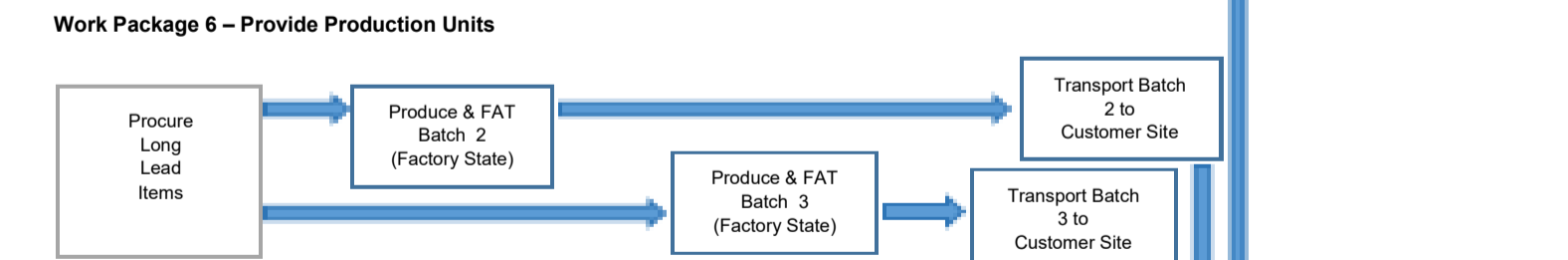
Work Package 4 – Support Security Accreditation



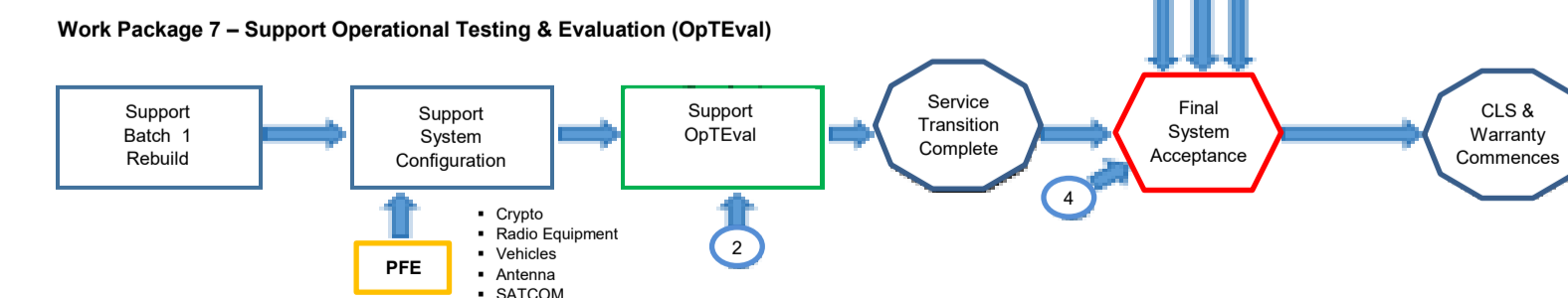
Work Package 5 – Conduct National IS & Support NATO FMN Independent Verification & Validation Assessments



Work Package 6 – Provide Production Units



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



APPENDIX G TABLE OF ACRONYMS

Acronym	Meaning
AAA	Authentication, Authorisation & Accounting
ABB	Architectural Building Blocks
ABD	As Built Drawings
ABL	Allocated Baseline
ABS	Anti-lock Braking System
ACU	Antenna Control Unit
AD	Active Directory
AES-NI	AES New Instructios
Ai	Intrinsic Availability
AN	Access Node
API	Application Programming Interface
AQAPs	Allied Quality Assurance Publications
ARM	Availability & Reliability Maintenance
ATE	Automated Test Equipment
ATU	Antenna Tuning Unit
BCC	Battalion Communication Centre
BIT	Built In Test
BLOS	Beyond Line of Sight
BMC	Baseboard Management Controller
BMS	Battlefield Management System

Acronym	Meaning
BoB	Breakout Box
BPS	Boundary Protection System
CAC	Call Admission Control
CBT	Computer Based Training
CCC	Company Communication Centre
CCP	Configuration Control Plan
CCAP	Configuration Capture Acceptance Plan
CDRL	Contract Deliverables Requirement List
CI	Configuration Item
CIWG	Capability Integration Working Group
CLSP	Contract Logistics Support Plan
CM	Configuration Management
CMP	Configuration Management Plan
CMDB	Configuration Management Database
CNM	Core Network Module
CoC	Certificate of Conformity
COI	Community Of Interest
CNR	Combat Net Radio
CR	Change Request
CRP	Change Request Plan
C2	Command & Control

Acronym	Meaning
C4ISR	Command, Control, Communications, Computers Intelligence, Surveillance and Reconnaissance
CARC	Chemical Agent Resistant Coating
CAS	Compute and Storage
CCA	Coloured Cloud Access
CCAP	Capability Capture
CD	Compact Disc
CDR	Critical Design Review
CES	Core Enterprise Service
CFP	Connector ised Front Panel
CIS	Communication and Information System
CLIN	Contract Line Item Number
CLS	Contracted Logistic Support
CMDB	Configuration Management Database
CoG	Center of Gravity
CONEMP	Concept Of Employment
COTS	Commercial Off The Shelf
CSA	Configuration Status Accounting
CSC	Computer Support Centre
CSCI	Computer Software Configuration Item
CUBE	Cisco Unified Border Element
CUCM	Cisco Unified Call Manager

Acronym	Meaning
DCIS	Deployable Communication and Information System
DCIS CA	DCIS Cube Architecture
DHCP	Dynamic Host Configuration Protocol
DP	Documentation Plan
DPOP	Deployable Point Of Presence
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DNS	Domain Name Server
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	
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
ELOS RP	External Line of Sight Roof Panel
EMC	Electro-Magnetic Compatibility

Acronym	Meaning
EMM	Element Management Module
EMSEC	Emission Security
EPP	External Power Panel
ERFP	External RF Panels
ES	Engineering Support
ESATRP	External SATCOM Roof Panel
ESP	Encapsulating Security Protocol
ETE	Estimated Time to Empty
EU	European Union
EUD	End User Devices
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
FIPS	Federal Information Processing Standards

Acronym	Meaning
FMECA	Failure Mode Effect & Criticality Analysis
FMN	Federated Mission Network
FO	Fibre Optic
FSA	Full 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
IaaS	Infrastructure as a Service
IER	Information Exchange Requirements
IETF	Internet Engineering Task Force
IGP	Interior Gateway Protocol
iLO	Integrated Lights-Out
ILS	Integrated Logistic Support

Acronym	Meaning
ILSP	Integrated Product Support Plan
IMP	Issue Management Plan
INM	Interconnection to Nation Module
IMS	Informal Messaging Service
IMT	Industry Maintenance Task International Mobile Telecommunication
IOPS	Input/output Operations Per Second
IP	Internet Protocol
IPDV	IP jitter
IPL	Initial Provisioning List
IPLR	IP packet loss rate
IPMI	Intelligent Platform Management Interface
IPS	Intrusion Prevention System
IPS	Integrated Product Support
IPSP	Integrated Product Support Plan
IPTD	IP transfer delay
IRFP	Internal RF Panels
IRR	Infra-Red Reflective
ISM	Infrastructure Service Module
ISPCP	Initial Spare Parts & Consumables Package
ITSM	Information Technology Service Management
ISS	In Service Support

Acronym	Meaning
ISSP	In Service Support Plan
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
LLD	Low Level Design
LOS	Line of Sight
LORA	Level Of Repair Analysis
LRU	Line Replaceable Unit
LSA	Logistics Support Analysis
LSP	Label-Switched Path
MAN	Metro Area Network
MCU	Multipoint Control Unit
MIL-STD	Military Standard
MLPP	Multi-Level Precedence Pre-emption
MMA	Multimedia Access
Mini-LOS	Mini-Line of Sight
MNP	i. Mission Network Partner ii. Mission Network Participant
MOU	Memorandum Of Understanding

Acronym	Meaning
MP	Maintenance Plan
MPC	Mission Preparation Centre
MPLS-TE	Multiprotocol Label Switching – Traffic Engineering
MPT	Multi-Purpose Tires
MU	Mission UNCLASSIFIED
MR	Mission RESTRICTED
MS	Mission SECRET
MSDP	Multicast Source Discovery Protocol
MTA	Maintenance Task Analysis
MTBCF	Mean Time Between Critical Failures
MTBF	Mean Time Between Failures
MTP/TRP	Media Termination Point / Trusted Relay Point
MTTRS	Mean Time To Restore Service
MTTR	Mean Time To Repair
MTV	Medium Tactical Vehicle
NATO	North Atlantic Treaty Organisation
Nat-U	National UNCLASSIFIED
Nat-R	National RESTRICTED
Nat-S	National SECRET
NBD	
NCI AGENCY	NATO Communication & Information Agency

Acronym	Meaning
NCOP	
NDN	National Defence Network
NIAPC	NATO Information Assurance Product Catalogue
NIDS	Network Intrusion Detection System
NIP	Network Interconnection Point
NMCD	Network Management and Control Device
NR	NATO RESTRICTED
NRF	NATO Reaction Force
NSPA	NATO Supply & Procurement Agency
NTP	Network Time Protocol
NU	NATO Unclassified
NS	NATO Secret
OAS	OpenAPI Specification
OBL	Operational Base Line
OCR	Optical Character Recognition
ODU	Outdoor Unit
OEM	Original Equipment Manufacturer
OJT	On Job Training
OpTEval	Operational Evaluation
OTA	Over The Air
OTI	Operational Task Inventory

Acronym	Meaning
OTS	Off The Shelf
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
PM	Project Manager
PNA	Portuguese National Army
PMP	Project Management Plan
PMS	Project Master Schedule

Acronym	Meaning
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	Portuguese
PRT MOD	Portuguese Ministry Of Defence
PSA	Preliminary System Acceptance
PTP	Precision Time Protocol
PTT	Push To Talk
QA	Quality Assurance
QAP	Quality Assurance Plan
QAR	Quality Assurance Representative
QC	Quality Control
QMP	Quality Management Plan
QoS	Quality of Service
RAIDO	Risks Assumptions Issues Dependencies Opportunities
RAML	RESTful API Modeling Language
RAMT	Reliability Availability Maintainability Testability

Acronym	Meaning
RAP	Radio Access Point
RBD	Reliability Block Diagram
RCB	Residual Current Breakers
RCIL	Recommended Consumables Items List
RCM	Reliability Centred Maintenance
RDP	Remote Desktop Protocol
RF	Radio Frequency
RFD	Request For Deviation
RFW	Request For Waiver
RL	Rear Link
RMP	Risk Management Plan
RNM	Remote Network Module
ROADS	Record of Actions & Decisions
RPL	Repair Price List
RSPCL	Recommended Spare Parts & Consumables List
RT	Real Time
RTM	Requirement Traceability Matrix
RTTL	Recommended Tools & Test Equipment List
RtR	Real Time Replication
SAG	System Administration Guide
SAT	System Acceptance Test; this is another name for the FAST above

Acronym	Meaning
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
SHDSL	Symmetric High speed Digital Subscriber Line
SIC-T	Sistema de Informação e Comunicações - Tático
SGS	Satellite Ground Station
SIT	System Integration Test
SL	Software Level
SM	Single Mode
SMC	Service Management and Control
SME	Subject Matter Expert
SNMP	Simple Network Management Protocol
SOC	State of Charge
SOS	System Of Systems
SOW	State Of Work
SPD	Surge Protective Devices

Acronym	Meaning
SRR	System Requirements Review
SRS	Systems Requirement Statements
SRST	Survivable Remote Site Telephony
SRU	
SSH	Secure Shell Protocol
SSPP	System Safety Program Plan
SSR	System Safety Review
SSS	Schedule of Supplies & Services
STANAGS	Standard NATO Agreements
STE	Special to Type Equipment
STP	Shielded Twisted Pair
SW	Software
TA	Target Architecture
TAT	Turn Around Time
TB	Terabyte
TBW	TB Written
TDCIS	Tactical Deployable Communication Information System
TDM	Time Division Multiplexing
TFS	Traffic Flow Secu
TIWG	Test Integration Working Group
TLS	Through Life Support

Acronym	Meaning
TM	Technical Manual
TN	Transit Node
TNA	Training Needs Analysis
TP	Training Plan
TPDP	Technical Publication Development Plan
TPM	Trusted Platform Module
TSGT	Tactical Satellite Ground Terminal
TTR	Time To Recover
TVVP	Test, Verification & Validation Plan
TXT	Trusted Execution Technology
UAM	User Access Module
UCC	Unified Communication and Collaboration
UAT	User Acceptance Test
UAT(E)	User Acceptance Test of Equipment
UPS	Uninterrupted Power Supply
V2	Voice and Video
vCPU	virtual CPU
VCU	Virtual Crypto Unit
VLAN	Virtual Local Area Network
VM	Virtual Machine
vRAM	virtual RAM

Acronym	Meaning
VRF	Virtual Routing and Forwarding
VTC	Video Teleconference
WAN	Wide Area Network
WAP	Wireless Access Point
WBS	Work Breakdown Structure
WGS	Wideband Global SATCOM
WinRM	Windows Remote Management

APPENDIX H 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)	<ul 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>





NATO Communications and Information Agency
 Agence OTAN d'information et de communication

Portuguese Republic Ministry of Defence Tactical Deployable Communication and Information System

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1 Introduction

1.1 Purpose

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 SOW.

1.2 Context

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)

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.

SRS (PRTTDCIS-1215)

The TDCIS system shall be compliant with the FMN Spiral 3 specification.

NOTE (PRTTDCIS-1217)

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 garrisons Mission Preparation Center (MPC).

1.3 Conventions

NOTE (PRTTDCIS-3247)

All Conventions defined in the Statement Of Work (SOW) are equally applicable to the SRS.

1.3.1 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.

SRS (PRTTDCIS-2092)

A specific SRS statement shall always supersede the conventions of this section of the document.

NOTE (PRTTDCIS-3041)

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

1.3.2 Architecture

NOTE (PRTTDCIS-2309)

All architecture diagrams are modeled using Archimate 3.0 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 Bearer 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.

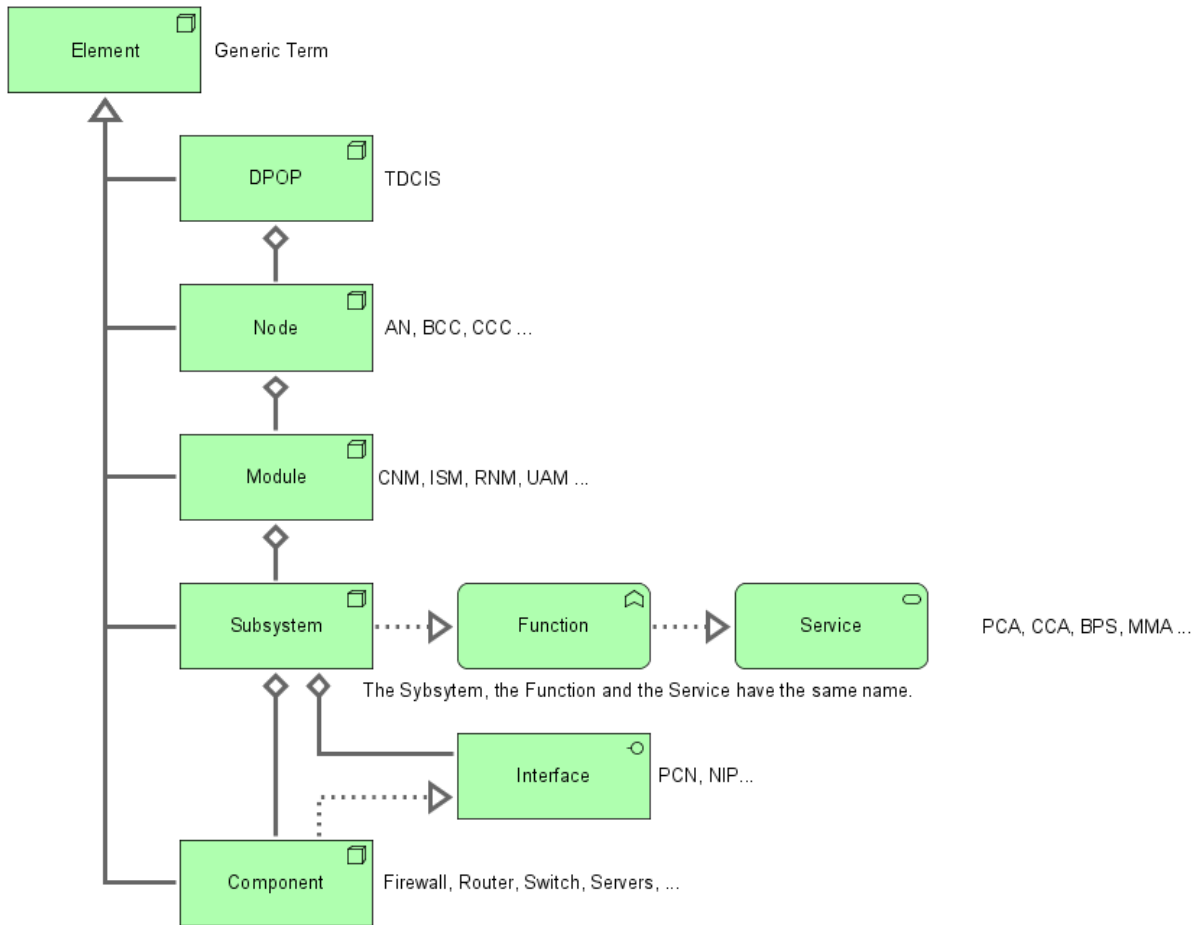


Figure 1 - Architecture Taxonomy

NOTE (PRTTDCIS-1113)

The CIS Nodes are built from CIS Modules, Bearer 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 system (or 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.

NOTE (PRTTDCIS-1116)

Diagrams representing building blocks are coloured using standard Archimate 3.0 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 are in scope of the project but do not constitute project deliverables such as Purchaser Furnished Equipment (PFE) provided for integration.

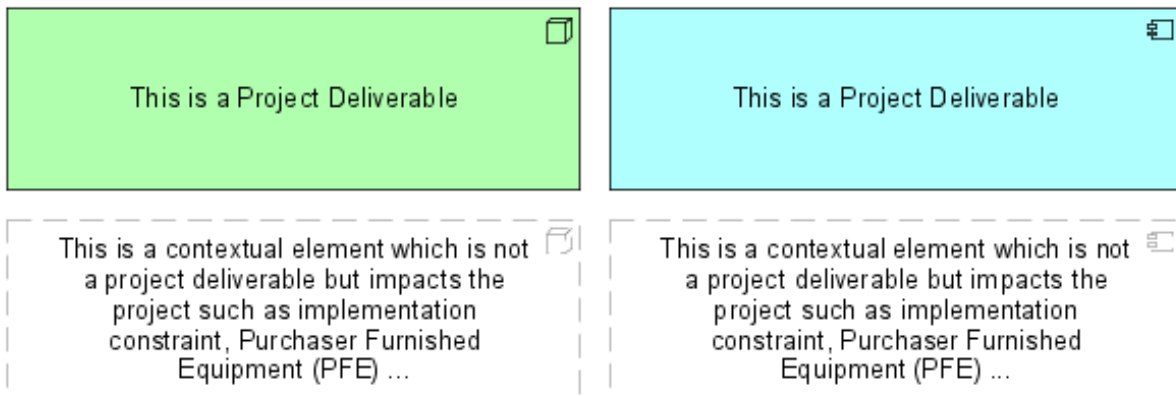


Figure 2 - Block styling convention

NOTE (PRTTDCIS-1228)

In the architectural diagrams the different assets are identified as virtualized or non-virtualized by marking these with a grey stamp with the inscription "virtualized" in white, as shown in the picture below.



Figure 3 - Virtual vs Non-Virtual asset representation

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.

1.3.3 Definitions**NOTE** (PRTTDCIS-1124)

"-xx" is the generic suffix denoting either:

- 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 Target Architecture (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-1132)

Assuring FMN compliance is the responsibility of the Purchaser, and it is fulfilled through the technical specification in this SRS, and through guidance provided to the Contractor during the design phase, and the Configuration Capturing activities in particular.

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 "Detailed 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-1523)

The term "enable" (or enabled) is to be interpreted 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, ...

1.3.4 Computation

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<>127bytes is 20%; and,
- 3) IP packets sized 128<>255bytes is 9%; and,
- 4) IP packets sized 256<>511 bytes is 5%; and,
- 5) IP packets sized 512<>1023 bytes is 18%; and,
- 6) IP packets sized larger than1024 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.

1.3.5 Interfaces**SRS** (PRTTDCIS-2091)

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 Fibre Optic Interface (Short Range);
- *Eth-FO-LR*: 1G/10G Single Mode Fibre Optic Interface (Long Range).

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 PCN;
- 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-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-2388)

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

1.4 Standards

1.4.1 Environmental Endurance

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 A/C) 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, depot) 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 DPOP shall be able to survive the Climatic specification with following additional comments on Test Conditions when packaged as designed during transportation, depot, 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 AECTP-300 Edition D, version 1 method 301.

SRS (PRTTDCIS-3113)

The DPOP shall be able to survive the Mechanical specifications with following additional comments on Test Conditions when packaged as designed during transportation, depot, 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:
 - o Forward 3.0g; and,
 - o Side 1.5g; and,
 - o Aft 1.5g; and,
 - o Vertical (up) 2.0g; and,
- 1) Shock: 20 G peak value (11 ms, half sine mechanical shock) according AECTP-400, Edition D Version 1, Method 403 or according to IEC 60068-2-27:2008; and,
- 2) Vibration as per TN-1078 with following additional comment: test methods according to AECTP-400, Edition D, Version 1, Method 401 or according to IEC 60068-2-64:2008 +AMD1:2019 CSV; and,
- 3) Acceleration as per TN-1078 with following additional comment: test methods according to IEC 60068-2-7:1983+AMD1:1986 CSV:
 - o $\leq 10g$ for transport; and,
 - o $\leq 2g$ for storage and handling; and,
 - o $\leq 2g$ for depot; and,
- 1) Bump as per TN-1078 with following additional comment: test methods according to IEC 60068-2-27:2008
 - o 25g, 6 ms, 1000 pulses for depot, transport, storage and handling; and,
- 1) Drop and topple as per TN-1078 with following additional comment: test methods according to IEC 60068-2-31:2008; and,
- 2) Free fall as per TN-1078 with following additional comment: test methods according to IEC 60068-2-31:2008.

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 30km including 5km 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 DPOP under road test shall be towed by or mounted on a vehicle on all-roads: motorway at 90 km/h, unpaved road at 50 km/h and country road at 30 km/h, without sustaining any damage. This shall be demonstrated by a test in which the DPOP 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:

- 1) Road test over a level hard surface (asphalt or concrete) with a specially prepared course; and,
- 2) 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,
- 3) 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:
 - o After the road test, all DPOP elements will be inspected using methods defined in the SOW; and,
 - o After the test there shall be no evidence of permanent deformation, delamination, buckling or any damage to any of the DPOP elements.

SRS (PRTTDCIS-3114)

The DPOP shall be able to survive the Sealing specifications with following additional comments on Test Conditions when packaged as designed during transportation, depot, 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 DPOP shall be able to survive the Biological and chemical specification with following additional comments on Test Conditions when packaged as designed during transportation, depot, 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; and,
- 3) Contamination by fluids: test methods according to AECTP-300 Edition D, version 1 method 314; and,
- 4) Mould growth: test methods according to AECTP-300 Edition D, version 1 method 308.

SRS (PRTTDCIS-3245)

When DPOP elements are packaged as designed during transportation, depot, storage and handling, all outdoor exposed materials (painted surfaces, sealing, etc.) shall be resistant to 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; and,
- Depot.

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, handling and depot.

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-1366)

Unless stated otherwise, all outdoor assemblies and sub-assemblies; such as, but not limited to, Housing Elements, CIS Components (e.g. Antenna, Mast, ODU...)...; under full operational configuration, shall be capable of withstanding climatic and environmental conditions, without suffering degradation of system performance (gain, pattern type, sensitivity) and without suffering permanent mechanical damages, as stipulated operate under in TN-1078 for OPE-1a environmental conditions.

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.

1.4.2 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-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 shall be compliant with *SDIP-29/2*, latest edition (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, 10 cm separation between RED and BLACK lines, and 50 cm separation between RED and BLACK equipment, when operated).

NOTE (PRTTDCIS-2396)

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

SRS (PRTTDCIS-2471)

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

SRS (PRTTDCIS-1147)

All CIS Nodes, Modules and their electric and electronic components shall comply with *SDIP-27*, latest edition (hereafter referred to as *SDIP-27*).

NOTE (PRTTDCIS-1148)

SDIP-27 Level B typically requires metallically sealed transit cases with shielded connectors mounted on front/rear panels and possibly additional EMC protection such as removable EMC panels (Radio Frequency (RF) grid).

SRS (PRTTDCIS-1149)

All CIS Nodes and Modules including electronic components processing classified information shall, as a minimum, be certified to TEMPEST requirements Level B.

SRS (PRTTDCIS-2469)

TEMPEST testing and certification shall only be performed by approved providers listed on the NATO Information Assurance Product Catalogue (NIAPC - <https://www.ia.nato.int/niapc/tempest>).

SRS (PRTTDCIS-1150)

All CIS Nodes and Modules shall implement power filter within their housing element (e.g. transit case or shelter) with a minimum attenuation of 60 dB over the frequency range of 100 kHz to 1 GHz.

SRS (PRTTDCIS-2470)

Power filters shall be sourced from approved vendors listed in the NATO Information Assurance Product Catalogue (NIAPC - <https://www.ia.nato.int/niapc/tempest>).

SRS (PRTTDCIS-1151)

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

SRS (PRTTDCIS-1370)

All housing elements, when fitted with CIS equipment, shall conform to the TEMPEST requirements of NATO standard *SDIP-27* Level C, operating in a NATO Zone 2 environment.

SRS (PRTTDCIS-1371)

All housing elements shall conform to the requirements of NATO standard *SDIP-29* (current edition).

1.4.3 Security

SRS (PRTTDCIS-1155)

All the CIS equipment involving firmware and software, and integrated into or directly supporting the DPOP, shall be hardened in accordance with the Purchaser's standard security hardening settings, as documented in the *Security Configuration Catalogue*.

NOTE (PRTTDCIS-2472)

Security Configuration Catalog will be provided to the Contractor after Contract Award.

SRS (PRTTDCIS-1156)

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

SRS (PRTTDCIS-1227)

The TDCIS shall employ state to the art virtualization that conforms to the NATO Technical and Implementation Directive on CIS Security AC/322-D/0048-REV3.

1.4.4 Timing

SRS (PRTTDCIS-1157)

All the Communication and Information System (CIS) equipment requiring timing shall primarily rely on the Network Time Protocol (NTP) feed from the static infrastructure when available.

1.4.5 Electricity

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,
- EN 50110-2:2010 Operation of electrical installations. National annexes; and,
- IEC 60364 series - Low-voltage electrical installations; and,
- IEC 60309 series - Plugs, socket-outlets and couplers for industrial purposes.

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 E (Schuko) power sockets.

1.4.6 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.

1.4.7 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.

1.4.8 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...).

1.4.9 Supportability

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.

1.4.9.1 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 failure of another component or item.

SRS (PRTTDCIS-3313)

Mean Time Between Failures (MTBF) shall be greater than 1500 hours in Ground Fixed environment (ref. MIL-HDBK-338B) using certified failure rates data at component level.

SRS (PRTTDCIS-3314)

Mean Time Between Critical Failures (MTBCF) shall be greater than 2000 hours in Ground Fixed environment (ref. MIL-HDBK-338B) using certified failure rates data at component level.

1.4.9.2 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

1.4.9.3 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.

1.4.9.4 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 > 90%; and,
- 3) (Critical + Non-Critical) Failures for HL3/SL3 < 15%; and,
- 4) Critical Failures for HL3/SL3 < 10%; 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 2 (two) 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.

1.4.9.5 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 maintaining unchanged the overall architecture.

1.5 Structure

NOTE (PRTTDCIS-1667)

This SRS is structured as follow:

- 1) **Introduction** (this chapter) covers
 - 1) The *Purpose* of the document,
 - 2) The *Context* in which the TDCIS has to operate,
 - 3) The *Conventions* and *Standards* which are applicable all this document long; then,
- 2) **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 *Operational Targets* TDCIS has to meet; then,
- 3) **Services** covers all services (*Communication, Infrastructure, Security...*) TDCIS has to provide and *Availability Targets* to be met; then,
- 4) **Modules** covers in details the *Functional* and *Technical Requirements*, together with the *Implementation Constraints* applicable to the different Systems and Subsystems which are used to build the TDCIS; then,
- 5) **Bearers** covers in details the *Specifications* of all Bearer Systems (such as SATCOM, Radio...) present in TDCIS; finally,
- 6) **Housing Elements** covers in details the *Specifications* of all Housing elements (such as Shelter, Trailer and Casing) present in TDCIS.

2 High Level Specification

2.1 General

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 or as a National Defence Network (NDN) extension.

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 nodes 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.

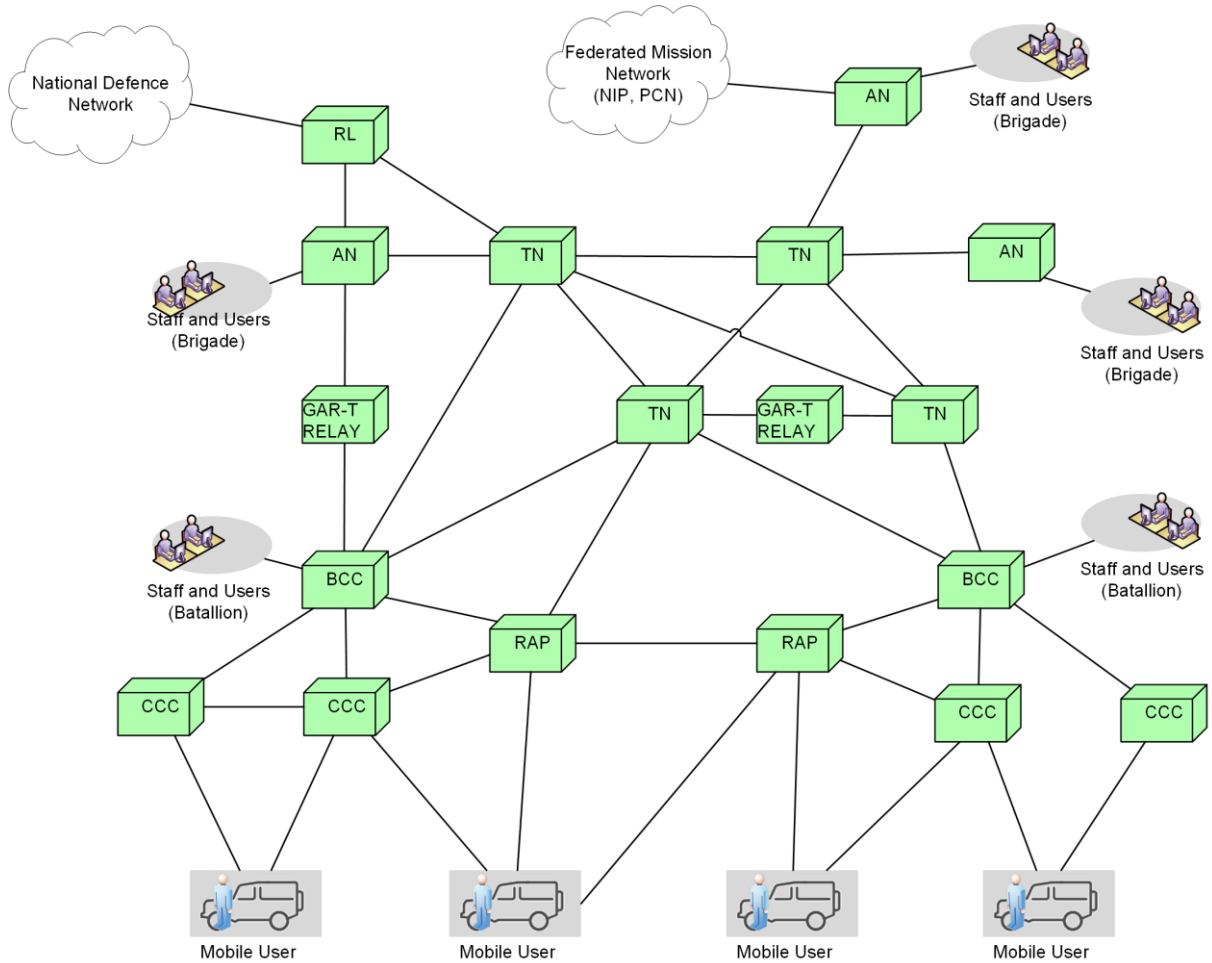


Figure 4 - TDCIS Nodes in context

NOTE (PRTTDCIS-1190)

The backbone of the TDCIS is composed of TN that create an independent wireless and/or wired network infrastructure that interconnect 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 a direct wireless and/or wired link.

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

- a High Capacity Line Of Sight (HCLOS) radio system between AN, BCC, TN, RAP and RL; and,
- a Mini-Line of Sight (Mini-LOS) radio system between BCC and CCC.

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).

NOTE (PRTTDCIS-1194)

The reach back to the National Defense Network (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 bearers.

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 the HCLOS links.

SRS (PRTTDCIS-1444)

The TDCIS shall be scalable to allow the PRT Army to choose the operating capability for the deployment they are undertaking, by identify and configuring only the assets required for the specific mission.

SRS (PRTTDCIS-1222)

The TDCIS node design shall be modular and generic, built in common building blocks.

SRS (PRTTDCIS-1223)

Nodes shall be fitted only with those elements that are required.

NOTE (PRTTDCIS-2932)

The breakdown of the TDCIS in its composing Nodes is illustrated in the following figure.

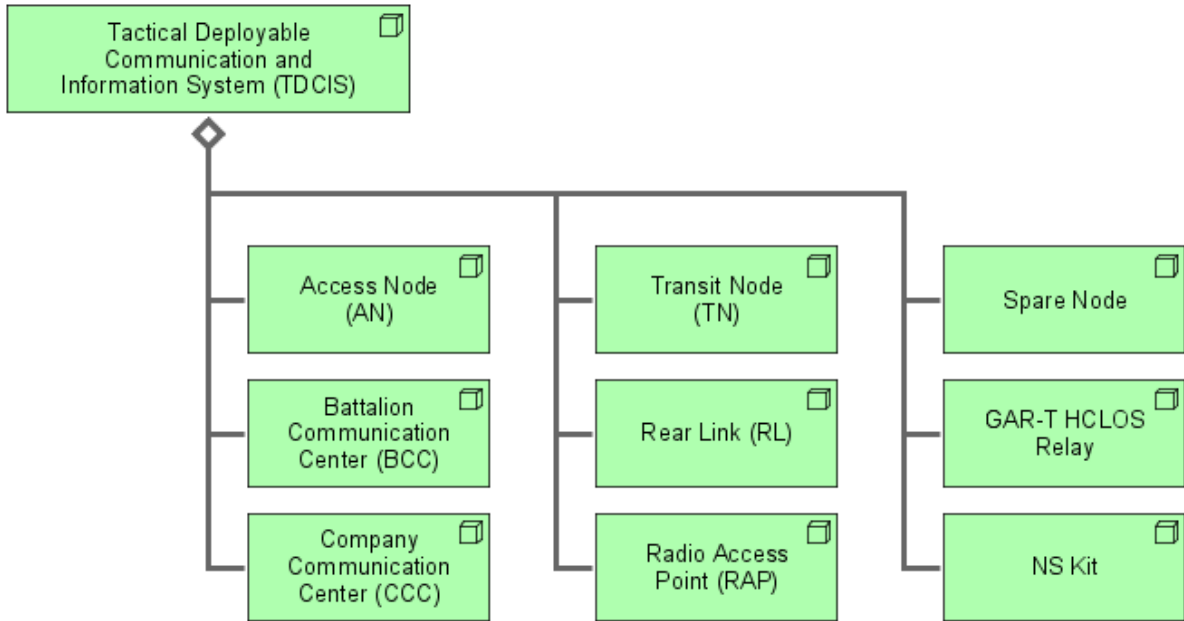


Figure 5 - TDCIS Nodal breakdown

2.2 Nodes

SRS (PRTTDCIS-1239)

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

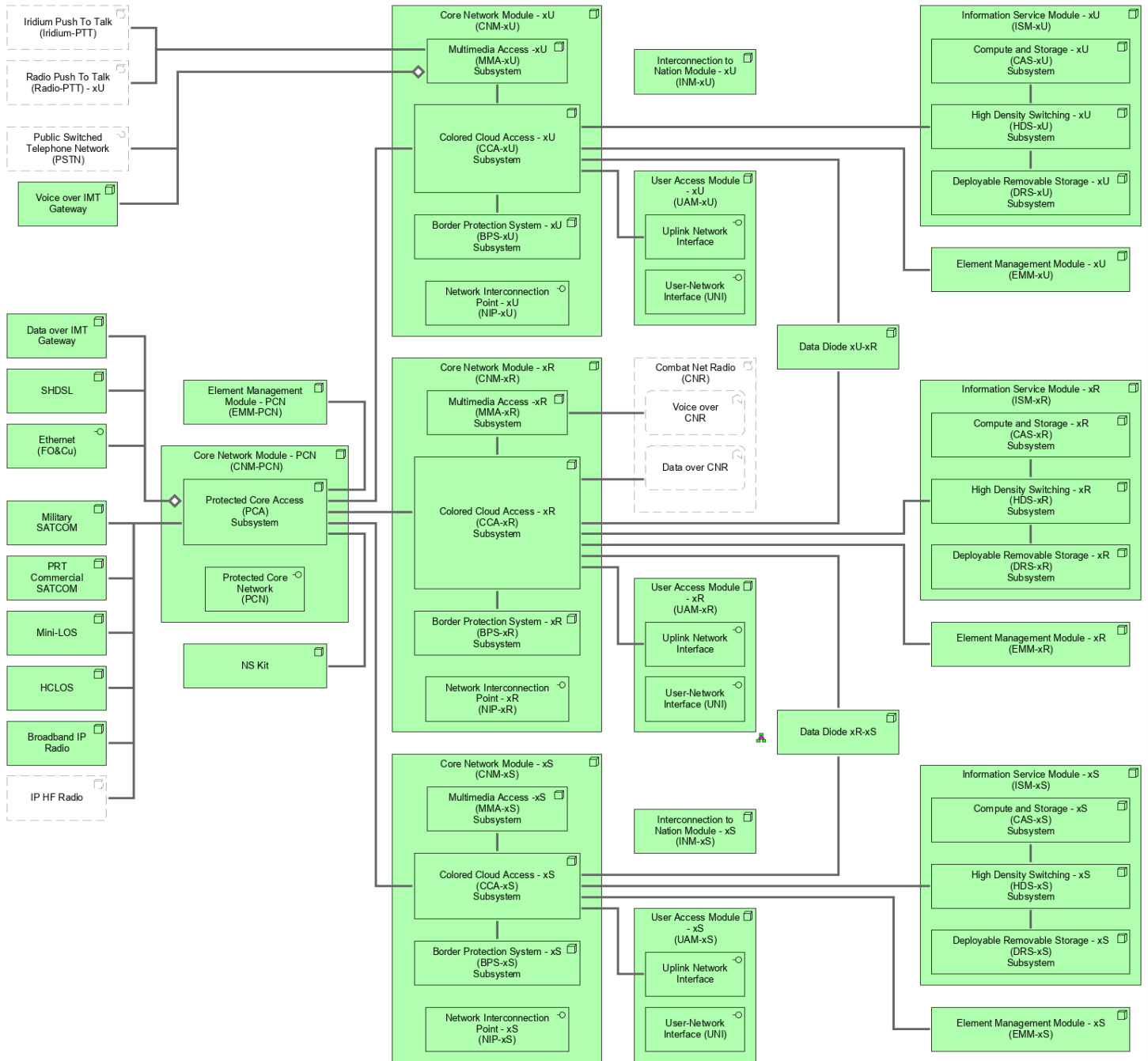


Figure 6 - Generic Node Architecture

SRS (PRTTDCIS-1195)

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

- UNCLASSIFIED (xU) with MISSION UNCLASSIFIED (MU) and National UNCLASSIFIED (Nat-U) as variants; and,
- RESTRICTED (xR) with the National RESTRICTED (Nat-R) as the single variants; 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 National Defense Network (NDN) extension and integrate with it.

NOTE (PRTTDCIS-3120)

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

SRS (PRTTDCIS-3121)

Colour Clouds encrypted traffic shall be transported by the Protected Core Network (PCN).

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-1431)

TDCIS Nodes shall support end users, as per the table below:

Security Domain	AN	TN	BCC	CCC	RAP	RL
xU	34	-	16	4	-	-
xR	34	-	16	4	-	-
xS	22	-	10	-	-	-

Table 1 - 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	TN	BCC	CCC	RAP	RL
xU	2	2	2	2	2	2
xR	2	-	2	2	2	-
xS	2	-	2	-	-	-

Table 2 - System Administrators per security domain and node type

SRS (PRTTDCIS-2461)

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

Service	xU	xR	xS
Antivirus Service	X	X	X
Community of Interest Service	X	X	X
Voice Collaboration Service	X	X	X
Video Teleconference Service	X		X
Collaborative Information Portal Service	X	X	X
Printing Service	X	X	X
Instant Messaging Service	X	X	X
Email Service	X	X	X
File Sharing Service	X	X	X

Table 3 - End-users Services per security domain.

NOTE (PRTTDCIS-1817)

End-User Devices (e.g. phones, computers, 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	TN	BCC	CCC	RAP	RL
Wireless VoIP Telephone	3	-	3	1	1	4

Table 4 - 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 PCN.

SRS (PRTTDCIS-2684)

Each TDCIS shelter shall be equipped with two (2) System Administrator wired VoIP Phones per security domain present in the Node.

SRS (PRTTDCIS-1199)

Following table lists TDCIS Nodes that shall include data diodes:

	AN	BCC	CCC	RAP
Data Diode xU-xR	1	1	1	1
Data Diode xR-xS	1	1		

Table 5 - Data Diodes quantities per node

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.

NOTE (PRTTDCIS-1208)

Network Interconnection Point (NIP) will be available to collocated Mission Network Partners (MNP) in the same security domain as the TDCIS configuration (xS and/or xU), in compliance with the Federated Mission Network (FMN) framework.

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.

NOTE (PRTTDCIS-1525)

TDCIS Nodes will be equipped with different Bearer Systems:

- On the PCN, 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**, mainly as AN-BCC radio network; 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 fall-back mean of communication by connecting to an International Mobile Telecommunication (IMT) network (GSM/UMTS/LTE (4G)); and,
 - **IP HF Radio** as a fall-back 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.

SRS (PRTTDCIS-1527)

The Data over IMT bearer functionality shall be integrated in the PCA of each node equipped with this bearer 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 PCN bearer system quantities, as per the table below:

	AN	TN	BCC	CCC	RAP	RL
Mini LOS	-	-	3	1	-	-
HCLOS	3	4	1	-	2	-
Broadband IP Radio	1	-	1	1	1	-
Commercial SATCOM	1	-	1	1	-	-
Military SATCOM	Enabled	Enabled	Enabled	-	-	1
Ethernet (FO and Cu)	1	1	1	1	1	1
SHDSL	2	2	2	2	2	2
Data over IMT	1	-	1	-	-	-
IP HF	-	-	-	-	-	1

Table 6 - PCN Bearer systems quantities

SRS (PRTTDCIS-2563)

All Nodes identified as Enabled shall be ready (mechanical, wiring...) to accommodate a Mil-SATCOM terminal.

NOTE (PRTTDCIS-1526)

TDCIS Nodes will have multiple Voice service integration options by means of following gateways:

- On the xU security domain:
 - **PSTN** for integration to a PABX; and,
 - **Voice over IMT** for integration to an International Mobile Communication (IMT) mobile telephony network (GSM/UMTS/LTE (4G)); 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	TN	BCC	CCC	RAP	RL
PSTN	4	4	4	4	4	4
Voice over IMT	1	-	1	-	1	2
Iridium PTT	Enabled	-	Enabled	Enabled	-	-
Radio PTT - xU	-	-	-	-	Enabled	Enabled
Radio PTT - xR	-	-	Enabled	Enabled	1	-

Table 7 - 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 ~~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.

SRS (PRTTDCIS-1810)

The TDCIS nodes shall be equipped with a number of UAM as listed in following table:

	AN	TN	BCC	CCC	RAP	RL
Medium UAM-xU	4	-	2	1	1	-
Small UAM-xU	2	2	2	2	2	2
Medium UAM-xR	4	-	2	1	1	-
Small UAM-xR	2	-	2	2	2	-
Medium UAM-xS	3	-	1	-	-	-
Small UAM-xS	2	-	2	-	-	-

Table 8 - UAM quantities per node

SRS (PRTTDCIS-2158)

The TDCIS Nodes shall be equipped with ancillary CIS equipment as per the table below.

	AN	TN	BCC	CCC	RAP	RL
Fiber Optic (FO) cable reel	2	2	2	1	1	1
Shielded Twisted Pair (STP) cable reel	2	2	2	1	1	1

Table 9 - CIS ancillaries per node

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	TN	BCC	CCC	RAP	RL
TCE 621B Crypto	1	-	1	-	-	-

Table 10 - 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	TN	BCC	CCC	RL	RAP
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 11 - 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	TN	BCC	CCC	RL	RAP
IP HF Radio Rack - Single	-	-	-	-	1	-
IP HF Transceiver TR-525AH	-	-	-	-	1	-
IP HF 500W Power Amplifier and Antenna Tuning Unit	-	-	-	-	1	-
IP HR Log-Periodic HF Antenna	-	-	-	-	1	-

Table 12 - IP HF Radio PFE Quantities

NOTE (PRTTDCIS-1524)

TN has no CIS PFE to be integrated.

SRS (PRTTDCIS-1437)

The table below contains the characteristics of the different Purchaser Furnished Equipment (PFE) CIS assets that shall be taken into consideration for integration in the different nodes and modules.

Asset	Estimated Rack Space (RU)	Weight (kg)	Power Supply	Electrical Power (Watt)	Estimated Heat dissipation (Watt)
TCE 621B Crypto	1	4.1	230VAC	25	-
CNR Double Vehicle Module	5	21.4	24VDC	672	550
CNR Single Vehicle Module	3	18.1	24VDC	360	286
CNR 150W HF Power amplifier	5	14.5	24VDC	960	810
CNR 50W V/UHF Power Amplifier	5	12.5	24VDC	450	360
CNR RoIP Gateway	3	10	24VDC	20	-
HF Radio Rack - Single	3	14	28VDC (Powered from Amplifier assembly)	120	100
HF 500W Power Amplifier and Antenna Tuning Unit	17	200	230VAC	2520	2000

Table 13 - PFE Characteristics

NOTE (PRTTDCIS-2682)

All other PFE assets listed in previous tables are taking place inside the modules for which characteristics are provided. Therefore, these are not considered as additional physical, environmental and electrical integration constraints.

NOTE (PRTTDCIS-3219)

All indoor PFE components (Radio, Amplifier...) to be integrated in Housing Elements are OPE-3 compliant and all outdoor PFE components (Antennas...) are OPE-1a compliant.

NOTE (PRTTDCIS-3220)

PFE detailed specifications will be shared with the Contractor after Contract Award.

NOTE (PRTTDCIS-3222)

CNR 150W HF Antenna Tuning Unit is

- not rack mounted but outdoor installed (close to the ERFP) in a location as close as possible from the Antenna, therefore it does not require any rack mounting units; and,
- in-line powered from the CNR 150W HF Power Amplifier over the RF connection, therefore its Estimated Heat Dissipation and Power Consumption are included in the characteristics of the CNR 150W HF Power Amplifier.

NOTE (PRTTDCIS-3221)

CNR 150W HF Power amplifier and CNR 150W HF Power amplifier have the same form fit factor and are rack mounted on a plate which can accommodate up to two (2) of these amplifiers. Therefore, a single 5U rack space has to be considered for every 2 of these power amplifier units.

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 Combat Net Radio (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 data diodes. The BMS/DSS in the xR security domain will feed over the xR-xS diodes 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.

SRS (PRTTDCIS-1450)

The breakdown of the Access Node (AN) is illustrated in the following figure. It identifies the required modules, bearer systems and housing elements that the AN is composed of. Each AN shall be built upon the building blocks as identified in this AN Breakdown.

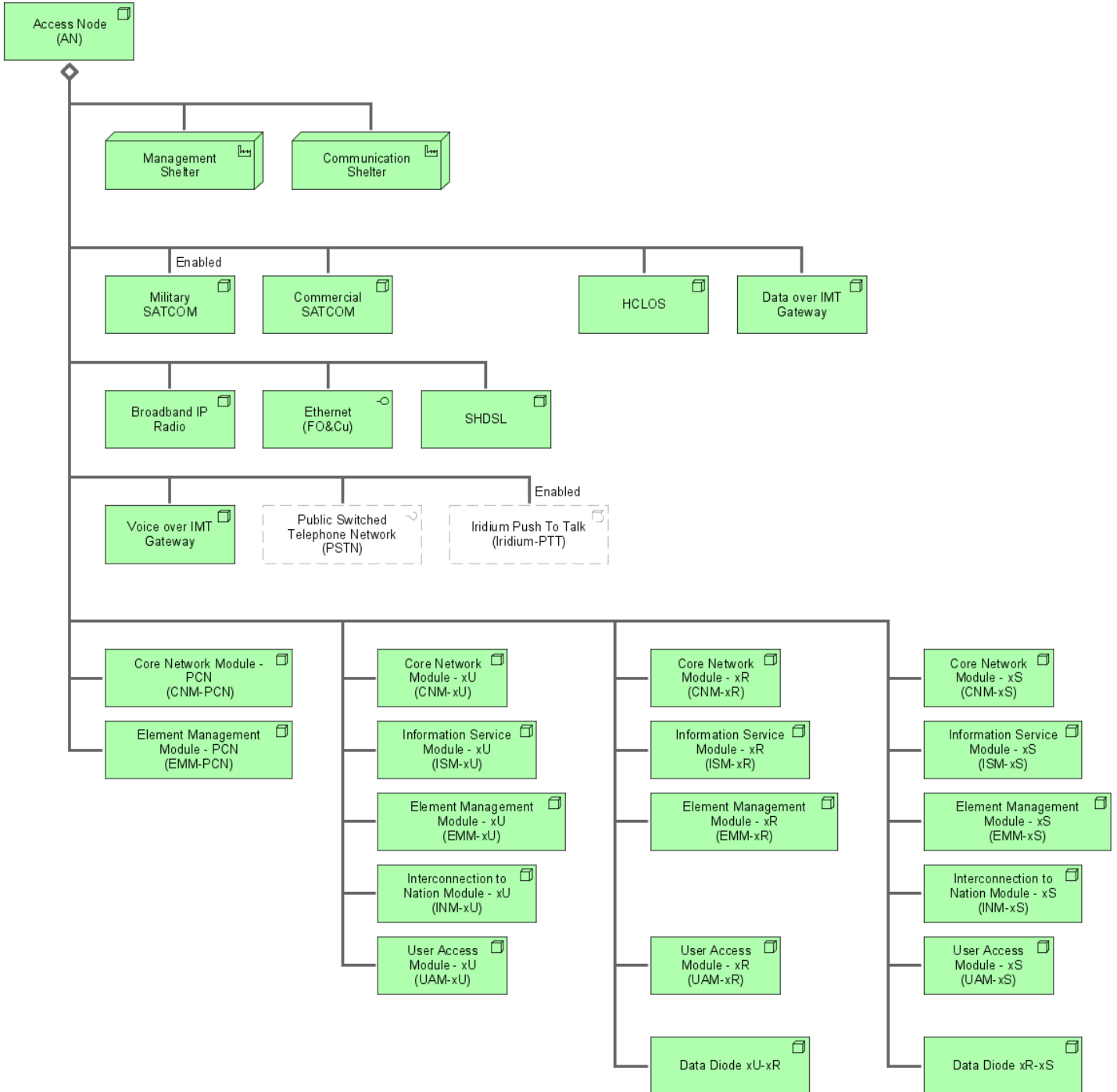


Figure 7 - Access Node breakdown

SRS (PRTTDCIS-1451)

The breakdown of the Battalion Communication Center (BCC) is illustrated in the following figure. It identifies the required modules, bearer systems and housing elements it is composed of. Each BCC shall be built upon the building blocks as identified in this figure.

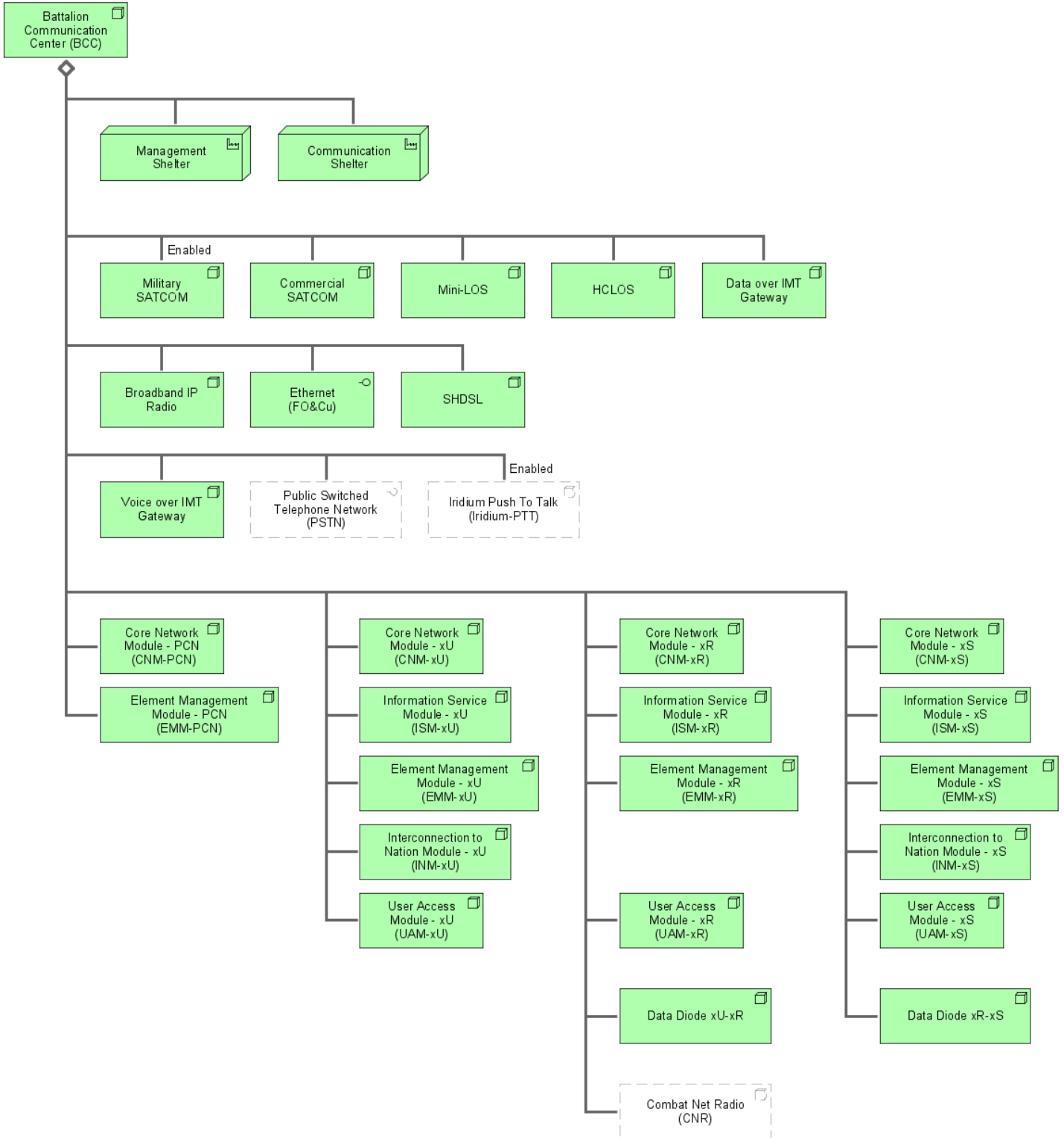


Figure 8 - Battalion Communication Center breakdown

SRS (PRTTDCIS-1452)

The breakdown of the Company Communication Center (CCC) is illustrated in the following figure. It identifies the required modules, bearer systems and using elements it is composed of. Each CCC shall be built upon the building blocks as identified in this figure.

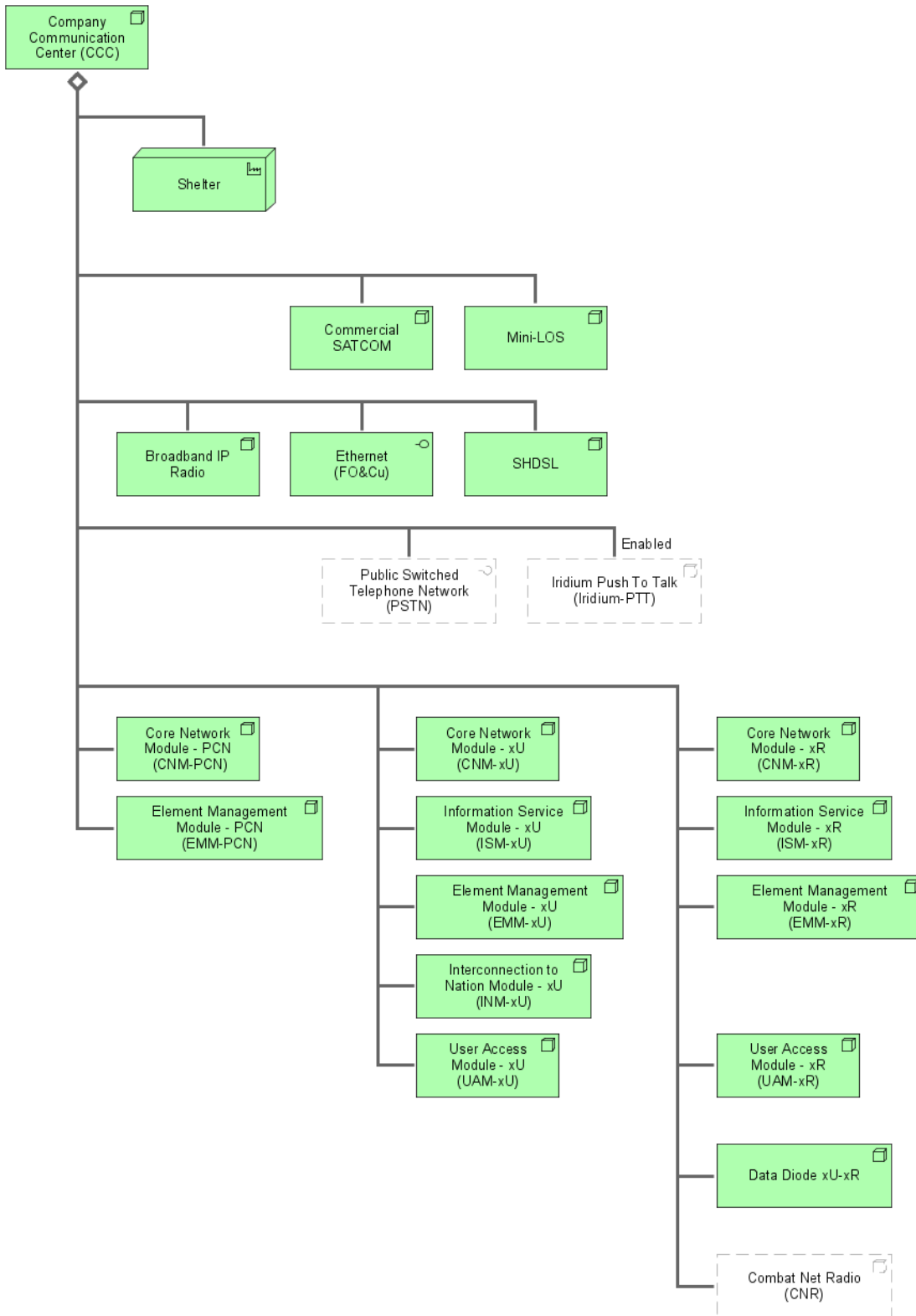


Figure 9 - Company Communication Center breakdown

SRS (PRTTDCIS-1453)

The breakdown of the Transit Node (TN) is illustrated in the following figure. It identifies the required modules, bearer systems and housing elements it is composed of. Each TN shall be built upon the building blocks as identified in this reference.

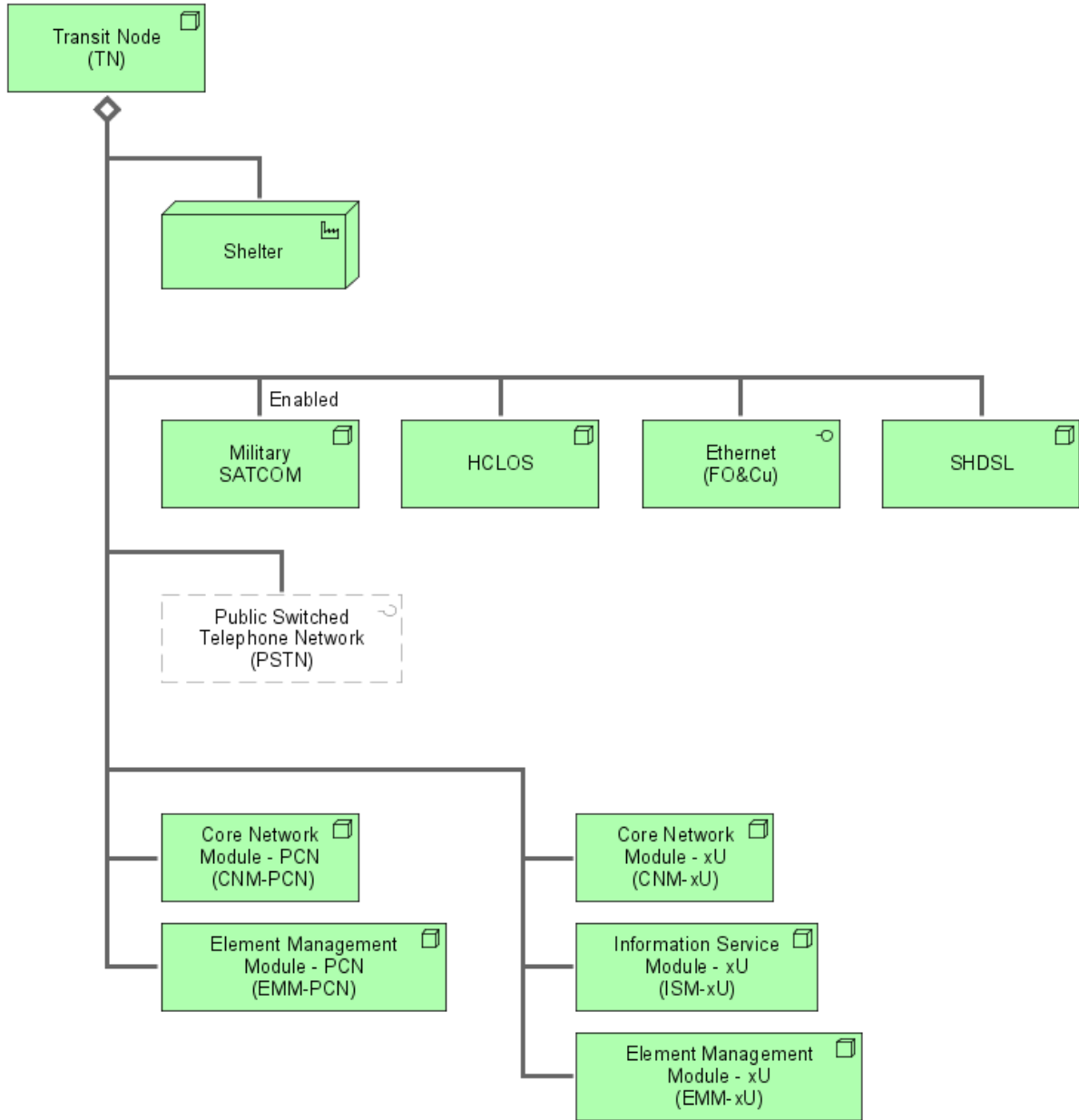


Figure 10 - Transit Node breakdown

SRS (PRTTDCIS-1454)

The breakdown of the Radio Access Point (RAP) is illustrated in the following figure. It identifies the required modules, bearer systems and housing elements it is composed of. Each RAP shall be built upon the building blocks as identified in this reference.

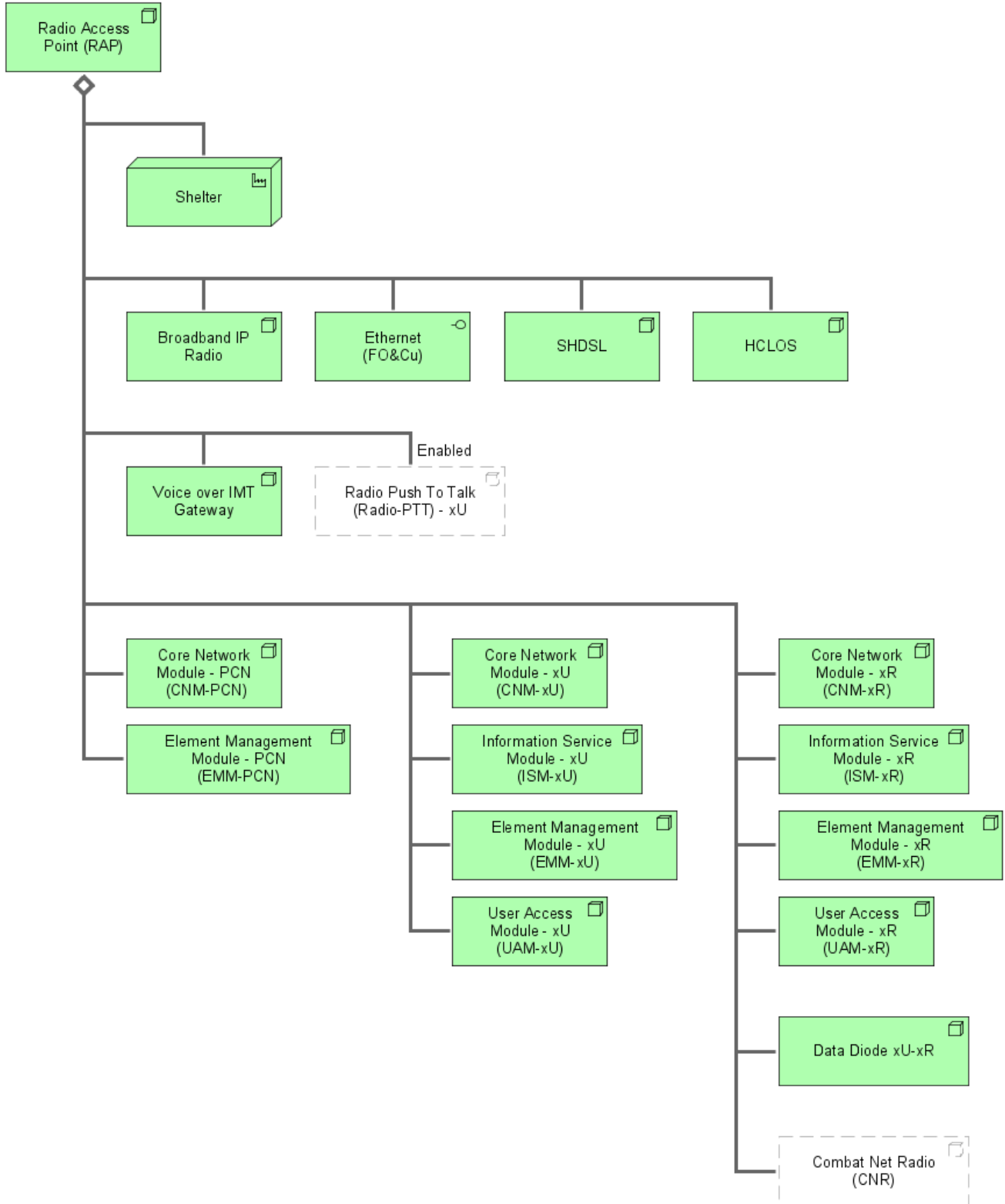


Figure 11 - Radio Access Point breakdown

SRS (PRTTDCIS-1455)

The breakdown of the Rear Link (RL) is illustrated in the following figure. It identifies the required modules, bearer systems and housing elements it is composed of. Each RL shall be built upon the building blocks as identified in this reference.

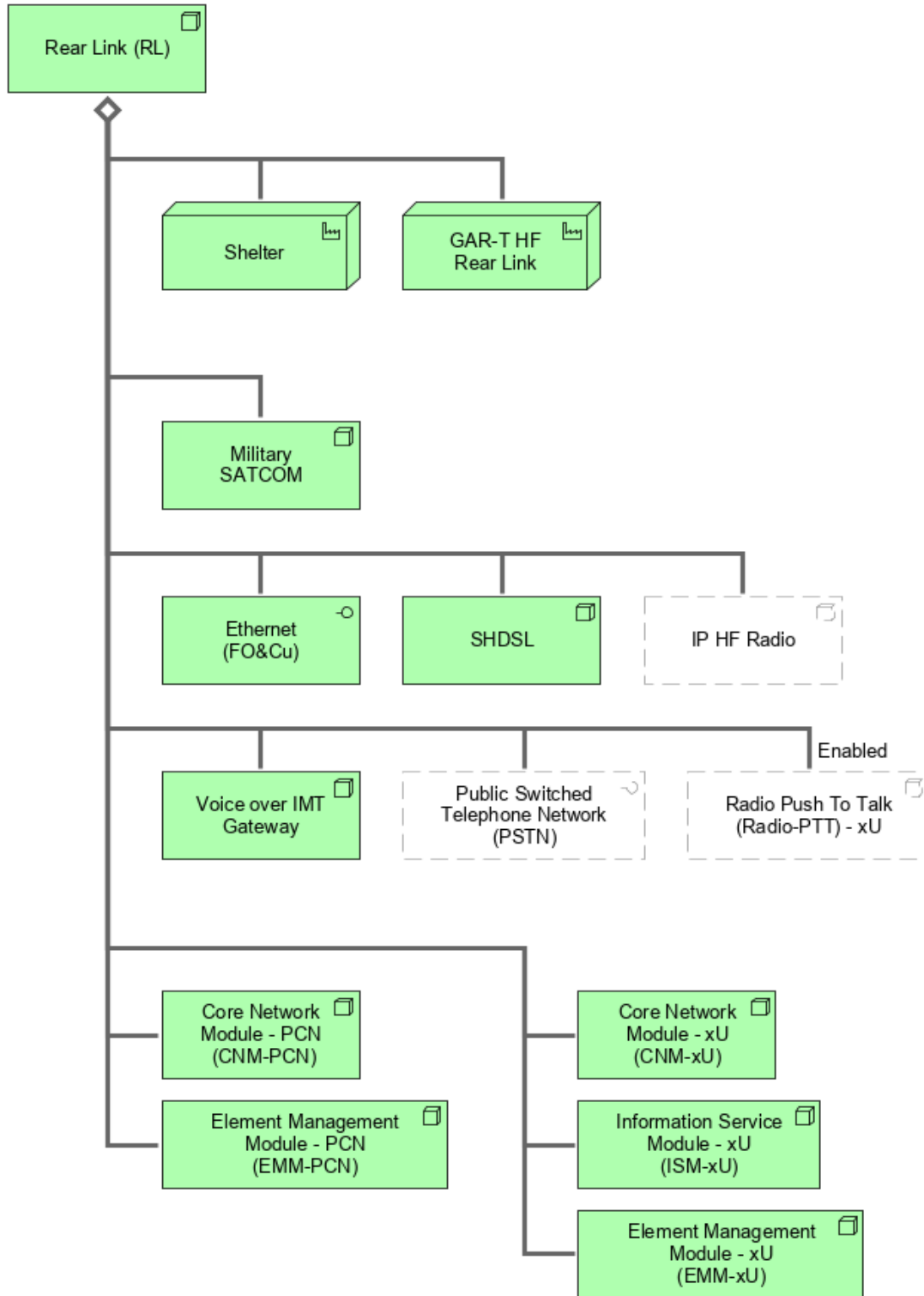


Figure 12 - Rear Link breakdown

SRS (PRTTDCIS-2685)

TDCIS shall include Spare Nodes.

SRS (PRTTDCIS-2686)

The breakdown of the Spare Node is illustrated in the following figure. It identifies the required modules, bearer systems and housing elements it is composed of. Each Spare Node shall be built upon the building blocks as identified in this reference.

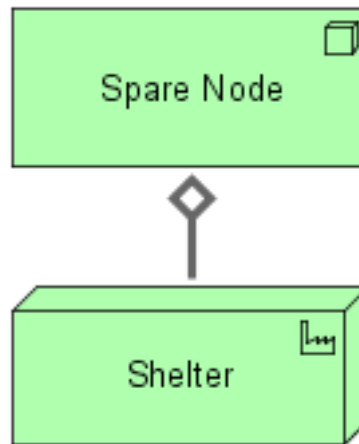


Figure 13 - Spare Node breakdown

2.3 Housing

SRS (PRTTDCIS-1499)

The physical configuration of a TDCIS node shall comprise of either a single shelter, a single shelter and a trailer, or a combination of two shelters.

SRS (PRTTDCIS-1500)

In the case of the double shelter, one shelter (Management Shelter) shall contain the Colour Clouds Elements and the second shelter (Communication Shelter) shall contain the PCN and the Bearer Elements.

SRS (PRTTDCIS-1501)

The connection between both shelters shall be achieved by two (2), black color, optical umbilical harnesses, each with a minimum of 10 transmission cores, one to be shared by xU and xR and the other for xS.

SRS (PRTTDCIS-1502)

Each of the umbilical harnesses to connect both Shelter shall be composed of four (4) hand carry cable reels of 250m long each, interchangeable between them and connectable to each other to reach a total distance of 1km.

SRS (PRTTDCIS-3033)

The umbilical harness cable reel shall be mounted on a mobile drum with belt strap and drum locking system.

SRS (PRTTDCIS-3027)

Each umbilical harness cable reel shall include a cable retention system on both ends to protect connectors from traction.

SRS (PRTTDCIS-3028)

Each Shelter shall include two (2) cable reel backpack conversion systems, each able to attach one (1) Umbilical Harness Cable reel.

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
Spare Node	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 14 - TDCIS Nodes Shelter and Trailer composition

SRS (PRTTDCIS-1372)

The Shelter is the housing element for all CIS and non-CIS assets that build a node. Following figure illustrates the Shelter breakdown structure. It identifies the elements it is composed of. Each Shelter shall be built upon the building blocks as identified in this reference.

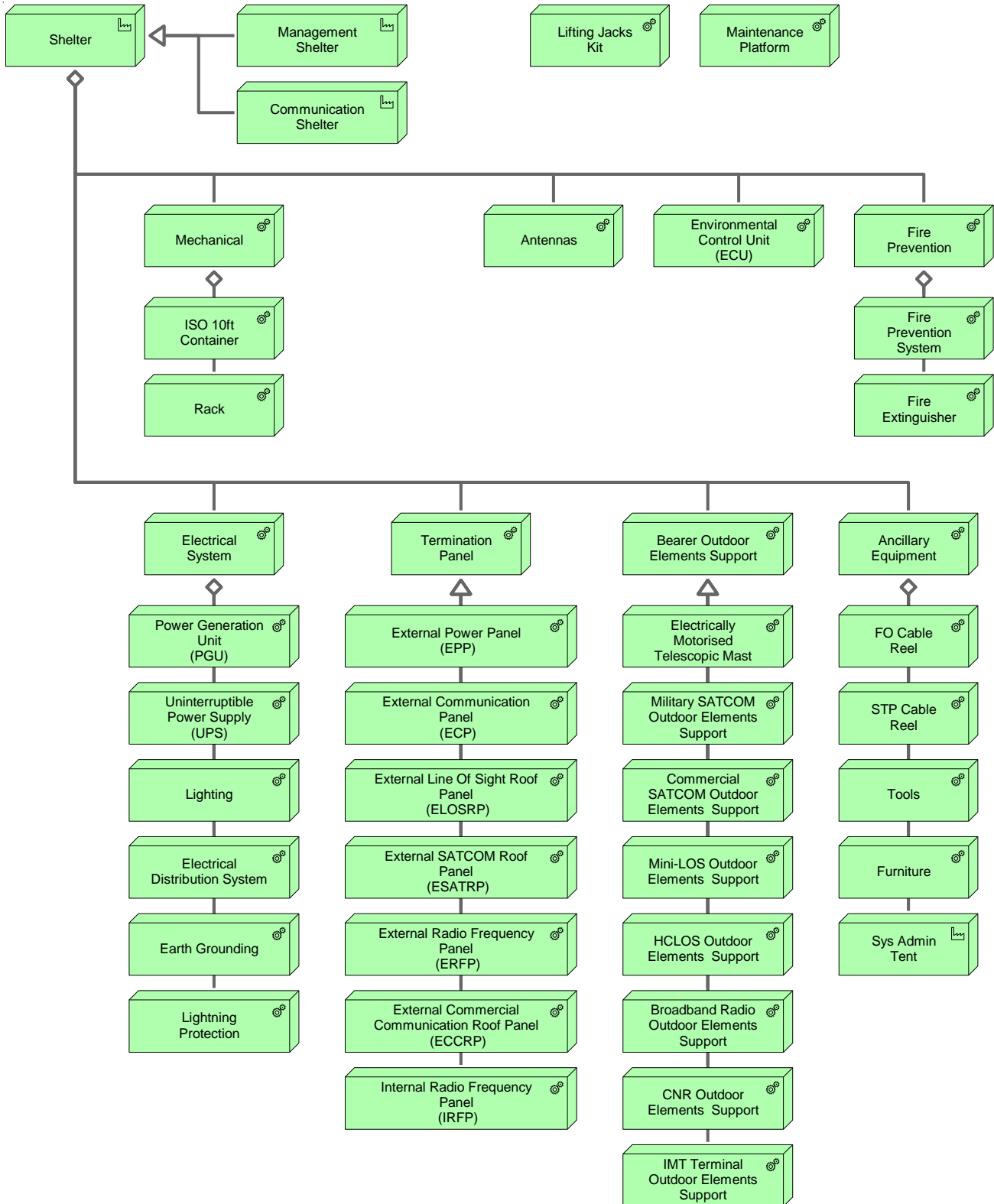


Figure 14 - Shelter Breakdown Structure

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”

NOTE (PRTTDCIS-2263)

The GAR-T has a common base structure, consisting of;

- Mechanical; (i.e. trailer, etc.);
- Electrical Power;
- Telescopic Antenna Mast; and
- Ancillary Equipment.

SRS (PRTTDCIS-1504)

The GAR-T Trailer is the housing element for CIS and non-CIS assets for the Rear Link HF trailer and for the HCLOS Relay trailer. Following figure illustrates the GART-T Trailer breakdown structure. It identifies the elements it is composed of. Each TGAR-T Trailer shall be built upon the building blocks as identified in this reference.

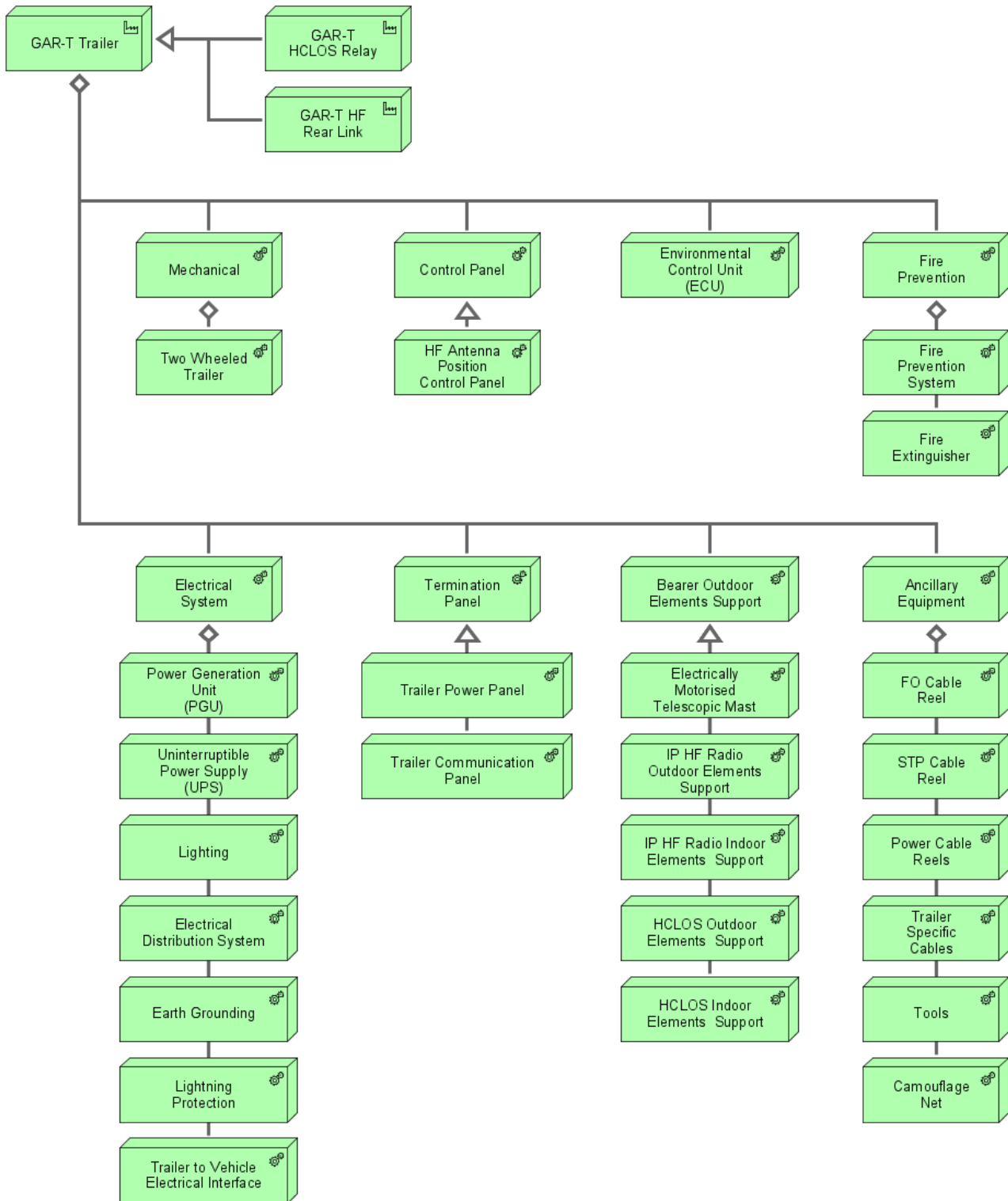


Figure 15 - GAR-T Trailer Breakdown Structure

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 End-User Devices (EUD) and ancillaries.

SRS (PRTTDCIS-3091)

Transit and Transport Cases shall be fixed inside the Node Shelter for transport.

2.4 NS Kit

SRS (PRTTDCIS-2549)

TDCIS shall include a NATO SECRET (NS) kit.

SRS (PRTTDCIS-2550)

The NS Kit shall include:

- **Core Node lite** providing NS Network Interconnection Point (NIP) for federation with other Mission Network Partners (MNP) in the NS security domain; and,
- **Remote Node lite** providing end-user access to services hosted in the NS federated network.

SRS (PRTTDCIS-2931)

The NS Kit is a group of nodes and shall be considered as a TDCIS Node.

SRS (PRTTDCIS-2551)

NS Kit being reserved only to NATO led missions, the NS kit (and all of its composing elements) shall be considered a pooled resource and therefore shall not be assigned to any TDCIS node in particular.

SRS (PRTTDCIS-2552)

The NS Kit Nodes quantities shall adhere to following table:

	Quantities
NS Kit - Core Node lite	3
NS Kit - Remote Node lite	7

Table 15 - NS Kit Nodes quantities.

SRS (PRTTDCIS-2697)

The NS Kit Nodes per node maximum collocated connected end users quantities shall adhere to following table:

	End User Quantities
NS Kit - Core Node lite	8
NS Kit - Remote Node lite	10

Table 16 - NS Kit Nodes End User quantities.

SRS (PRTTDCIS-2920)

The NS Kit Core Nodes shall support up to two (2) System Administrators.

SRS (PRTTDCIS-2919)

Each NS Kit Core Nodes shall include System Administrator devices as per following table:

	Quantities
System Administrator Workstations	2
System Administrator VoIP phones	2

Table 17 - NS Kit System Administrator quantities per Core Node.

SRS (PRTTDCIS-2553)

The breakdown of the NS Kit Nodes is illustrated in the following figure. It identifies the required modules it is composed of. Each NS Kit Node shall be built upon the building blocks as identified in this reference.

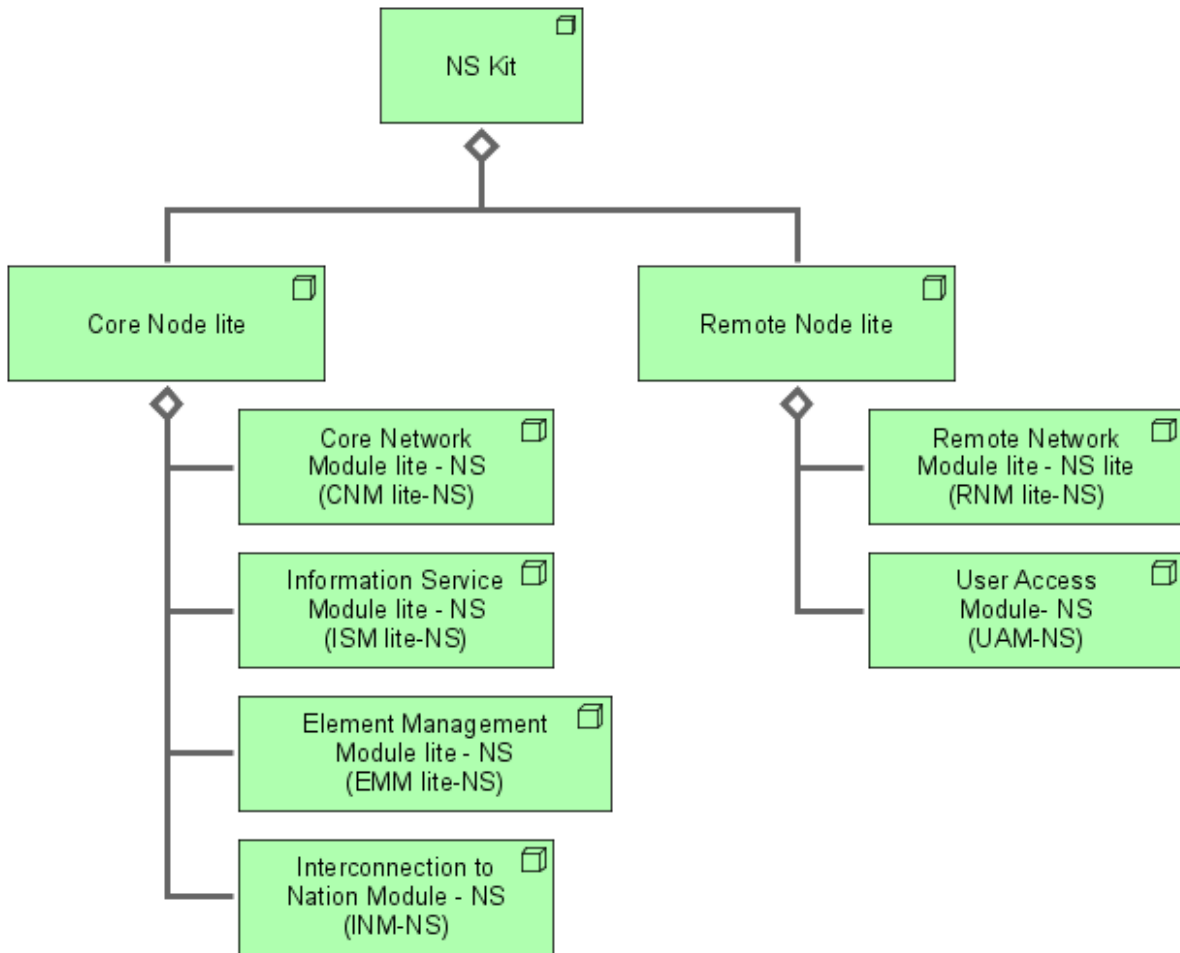


Figure 16 - NS Kit breakdown

SRS (PRTTDCIS-2745)

The NS Kit Core Node lite shall contain one (1) CNM lite and one (1) ISM lite.

SRS (PRTTDCIS-2746)

The NS Kit Remote Node lite shall contain one (1) RNM lite and one (1) regular UAM-NS.

NOTE (PRTTDCIS-2687)

The NS Kit Nodes in context is illustrated on the following picture.

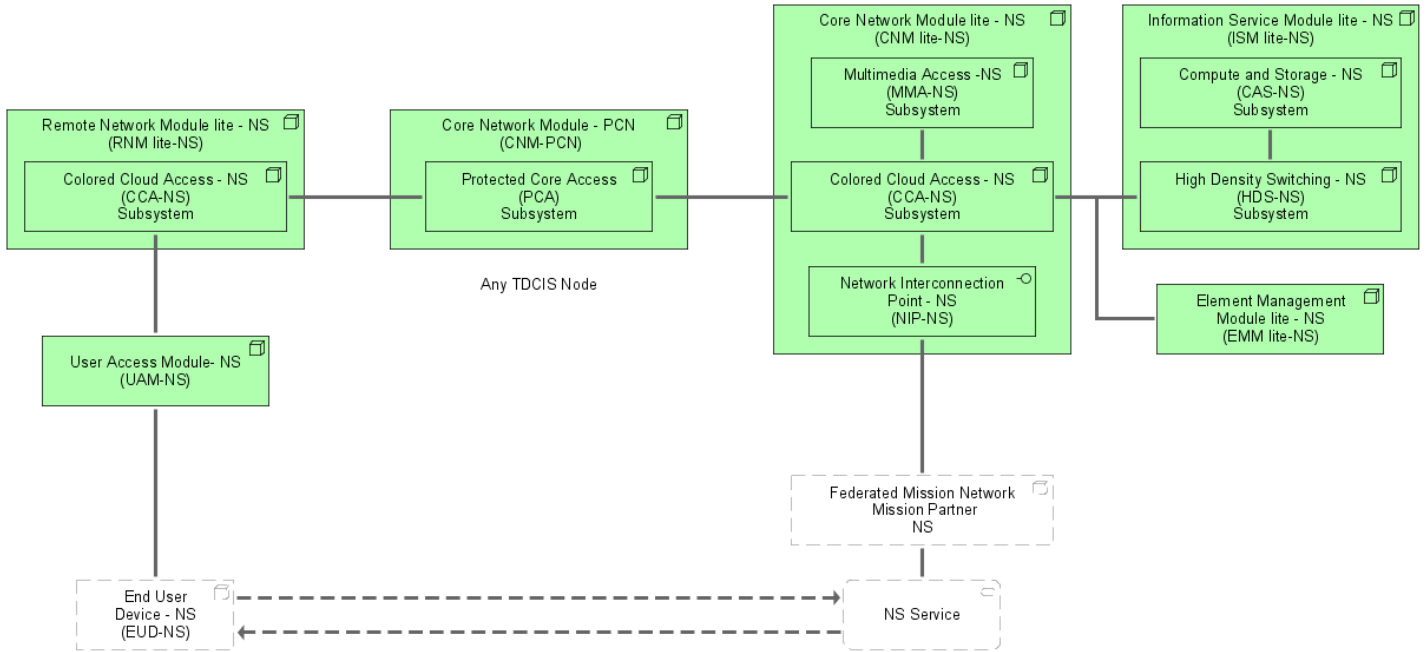


Figure 17 - NS Kit in context

SRS (PRTTDCIS-2747)

NS Kit CNM lite and RNM lite shall interconnect their respective CCA through the CNM-PCA of any TDCIS Node.

SRS (PRTTDCIS-2695)

The table below contains Crypto Purchaser Furnished Equipment (PFE) assets quantities that shall be considered for integration in the NS Kit.

Asset	NS Kit
TCE 621B Crypto	10

Table 18 - Crypto PFE Quantities for NS Kit

SRS (PRTTDCIS-2688)

The contractor shall aim for an identical design and hardware for NS Kit modules as for the TDCIS Node modules.

SRS (PRTTDCIS-2691)

The contractor shall prioritize small footprint and reduced size and weight of the NS Kit over hardware commonality with TDCIS Node modules.

SRS (PRTTDCIS-3003)

Each TDCIS Node Shelter shall have a storage and transport position for one (1) NS Kit Core Node and one (1) NS Kit Remote Node.

SRS (PRTTDCIS-3004)

NS Kit elements shall rely on the Node Shelter power supply.

SRS (PRTTDCIS-3005)

The Shelter UPS endurance shall cover one (1) NS Kit Core Node and one (1) NS Kit Remote Node in its computation.

SRS (PRTTDCIS-3006)

Each NS Kit Core Node shall be delivered with one (1) FO cable reel of 250m.

SRS (PRTTDCIS-3007)

Each NS Kit Remote Node shall be delivered with one (1) FO cable reel of 250m.

NOTE (PRTTDCIS-3008)

The maximum distance between two transit cases (in a NS Kit Core or a Remote Node) is 5m.

SRS (PRTTDCIS-3009)

All FO and power patch cables used to connect different transit cases in the NS Kit Core or Remote Node shall be stored inside the Transit Cases during storage and transport.

2.5 Operational targets

SRS (PRTTDCIS-2627)

All Operational Targets listed here below shall be met with a team of two (2) TDCIS trained technicians per Shelter.

SRS (PRTTDCIS-1947)

Any Node shall be teared-down in less than 30 minutes.

SRS (PRTTDCIS-2628)

Node Tear-down status shall be understood as all services and bearer links properly shutdown.

SRS (PRTTDCIS-1948)

Any Node shall re-deploy in less than 90 minutes.

SRS (PRTTDCIS-2629)

Node re-deploy status shall be understood as ready for departure: all components are properly packed and stored for transport, Shelter is closed and securely mounted on the Vehicle, trailer is attached to the vehicle, vehicle motor running and people sitting in the cabin ready to take the road.

SRS (PRTTDCIS-1949)

Any Node shall be self-sustainable during 72 hours of regular operations without Logistic Supply Run.

SRS (PRTTDCIS-2622)

Radio Based xR Voice service shall be operational in less than 15 minutes after arrival on site

SRS (PRTTDCIS-2623)

All Intra-Node services (e.g. those hosted in the Node) shall be operational in less than 30 minutes after arrival on site.

SRS (PRTTDCIS-2625)

All Radio and SATCOM links (including mast and antenna raising) shall be operational in less than 45 minutes after arrival on site.

SRS (PRTTDCIS-2624)

All Inter-Node services (e.g. those hosted in or interconnecting with other nodes) shall be operational in less than 60 minutes after arrival on site.

SRS (PRTTDCIS-2626)

Any node shall have reached Full Operational Capability in less than 75 minutes after arrival on site.

3 Services

3.1 General

NOTE (PRTTDCIS-1507)

TDCIS and NS Kit Nodes support the following services:

- 1) Communications Services, consisting of:
 - 1) Bearer Services;
 - 2) Transmission Services;
 - 3) Protected Core Access (PCA) Services;
 - 4) Coloured Cloud Access (CCA) Services, at xU, xR and xS levels, including interworking with 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-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.

NOTE (PRTTDCIS-2922)

NS Kit Nodes host:

- 1) Communications Services; and
- 2) CIS Security Services; and
- 3) Infrastructure Service; and
- 4) Service Management and Control Service.

3.1.1 Availability Targets

NOTE (PRTTDCIS-2923)

DPOP CIS 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.

SRS (PRTTDCIS-2929)

DPOP Inherent availability shall be at least 98% taking the following DPOP elements into consideration for availability predictions:

- 1) Nodes consisting of:
 - 1) Modules encompassing the following:
 - 1) Core Network Modules (CNM), Remote Network Modules (RNM) and User Access Modules (UAM); and
 - 2) Infrastructure Service Module (ISM) and Data Diodes; and
 - 2) User Appliances; and
- 2) Housing Elements, including:
 - 1) Environmental Control elements; and
 - 2) Power Supply elements; and
 - 3) Ancillary elements.

3.2 Communication Services

3.2.1 Availability Targets

SRS (PRTTDCIS-1520)

Communications Services availability levels shall meet or exceed the levels illustrated in the following figure and listed in the following table for communications between Nodes.

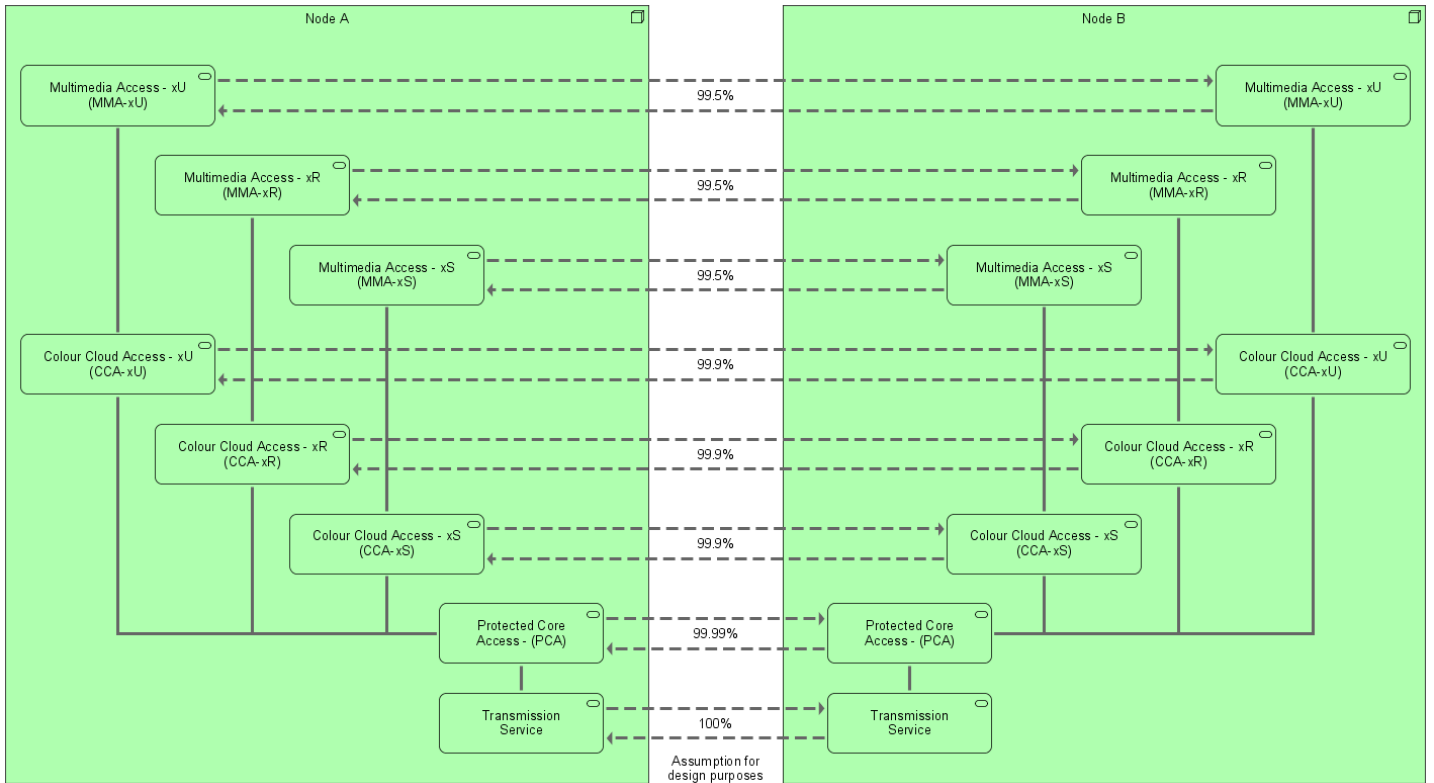


Figure 18 - Communication Services Availability - Node to Node

Services	Availability	Enabling Service	Enabling Modules
Bearer Services	100% Assumption for design purposes	SATCOM services, Radio Services, Landline services,	Multiple
Protected Core access service	99.99%	Transmission service (external, 100%)	CNM-PCN
Coloured Cloud Access Services-xU	99.9%	Protected Core Access service	UAM-xU CNM-xU CNM-PCN
Coloured Cloud Access Services-xR	99.9%	Protected Core Access service	UAM-xR CNM-xR CNM-PCN
Coloured Cloud Access Services-xS	99.9%	Protected Core Access service	UAM-xS CNM-xS CNM-PCN
Multimedia Access Services-xU	99.5%	Coloured Cloud Access Service - xU	UAM-xU CNM-xU CNM-PCN
Multimedia Access Services-xR	99.5%	Coloured Cloud Access Service – xR	UAM-xR CNM-xR CNM-PCN
Multimedia Access Services-xS	99.5%	Coloured Cloud Access Service - xS	UAM-xS CNM-xS RNM-xS CNM-PCN

Table 19 - Communication Services Availability - Node to Node

SRS (PRTTDCIS-1515)

For each layer of the stack, the design shall take into consideration the availability of the enabling service in the preceding layer, and the availability allocated to each of the enabling modules.

NOTE (PRTTDCIS-1516)

For Communications Services, availability levels concern end-to-end service availability between end-points alike, over the Wide Area or Metro Area Networks (WAN/MAN) in the theatre of operations or in garrison locations. The tables list availability levels from highest (bottom of the network stack) to lowest (top of the network stack).

SRS (PRTTDCIS-1517)

Assigned availability targets shall be read as the integrated system availability of the path from each specified module of Node-A to the same specified module of Node-B.

SRS (PRTTDCIS-1518)

The design shall include each related CIS and Non-CIS system components (e.g. routers, switches, cryptos, firewalls, UPSs, power distribution units, and passive components such as transit cases and shelters, etc.) in the availability allocation and prediction calculations in order to achieve the specified intrinsic availability targets.

NOTE (PRTTDCIS-1519)

For the purposes of availability calculations, availability metrics of any PFE components in the path can be assumed as 100%.

SRS (PRTTDCIS-1521)

The following shall be noted:

- 1) Protected Core Access services are delivered through the PCA subsystem; and,
- 2) Coloured Cloud Access services are delivered through the CCA and BPS subsystems. The CCA subsystem includes IP crypto devices; and,
- 3) Multimedia Access Services are delivered through the MMA subsystem.

3.3 Infrastructure Services

3.3.1 Availability targets

NOTE (PRTTDCIS-1680)

Availability levels for Infrastructure Services do not rely on enabling services external to the ISM. Hence, the below listed availability levels concern the intrinsic availability of the hardware and software elements that make the ISM in the TDCIS Nodes.

Services	Availability	Enabling Service	Enabling Modules
Infrastructure Services - xU	99.95%	None	ISM-xU
Infrastructure Services – xR	99.95%	None	ISM-xR
Infrastructure Services – xS	99.95%	None	ISM-xS

Table 20 - Infrastructure Services Availability

3.4 Business Support Services

3.4.1 General

SRS (PRTTDCIS-1231)

The contractor shall design, implement, configure and deliver all necessary Network (e.g. DHCP...), Infrastructure (e.g. AD, DC, DNS...) and Platform (e.g. hypervisor...) services necessary to support Business Support Services in line with industry best practices and compliant with security measures.

SRS (PRTTDCIS-2700)

Multiple services are linked to the Unified Communication and Collaboration (UCC) solution. The exact PFE product reference to fulfill the role of the UCC tool which is interfacing to the user, here after named the *Collaboration Application* is design driven. The Contractor shall specify the list and versions of products to the Purchaser for provisioning the *Collaboration Application* that are in compliance with the UCC solution providing full sets of features.

SRS (PRTTDCIS-3092)

The Unified Communication and Collaboration (UCC) solution shall conform to Internet Engineering Task Force (IETF) standards for online presence and messaging, providing the minimum core features, including instant messaging, voice and video calls, voice messaging, conferencing and desktop sharing.

SRS (PRTTDCIS-2887)

The *Collaboration Application* shall be a single software providing all functionalities specified for the services it supports.

SRS (PRTTDCIS-2876)

Following Services shall rely on a common Global Address List (GAL) of users:

- Instant Messaging Service; and,
- Email Service; and,
- Collaboration Information Portal Service; and,
- File Sharing Service; and,
- Printing and Scanning Services; and,
- Video Teleconference Service; and,
- Voice Collaboration Service.

SRS (PRTTDCIS-2880)

The contractor shall consider the largest user community (including End Users and System administrators) possible on a single security domain as the dimensioning constraint for all services implementation on all security domains.

3.4.2 Voice Collaboration Service

SRS (PRTTDCIS-2885)

The Voice Collaboration Service design shall adhere to the context diagram illustrated on the following figure.

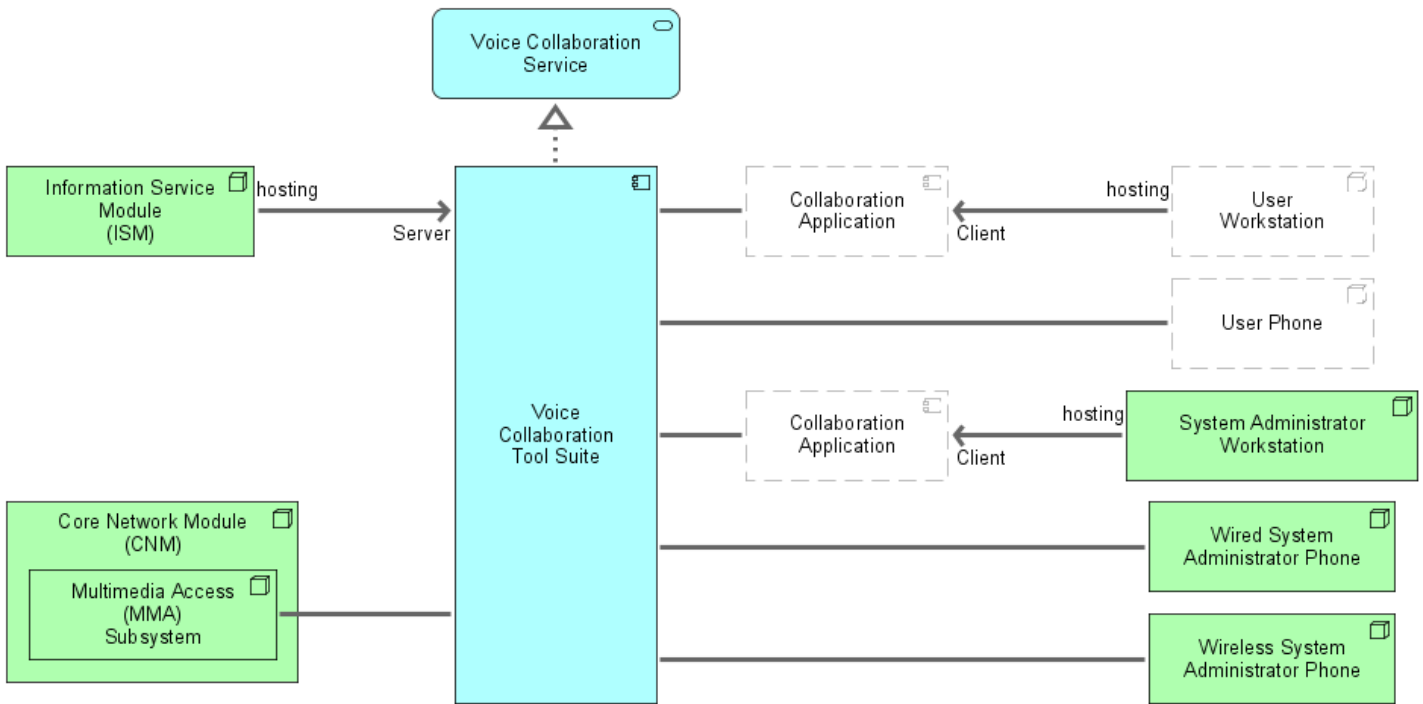


Figure 19 - Voice Collaboration Service in Context

SRS (PRTTDCIS-2888)

Each user shall be associated with one physical (hardware) and one virtual (software) phone, both configured on the collaboration solution.

SRS (PRTTDCIS-2889)

The virtual (software) phone shall be realized by the Collaboration Application.

SRS (PRTTDCIS-2901)

On top of the user community based dimensioning constraint, the Contractor shall include an additional 10% provision.

3.4.3 Video Teleconference Service

SRS (PRTTDCIS-2893)

The Video Teleconference (VTC) Service design shall adhere to the context diagram illustrated on the following figure.

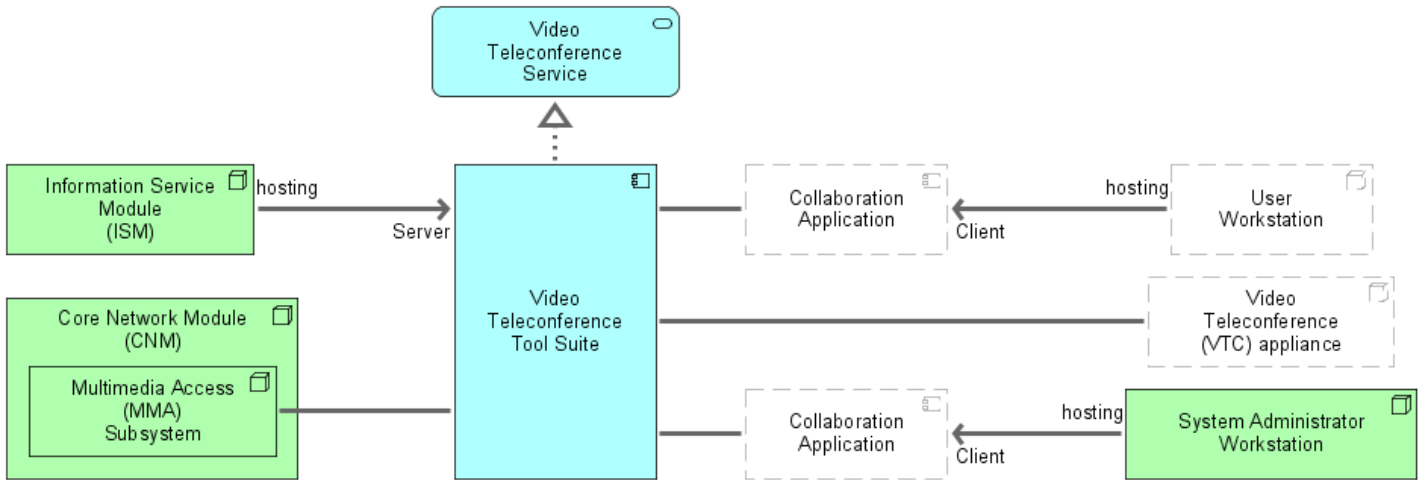


Figure 20 - Video Teleconference Service in Context

SRS (PRTTDCIS-2899)

The Video Teleconference Tool Suite shall support

- one (1) meeting room for each AN; and,
- one (1) meeting room for each BCC.

SRS (PRTTDCIS-2902)

Each user shall have a soft-VTC client realized by the Collaboration Application.

SRS (PRTTDCIS-2900)

On top of the user community based dimensioning constraint, the Contractor shall include an additional 10% provision.

SRS (PRTTDCIS-2903)

The exact PFE product reference to fulfill the role of the *VTC appliance* on EUD is design driven. The Contractor shall provide the exact brand and model to the Purchaser for provisioning of this PFE.

3.4.4 Collaboration Information Portal Service

SRS (PRTTDCIS-2894)

The Collaborative Information Portal Service design shall adhere to the context diagram illustrated on the following figure.

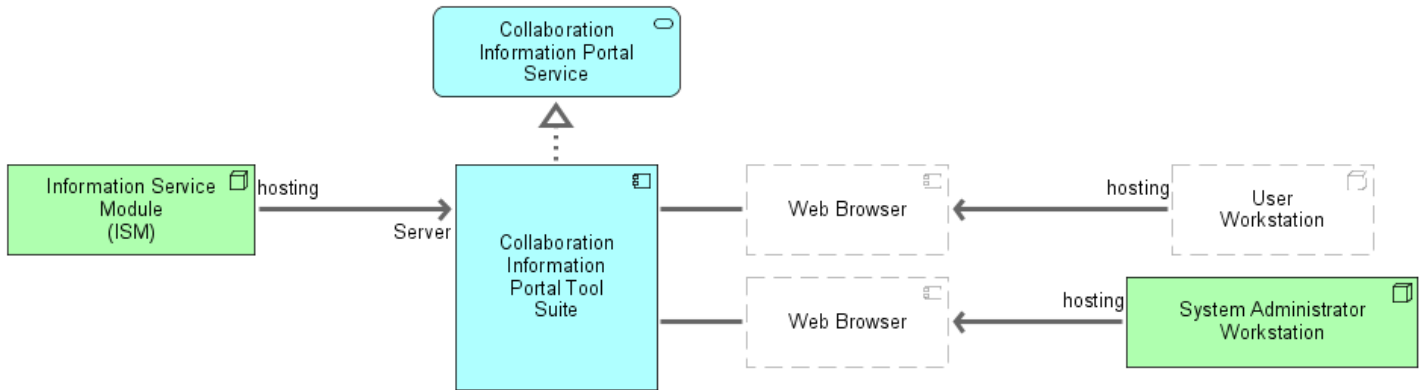


Figure 21 - Collaborative Information Portal Service in Context

SRS (PRTTDCIS-2904)

The Collaboration Portal Tool Suite shall support following functionalities:

- Content Management; and,
- Workflows; and,
- Search; and,
- Archiving

SRS (PRTTDCIS-2905)

The Collaboration Portal Tool Suite shall provide:

- 1TB of common storage; and,
- 2GB of personal storage for each user; and,
- 10% of reserve on the total.

3.4.5 Printing and Scanning Service

SRS (PRTTDCIS-2895)

The Printing and Scanning Service design shall adhere to the context diagram illustrated on the following figure.

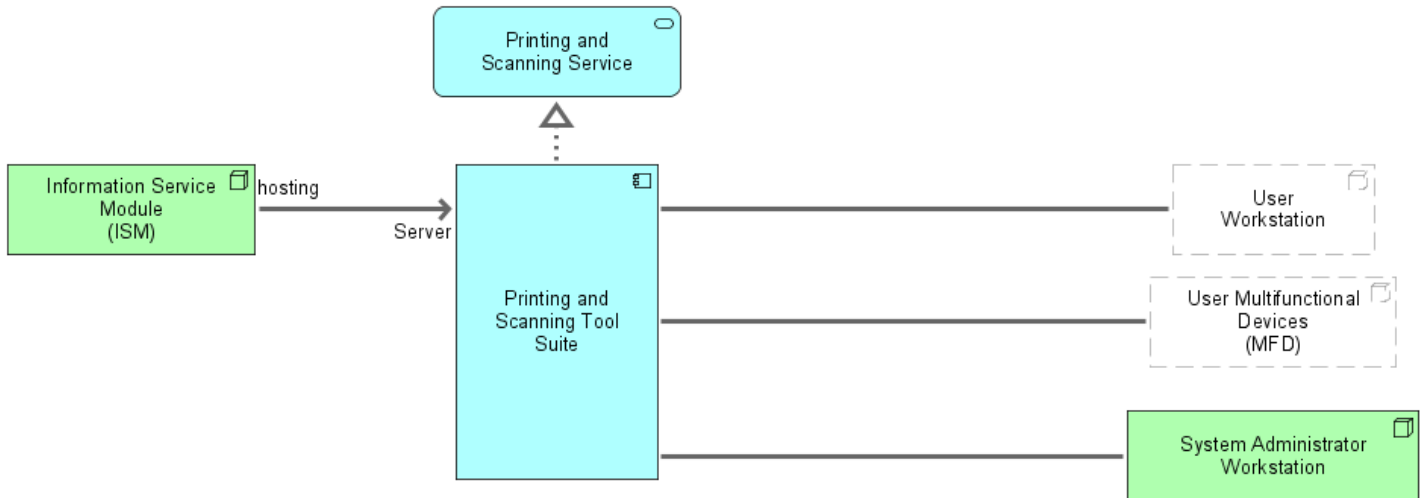


Figure 22 - Printing and Scanning Service in Context

SRS (PRTTDCIS-2907)

The Printing and Scanning Tool Suite shall allow users to :

- Print to paper hard copies on PFE Multifunctional Devices (MFD); and,
- Print to PDF file format; and,
- Scan from PFE Multifunctional Devices (MFD); and,
 - Send the scanned document via email to any user listed in the GAL; and,
 - Store the scanned document on a shared location provided by the File Sharing Service; and,
 - Store the scanned document in a library provided by the Collaborative Information Portal Service.

3.4.6 Instant Messaging Service

SRS (PRTTDCIS-2896)

The Instant Messaging Service design shall adhere to the context diagram illustrated on the following figure.

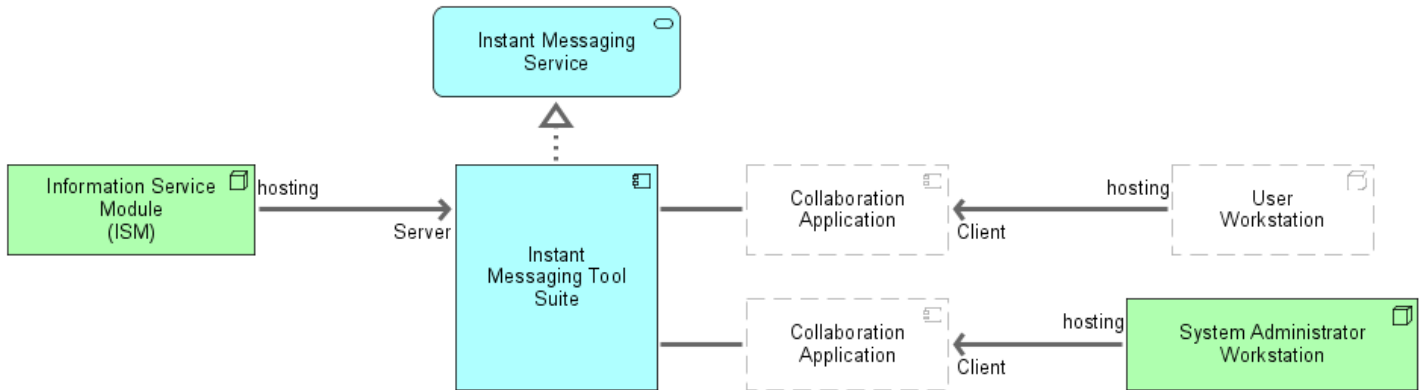


Figure 23 - Instant Messaging Service in Context

SRS (PRTTDCIS-2908)

The Instant Messaging Tool Suite shall support following functionalities :

- Exchange of live text messages under the form of a chat; and,
- Transfer of Documents.

SRS (PRTTDCIS-2909)

The Instant Messaging Tool Suite shall offer all its functionalities in:

- One to one, direct between users, mode; and,
- Group session including multiple users at the same time.

SRS (PRTTDCIS-2910)

Instant Messaging Groups shall be defined by users themselves at the moment these are required and by simply inviting users to the chat.

3.4.7 Email Service

SRS (PRTTDCIS-2897)

The Email Service design shall adhere to the context diagram illustrated on the following figure.

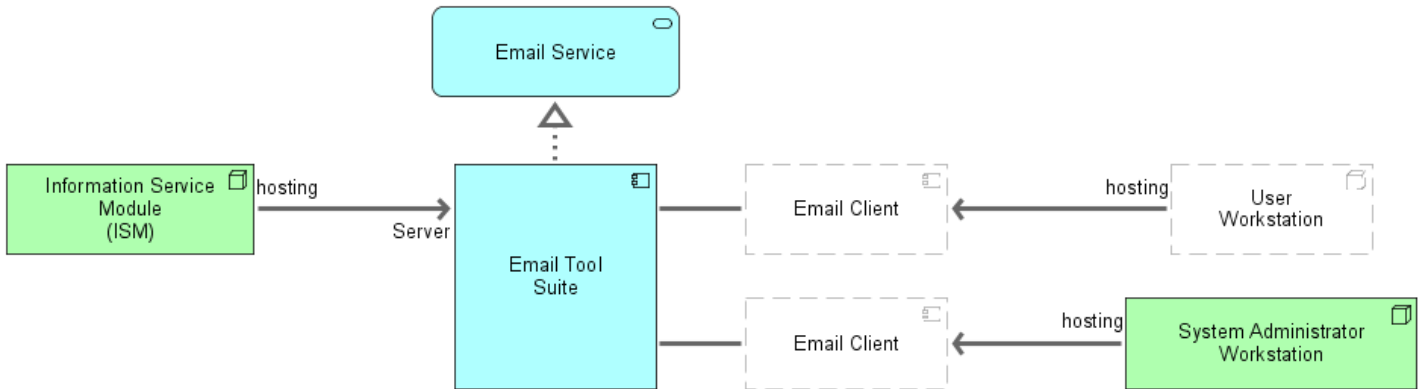


Figure 24 - Email Service in Context

SRS (PRTTDCIS-2879)

Email Service shall support Calendaring and Scheduling Service.

SRS (PRTTDCIS-2911)

Each node user shall have a personal mailbox in each security domain.

SRS (PRTTDCIS-2912)

Each TDCIS Nodes shall support up to 10 functional mailboxes per security domain.

SRS (PRTTDCIS-2913)

Each Mailbox shall support up to 2.5GB of storage with an additional 10% of reserve.

3.4.8 File Sharing Service

SRS (PRTTDCIS-2898)

The File Sharing Service design shall adhere to the context diagram illustrated on the following figure.

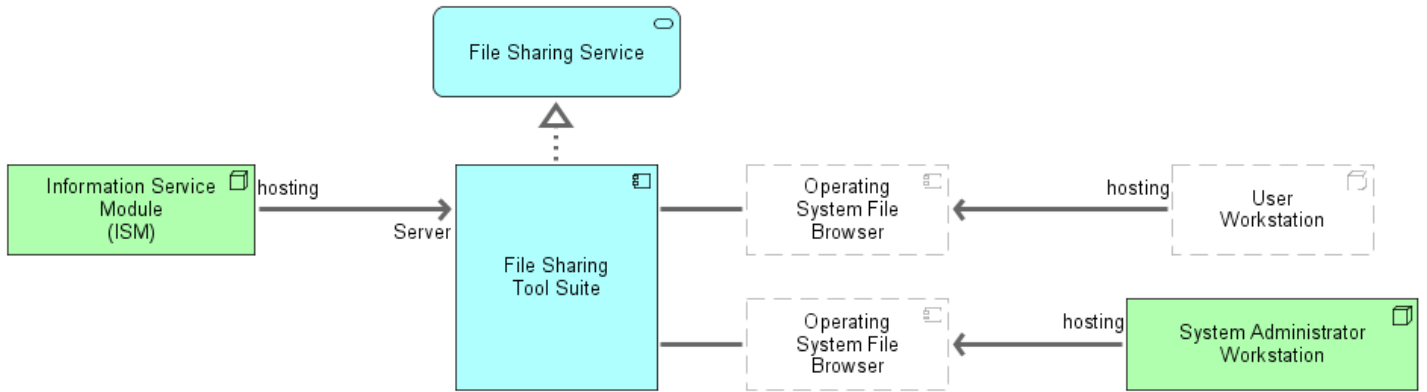


Figure 25 - File Sharing Service in Context

SRS (PRTTDCIS-2914)

Each node user shall have a personal file sharing storage, accessible from the Operating System File Browser, in each security domain.

SRS (PRTTDCIS-2915)

Each TDCIS Nodes shall support up to 10 functional file sharing storage, accessible from the Operating System File Browser, in each security domain.

SRS (PRTTDCIS-2916)

Each file sharing storage shall support up to 1GB of storage per user with an additional 10% of reserve.

3.5 Community of Interest Services

SRS (PRTTDCIS-2882)

The COI Service design shall adhere to the context diagram illustrated on the following figure.

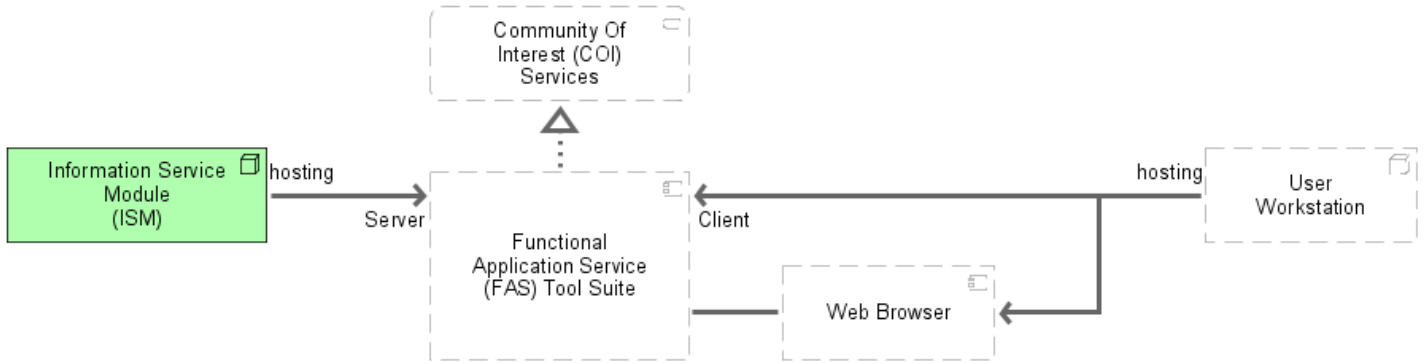


Figure 26 - COI Service in Context

NOTE (PRTTDCIS-1233)

TDCIS is designed to be a tactical deployable CIS system. Over this system, PRT Army is intending to run their own Mission-specific Software, in turn relying on the enabling services above. Therefore, specific provision processing power and storage for these specific applications has been specified with the ISM.

NOTE (PRTTDCIS-2881)

The Functional Application Service (FAS) Tool Suite is PFE.

SRS (PRTTDCIS-2883)

The Contractor shall create and configure the Virtual Machine (VM) as instructed by the Purchaser.

NOTE (PRTTDCIS-2884)

FAS software will be installed and configured by the Purchaser on the VM provided by the Contractor.

3.6 CIS Security Services

3.6.1 Antivirus Service

SRS (PRTTDCIS-2875)

The Antivirus Service design shall adhere to the context diagram illustrated on the following figure.

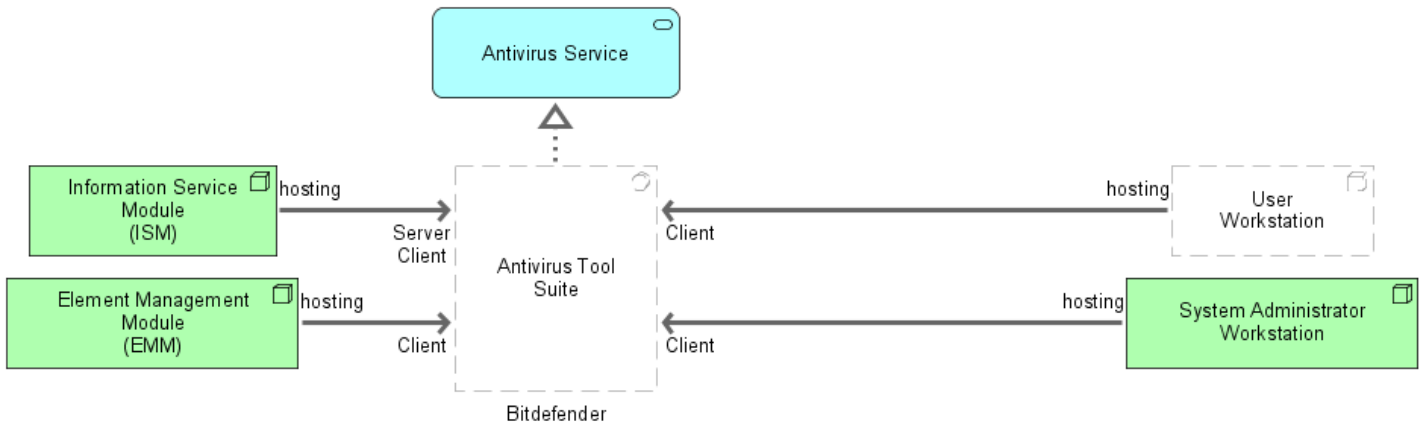


Figure 27 - Antivirus Service in Context

NOTE (PRTTDCIS-2873)

The Antivirus Service provides CIS Security Service.

NOTE (PRTTDCIS-2874)

The Antivirus Tool Suite is PFE and is a BitDefender product.

SRS (PRTTDCIS-2877)

Applicable Antivirus Tool Suite components shall be installed and configured by the Contractor on all servers.

SRS (PRTTDCIS-2886)

Applicable Antivirus Tool Suite components shall be installed and configured by the Contractor on all System Administrator Workstations.

3.7 Service Management and Control

3.7.1 General

NOTE (PRTTDCIS-2937)

Service Monitoring and Control (SMC) is divided in following levels:

- 1) **Element** SMC is the lowest level and contains all tools and processes to perform layer-, technology- or even product-centric Management and Configuration activities (e.g. SCCM, Cisco Prime...); and,
- 2) **Domain** SMC is the level providing Management and Monitoring over a certain community or subset (e.g. TDCIS as a whole or a mission or exercise specific TDCIS subset); and,
- 3) **Enterprise** SMC is the level providing Management and Monitoring at the highest level possible within an organization (e.g. PRT National Defense Network (NDN)).

SRS (PRTTDCIS-2938)

This project shall implement Element and Domain SMC for TDCIS.

SRS (PRTTDCIS-2939)

The integration of TDCIS SMC with PRT NDN at Enterprise level is not in scope of this project. However, the Contractor shall aim to provide a TDCIS SMC solution which supports this integration in the future.

SRS (PRTTDCIS-1235)

The TDCIS SMC shall consist of a set of computer tools to provide across all layers of the TDCIS architecture:

- **Element Management and Configuration:** Element level of SMC which provides:
 - Management, Monitoring and Configuration of Elements; and,
 - Inventory to the Service Management layer to support populating the Configuration Management Data Base (CMDB) with configuration Items (CI); and,
 - Events to the Service Monitoring layer; and,
- **Service Management:** Domain level of SMC which:
 - Enables the management of Services such as - but not limited to - Configuration Items Management (including configuration audit), Access Control...; and,
 - Manages the Service Models (CI, Tree structure, CI relationships, Service targets, links to Business Services...) in line with the Business Services; and,
 - Publishes the Service Models to the Service Monitoring layer; and,
 - Provides Ticket Handling in support of ITIL processes (supporting manual and automatic creation of tickets); and,
- **Service Monitoring:** Domain level of SMC which collects and correlates Events with Service Models to analyze the impacted services status in order to:
 - Report Service Situation Awareness (including all Service Subsets), usually presented as maps or dashboards; and,
 - Automatically create Incident Tickets.

SRS (PRTTDCIS-2940)

The following picture illustrates the relationships between Element Management and Configuration, Service Management, Service Monitoring and their associated Tool Suites in context and with which the Tool Suites shall comply.

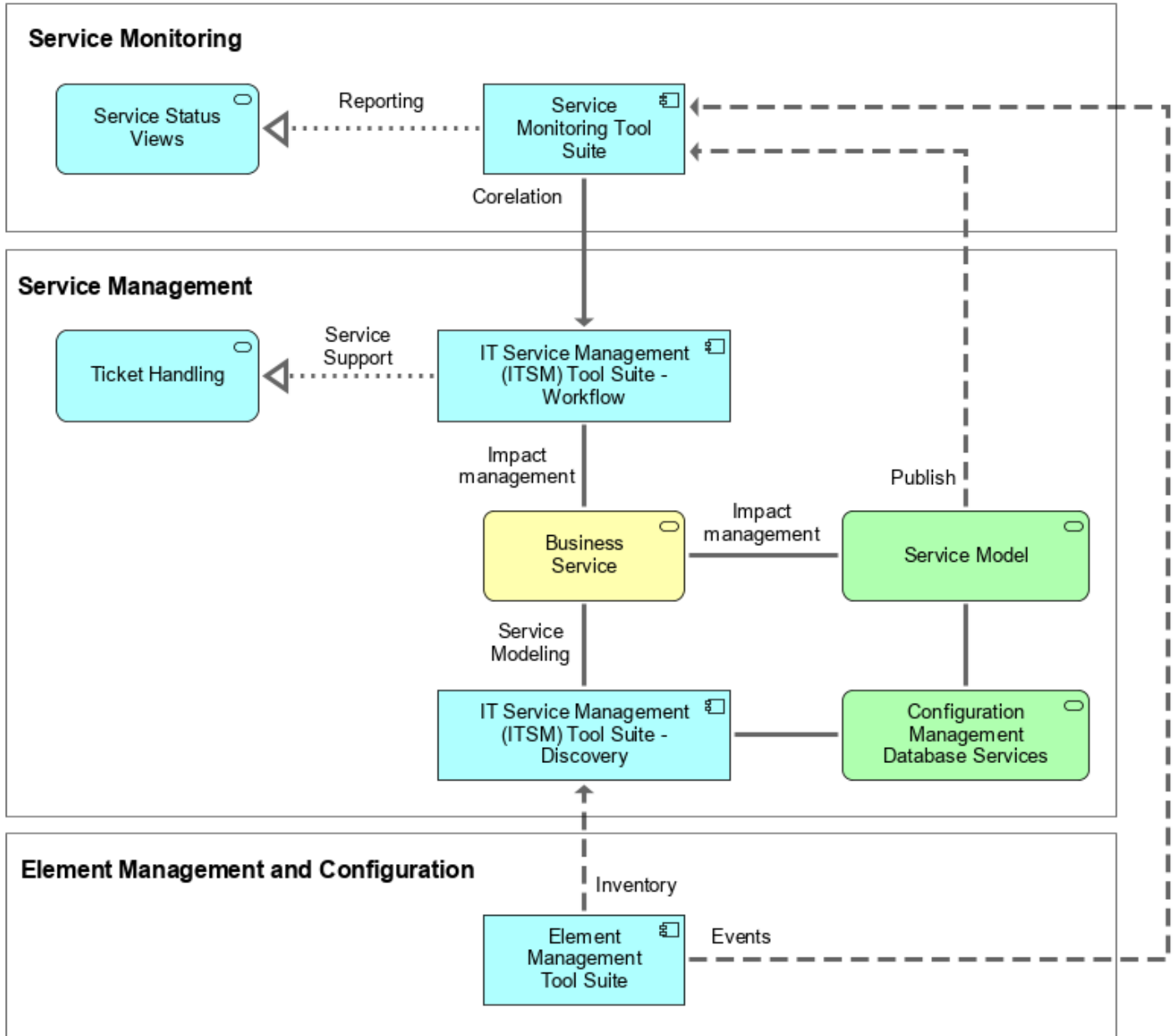


Figure 28 - SMC Tool Suites in Context

NOTE (PRTTDCIS-2941)

The lines in the Figure 28 - SMC Tool Suites in Context are not to be considered as design constraints. These illustrate the relationships between the different elements. e.g. nothing prevents the ITSM Tool Suite to interact directly with Configuration Items (radio, router, server...) to populate the Configuration Management Database (CMDB).

SRS (PRTTDCIS-2933)

SMC elements implemented as part of the DPOP, shall support Role Based Access Control via integration with Active Directory.

NOTE (PRTTDCIS-2934)

The existing Service Monitoring Tool in use in PRT NDN is Zabbix.

SRS (PRTTDCIS-2935)

The TDCIS SMC shall encompass the provision of the following:

- 1) Deployable management Account Administration tooling, running locally on the ISM, synchronized with the extant centralized account management capability when TDCIS is configured as NDN extension (Nat-x security domains variants); and
- 2) The implementation of Virtual Machines as required, to run local instances of the SMC tools; and
- 3) The ability to manage and configure all subsystems of the Nodes locally when isolated.

SRS (PRTTDCIS-2967)

Every TDCIS component shall be managed via a dedicated physical or logical Management Interface.

SRS (PRTTDCIS-2966)

TDCIS Components (with the exception of PFE items) Management Interface shall be managed using :

- As a minimum:
 - Simple Network Management Protocol version 1 (SNMP v1) and version 3 (SNMP v3) (IETF RFC 3410 – 3418, 2002); and,
 - RESTful API based configuration; and,
- Additionally one or multiple of the following:
 - HTTPS, TLS (as a minimum version 1.2 and 1.3):
 - RFC2616:1999, Hypertext Transfer Protocol – HTTP/1.1; and,
 - RFC2818:2000, HTTP Over TLS; and,
 - RFC5246:2008, the Transport Layer Security (TLS) Protocol Version 1.2; and,
 - RFC8446:2018, the Transport Layer Security (TLS) Protocol Version 1.3; and,
 - HyperText Transport Protocol (HTTP) (IETF RFC 7230, 2014); and,
 - Secure Shell Protocol (SSH) (IETF RFC 4251, 2006); and,
 - Windows Remote Management (WinRM); and,
 - Remote Desktop Protocol (RDP); and,
 - Keyboard, Video and Mouse (KVM) over Ethernet.

SRS (PRTTDCIS-3040)

Should it be required, use of SNMPv1 shall be solely limited to the integration of PFE elements.

SRS (PRTTDCIS-1358)

TDCIS SMC shall include an Automatic system for startup and shut down functions to allow the coordinated start up, reboot or shut down of the system.

SRS (PRTTDCIS-2968)

The command signals for the automatic system startup, shut down and reboot actions shall be triggered whether by the operator or automatically from other elements (e.g. Element Management Tool Suite for UPS, ECU...).

SRS (PRTTDCIS-1349)

The TDCIS SMC shall monitor and control the temperature of all elements of the system and trigger a graceful system shutdown when the temperature is above the maximum acceptable system limit and the ECU is not providing enough cooling capacity.

SRS (PRTTDCIS-1351)

The TDCIS SMC shall implement logically separated management networks isolated from the operational data network.

SRS (PRTTDCIS-1353)

The TDCIS SMC shall allow the detection, analysis, isolation and the possibility to perform correction measures of faulty or malfunctioning components, modules or services.

3.7.2 Element Management and Configuration

SRS (PRTTDCIS-2942)

The following figure illustrates the Element Management Tool Suite in context with which it shall comply.

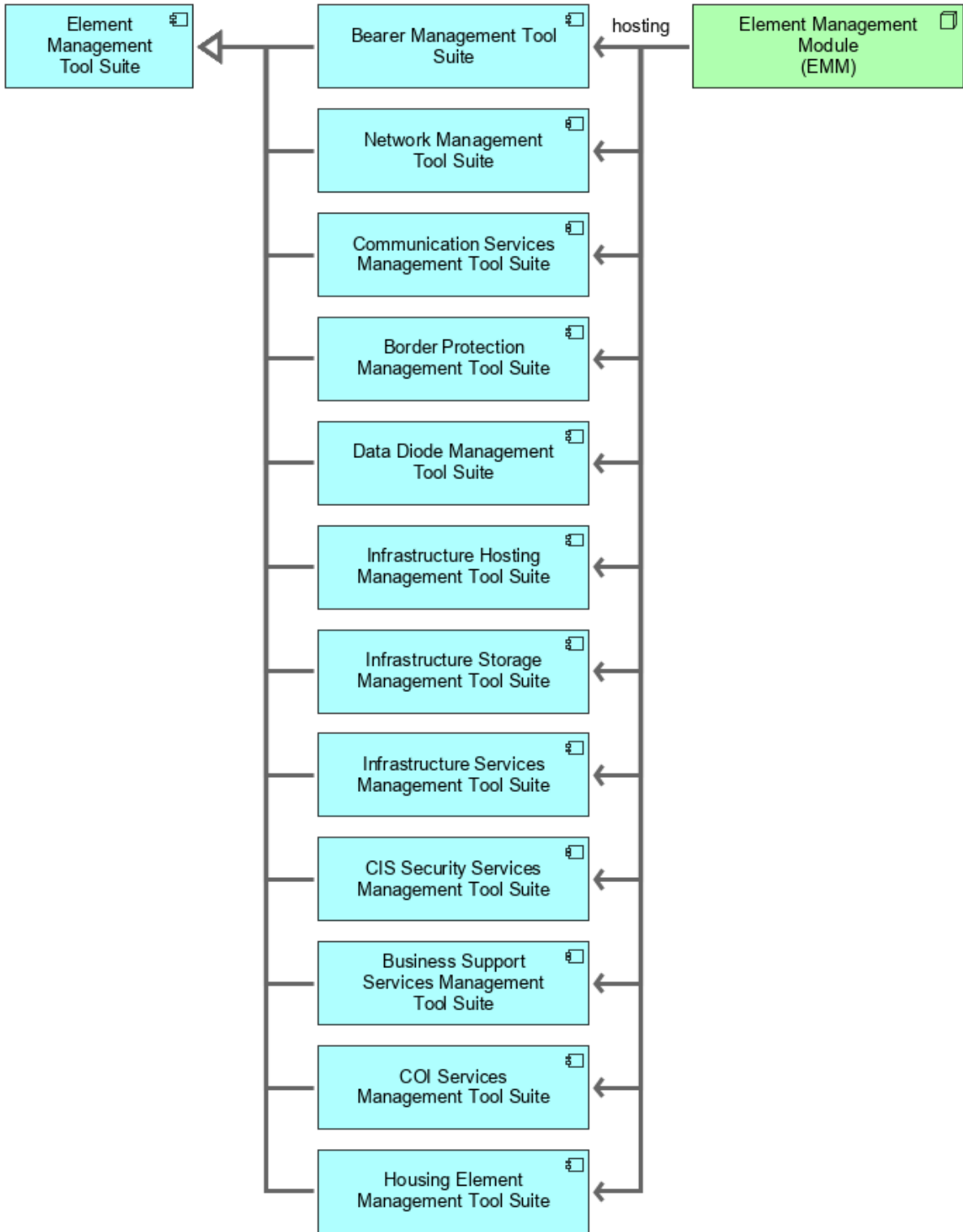


Figure 29 - Element Management Tool Suite in context

SRS (PRTTDCIS-2943)

The Element Management Tool Suite shall contain all tools and software to Manage, Monitor and Configure:

- 1) Bearer Elements; and
- 2) Network Elements; and
- 3) Communication Services Elements; and
- 4) Border Protection Elements; and
- 5) Data Diode Elements; and
- 6) Infrastructure Hosting Elements; and
- 7) Infrastructure Storage Elements; and
- 8) Infrastructure Services Elements; and
- 9) CIS Security Services; and,
- 10) Business Support Services; and,
- 11) COI Services Elements; and,
- 12) Housing Elements.

SRS (PRTTDCIS-2944)

The Element Management Tool Suite shall integrate PFE Management and Configuration tools related to PFE components.

SRS (PRTTDCIS-2945)

The Element Management Module (EMM) shall host security domain specific components of the Element Management Tool Suite.

NOTE (PRTTDCIS-2946)

The location of Element Management Tool Suite components is linked to the TDCIS Security Accreditation. To this end, with the exception of the PCN, all security domains (xU, xR and xS) components might need to be relocated from the EMM to the corresponding ISM during the design review phases of this project.

SRS (PRTTDCIS-2947)

Access to Element Management and Configuration Tool Suite components (with the exception the PFE elements) shall preferably be implemented as a web-service, accessed through a standard web browser, as a minimum Internet Explorer & Edge, Firefox, Chrome and Safari, without the need of special browser add-ons. Any special functionality shall be provided through HTML5.

SRS (PRTTDCIS-2960)

The EMM-PCN shall host Element Management Tool Suite components related to TDCIS elements as illustrated on following picture.

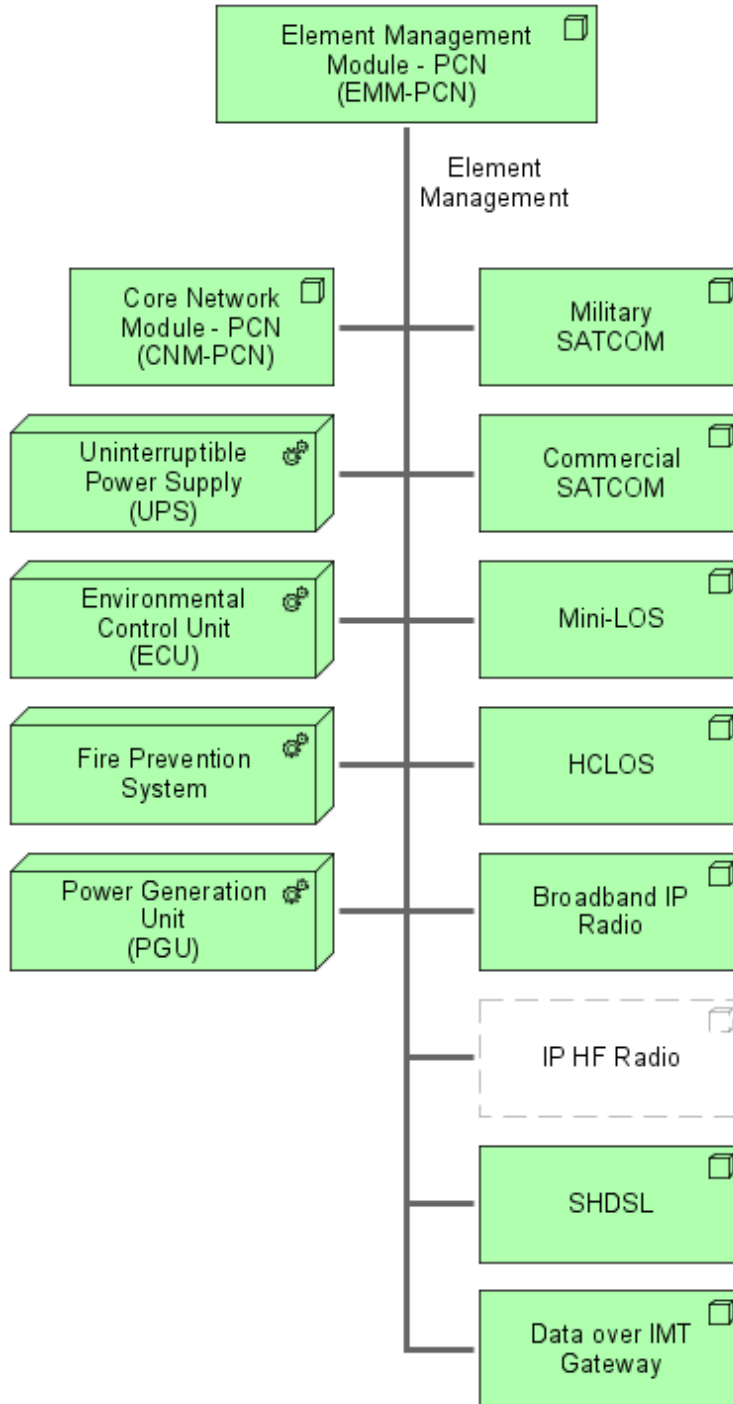


Figure 30 - EMM-PCN Element Management and Configuration scope.

SRS (PRTTDCIS-2963)

The EMM-xU shall host Element Management Tool Suite components related to TDCIS elements as illustrated on following picture.

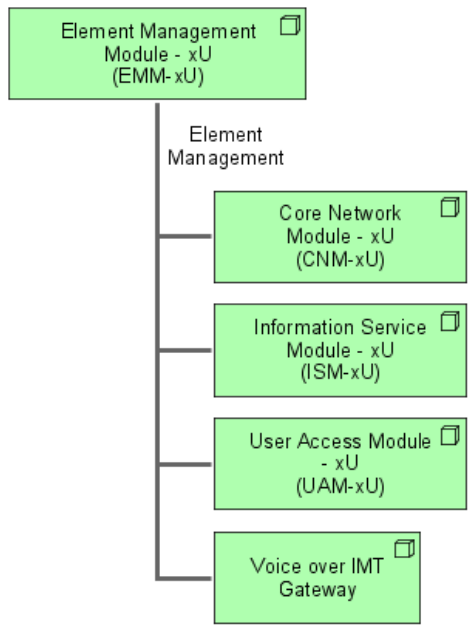


Figure 31 - EMM-xU Element Management and Configuration scope.

SRS (PRTTDCIS-2964)

The EMM-xR shall host Element Management Tool Suite components related to TDCIS elements as illustrated on following picture.

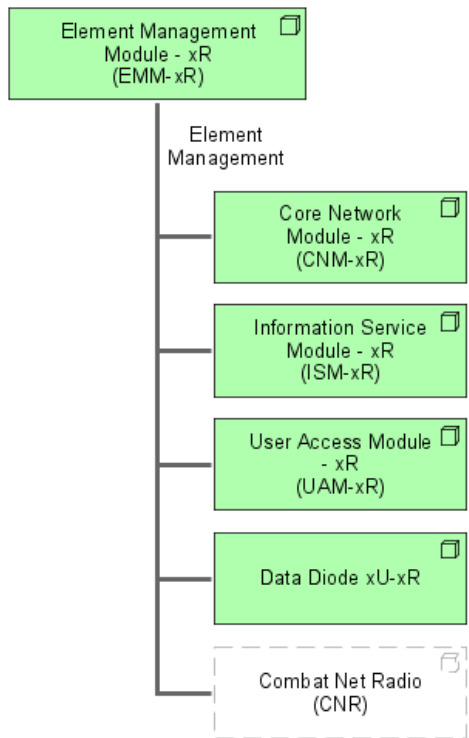


Figure 32 - EMM-xR Element Management and Configuration scope.

SRS (PRTTDCIS-2965)

The EMM-xS shall host Element Management Tool Suite components related to TDCIS elements as illustrated on following picture.

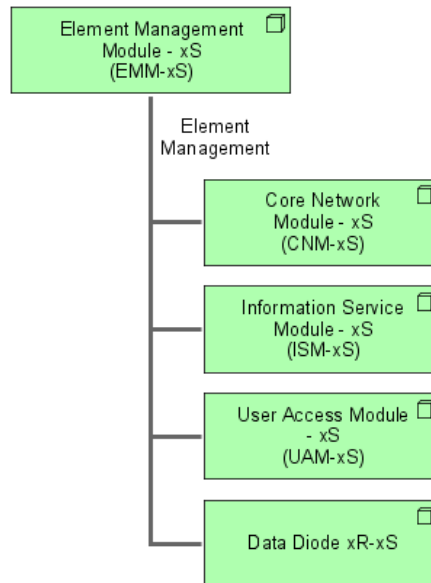


Figure 33 - EMM-xS Element Management and Configuration scope.

SRS (PRTTDCIS-3036)

Element Management Tool Suite shall include one or multiple Spectrum Analyzer element(s) suited for bearers composing TDCIS.

SRS (PRTTDCIS-3093)

Spectrum Analyzer elements shall be composed of software and hardware components supporting:

- Live bearer monitoring from the Element Management and Configuration Tool Suite; and,
- Physical troubleshooting on all bearer hardware components in base band and in RF band, where and when applicable.

3.7.3 Service Management

SRS (PRTTDCIS-3263)

The Service Management Tool Suite shall at least contain a Discovery and a Workflow element as described on the following picture.

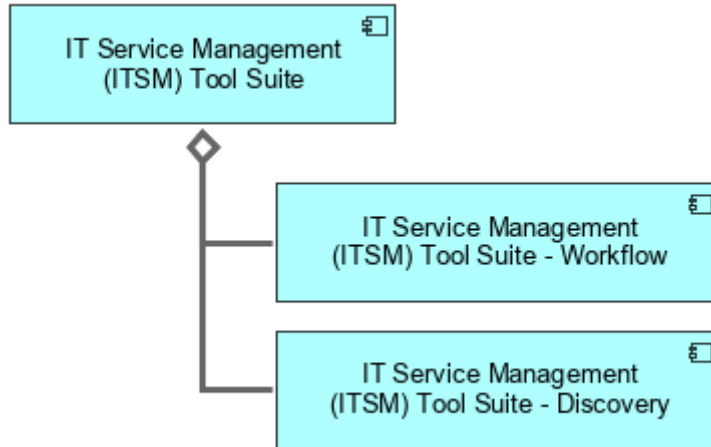


Figure 34 - Service Management Tool Suite minimum breakdown

SRS (PRTTDCIS-2951)

The following figure illustrates the Service Management Tool Suite in context with which it shall comply.

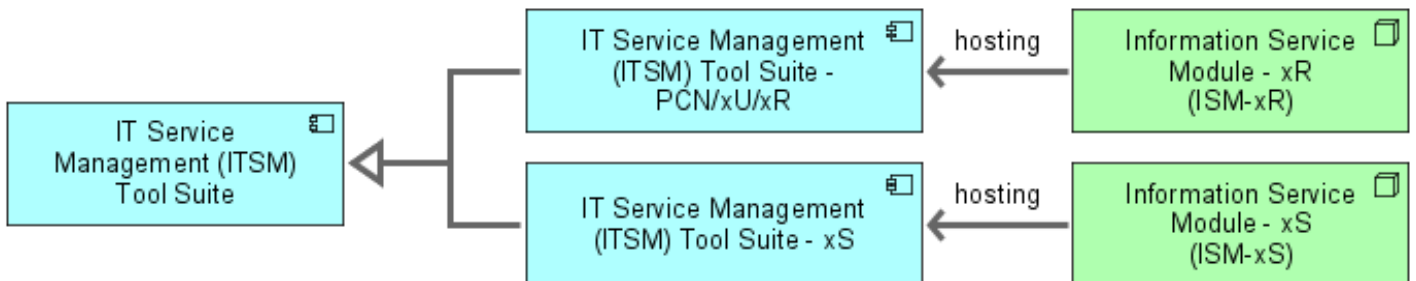


Figure 35 - Service Management Tool Suite in context

SRS (PRTTDCIS-2952)

The Service Management Tool Suite shall contain all tools and software to perform:

- 1) Ticket handling in support of all ITIL processes; and
- 2) Configuration Management (including Configuration Audit); and
- 3) Service Modelling; and,
- 4) Access Management.

SRS (PRTTDCIS-2969)

The Configuration Management functionality shall allow to perform automated configuration audit of Configuration Items against baseline configurations.

SRS (PRTTDCIS-3262)

The Service Modelling functionality shall allow the creation of Service Models containing:

- 1) The Service Tree composed of the list of and the relationships between CIs it is composed of; and,
- 2) The Service Targets (Availability, Restoration...).

SRS (PRTTDCIS-1357)

The Access Management functionality shall log all action carried out within the scope of the management of TDCIS to enable audits and forensics.

SRS (PRTTDCIS-1356)

The Access Management functionality shall enable application of access policies to management platforms. To this end, it shall include functionalities for creation, removal and control of users, together with their associated level of management services. It shall also include the distribution of relevant security information.

SRS (PRTTDCIS-1354)

The Configuration Management functionality shall enable the identification, configuration, control and location of every Configuration Item over the management network.

SRS (PRTTDCIS-2953)

There shall be two (2) distinct implementations of the Service Management Tool Suite:

- 1) One for the PCN, xU and xR security domains, hosted in the ISM-xR; and
- 2) One for the xS security domain, hosted on the ISM-xS.

SRS (PRTTDCIS-2954)

The Configuration Management functionality of the Service Management Tool Suite shall automatically populate the Configuration Management Data Base (CMDB).

SRS (PRTTDCIS-2949)

Access to Service Management Tool Suite components shall be implemented as a web-service, accessed through a standard web browser, as a minimum Internet Explorer & Edge, Firefox, Chrome and Safari, without the need of special browser add-ons. Any special functionality shall be provided through HTML5.

3.7.4 Service Monitoring

SRS (PRTTDCIS-2955)

The following figure illustrates the Service Monitoring Tool Suite in context with which it shall comply.

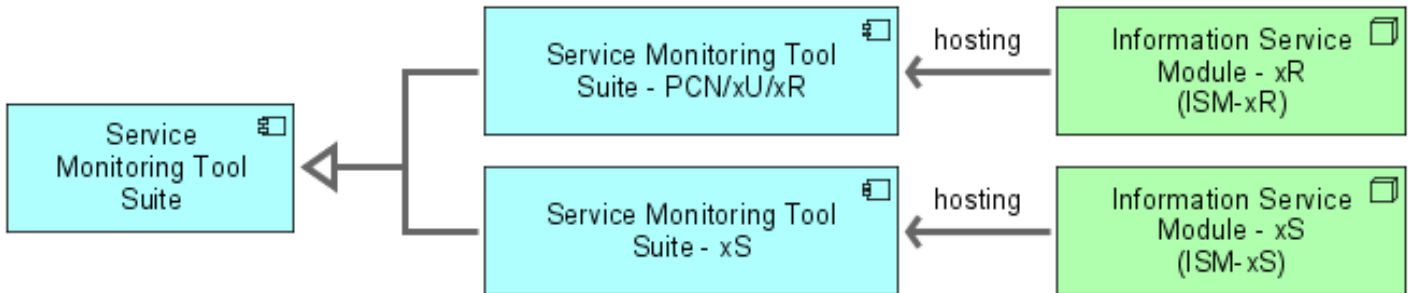


Figure 36 - Service Monitoring Tool Suite in context

SRS (PRTTDCIS-3260)

The Service Management Tool Suite shall:

- 1) Collect events coming from Element Management Tool Suite; and,
- 2) Collect Service Models coming from Service Management Tool Suite; and,
- 3) Correlate events based on service trees and correlation intelligence (filtering, aggregation, de-duplication, analysis of relationships between events); and,
- 4) Generate Incident Tickets, containing the service impact, the service targets and the root cause via parent master event.

SRS (PRTTDCIS-2956)

The Service Management Tool Suite shall contain all tools and software to:

- 1) Visualize all services health status for the TDCIS, a subset of it and at the scale of a single node; and
- 2) Alert System Administrator of Service outages; and
- 3) Allow System administrator to Identify and Isolate Service outage root cause; and
- 4) Report Service Performance live and though reports over time.

SRS (PRTTDCIS-1355)

The Performance Management functionality shall continuously evaluate the operating effectiveness of the system.

SRS (PRTTDCIS-2957)

There shall be two (2) distinct implementations of the Service Management Tool Suite:

- 1) One for the PCN, xU and xR security domains, hosted in the ISM-xR; and
- 2) One for the xS security domain, hosted on the ISM-xS.

SRS (PRTTDCIS-2958)

The Service Monitoring Tool Suite shall automatically pre-populate a set of views based on the information available in the CMDB.

SRS (PRTTDCIS-2959)

The Service Monitoring Tool Suite shall allow System Administrator to create custom views.

SRS (PRTTDCIS-2961)

Where and when possible, the Service Monitoring Tool Suite shall integrate with the Element Management Tool Suite, without any custom development other than software configuration, to quickly and easily access component-specific tools and software.

SRS (PRTTDCIS-2962)

Where and when possible, the Service Monitoring Tool Suite shall integrate with the Service Management Tool Suite, without any custom development other than software configuration, to create pre-populated tickets.

SRS (PRTTDCIS-1360)

Service Monitoring Tool Suite shall inform about the actual State of Charge (SOC) of the battery, the Estimated Time to Empty (ETE) of the battery and other relevant data of the Shelter UPS.

SRS (PRTTDCIS-2950)

Access to Service Monitoring Tool Suite components shall be implemented as a web-service, accessed through a standard web browser, as a minimum Internet Explorer & Edge, Firefox, Chrome and Safari, without the need of special browser add-ons. Any special functionality shall be provided through HTML5.

3.7.5 NS Kit

SRS (PRTTDCIS-2973)

SMC for NS Kit shall comply with all specifications for TDCIS SMC reduced to the NS Kit specificities.

SRS (PRTTDCIS-2970)

The following figure illustrates the Element Management, the Service Management and the Service Monitoring Tool Suites of the NS Kit in context with which these shall comply.

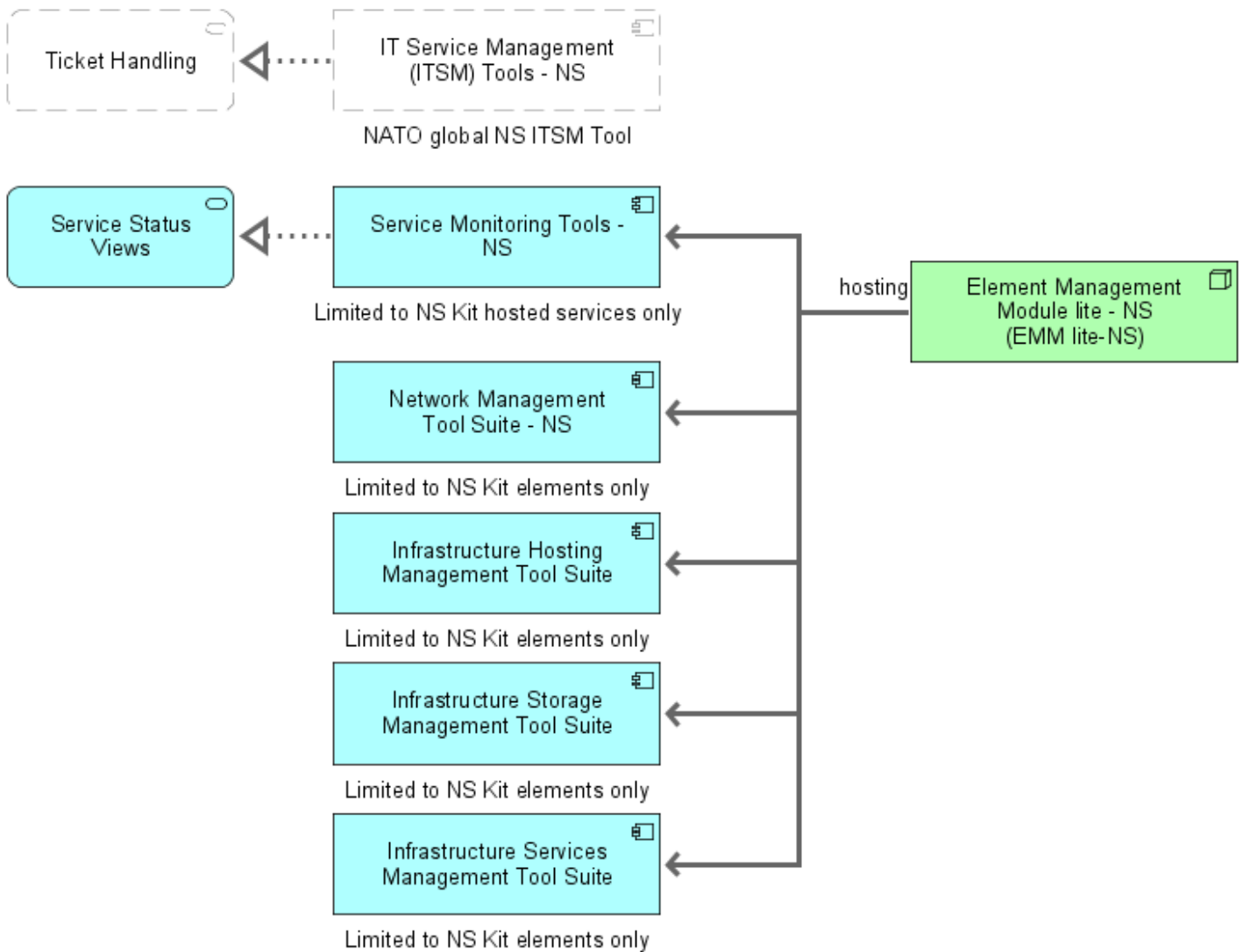


Figure 37 - NS Kit SMC in context

SRS (PRTTDCIS-2971)

The Element Management Module (EMM) of the NS Kit shall host Element Management and Service Monitoring Tool Suites.

SRS (PRTTDCIS-2972)

The EMM of the NS Kit shall host Element Management Tool Suite components related to NS Kit elements as illustrated on following picture.

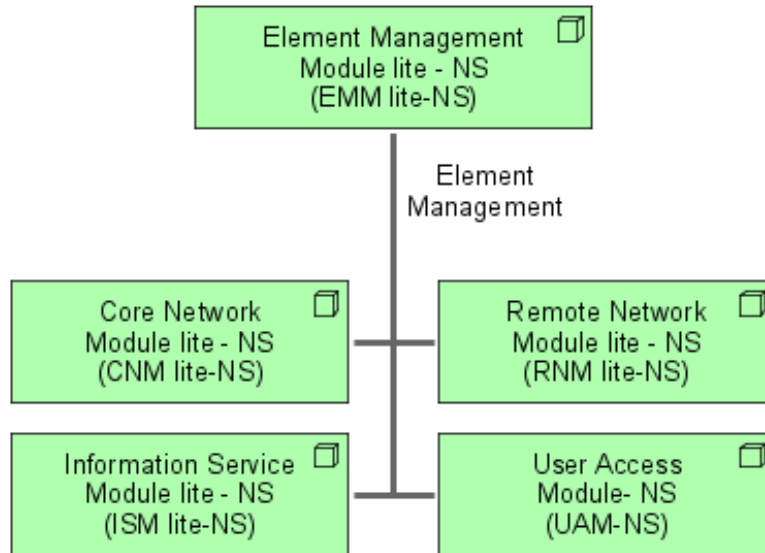


Figure 38 - NS Kit EMM Element Management and Configuration scope.

SRS (PRTTDCIS-2974)

The NS Kit Element Management Tool suite shall be limited to the sole components and services hosted in the NS Kit.

SRS (PRTTDCIS-2975)

The NS Kit Service Monitoring Tool Suite and functionalities shall be limited to the sole components and services hosted in the NS Kit.

NOTE (PRTTDCIS-2976)

The NS Kit Service Management Tool suite will be provided by the existing Tool Suite over the federated NS network. No integration with this Tool Suite will be performed.

4 Modules

4.1 General

SRS (PRTTDCIS-1511)

Each CIS Module shall implement dual independent power feeds with the Power Distribution Units (PDU) that are interoperable with Shelter Power Supplies; i.e the same plugs and sockets.

NOTE (PRTTDCIS-2560)

Where not specified explicitly, xU, xR and xS variants of modules will be preferably fiber-based wired.

SRS (PRTTDCIS-2561)

xU, xR and xS variants of modules connections to End-User Devices (EUD) shall be Ethernet RJ45.

SRS (PRTTDCIS-2559)

NS Kit modules shall be fiber-based wired, including the connections to End-User Devices (EUD).

SRS (PRTTDCIS-2698)

All module components storage media (e.g. Hard Drives, Flash Drives...) shall be easily accessible and quickly removable from their hosting parent without having to remove or dismount any asset.

4.2 Core Network Module

SRS (PRTTDCIS-1665)

Each Core Network Module shall provide local area and Metro-Area Network (MAN) connectivity to:

- 1) Information Services Module (ISM); and,
- 2) Data-diodes connecting two CNM-xx from two different security domains; and,
- 3) User Access Module (UAM), where local users connect; and,
- 4) Points of Presence (PoP) of collocated Mission Partner nations in the mission network environment (FMN); and,
- 5) Protected Core Network (PCN) connectivity to other PCN participants.

SRS (PRTTDCIS-1666)

Each Core Network Module (CNM) shall provide wide area network connectivity to:

- 1) The PRT static infrastructure, via terrestrial lines or over SATCOM (from RL), anchoring the links at the PRT Satellite Ground Stations (SGS); and simultaneously,
- 2) The Core Network Modules of other TDCIS Nodes.

4.2.1 Functional Requirements

NOTE (PRTTDCIS-1529)

The CNM implements the following functions in support of deployable instances of Communications Services:

- 1) Protected Core Access function; and,
- 2) Coloured Cloud Access function; and,
- 3) Multimedia Access function; and,
- 4) Boundary Protection function.

SRS (PRTTDCIS-1530)

The **Protected Core Access (PCA)** function of the CNM shall:

- 1) Aggregate and distribute traffic across the diverse bearers on the DCIS Protected Core (e.g. SATCOM, HCLOS radio, fibre, etc. where available), using IP unicast and IP multicast routing; and,
- 2) Implement the DCIS Protected Core, providing wide-area transport services in support of the Coloured Cloud Access (CCA) function, both intra-theatre towards other TDCIS Nodes, as well as into the PRT static infrastructure (via the RL); and,
- 3) Implement Multiprotocol Label Switching - Traffic Engineering (MPLS-TE) in order to assure end-to-end Quality and Class of Service across the WAN, for the flows of CCA functions of different classifications, and for the flows within each CCA function and security classification.

SRS (PRTTDCIS-1531)

The **Coloured Cloud Access (CCA)** function of the CNM shall, for each security domain:

- 1) Connect to the PCA function using a Security accredited commercial grade IPsec function (for the CCA-xU and CCA-xR); and,
- 2) Connect to the PCA function using a PRT Nationally accredited high-grade IP Crypto function (for the CCA-Nat-S); and,
- 3) Connect to the PCA function using a NATO accredited high-grade IP Crypto function (for the CCA-MS and CCA-NS); and,
- 4) Provide the core switching capability, acting as a hub for the MMA and BPS functions, as well as for the ISMs and Data Diodes; and,
- 5) Use an Interior Gateway Protocol (IGP) to converge routing information within the Coloured Cloud; and,
- 6) Provide IP access (LAN) and IP transport (WAN) to the Multimedia Access function of the CNM, Information Services modules (ISM) and User Access Modules (UAM) within the TDCIS Node; and,
- 7) Provide IP access (LAN) to the Boundary Protection function in the CNM, such that IP flows from/to the local ISM, UAM and MMA, as well as the flows from/to the WAN (other TDCIS Nodes) can be routed through it and protected accordingly; and,
- 8) Implement traffic classification and marking, traffic conditioning and dynamic IP routing at the edges of the network; and,
- 9) Support IP interworking with collocated Mission Network Participants (MNP), over a Network Interconnection Point (NIP), compliant with FMN Spiral 3.

SRS (PRTTDCIS-1532)

The **Multimedia Access (MMA)** function of the CNM shall, for each security domain:

- 1) Provide local users with multimedia access for IP Telephony, voice mail and secure voice conferencing support, at xU, xR and xS levels, using the CCA function for transport; and,
- 2) Implement an IP telephony service that enables users at a TDCIS Node to intercommunicate with other users in other TDCIS Nodes, MNP nodes, or in the PRT static infrastructure, within the same security domain; and,
- 3) Support multi-protocol signaling (i.e. SIP, H.323) and media (i.e. DTMF, fax) interworking, codec transcoding, voice and video conferencing; and,
- 4) Terminate and relay media streams, address and port translations (Topology Hiding); and,
- 5) Feature a Session Border Controller (SBC) capability to enable voice and video (V2) services federation with third party V2 network at xU and xS levels, over the NIP of the CCA function; and,
- 6) Use Call Admission Control (CAC) to prevent oversubscription of bandwidth across the WAN trunks that would degrade voice quality; and,
- 7) Support Multi-Level Precedence Pre-emption (MLPP) across the WAN trunks to ensure best use of the available bandwidth, with four levels of priority (Flash Override, Flash, Intermediate, Priority, Routine); and,
- 8) Support user-initiated subscriber extension mobility; and,
- 9) A Gateway for mobile cellular networks, third party Time Division Multiplexing (TDM) based (i.e. E1) networks, analogue telephone lines to the implemented IP Telephony service, only in the xU security domain; and,
- 10) A Gateway for Radio over IP integration, enabling Push To Talk (PTT) analogue audio communication through the VoIP network and between different Voice Radio networks (i.e. Tactical Radios, TETRA, etc.), only in the xU security domain; and,
- 11) A Gateway for Radio over IP integration, enabling PTT communication through the xR-VoIP network and the CNR Voice network, only in the xR security domain; and,
- 12) Federation to MNP according to FMN Spiral 3; and,
- 13) Unified Communication and Collaboration (UCC) capabilities in the form of integrated Video, Audio and Web communication; and,
- 14) Provide Auto attendant and contact center features with multiple greetings and structured menu functionality; and,
- 15) Provide Call Detail Record (CDR) reports; and,
- 16) Provide survivable remote node IP telephony service in case the main call processing device; i.e. Communication server is not reachable or down.

SRS (PRTTDCIS-1533)

The **Boundary Protection (BPS)** function of the CNM shall, for each security domain:

- 1) Implement the Self-protecting Node principle and protect the following LAN, WAN and MAN traffic flows using port-based or/and ApplID inspection on the flows:
 - 1) UAM to local ISM (LAN); and,
 - 2) UAM to local MMA function (LAN); and,
 - 3) ISM to remote ISM or to PRT static infrastructure, over the CCA and PCA functions (WAN); and,
 - 4) UAM to remote ISM, over the CCA and PCA functions (WAN); and,
 - 5) ISM to Data Diode (LAN); and,
- 2) Be able to detect malicious activity by implementing a Network Intrusion Detection System (NIDS) functionality.

NOTE (PRTTDCIS-3330)

As defined in D/48 Rev. 3, a Self-Protecting CIS is to be understood as each CIS treating other CIS as un-trusted and implementing protection measures to control the exchange of information with other CIS.

4.2.2 Technical Requirements

SRS (PRTTDCIS-1639)

The detailed system design of the CNM shall map each of the functions specified into subsystems (or functional building blocks) by the same name (i.e. PCA, CCA, MMA and BPS) and adhere to the subsystems breakdown presented on the following picture:

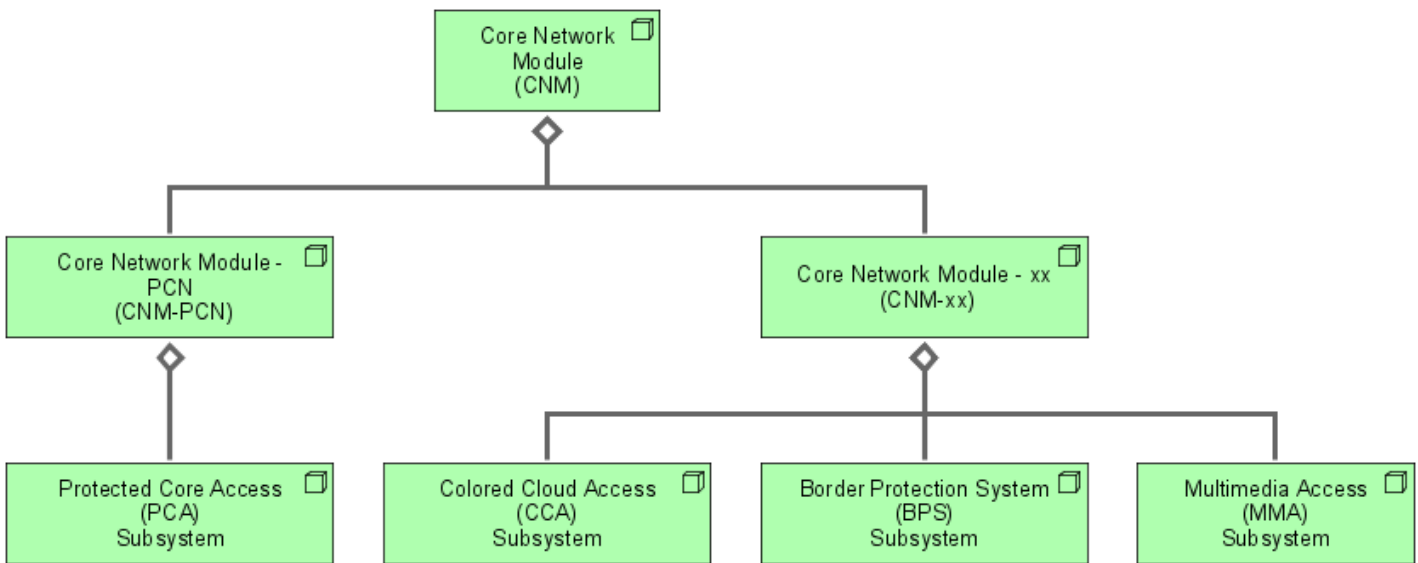


Figure 39 - CNM building blocks

4.2.2.1 PCA subsystem

NOTE (PRTTDCIS-3049)

The following picture illustrates the PCA in context.

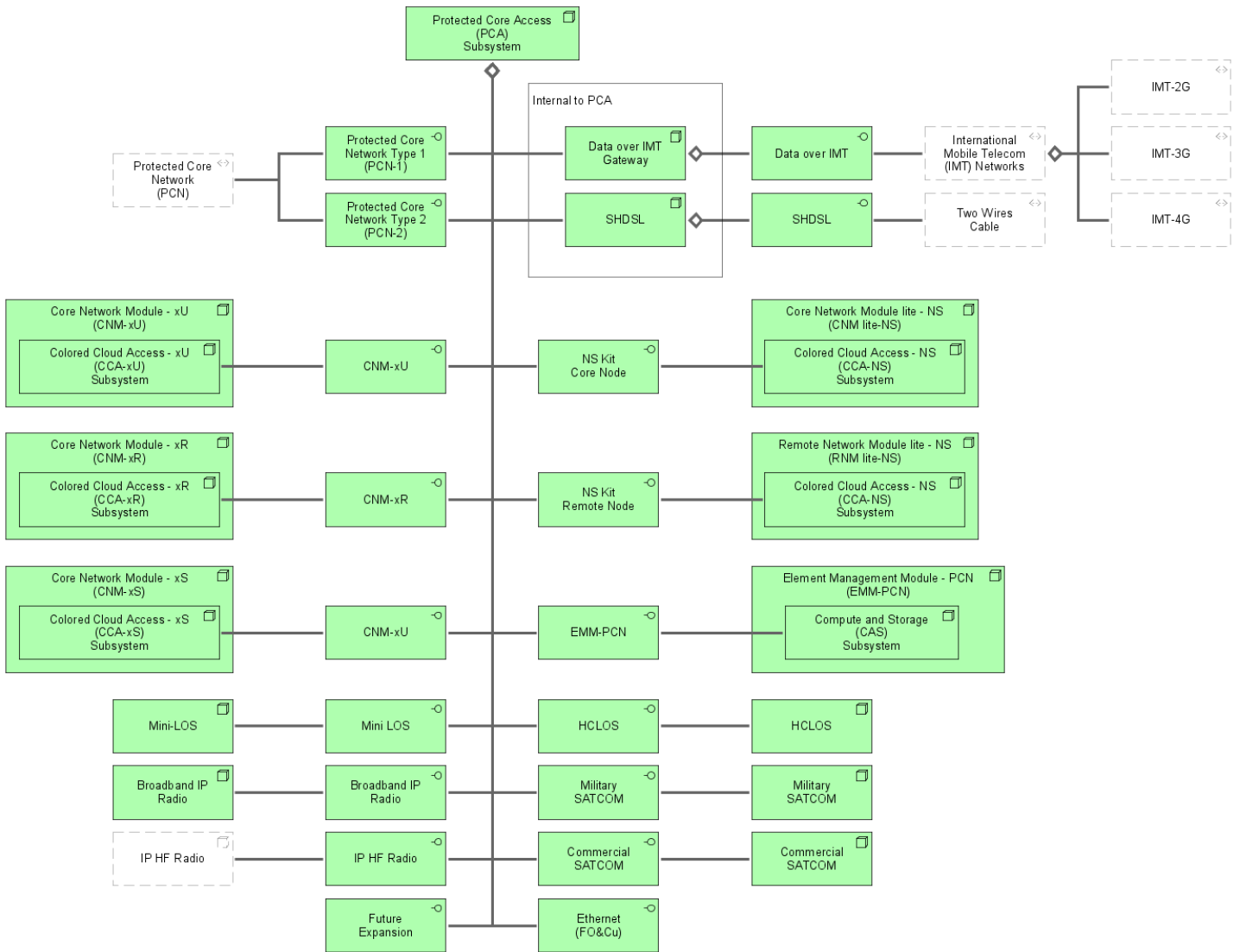


Figure 40 - PCA in context

SRS (PRTTDCIS-1243)

The PCA design shall adhere to the design concept presented in following figure:

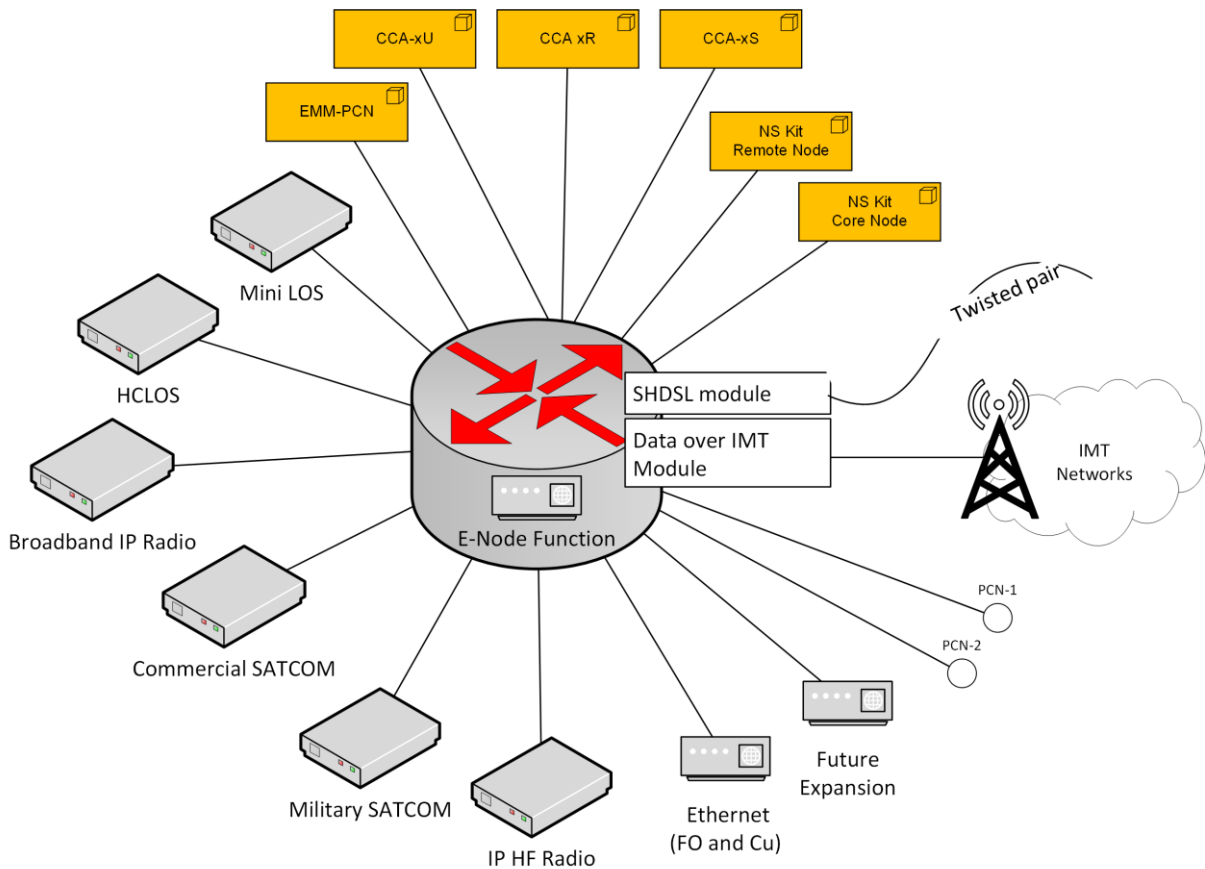


Figure 41 - PCA Design Concept

SRS (PRTTDCIS-1535)

The PCA subsystem shall implement the PCA functions.

SRS (PRTTDCIS-1289)

The PCA shall include a data gateway to International Mobile Telecommunication (IMT) Networks.

SRS (PRTTDCIS-2474)

In order to be worldwide compatible, the IMT data gateway shall include multimode 4G/3G/2G connectivity to cellular networks operating in LTE 800 MHz (band 20), 900 MHz (band 8), 1800 MHz (band 3), 2100 MHz (band 1) and 2600 MHz (band 7) frequencies, backward compatible with UMTS and HSPA+ on 850 MHz (band 5), 900 MHz (band 8), 1900 MHz (band 2) and 2100 MHz (band 1).

SRS (PRTTDCIS-2097)

The PCA shall include Symmetric High speed Digital Subscriber Line (SHDSL) interfaces that enable high speed communications over single unloaded and unconditioned twisted copper pairs, of the type used in the local telephone distribution plant.

SRS (PRTTDCIS-2098)

The SHDSL shall be compliant with ITU-T G.991.2 Annexes B, F and G.

SRS (PRTTDCIS-1536)

The PCA subsystem shall deliver MPLS-based IP transport services to the xS, xR and xU IP routed security domains (implemented by the respective CCA subsystems).

SRS (PRTTDCIS-1537)

The PCA subsystem shall perform the Provider Edge (PE) function of the MPLS WAN, and support MP-BGP.

SRS (PRTTDCIS-1538)

The PCA subsystem shall forward packets to and from each CCA subsystems based on labels.

SRS (PRTTDCIS-1539)

The PCA subsystem shall use MPLS to implement Traffic Engineering through Label-Switched Paths (LSP). LSP are logical paths established over multiple transmission media. A given logical path may involve one or more bearer.

SRS (PRTTDCIS-1540)

The PCA subsystem shall use an internal routing protocol which shall be configured in all WAN interfaces in support of the exchange of control-plane information. This includes:

- 1) IP reachability information; and,
- 2) MPLS traffic engineering metrics.

SRS (PRTTDCIS-1541)

OSPF-TE shall be used as the Interior Gateway Protocol (IGP) within the MPLS WAN to provide BGP next-hop reach ability.

SRS (PRTTDCIS-1542)

Label Distribution Protocol (LDP) shall be used within the MPLS core to facilitate MPLS VPN services.

SRS (PRTTDCIS-1543)

The PCA subsystem shall use its IGP to carry topology information for the WAN links, its loopback interfaces (which are the end-points for MPLS LSPs), its physical interfaces, used for the IPsec tunnels for the xU, xR and xS access networks (e.g. the interfaces facing the black IP port of the TCE-621B).

SRS (PRTTDCIS-1544)

The PCA subsystem shall implement different LSPs to carry traffic internal, amongst TDCIS Nodes and towards the PRT static infrastructure, and FMN traffic transiting between NIPs.

SRS (PRTTDCIS-1545)

The PCA subsystem interfaces for IPsec tunnel end-points shall be set as "passive" in the IGP as they are Protected Core Edge connections.

SRS (PRTTDCIS-2312)

There shall be no IP routing interaction between the Protected Core and the xU, xR and xS networks.

SRS (PRTTDCIS-1546)

The PCA subsystem shall implement IPv4 and IPv6 multicast routing through PIM-SM, PIM-SSM and MLDv2.

SRS (PRTTDCIS-1547)

Rendezvous points shall be anycasted in accordance with (RFC4610). Geographically RP redundancy shall be implemented.

SRS (PRTTDCIS-1548)

For IPv4 multicast, the anycasted rendezvous points shall use Multicast Source Discovery Protocol (MSDP).

SRS (PRTTDCIS-1549)

For IPv4 multicast, when BGP-4 is used across interoperability interfaces, MSDP shall peer using the same source and destination addresses as the external BGP peering session.

SRS (PRTTDCIS-1550)

For IPv4 multicast, MSDP shall be configured to source from the loopback addresses on internal BGP peering sessions.

SRS (PRTTDCIS-1551)

The PCA subsystem shall support IP throughput performances up to 5 Gbps and 20 Gbps, with and without IPsec encryption, respectively.

SRS (PRTTDCIS-1552)

The PCA subsystem shall be able to simultaneously connect to all the PCN bearer systems.

SRS (PRTTDCIS-1554)

The PCA shall support (but not implement) increasing that capacity with an additional 4 interfaces, at 1 Gbps each.

SRS (PRTTDCIS-1555)

The PCA subsystem shall, as a minimum, implement interfaces to the WAN/MAN and to other subsystems within the CNM, as per the table below. The need for additional interfaces, or interfaces different from those listed below, including internal interfaces within the PCA subsystem, if required, as well as their specification, shall be design-driven and shall be justified, based on component selection and functionality sought.

ID	Interface to	Subsystem	Qty.	Remarks
1	Mini LOS	Mini LOS	3	Speed and type are design-driven
2	HCLOS	HCLOS	4	Speed and type are design-driven
3	Broadband IP Radio	Broadband IP Radio	1	Speed and type are design-driven
4	Commercial SATCOM	Commercial SATCOM	1	Speed and type are design-driven
5	Military SATCOM	Military SATCOM	1	Speed and type are design-driven
6	Ethernet (FO and Cu)	Ethernet (FO and Cu)	4	SFP based supporting both RJ45 and fiber for 100/1000Mbps
7	SHDSL	External - Two wire cable	2	Internal to PCA
8	Data over IMT	External - IMT Network	1	Internal to PCA
9	IP HF Radio	IP HF Radio	1	10BaseT
10	PCN-1	External - PCN	2	1 Gbps, 1000BASE-LX/LH
11	PCN-2	External - PCN	2	1 Gbps, 1000BASE-LX/LH
12	CNM-xS	CCA-xS	1	Interface to TCE-621B (1 Gbps)
13	CNM-xR	CCA-xR	1	10 Gbps
14	CNM-xU	CCA-xU	1	10 Gbps
15	NS Kit - Remote Node	RNM lite - CCA-NS	2	1 Gbps, 1000BASE-LX/LH
16	NS Kit - Core Node	CNM lite - CCA-NS	1	1 Gbps, 1000BASE-LX/LH

17	EMM-PCN	CAS (In Rack System)	M	1 Gbps, 1000BASE-LX/LH (M is design Driven)
18	EMM-PCN	CAS (SysAdmin Workstation)	1	1 Gbps
19	Future expansion	External	4	Future expansion (Qty 4 x 1 Gbps)

Table 21 - PCA subsystem interface

SRS (PRTTDCIS-1668)

All PCA across TDCIS Nodes shall be identical, therefore, the computation of interface quantities have taken into consideration the largest connections possible.

SRS (PRTTDCIS-1556)

The PCA subsystem shall implement additional interfaces, as required and as driven by the design, in support of service management and control functionalities.

NOTE (PRTTDCIS-1557)

Additional interfaces may be implemented to accommodate other connections and end-points resulting from the detailed design.

SRS (PRTTDCIS-1558)

Any routers and switches in the PCA subsystem shall be duly sized and licensed in order to meet the functional and technical requirements above.

SRS (PRTTDCIS-1248)

The PCA shall support the E-Node functionality in support of the Protected Core Network (PCN) specification, in accordance with STANAG-5637.

SRS (PRTTDCIS-1244)

In order to be an ENode in the PCN context, the PCA shall support following services and their federation with other affiliates of the PCN:

- Domain Name Server (DNS); and,
- Authentication, Authorisation & Accounting (AAA); and,
- Network Time Protocol (NTP); and,
- Public Key Interface (PKI); and,
- Interface to the Network Management / Cyber Defence System.

SRS (PRTTDCIS-1670)

The PCA own Domain Specific Management System (DSMS) shall interface northbound to the PCN Network Management and Control Device (NMCD).

4.2.2.2 CCA subsystem

NOTE (PRTTDCIS-3050)

The following picture illustrates the CCA in context.

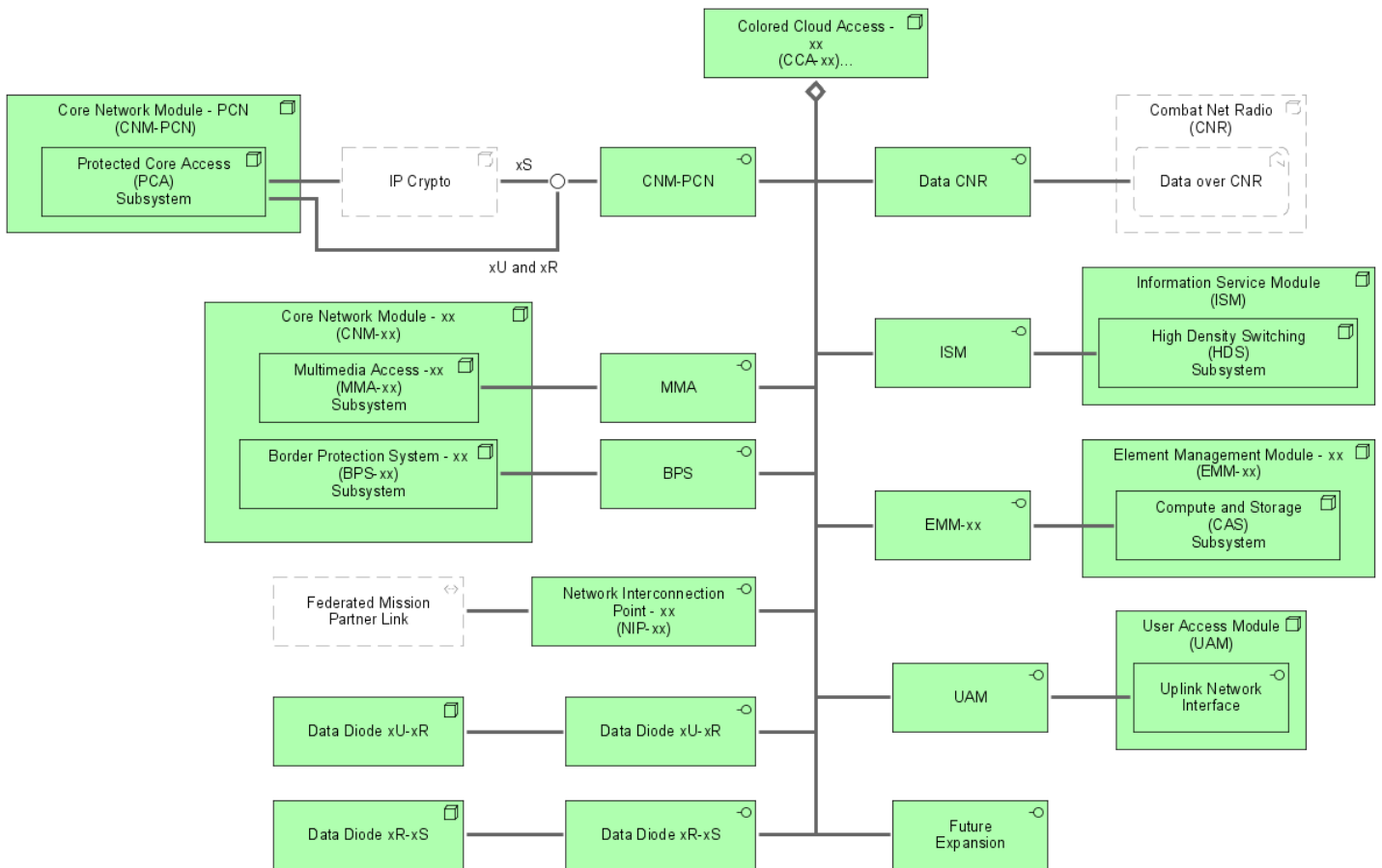


Figure 42 - CCA in context

NOTE (PRTTDCIS-1559)

The CCA subsystem exists in three different flavours: xU, xR and xS. The xU and xR flavours are different from the other one in the sense that the corresponding module will require no crypto equipment.

SRS (PRTTDCIS-1560)

The CCA subsystem shall implement the CCA functions.

SRS (PRTTDCIS-1561)

The CCA subsystem shall implement IPv4/IPv6 dual stack.

SRS (PRTTDCIS-1562)

The CCA subsystem shall implement a 10 Gbps switching core.

SRS (PRTTDCIS-1563)

All CCA subsystems shall be built and licensed the same, irrespective of the security domain.

SRS (PRTTDCIS-1564)

The CCA subsystem shall use OSPFv2 as the IGP for IPv4 and OSPFv3 as the IGP for IPv6.

SRS (PRTTDCIS-1565)

The CCA subsystem shall support IP multicast and fulfil all multicast-related requirements stated for the PCA subsystem.

SRS (PRTTDCIS-1566)

The CCA subsystem shall implement a tunneling architecture for transporting xS data between TDCIS Nodes. Tunnels shall provide point-to-point IP transport at a given QoS level, in turn determined by the link attributes of the underlying MPLS-TE tunnels (LSP) between the PCA subsystems.

SRS (PRTTDCIS-1567)

To allow dynamic routing updates between two connected TDCIS Nodes, a main End-to-End tunnel shall be created between CCAs.

SRS (PRTTDCIS-1568)

This tunnel acts as a logical interface to BGP and OSPF, and as the point-to-point transport interface connecting to other networks. All dynamic routing updates shall be sent and received through this tunnel.

NOTE (PRTTDCIS-1569)

Quality of Service (QoS) and Anti-Replay methods are performed inside the End-to-End tunnel and are transparent to the dynamic routing protocols. The per-QoS Encapsulating Security Protocol (ESP) between IP crypto equipment correspond to separate Virtual Crypto Units (VCU).

SRS (PRTTDCIS-1570)

For each End-to-End (E2E) Generic Routing Encapsulation (GRE) tunnel and for QoS purposes, five additional GRE tunnels shall be configured within the CCA subsystem, one for each QoS class. The routing design shall be implemented as follows:

- 1) QoS tunnels shall be established between CCA subsystem instances;
- 2) Traffic shall be first routed into the correct E2E tunnel by the dynamic routing protocol;
- 3) Once in the correct E2E tunnel, traffic shall be then routed into one of the associated five QoS-based GRE tunnels via static configuration. As this routing decision is based upon Differentiated Services Code Point (DSCP) and destination IP (with the destination being the tunnel endpoint of the chosen E2E GRE), Policy-Based Routing (PBR) and a separate Virtual Routing and Forwarding (VRF) instance are required;
- 4) Each QoS tunnel (mapped to a VCU) shall be associated with one or more (more in case of load balancing across cryptos) cryptographic tunnels and routed across the Protected Core (PCA network) accounting for the QoS requirements.

NOTE (PRTTDCIS-1571)

Cryptographic tunnels are established between IP encryption equipment (PFE) (this applies to the xS Coloured Cloud IP Access subsystems) or between commercial grade crypto instances (this applies to the xU and xR Coloured Cloud IP Access subsystems).

SRS (PRTTDCIS-1573)

The CCA subsystem shall implement VRFs to carry FMN transit traffic between NIPs in different TDCIS Nodes.

SRS (PRTTDCIS-1574)

Traffic from/to this VRF shall be routed through the Boundary Protection function where required.

SRS (PRTTDCIS-1575)

The CCA subsystem shall use BGP4 as the EGP to interconnect interior routing domains (iBGP) and to dynamically advertise IP information over the NIP (eBGP).

SRS (PRTTDCIS-1576)

Over the NIP, each CCA subsystem shall transit multicast traffic on behalf of all Mission Network Participants (MNP).

SRS (PRTTDCIS-1578)

In order to fulfil end-to-end QoS for higher level services, IP performance shall be expressed as a maximum IP packet loss rate (IPLR), a maximum IP transfer delay (IPTD) and a maximum jitter (IPDV) and shall comply with parameters are as follows for the Real Time (RT) Voice and Video (V2) traffic:

- Latency \leq 150 ms one-way; and,
- Jitter \leq 30 ms; and,
- Loss \leq 1%.

SRS (PRTTDCIS-1579)

The following QoS parameters for Inter-domain Multicast Source Discovery over the CCA subsystem shall be observed or tailored to fit mission-specific requirements: Application Type: Router (multicast source discovery).

SRS (PRTTDCIS-1580)

The following QoS parameters for Inter-domain Routing over the CCA subsystem shall be observed or tailored to fit mission-specific requirements: Application Type: Router (inter-domain routing).

SRS (PRTTDCIS-1581)

The following QoS parameters for Inter-domain Multicast Signaling over the CCA subsystem shall be observed or tailored to fit mission-specific requirements: Application Type: Router (multicast signaling).

SRS (PRTTDCIS-1582)

The following QoS parameters for Key negotiation and keepalives over the CCA subsystem shall be observed or tailored to fit mission-specific requirements: Application Type: Router (IPSec authentication and tunnel management).

SRS (PRTTDCIS-1583)

Over the NIP, the CCA subsystem shall provide multicast infrastructure based on PIMv2 Sparse-Mode signaling and Rendezvous points within each MN Communications Services Provider.

SRS (PRTTDCIS-1584)

Each individual CCA subsystem shall implement IP throughput performances of at least 5 Gbps without IPSec encryption enabled.

SRS (PRTTDCIS-1585)

Each individual CCA subsystem shall support IP throughput performances up to 10 Gbps without IPSec encryption enabled.

SRS (PRTTDCIS-1586)

Each individual CCA subsystem shall implement a core switching capability based on a dual-core architecture with buffers of at least 32 MB, in order to prevent frame drops resulting from micro-bursts of traffic.

SRS (PRTTDCIS-1587)

Each individual CCA subsystem shall, as a minimum, implement interfaces to other subsystems within the Core Network Module as well as to external elements, as per the table below. The need for additional interfaces, or interfaces different from those listed below, as well as their specification, shall be design-driven and shall be justified, based on component selection and functionality sought.

ID	Interface to:	Subsystem	Qty.	Remarks
1	CNM-PCN	PCA	1	1 Gbps (xS) or 10 Gbps (xU and xR), direct interface on PCA routing platform
2	UAM	LAN	2	10 Gbps, CCA switching core (allows two switches UAM)
3	Internal CNM	MMA	M	1 Gbps, CCA switching core (M is design driven)
4	Internal CNM	BPS	N	10 Gbps, CCA switching core (N is design driven)
5	Network Interconnection Point (NIP)	External Mission Partner	1	1 Gbps, 1000BASE-LX/LH, direct interface on CCA routing platform
6	ISM	HDS	P	10 Gbps, through CCA switching core (P is design driven)
7	EMM	CAS	Q	1 Gbps, CCA switching core (Q is design driven)
8	Data CNR	Data over CNR	R	IP interface (R is design driven)
9	Data Diode xU-xR	Data Diode xU-xR	1	1 Gbps
10	Data Diode xR-xS	Data Diode xR-xS	1	1 Gbps
11	Future Expansion	N/A	4	Future expansion (Qty 4 x 1 Gbps)

Table 22 - CCA subsystem interfaces

SRS (PRTTDCIS-1669)

All CCA across TDCIS Nodes shall be identical, therefore, the computation of interface quantities have taken into consideration the largest connections possible.

SRS (PRTTDCIS-1588)

Each CCA subsystem shall implement additional interfaces, as required and as driven by the design, in support of service management and control functionalities.

SRS (PRTTDCIS-1589)

Each CCA subsystem shall support (but not implement) two additional 10G ports in order to allow connecting two additional UAMs (thus resulting in four 10G ports for UAMs, two more than those implemented as per in Table 3 10 above).

NOTE (PRTTDCIS-1590)

Additional interfaces may be implemented to accommodate other connections and end-points resulting from the detailed design.

SRS (PRTTDCIS-1591)

Any routers and switches in each CCA subsystem shall be duly sized and licensed in order to meet the functional and technical requirements above.

SRS (PRTTDCIS-1254)

The CCA-xU design shall adhere to the design concept presented in following figures:

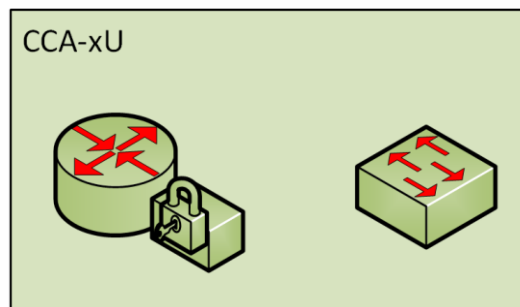


Figure 43 - CCA-xU design concept

SRS (PRTTDCIS-3236)

The CCA-xR design shall adhere to the design concept presented in following figures:

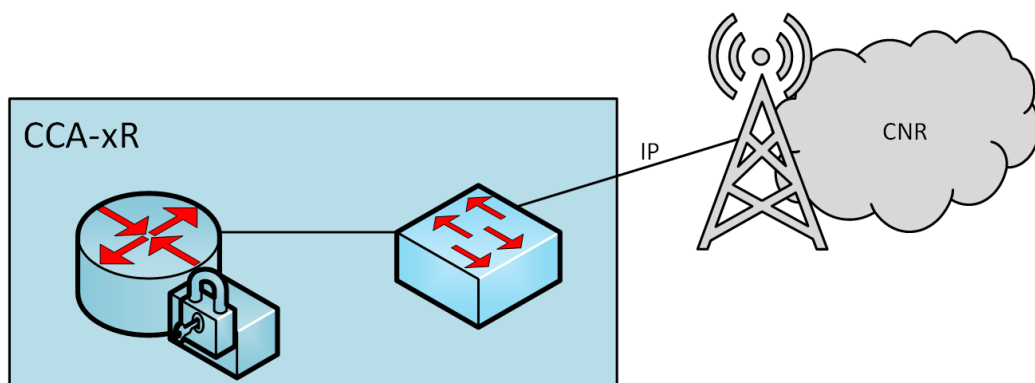


Figure 44 - CCA-xR design concept

SRS (PRTTDCIS-3237)

The CCA-xS design shall adhere to the design concept presented in following figures:

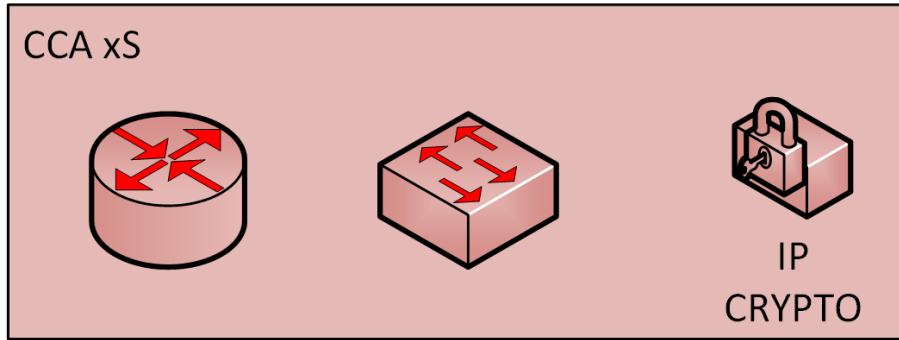


Figure 45 - CCA-xS design concept

4.2.2.3 MMA subsystem

NOTE (PRTTDCIS-3051)

The following picture illustrates the Multi Media Access (MMA) in context.

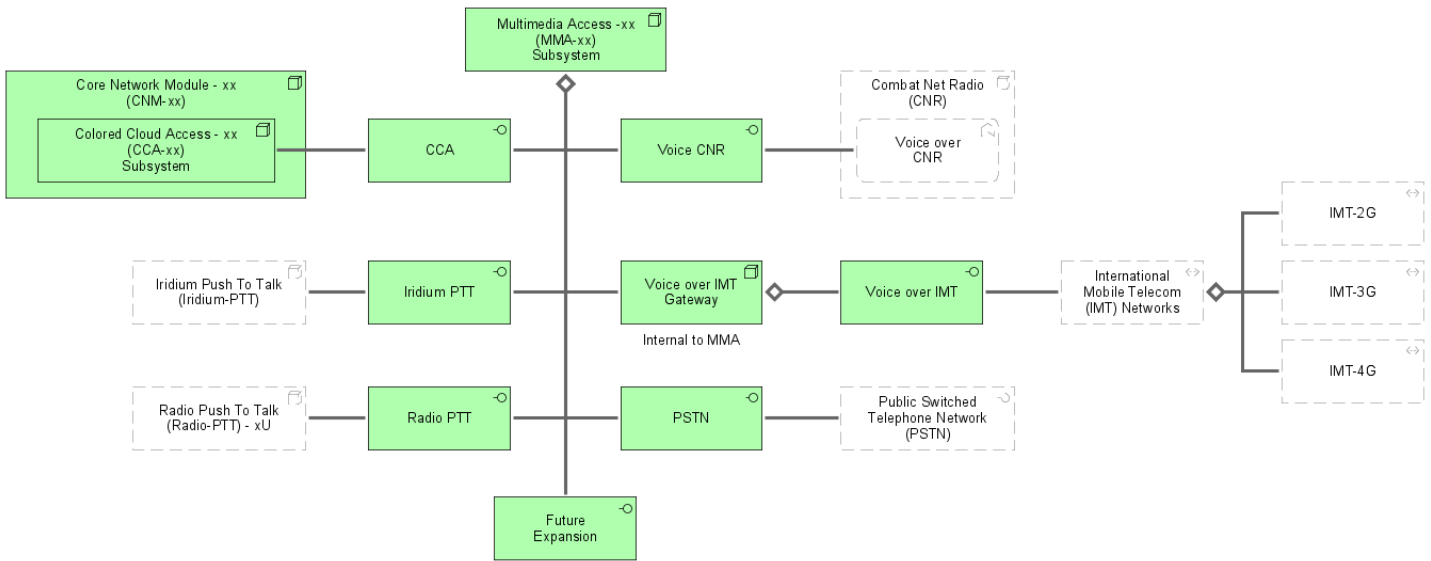


Figure 46 - MMA in context

SRS (PRTTDCIS-1592)

The MMA subsystem shall implement the MMA functions.

SRS (PRTTDCIS-1593)

There shall be as many instances of the MMA subsystems as CNMs and security domains (xU, xR and xS).

SRS (PRTTDCIS-1594)

The MMA subsystem shall implement media stream termination and relay functions using DSP hardware acting as Media Termination Point / Trusted Relay Point (MTP/TRP).

SRS (PRTTDCIS-1595)

The MMA subsystem shall perform codec conversion and use TLS to communicate with the call management function.

SRS (PRTTDCIS-1596)

The call management function corresponding application shall run as a workload in the ISM.

SRS (PRTTDCIS-1672)

The MMA subsystem shall implement the call management function compatible with the specifications of a Cisco Unified Call Manager (CUCM).

SRS (PRTTDCIS-1597)

The MMA subsystems shall support Dynamic Host Configuration Protocol (DHCP) towards the user appliances connecting via the UAM.

SRS (PRTTDCIS-2412)

DHCP shall be implemented in a controlled manner taking necessary security measures depicted in the NCIRC guidance.

SRS (PRTTDCIS-1598)

The MMA subsystem shall support local voice and video conferencing.

SRS (PRTTDCIS-1599)

The MMA subsystem shall implement a Session Border Controller (SBC) function compatible with the specifications of the Cisco Unified Border Element (CUBE).

SRS (PRTTDCIS-1624)

The SBC and MTP/TRP instances shall be implemented in DSP-equipped router appliances, integrated in the CNM.

SRS (PRTTDCIS-1600)

The SBC function shall be implemented as an application running as a workload in the ISM for MMA-xU and MMA-xR.

SRS (PRTTDCIS-1625)

The MMA-xS SBC shall be implemented in a dedicated appliance.

SRS (PRTTDCIS-1601)

The MMA subsystem shall support concurrent SIP/H.323 sessions equals to the largest user quantity possible on a node and in a security domain plus 10%.

NOTE (PRTTDCIS-1603)

Software versions are the latest approved versions, these might however be higher during the actual implementation, this will be subject to local coordination and approval prior to any deployment.

SRS (PRTTDCIS-1604)

All MMA subsystems shall be built and licensed the same, irrespective of the security domain.

SRS (PRTTDCIS-1605)

The MMA subsystem shall interface the CCA subsystem over a redundancy system of Two 1 Gbps interfaces.

SRS (PRTTDCIS-1606)

Any software component of the MMA subsystem that is able to run on commodity hardware shall be implemented as a workload on the ISM. This is applicable to all security domain (xS, xR and xU).

SRS (PRTTDCIS-1607)

The implementation of MLPP by the MMA subsystem, shall support, on top of routine calls, five levels of precedence and pre-emption, as follows (from highest to lowest):

- 1) Flash Override; and,
- 2) Flash; and,
- 3) Intermediate; and,
- 4) Priority; and,
- 5) Routine.

SRS (PRTTDCIS-1608)

The MMA subsystem shall implement a dial plan compliant with STANAG 4705.

SRS (PRTTDCIS-1609)

The MMA subsystem shall implement a local Call Management instance that refers to the Survivable Remote Site Telephony (SRST) function, this function being a local call processing and management function performed by the MMA router if the node is isolated and lost the connection to the CUCM to ensure intra-node communication.

SRS (PRTTDCIS-1610)

The MMA subsystem for each security domain shall be sized for the maximum number of VoIP phones supplied per domain + 10%.

NOTE (PRTTDCIS-1626)

The MTP/RTP instance may be integrated/collapsed in the appliance(s) implementing the CCA subsystem.

SRS (PRTTDCIS-1628)

Any routers, switches and applications in the MMA subsystem shall be duly sized and licensed in order to meet the functional and technical requirements above.

SRS (PRTTDCIS-1629)

Each MMA subsystem shall, as a minimum, implement interfaces to other subsystems within the Core Network Module as well as to external elements, as per the table below. The need for additional interfaces, or interfaces different from those listed below, as well as their specification, shall be design-driven and shall be justified, based on component selection and functionality sought.

ID	Interface to:	Subsystem	Qty.	Remarks
1	Internal CNM	CCA	M	1 Gbps, CCA switching core (M is design driven)
2	PSTN	External - PSTN Networks	4	T1/E1
3	Voice over IMT	External - IMT Networks	2	Only in MMA-xU
4	Iridium PTT	External	N	Only in MMA-xU (N is design driven)
5	Radio PTT	External	P	Only in MMA-xU (P is design driven)
6	Voice CNR	CNR	1	Only in MMA-xR
7	Future Expansion	N/A	4	Future Expansion (Qty 4 x 1Gbps)

Table 23 - MMA subsystem interfaces

SRS (PRTTDCIS-1673)

All MMA across TDCIS Nodes shall be identical, therefore, the computation of interface quantities have taken into consideration the largest connections possible.

SRS (PRTTDCIS-1630)

Each MMA subsystem shall implement additional interfaces, as required and as driven by the design, in support of service management and control functionalities.

NOTE (PRTTDCIS-1631)

Additional interfaces may be implemented to accommodate other connections and end-points resulting from the detailed design.

SRS (PRTTDCIS-1632)

Any routers and switches in each MMA subsystem shall be duly sized and licensed in order to meet the functional and technical requirements above.

SRS (PRTTDCIS-1260)

The UCC capability shall enable users to establish video conferencing sessions and augment them with web based collaboration features, including options for recording, as well as streaming and distribution of video content.

SRS (PRTTDCIS-1676)

Users shall be able to access VTC services using the Collaboration Application.

SRS (PRTTDCIS-1262)

The TDCIS shall support the integration (mechanical, electrical and logical) of the PFE Iridium terminal.

SRS (PRTTDCIS-1264)

The MMA IP telephony service in the xR security domain shall integrate the PFE RoIP gateway that will be connected to the CNR voice interface.

SRS (PRTTDCIS-1266)

VoIP and VTC shall be provided in xU and xS security domains, in accordance to FMN Spiral 3 specifications.

SRS (PRTTDCIS-1674)

The UCC function corresponding application shall run as a workload in the ISM.

SRS (PRTTDCIS-2906)

The VTC Multipoint Control Unit (MCU) shall be implemented as a virtual workload to the ISM.

SRS (PRTTDCIS-2699)

MMA Voice Collaboration and VTC services shall integrate with the PFE Collaboration Application installed on End User Devices (EUD).

SRS (PRTTDCIS-3835)

The MMA subsystem shall, as a minimum, support following video codecs:

- H.264 SVC; and,
- H.264 AVC High Profile; and,
- H.264 AVC Base Profile; and,
- H.263++; and,
- H.261.

SRS (PRTTDCIS-1256)

The MMA-xU design shall adhere to the design concept presented in following figure:

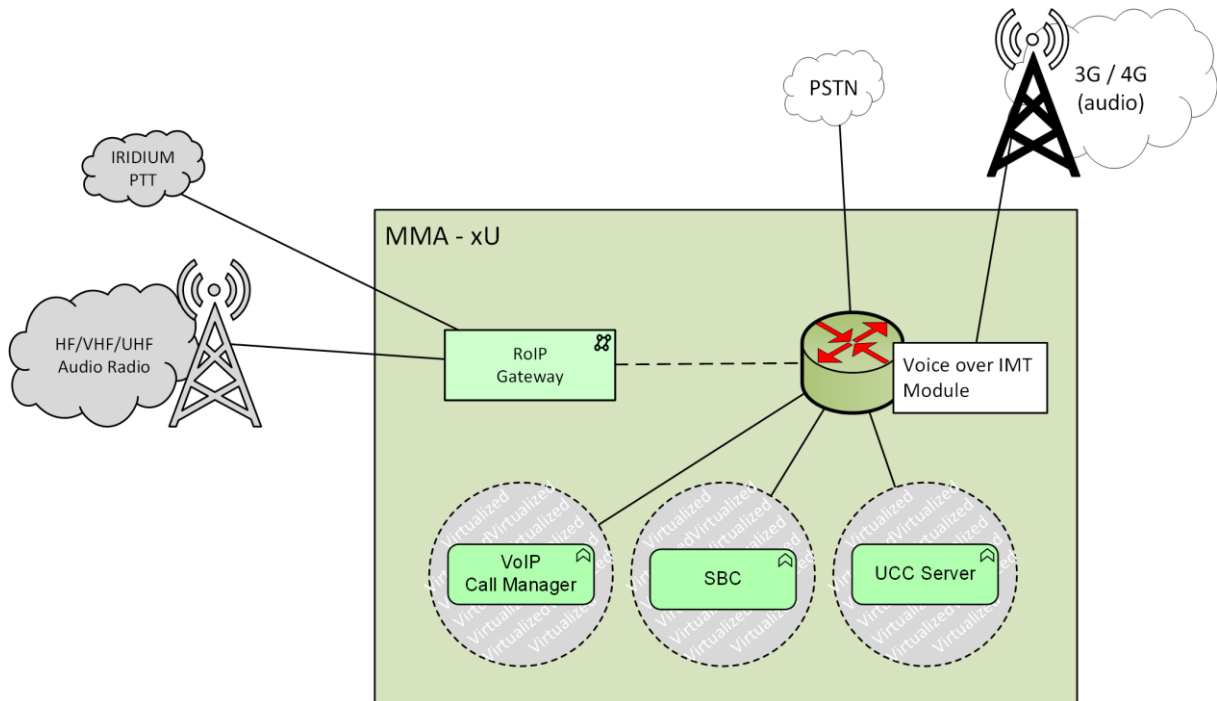


Figure 47 - MMA-xU design concept

SRS (PRTTDCIS-3238)

The MMA-xR design shall adhere to the design concept presented in following figure:

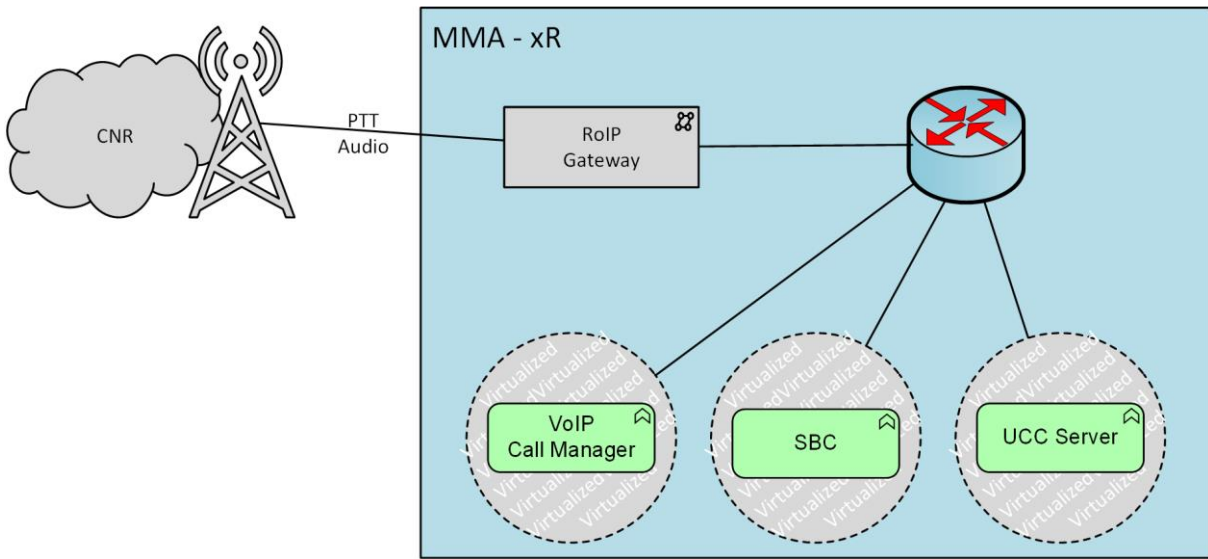


Figure 48 - MMA-xR design concept

SRS (PRTTDCIS-3239)

The MMA-xS design shall adhere to the design concept presented in following figure:

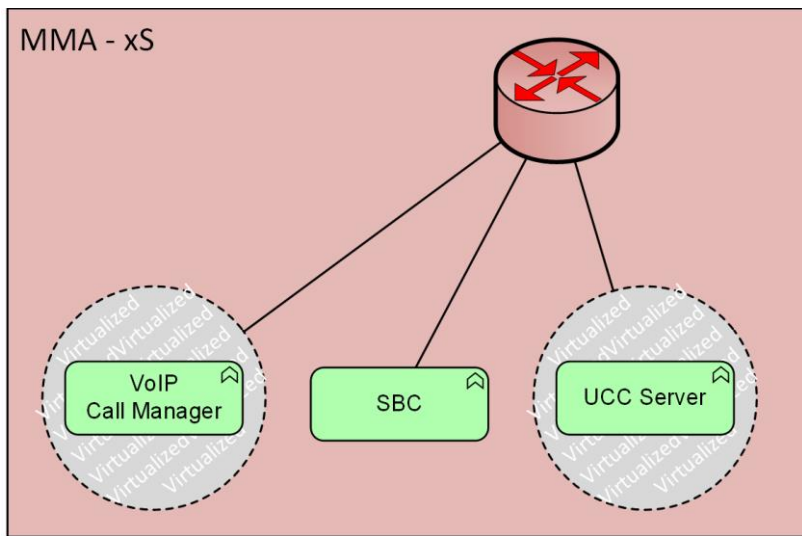


Figure 49 - MMA-xS design concept

4.2.2.4 BPS subsystem

NOTE (PRTTDCIS-3053)

The following picture illustrates the BPS in context.

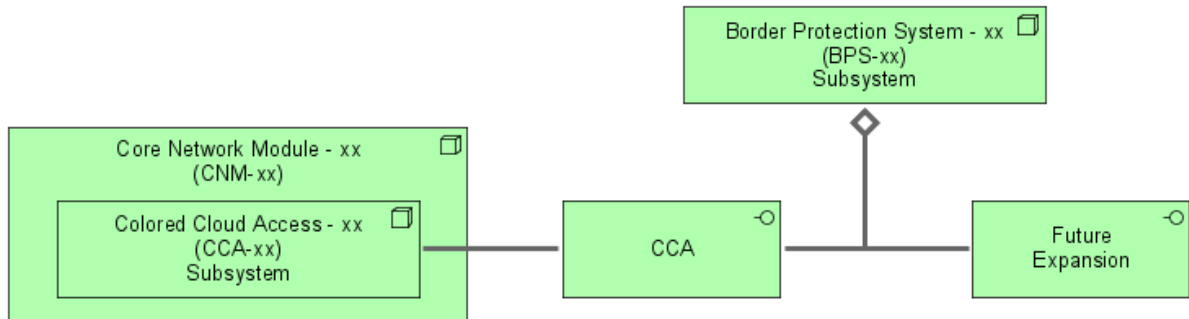


Figure 50 - BPS in context

SRS (PRTTDCIS-1633)

The BPS subsystem shall implement the BPS functions.

SRS (PRTTDCIS-1634)

Each BPS subsystem shall be directly connected to the core switching element of the corresponding CCA.

SRS (PRTTDCIS-1635)

All BPS subsystems shall be built and licensed the same, irrespective of the security domain.

SRS (PRTTDCIS-1636)

All BPS subsystems shall support up to 4 Gbps of traffic, with the Intrusion Prevention System (IPS) feature enabled .

SRS (PRTTDCIS-1637)

Intrusion Prevention System (IPS) licenses shall be provided with each BPS firewall (1-year subscription). Licenses shall be based on volume (number of hosts).

SRS (PRTTDCIS-1638)

The BPS subsystem shall implement interfaces as per the table below.

ID	Interface to:	Subsystem	Qty.	Remarks
1	Internal	CCA	M	10 Gbps, through CCA switching core (M is design driven)
2	Future Expansion	N/A	N	N is design driven.

Table 24 - BPS subsystem interfaces

SRS (PRTTDCIS-3122)

BPS shall support network segmentation through its single internal interface to the CCA.

SRS (PRTTDCIS-1677)

BPS shall be realized with physical appliances

4.2.3 Implementation Constraints

SRS (PRTTDCIS-1643)

Any switches and routers in the CNM shall be fitted with redundant power supplies.

SRS (PRTTDCIS-1644)

Core switches in the CNM shall implement 10 Gbps uplinks towards the LAN subsystem of the UAM.

SRS (PRTTDCIS-1651)

In order to achieve the high availability targets that are driven by PCA, the PCA subsystem design shall implement sufficient redundancy, including component selection with built-in redundancy, if necessary.

SRS (PRTTDCIS-1662)

Crypto devices shall be removable from the racks of the CNM, for storage and transport. The removal of the crypto devices shall be compatible with the implementation of TEMPEST requirements in the racks.

SRS (PRTTDCIS-1664)

The hardware of CNM-xS, CNM-xR and CNM-xU shall be physically built the same, such that these modules are interchangeable.

SRS (PRTTDCIS-1839)

The MMA Voice Capability shall be compatible with the EUD baseline.

SRS (PRTTDCIS-1840)

The Voice EUD baseline comprises of 4 types namely; Standard, Enhanced, Wireless and Conference. The MMA shall be fully compatible with the following EUD:

- Standard – Cisco 8841
- Enhanced – Cisco 8865
- Wireless – Cisco 8821
- Conference – Cisco 8832

SRS (PRTTDCIS-2413)

For the Voice EUD, the COTS phones shall meet the minimum TEMPEST requirement of the respective security domain which will be connected.

SRS (PRTTDCIS-2869)

Crypto devices shall be removable from the transit cases of the CNM lite, for storage and transport.

SRS (PRTTDCIS-2870)

Foam-padded transport cases able to carry one TCE-621/B shall be provided for that purpose.

SRS (PRTTDCIS-2871)

Transport cases shall accommodate the use of padlocks.

SRS (PRTTDCIS-1659)

The CNM-xU design shall adhere to the design concept depicted in the following figure:

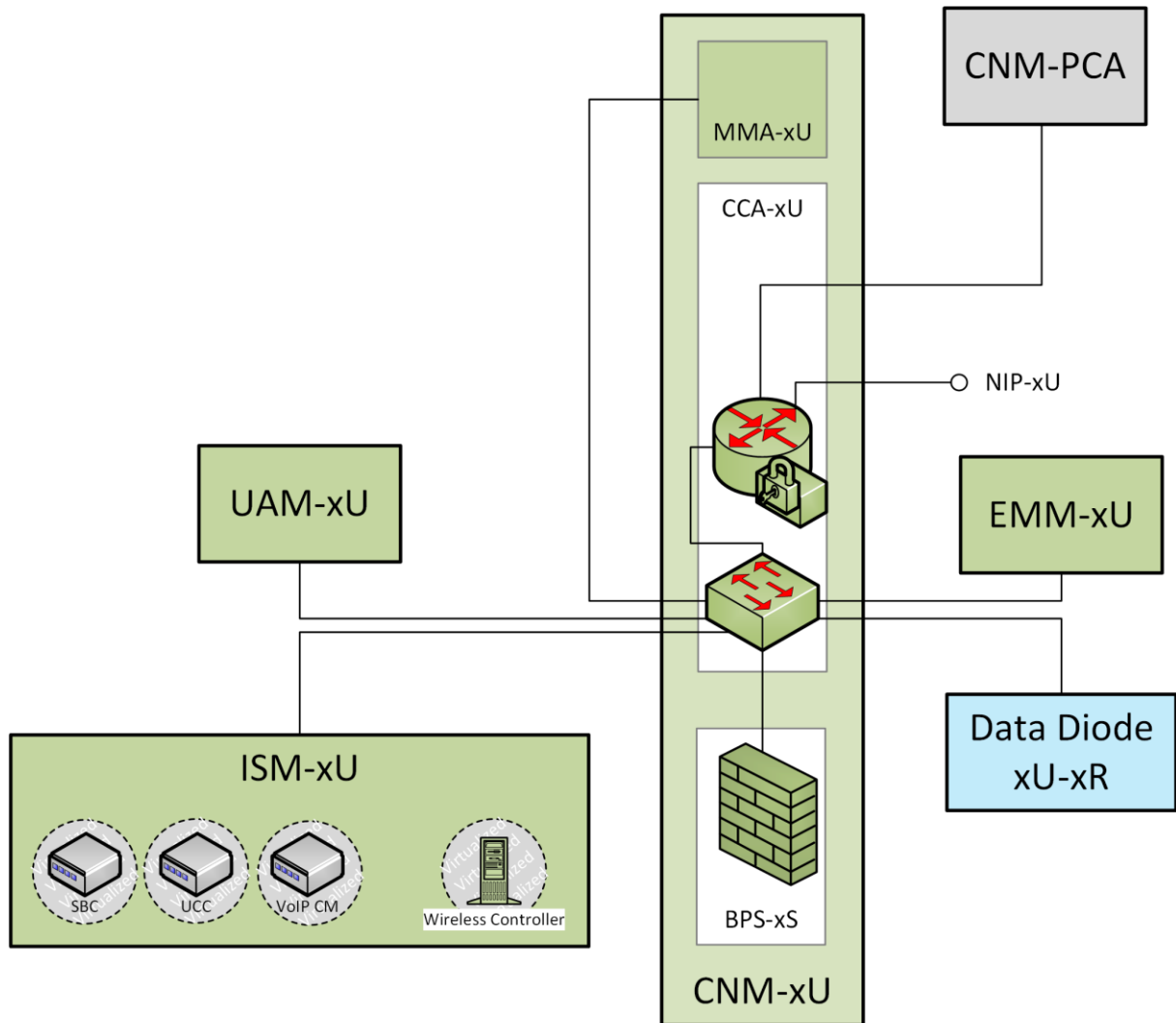


Figure 51 - CNM-xU - Design Concept

SRS (PRTTDCIS-3240)

The CNM-xR design shall adhere to the design concept depicted in the following figure:

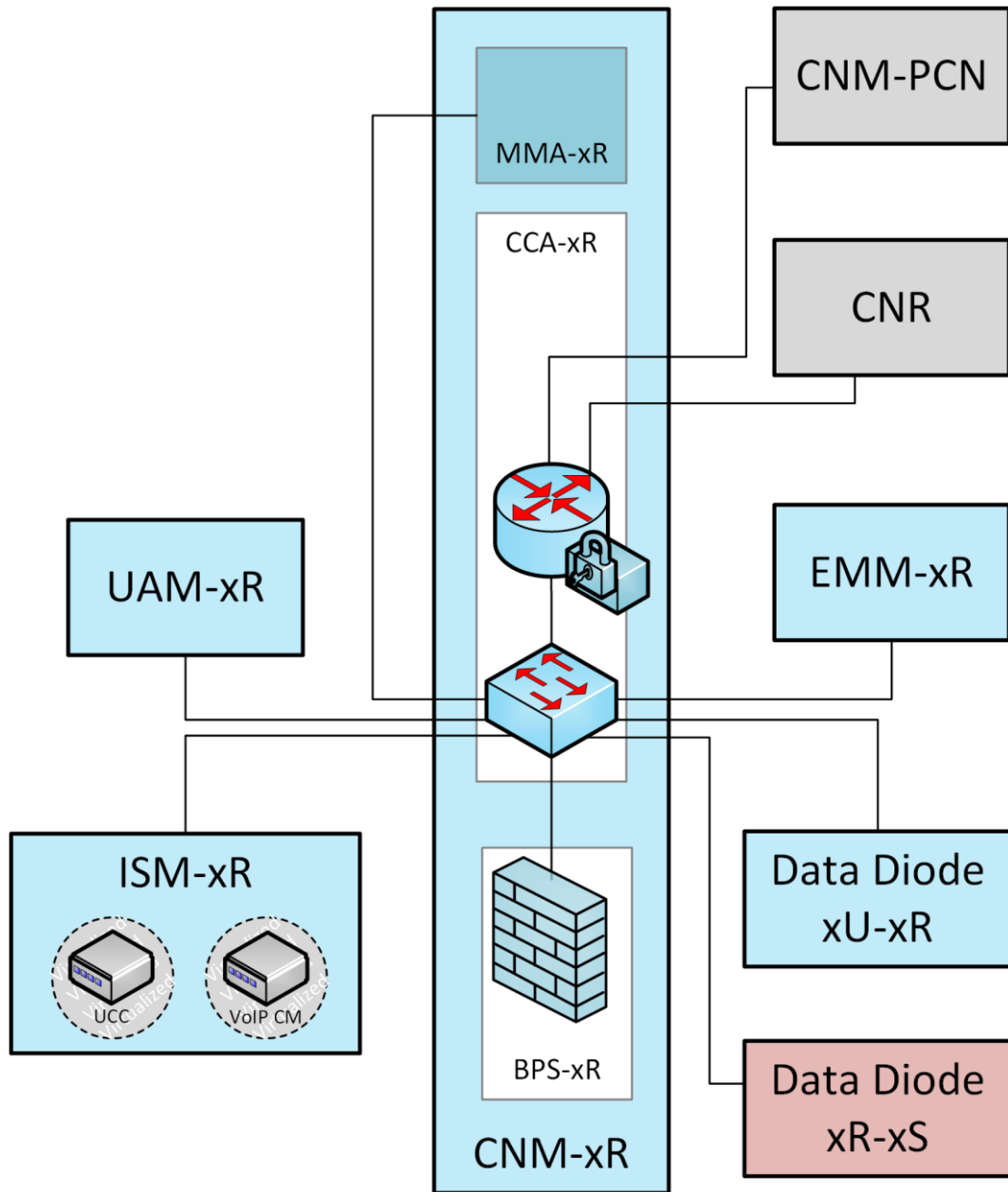


Figure 52 - CNM-xR - Design Concept

SRS (PRTTDCIS-3241)

The CNM-xS design shall adhere to the design concept depicted in the following figure:

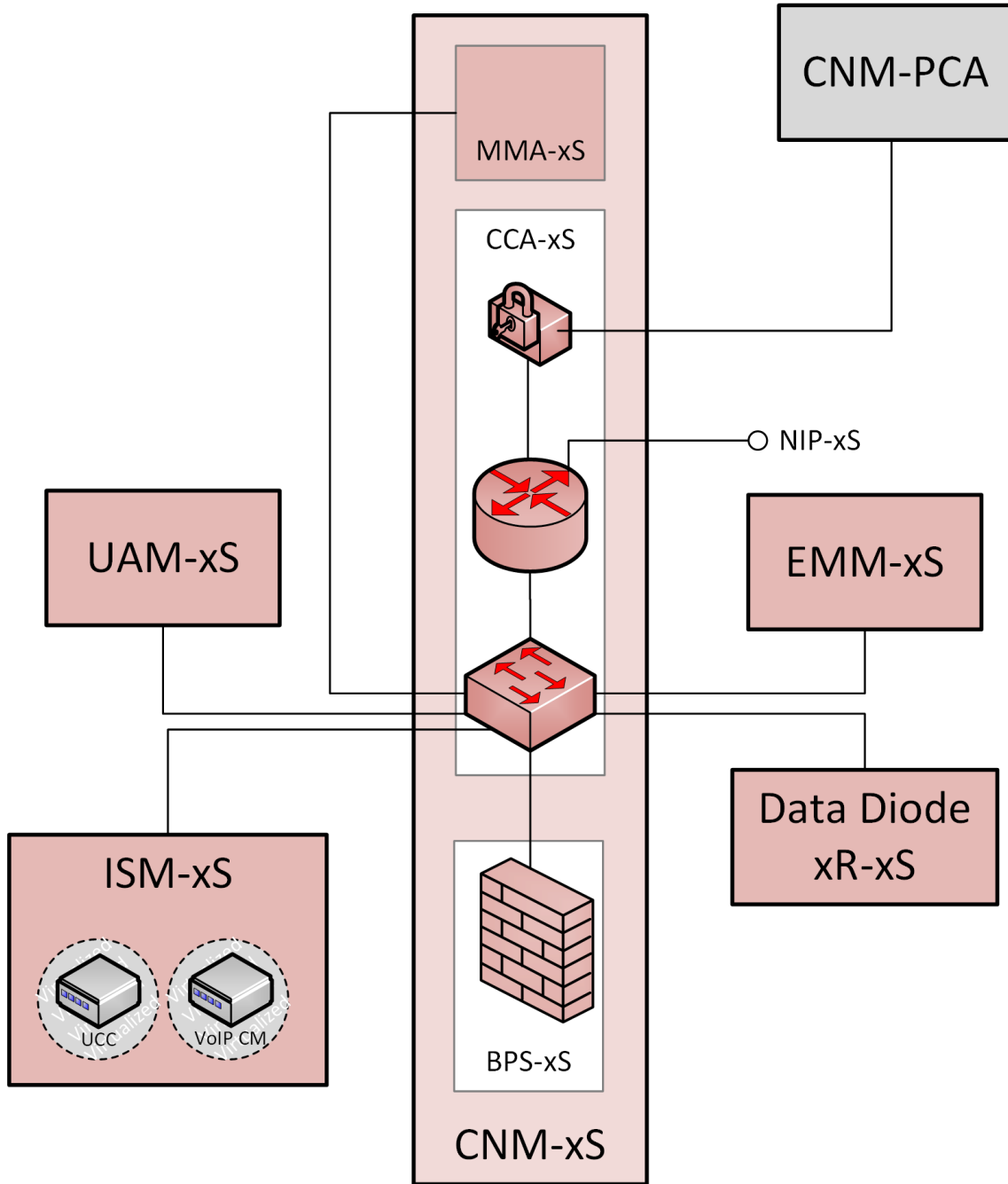


Figure 53 - CNM-xS - Design Concept

4.3 Core Network Module lite

NOTE (PRTTDCIS-2858)

The Core Network Module (CNM) lite is a reduced version of the CNM which shares the same description, functionalities and characteristics. It is built in Transit Cases to provide the flexibility required by the NS Kit.

SRS (PRTTDCIS-2861)

The CNM lite shall comply with all CNM specifications unless specifically specified otherwise.

SRS (PRTTDCIS-2782)

The design of the CNM lite shall adhere to the architecture presented in following figure.

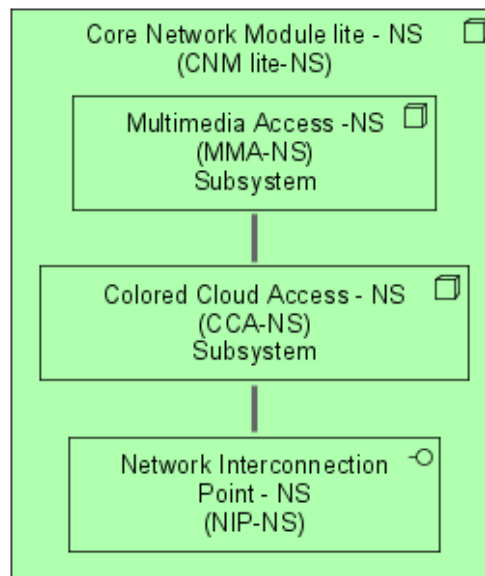


Figure 54 - CNM lite architecture

SRS (PRTTDCIS-2786)

The detailed system design of the Core Network Module (CNM) lite shall adhere to the subsystem breakdown in the following figure

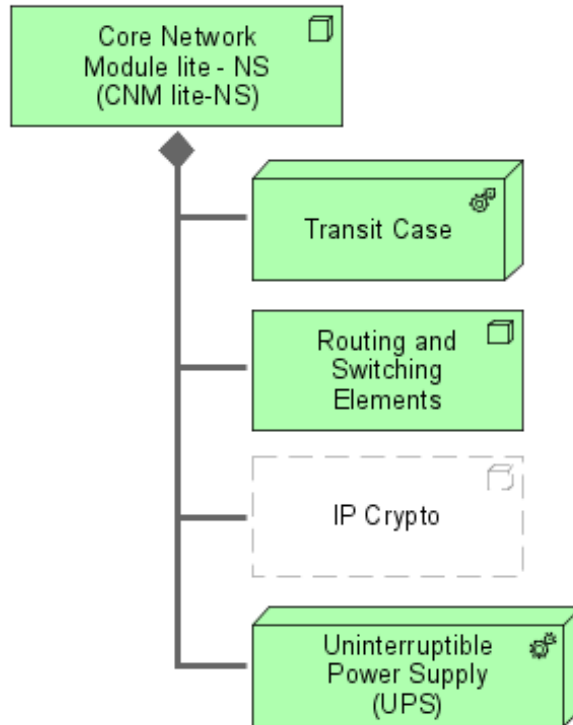


Figure 55 - CNM lite subsystems breakdown

4.3.1 Functional Requirements

SRS (PRTTDCIS-2787)

The CNM lite shall implement the Coloured Cloud Access (CCA) function.

SRS (PRTTDCIS-3024)

The CNM lite shall implement the MMA function, including the ISM workload elements, limited to Voice Collaboration Service related features.

SRS (PRTTDCIS-2788)

The CNM lite shall implement a dedicated uninterrupted power supply (UPS) functionality, giving the CNM lite the ability to continue to operate through mains power outage and power quality deficiencies.

4.3.2 Technical Requirements

4.3.2.1 CCA subsystem

SRS (PRTTDCIS-2789)

The CCA subsystem in the CNM lite shall implement the functions listed under the CCA function in the CNM.

SRS (PRTTDCIS-2790)

The CCA subsystem in the CNM lite shall meet the same technical requirements formulated for the CCA subsystem of the CNM, excluding the 10G Core Switching core, and shall implement IP throughput performances of at least 2 Gbps, without IPsec encryption enabled.

SRS (PRTTDCIS-2791)

The CCA subsystem of the CNM lite shall, as a minimum, implement interfaces as per the table below. The need for additional interfaces, or interfaces different from those listed below, as well as their specification, shall be design-driven and shall be justified, based on component selection and functionality sought.

ID	Interface to:	Subsystem	Qty.	Remarks
1	TDCIS Node	CNM-PCA	1	1 Gbps, direct interface on CCA crypto
2	NS Kit EMM	N/A	2	100BaseFX, direct interface on SysAdmin Workstation
3	NS Kit ISM lite	ISM-CAS	2	1 Gbps, direct interface on CAS
4	NIP-NS	N/A	2	1 Gbps, direct interface to Mission Partner

Table 25 - CNM lite CCA subsystem interfaces

SRS (PRTTDCIS-2792)

CCA subsystem in the CNM lite shall support IP throughput performances up to 4 Gbps without IPsec enabled.

SRS (PRTTDCIS-2793)

CCA subsystem in the CNM lite shall support IP throughput performances up to 1.5 Gbps with IPsec enabled.

4.3.2.2 UPS subsystem

SRS (PRTTDCIS-2794)

The UPS subsystem shall implement power conditioning protecting the CNM lite against surges, against spikes, against excessive line noise, against under voltage, brownout and sags, and against swells/overvoltage.

SRS (PRTTDCIS-2795)

The UPS shall implement ability for the CNM lite to continue to operate through:

- 1) Mains or generator power blackout for at least 20 minutes; and,
- 2) Mains or generator power brownouts indefinitely.

SRS (PRTTDCIS-2796)

The UPS subsystem shall implement a graceful shutdown mechanism of the subsystems making up the CNM lite that require such.

SRS (PRTTDCIS-2797)

The UPS subsystem shall implement UPS monitoring signaling changes in status and critical capacity warnings towards the EMM and optical and audio signals from the UPS itself.

4.3.3 Implementation Constraints

SRS (PRTTDCIS-2798)

The CCA subsystems of the CNM lite shall be implemented using routers and switches compatible with the element management system for routing and switching platforms.

SRS (PRTTDCIS-2799)

Any switches and routers in the CNM lite shall be fitted with redundant power supplies.

SRS (PRTTDCIS-2800)

Crypto devices shall be removable from the transit cases of the CNM lite, for storage and transport.

SRS (PRTTDCIS-2801)

The removal of the crypto devices shall be compatible with the implementation of TEMPEST requirements in the transit cases.

SRS (PRTTDCIS-2803)

Foam-padded transport cases able to carry one TCE-621/B shall be provided for that purpose.

SRS (PRTTDCIS-2802)

Transport cases shall accommodate the use of padlocks.

SRS (PRTTDCIS-2804)

All CNM lite shall, as a minimum, comply with TEMPEST requirements as per SDIP-27 Level B.

SRS (PRTTDCIS-2805)

The Elements which compose the CNM lite shall be integrated in a single MEDIUM transit case.

SRS (PRTTDCIS-3826)

The CNM Lite shall operate in OPE-1b conditions.

4.4 Information Services Module

NOTE (PRTTDCIS-1771)

The Information Services Module (ISM) implements a deployable Infrastructure as a Service (IaaS) on which the TDCIS infrastructure and platform services and business applications run.

NOTE (PRTTDCIS-1772)

The deployable IaaS in the ISM provides Virtual Machines (VM) hosting the PFE software that enables Core Enterprise Services (CES) and Functional Area Services (FAS), as well as software supporting Multimedia Access Module, in conjunction with the MMA subsystem of the CNM.

NOTE (PRTTDCIS-1773)

Any software running in a VM is hereafter referred to as Workload.

NOTE (PRTTDCIS-1774)

In addition to hosting CES, FAS and MMS workloads, the ISM also hosts the Service Management and Control (SMC) applications for the monitoring and control of the CNM, RNM, UAM and the ISM itself.

NOTE (PRTTDCIS-1775)

The ISM IaaS is implemented through Software-defined Compute, Software-defined Storage and Software-defined Networking mechanisms.

SRS (PRTTDCIS-1776)

The elements inside the ISM have to be identical and interchangeable; noting that the configuration of the ISM defines the security domain.

4.4.1 Functional Requirements

SRS (PRTTDCIS-1707)

The ISM shall implement the following in support of deployable instances of Infrastructure Services:

- 1) Software-defined Compute (SdC); and,
- 2) Software-defined Storage (SdS); and,
- 3) Software-defined Networking (SdN).

SRS (PRTTDCIS-1708)

Furthermore, the ISM shall implement Backup and Recovery.

4.4.1.1 Software-defined Compute

NOTE (PRTTDCIS-1681)

The software-defined compute implementation is specified in detail in DCIS CA Annex B. The requirements below elaborate and detail the software-defined networking requirements.

SRS (PRTTDCIS-1682)

The Software-defined Compute (SdC) function shall:

- 1) Abstract the physical hardware of the ISM into a VM cluster that shares CPU, memory and peripherals, through the use of virtualization hypervisors; and,
- 2) Establish, change, monitor, power-on, power-off, snapshot and teardown of VMs within the VM cluster established within the ISM; and,
- 3) Assure high availability for VMs, by implementing automatic failover to alternate hosts within the ISM; and,
- 4) Provide a documented and open Application Programming Interface (API) for management and control purposes.

4.4.1.2 Software-defined Storage

SRS (PRTTDCIS-1684)

The Software-defined Storage (SdS) function shall:

- 1) Abstract the physical storage of the ISM, and provide virtual disk access to VMs (or ISM cluster) and to collocated external machines external to the ISM; and,
- 2) Support presentation of virtual disks to the VM and networked as a SdS area network through iSCSI. This function is also referred to as Block I/O; and,
- 3) Provide file access to VMs running on the ISM and to collocated machines external to the ISM as virtual network attached storage through NFS and CIFS/SMB. This function is also referred to as File I/O; and,
- 4) Provide object-based storage access to VMs running on the ISM and collocated machines external to the ISM; and,
- 5) Enforce storage quality of service, through configurable limits (maximum) and guarantees (minimum) of storage throughput per VM, per group of VMs, per SdS resource, and per group of SdS resources.

SRS (PRTTDCIS-1686)

The Software-defined Storage function shall:

- 1) Optimize storage capacity use, though de-duplication and compression. This optimization shall be fully automatic and opaque to the storage consumers. As a minimum it shall be possible to configure de-duplication + compression and de duplication only; and,
- 2) Cluster physical storage resources across all compute nodes (servers); and,
- 3) Control and monitor the execution of the above described functionalities; and,
- 4) Provide a well-documented and open API for management and control purposes.

NOTE (PRTTDCIS-1779)

The Storage Optimization may involve automatic storage tiering of less used data to slower storage resources or to external storage, which may potentially be located in the ISM of another TDCIS Node, in the PRT static infrastructure or cloud service.

NOTE (PRTTDCIS-1685)

Depending on the available resources at a deployment, the mission profile and its associated security profile, remote storage resources may be used, including NATO or National private clouds.

NOTE (PRTTDCIS-3123)

Depending on the available resources at a deployment, the mission profile and its associated security profile, remote storage resources on commercial public clouds may be used for the xU security domain.

4.4.1.3 Software-defined Networking

SRS (PRTTDCIS-1688)

The Software-defined Networking (SdN) function shall:

- 1) Establish, change, monitor and teardown virtual Ethernet LAN (VLAN) segments, within the ISM; and,
- 2) Connect and remove external Ethernet interfaces and VMs to those VLAN segments; and,
- 3) Support WAN and LAN interfaces to the CCA function of the CNM, for wide-area communications purposes; and,
- 4) Provide a well-documented and open API for management and control purposes.

4.4.1.4 Hardware Control

SRS (PRTTDCIS-1690)

The Hardware Control function shall manage the hardware-based Compute, Storage and Networking components, upon which the above described Software-defined Compute, Storage and Networking functions run.

SRS (PRTTDCIS-1691)

To that end, the Hardware Control function shall combine and abstract the hardware-specific management and control interfaces of the components that make up the ISM, into open, standardized and authenticated interfaces (standard networking API), in order to make the underlying hardware agnostic to the orchestration.

SRS (PRTTDCIS-1692)

The Hardware Control function shall:

- 1) Operate both local as well as networked (i.e. over the WAN), providing both local and remote console access; and,
- 2) Subscribe to a centralized Hardware Control service in the PRT static infrastructure, allowing through dashboards the centralized hardware monitoring and control; and,
- 3) Implement power control: power-on, power-off, graceful shutdown, emergency shutdown; and,
- 4) Implement boot control, i.e. setting the boot source, boot and reset; and,
- 5) Implement monitoring of hardware and environmental status; and,
- 6) Support the installation, updating and configuration of BIOS and firmware; and,
- 7) Provide interfaces that are able to monitor, control and operate hosts independent of the host system CPU, firmware (BIOS) and operating system, in order to grant direct access the hardware-based compute, storage and network components; and,
- 8) Interface with the Uninterruptible Power Supply control listening for a "battery low" signal, which shall result in a graceful shutdown and subsequent power-off of the individual compute, storage and networking functions and hosted VMs.

NOTE (PRTTDCIS-1780)

Monitoring and Control interfaces are, for example, an interface to a so-called Baseboard Management Controller (BMC), Intelligent Platform Management Interface (IPMI), Integrated Lights-Out (iLO), terminal/console ports of servers and switches; including access to BIOS, firmware, bootloader, etc.

4.4.1.5 Backup and Recovery**NOTE** (PRTTDCIS-1694)

After any restoration of service, the TDCIS will revert to a configured working state of all services.

SRS (PRTTDCIS-1695)

The Backup and Recovery function shall implement the mechanisms, hardware and software in support of snapshotting, backup of, and the recovery from corruption or loss of:

- 1) a VM realized by the ISM; and,
- 2) a workload served by a VM realized by the ISM; and,
- 3) an ISM.

SRS (PRTTDCIS-1696)

The Backup and Recovery function shall:

- 1) Be implemented with a deployable backup storage component, deployed alongside the ISM, but physically separated from the ISM in rack, using deployable and networked backup storage hardware, with as many instances available as security domains; and,
- 2) Be able to create and restore (roll-back) multiple snapshots, or point-in-time copies, of any data stored in the ISM, including storage, file system, infrastructure data and application data.

SRS (PRTTDCIS-1697)

Snapshots shall include the configuration of the software defined compute, networking and storage functions, both at the level of single VMs and clusters of VMs.

SRS (PRTTDCIS-1699)

The Backup and Recovery function shall create, restore, optimize and manage the storage of snapshots and backups.

SRS (PRTTDCIS-1700)

Automatic optimization shall minimize the use of storage space on the backup media, using deduplication, compression or a combination thereof, while retaining recovery points as defined in a retention policy that can be configured through the administration interface.

SRS (PRTTDCIS-1701)

Backup management shall support backups to be automatically tiered to an off-site storage system (not a project deliverable), typically located in the PRT static infrastructure.

SRS (PRTTDCIS-1702)

The Backup and Recovery function shall maintain a continuous replica of the storage for quick disaster recovery; i.e. Real Time Replication (RtR).

SRS (PRTTDCIS-1703)

The Backup and Recovery function shall implement application-consistent backups and replicas of VMs running applications supporting Microsoft VSS, and of VMs running applications that support so-called quiescing scripts.

NOTE (PRTTDCIS-1781)

Quiescing refers to pausing or altering a device or application to achieve a consistent state, usually in preparation for a backup or other maintenance activities.

SRS (PRTTDCIS-1704)

The Backup and Recovery function of the ISM shall implement mechanisms to restore and clone an ISM from snapshots, supporting a disaster recovery scenario where an ISM cannot be recovered and is physically replaced with un-configured hardware.

SRS (PRTTDCIS-1705)

The Backup and Recovery function of the ISM shall be implemented such that it can be managed and controlled both centrally and locally, as appropriate for the specific deployment, through the static (in PRT static infrastructure) and deployable (local to the ISM) instances of the EMM.

SRS (PRTTDCIS-1706)

The Backup and Recovery function of the ISM shall implement a RESTful well-documented and open API (RESTful API), exposing all operations.

4.4.2 Technical Requirements

NOTE (PRTTDCIS-1743)

The Technical requirements provided here below concern the Information Services Module (ISM) as a system, realized by three subsystems, as depicted in the following figure:

- 1) Compute and Storage (CAS) subsystem, providing CPU, RAM and solid state storage, for use by software-defined Compute and Storage functions described above; and,
- 2) High Density Switching (HDS) subsystem, providing the physical means to interconnect and manage all physical components of the CAS subsystem, including external interfaces, for use by the ISM-internal Software-defined Networking function described above; and,
- 3) Deployable Removable Storage (DRS) subsystem, comprising the storage infrastructure that is external to and not dependent on the ISM.

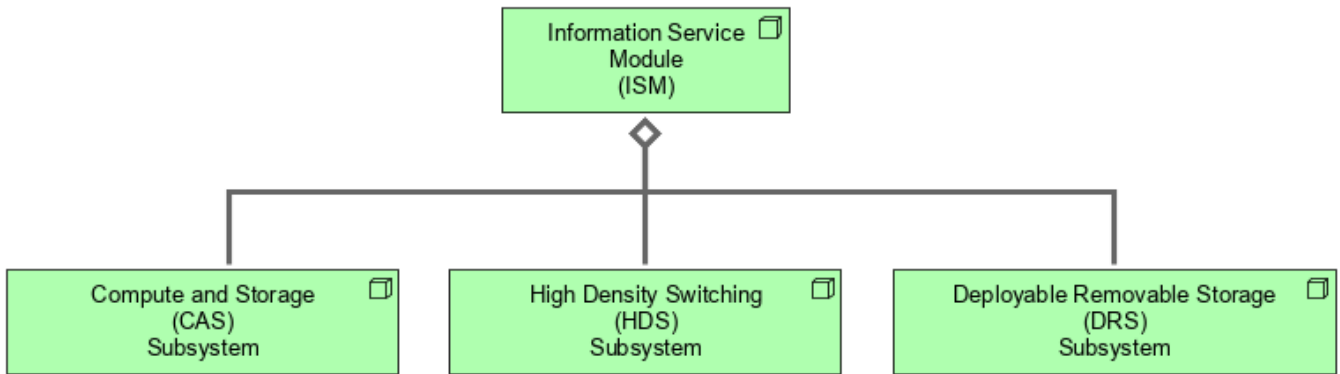


Figure 56 - ISM building blocks

SRS (PRTTDCIS-1748)

Each ISM instance shall be able to operate through the failure of a single hardware component in the ISM, such as a failing of a:

- 1) Server (CPU and/or storage); and,
- 2) Ethernet switch; and,
- 3) Power supply, or any sub-component.

SRS (PRTTDCIS-1749)

Any single hardware failure shall not degrade the capacity and performance specified for the CAS and HDS subsystems. To that end, each ISM instance shall implement the following resilience measures:

- 1) N+1 redundancy for all compute, storage and networking components; and,
- 2) Dual independent power supplies available to each active component; and,
- 3) Dual independent connections to the mains power; and,
- 4) Distributing storage data blocks across:
 - 1) Physical storage devices; and,
 - 2) Physical compute nodes within the VM-cluster.

SRS (PRTTDCIS-1750)

It shall be possible to upgrade and/or replace the hardware layer, the virtualization layer and the orchestration layer of the ISM, in independent cycles. To that end, the hardware and software layers shall be chosen and be validated to support each other's lifecycle. This shall also include the lifecycle of guest OS and workloads.

SRS (PRTTDCIS-1751)

The ISM shall implement well-documented and open APIs compliant with the following:

- 1) Representational State Transfer (REST); and,
- 2) HTTPS, TLS (as a minimum version 1.2 and 1.3):
 - o RFC2616:1999, Hypertext Transfer Protocol – HTTP/1.1; and,
 - o RFC2616:1999, Hypertext Transfer Protocol – HTTP/1.1; and,
 - o RFC2818:2000, HTTP Over TLS;3) RFC5246:2008, the Transport Layer Security (TLS) Protocol Version 1.2; and,
 - o RFC8446:2018, the Transport Layer Security (TLS) Protocol Version 1.3; and,
- 1) IPv4 IETF STD5; and,
- 2) IPv6 RIPE-554; and,
- 3) PowerShell support; and,
- 4) Python support.

SRS (PRTTDCIS-1752)

Each operation, carried across the corresponding interfaces of the ISM, shall be implemented through:

- 1) Use of the ISM's hardware and software native RESTful API;
- 2) Use of custom made scripts developed for the ISM;
- 3) Use off-the-shelf scripts; or
- 4) A combination of the native RESTful API, custom made scrips and off-the-shelf scripts.

SRS (PRTTDCIS-1753)

The implementation of the API shall:

- 1) Build upon a well-documented and open API framework ; and,
- 2) Include source code and full documentation of any scripts developed for the ISM.

NOTE (PRTTDCIS-1782)

RESTful API Modeling Language (RAML) and OpenAPI Specification (OAS) are example of such API.

SRS (PRTTDCIS-2449)

In addition to an API, and in support of the Hardware Control function the ISM shall implement Local console interfaces to hardware components such as servers and switches to provide low level access to the hardware systems (for use by an on-site engineer). These interfaces shall implement authentication.

SRS (PRTTDCIS-2450)

In addition to an API, and in support of the Hardware Control function the ISM shall implement Remote console interfaces to all hardware components, as a minimum, through SSH2 or through a web-based terminal interface over HTTPS. These interfaces shall implement both authentication and encryption.

SRS (PRTTDCIS-2451)

In addition to an API, and in support of the Hardware Control function the ISM shall implement local orchestration interfaces, to bootstrap the ISM on site when no WAN connectivity is available, or for introducing changes during a communications outage, or to involve the Backup and Recovery function.

4.4.2.1 CAS Subsystem**SRS** (PRTTDCIS-1711)

The Compute and Storage (CAS) subsystem shall implement the Compute and Storage hardware, with each individual server (host) integrating Compute and Storage resources.

SRS (PRTTDCIS-1712)

The servers in the CAS subsystem shall support and be agnostic to the corresponding Software-defined Compute (Virtualization Hypervisor), Software-defined Storage and Software-defined Networking.

NOTE (PRTTDCIS-1713)

The below requirements specify the minimum performance and capacity to be implemented, with respect to CPU, RAM and permanent storage. Neither oversubscription nor any additional capacity necessary to implement the required N+1 resilience, are included in the requirements herein. Any redundancy is considered as additional capacity on top of the minimal capacity required herein.

SRS (PRTTDCIS-1715)

The CAS subsystem of a single module shall implement 120 CPU cores as a minimum, where:

- 1) CPU cores feature as a minimum 20 Cores per processor; and,
- 2) CPU cores implement Hyper-threading with as a minimum 2 threads per core, and operate at a minimum base frequency of 2.4 GHz; and,
- 3) All CPUs shall be 64-bit x86 processors implementing AMD or Intel Virtualization Technology (AMD-V or Intel VT-x).

SRS (PRTTDCIS-1716)

All server hardware realizing the Compute function shall implement:

- 1) Intel Trusted Execution Technology (TXT) or equivalent AMD technology; and,
- 2) Trusted Platform Module (TPM); and
- 3) AES New Instructions (AES-NI).

SRS (PRTTDCIS-1717)

The CAS subsystem shall implement a minimum available RAM capacity of 1.6 Terabyte (TB).

SRS (PRTTDCIS-1718)

The CAS subsystem shall implement a minimum available solid-state storage capacity of 40TB. Physical storage devices shall be provided as Enterprise Class. In particular, storage drives used for caching shall implement a write endurance of at least 3 Drive Writes Per Day (DWPD) or at least 4 TB Written (TBW) per day.

SRS (PRTTDCIS-1719)

The CAS subsystem shall rely on storage hardware supporting as 75,000 Input/output Operations Per Second (IOPS) at a mixed random read (70%) and write (30%).

SRS (PRTTDCIS-1720)

In addition to the storage requirements above, all compute nodes (servers) shall implement dedicated hypervisor boot storage device with sufficient capacity to store the virtualization hypervisor and all necessary software to boot the computer node, to store core dumps and to store logging, following the guidelines and directions of the supported virtualization hypervisor vendors, with a minimum of 32 GB (SD Card Class 10 or above).

SRS (PRTTDCIS-1721)

The CAS subsystem shall only implement solid state storage hardware.

NOTE (PRTTDCIS-1783)

Solid State is defined as non-volatile computer storage that stores and retrieves digital information using only electronic circuits, without any involvement of moving mechanical parts.

SRS (PRTTDCIS-1722)

In support of automated storage tiering, the CAS subsystem shall automatically migrate less used data (i.e. cold data) to external object-compatible storage resources.

SRS (PRTTDCIS-1723)

The CAS subsystem shall implement the Hardware Control function with dedicated Controller software, hereafter referred to as the ISM Controller, running as a VM installed on the System Administrator laptop of each security domain. Once the ISM is in operation, the ISM Controller shall, in addition, be implemented as a workload in a VM running the management domain of the ISM itself. The ISM Controller software on the laptop shall reach the ISM over a network (IP) link.

SRS (PRTTDCIS-3015)

The Contractor shall design the CAS subsystem based on all services it has to host.

SRS (PRTTDCIS-3016)

On top of all services identified in the Contractor Design, the contractor shall include the PFE workload to ISM which requires:

- 1) A minimum of 150 virtual CPU (vCPU); and
- 2) A minimum of 428 GB of virtual RAM (vRAM); and
- 3) A minimum of 12TB of Storage.

SRS (PRTTDCIS-3017)

The contractor shall include following provision for growth in the design of the ISM:

- 1) 10% for vCPU; and
- 2) 10% for vRAM; and
- 3) 20% for Storage.

4.4.2.2 HDS Subsystem

NOTE (PRTTDCIS-3087)

The following picture illustrates the HDS in context.

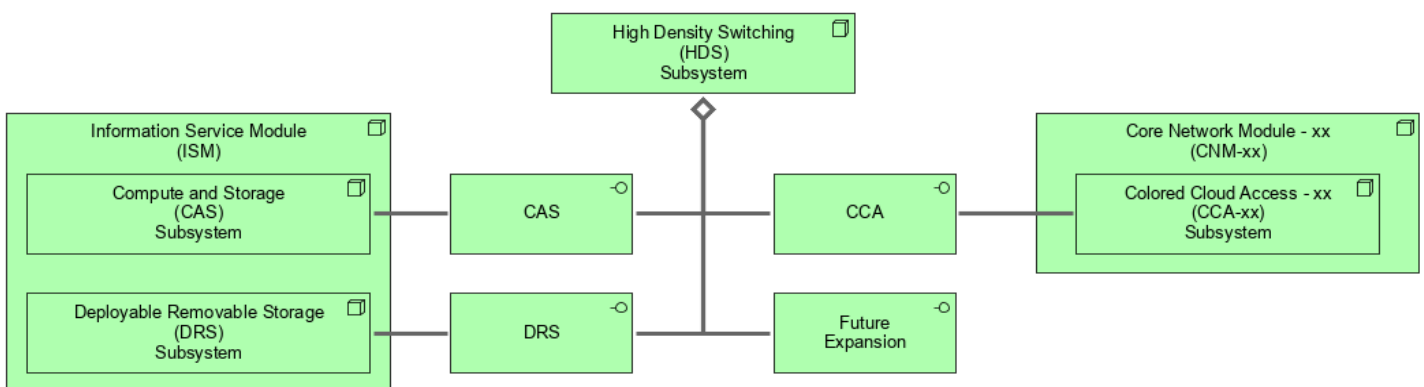


Figure 57 - HDS in context

SRS (PRTTDCIS-1724)

The High Density Switching (HDS) subsystem of the ISM shall be implemented physically and logically N+1 redundant, including redundant wiring with CAS components.

SRS (PRTTDCIS-1725)

All connections within the ISM (CAS and HDS Subsystems combined) shall support at least 40 Gbps of full-duplex traffic, as follows:

- 1) Between the Ethernet switches within the HDS; and,
- 2) Between the Ethernet switches and the servers; and,
- 3) Between individual servers, either direct or through the Ethernet switches.

SRS (PRTTDCIS-1726)

The HDS subsystem shall implement as a minimum six (6) 1 Gbps interfaces, as a minimum three (3) per Ethernet switch, in accordance to the following specification:

- 1) Single Mode Connector; and,
- 2) Conform IEEE 802.3z 1000BASE-LX/LH single-mode fibre in accordance with IEEE 802.3:2012, supporting the ability to change to multi-mode fibre through replacing the SFP and fibre pig-tail; and,
- 3) Supporting an MTU of 9000 bytes; and,
- 4) Supporting VLAN tagging in accordance with 802.1Q:2011.

SRS (PRTTDCIS-1727)

The HDS subsystem shall implement as a minimum six (6) 10 Gbps interfaces, as a minimum three (3) per Ethernet switch, in accordance to the following specification:

- 1) Single Mode Connector; and,
- 2) Conform IEEE 802.3ae 10GBASE-LR single-mode fibre, supporting the ability to change to 10GBASE-SR multi-mode fibre through replacing the SFP+; and,
- 3) Supporting an MTU of 9000 bytes; and,
- 4) Supporting VLAN tagging in accordance with 802.1Q:2011.

SRS (PRTTDCIS-3124)

The HDS subsystem shall implement as a minimum six (6) 40 Gbps interfaces, as a minimum three (3) per Ethernet switch, in accordance to the following specification:

- 1) Single Mode Connector; and,
- 2) Conform IEEE 802.3ae 10GBASE-LR single-mode fibre, supporting the ability to change to 10GBASE-SR multi-mode fibre through replacing the SFP+; and,
- 3) Supporting an MTU of 9000 bytes; and,
- 4) Supporting VLAN tagging in accordance with 802.1Q:2011.

SRS (PRTTDCIS-1728)

The HDS subsystem shall be based on a dual-core architecture with buffers of at least 32 MB, in order to prevent frame drops resulting from micro-bursts of traffic.

SRS (PRTTDCIS-1729)

Each HDS subsystem shall, as a minimum, implement interfaces to other subsystems within the ISM as well as to external elements, as per the table below. The need for additional interfaces, or interfaces different from those listed below, as well as their specification, shall be design-driven and shall be justified, based on component selection and functionality sought.

ID	Interface to:	Subsystem	Qty.	Description
1	CNM - LAN facing	CCA	M	10GBASE-LR (M is design driven)
2	Internal ISM	DRS	1	10GBASE-LR
3	Internal ISM	CAS	N	40GBASE-LR (N is design driven)
4	Future Expansion	N/A	4	10GBASE-LR

Table 26 - ISM External Interfaces

SRS (PRTTDCIS-1732)

All external ISM interfaces shall be implemented as general purpose, where their configuration, function, activation, monitoring and tearing down of these interfaces shall occur through the Infrastructure Orchestration.

SRS (PRTTDCIS-1733)

The external ISM interfaces "Management + Orchestration" and the interface "DRS" shall be dedicated and accessible all time, including when the ISM is in "Spare State".

SRS (PRTTDCIS-1734)

It shall be possible to identify physical Interfaces (once configured) using removable and reusable tags.

SRS (PRTTDCIS-1735)

The ISM shall implement Software-defined Networking to interconnect virtualized workloads distributed across multiple Compute and Storage instances within the ISM, and with physical external Ethernet interfaces of the ISM.

SRS (PRTTDCIS-1736)

The hardware realizing the HDS shall be sized to allow all ISM interfaces to be operated at near to line rate, all interfaces at the same time and full-duplex, without introducing significant latency, nor jitter.

4.4.2.3 DRS Subsystem

SRS (PRTTDCIS-1737)

The Deployable Removable Storage (DRS) subsystem shall support the deployable backup storage as part of the Backup/Restore building block.

SRS (PRTTDCIS-1738)

The DRS subsystem shall implement, as a minimum:

- 1) A usable capacity of 50TB for backups; and,
- 2) Support for an upgrade of the usable capacity with 100% by merely adding additional storage devices within the existing transit case.

SRS (PRTTDCIS-1739)

The DRS subsystem shall be implemented using solid-state storage only.

SRS (PRTTDCIS-1740)

The DRS subsystem shall be implemented in a SMALL transit case.

SRS (PRTTDCIS-1741)

The DRS shall implement the interfaces as per Annex I of the DCIS CA and Annex J of the DCIS CA, logically aggregated to minimize the amount of physical connections with the ISM.

SRS (PRTTDCIS-1742)

The DRS subsystem shall be implemented with one physical instance per ISM per security domain, each having the same composition, capacity and performance.

SRS (PRTTDCIS-3018)

A dedicated foam-padded transport cases able to carry DRS and fitting cabin luggage size and weight (including the DRS) limitations shall be provided for each DRS of each security domain.

SRS (PRTTDCIS-3019)

Transport cases shall accommodate the use of padlocks.

4.4.3 Implementation Constraints

SRS (PRTTDCIS-1759)

The implementation of the hypervisor may include additional or 3rd party products as add-ons to those specified above or be part of a unified Software-Defined Data Center (SDDC) platform.

SRS (PRTTDCIS-1761)

The ISM shall implement the software-defined storage function including any necessary additional supporting software.

SRS (PRTTDCIS-1762)

The software-defined storage function shall support and integrate with the backup/recovery function implemented by the Distributed Resource Scheduler with Deployable Removable Storage.

SRS (PRTTDCIS-1763)

Sufficient software licenses of the virtualization software shall be provided in order to exploit the CPU, storage and RAM capacity of the CAS to their maximum extent.

SRS (PRTTDCIS-1764)

Licensing, where applicable, shall be implemented according to the licensing model of the selected vendor for each CPU core, each physical server and each ISM as specified herein.

SRS (PRTTDCIS-1767)

It shall be possible to connect external set-top servers to the HDS system of the ISM, as PFE (e.g. SPARC servers).

SRS (PRTTDCIS-1678)

The hardware of ISM-xS, ISM-xR and ISM-xU shall be physically built the same, such that these modules are interchangeable.

SRS (PRTTDCIS-2866)

Hard Disk Drives devices shall be removable from the servers of the ISM lite, for storage and transport.

SRS (PRTTDCIS-2867)

Foam-padded transport cases able to carry Hard Disk Drives shall be provided for that purpose.

SRS (PRTTDCIS-2868)

Transport cases shall accommodate the use of padlocks.

SRS (PRTTDCIS-2997)

xR and xU HDD shall be stored in the same Transport Case.

SRS (PRTTDCIS-2998)

xS HDD shall be stored in a dedicated Transport Case.

4.5 Information System Module lite

NOTE (PRTTDCIS-2859)

The Information Service Module (ISM) lite is a reduced version of the ISM which shares the same description, functionalities and characteristics. It is built in Transit Cases to provide the flexibility required by the NS Kit.

SRS (PRTTDCIS-2860)

The ISM lite shall comply with all ISM specifications unless specifically specified otherwise.

NOTE (PRTTDCIS-2689)

The ISM lite will host only those services required to enable the Interconnection to Nation Module (INM) and no end-user consumed services.

SRS (PRTTDCIS-2825)

The design of the ISM lite shall adhere to the architecture presented in following figure.

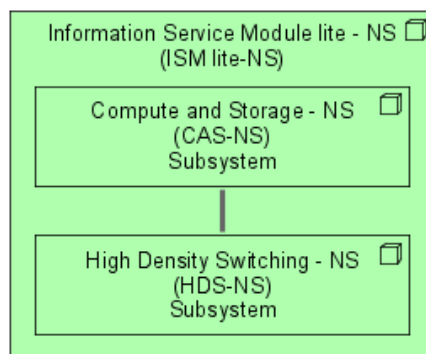


Figure 58 - ISM lite architecture

SRS (PRTTDCIS-2826)

The detailed system design of the ISM lite shall adhere to the subsystem breakdown in the following figure

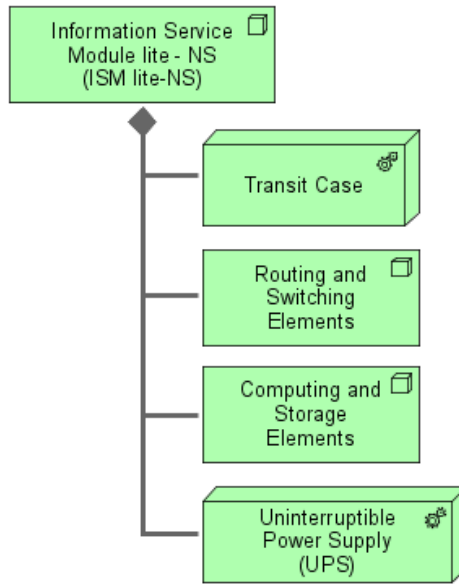


Figure 59 - SIM lite subsystems breakdown

4.5.1 Functional Requirements

SRS (PRTTDCIS-2806)

The ISM lite shall implement the Compute And Storage (CAS) function.

SRS (PRTTDCIS-2830)

The ISM lite shall implement the High Density Switching (HDS) function.

SRS (PRTTDCIS-2807)

The ISM lite shall implement a dedicated uninterrupted power supply (UPS) functionality, giving the ISM lite the ability to continue to operate through mains power outage and power quality deficiencies.

4.5.2 Technical Requirements

4.5.2.1 CAS Subsystem

SRS (PRTTDCIS-2864)

The CAS subsystem in the ISM lite shall implement the functions listed under the CAS function in the ISM.

SRS (PRTTDCIS-2865)

The CAS subsystem in the ISM lite shall meet the same technical requirements formulated for the CAS subsystem of the ISM.

SRS (PRTTDCIS-2690)

The ISM lite shall not implement High Availability Cluster.

4.5.2.2 HDS Subsystem

SRS (PRTTDCIS-2862)

The HDS subsystem in the ISM lite shall implement the functions listed under the HDS function in the ISM.

SRS (PRTTDCIS-2863)

The HDS subsystem in the ISM lite shall meet the same technical requirements formulated for the HDS subsystem of the ISM.

SRS (PRTTDCIS-2846)

The High Density Switching (HDS) subsystem of the ISM lite shall not implement the physically and logically N+1 redundancy of the ISM HDS.

SRS (PRTTDCIS-2851)

The HDS subsystem of the ISM lite shall implement the interfaces as specified in table below.

ID	Interface to:	Qty.	Description
1	CNM lite - LAN facing	2	1Gbps
2	Management	1	100BaseFX

Table 27 - ISM lite External Interfaces

4.5.2.3 UPS subsystem

SRS (PRTTDCIS-2813)

The UPS subsystem shall implement power conditioning protecting the ISM lite against surges, against spikes, against excessive line noise, against under voltage, brownout and sags, and against swells/overvoltage.

SRS (PRTTDCIS-2814)

The UPS shall implement ability for the ISM lite to continue to operate through:

- 1) Mains or generator power blackout for at least 20 minutes;
- 2) Mains or generator power brownouts indefinitely.

SRS (PRTTDCIS-2815)

The UPS subsystem shall implement a graceful shutdown mechanism of the subsystems making up the ISM lite that require such.

SRS (PRTTDCIS-2816)

The UPS subsystem shall implement UPS monitoring signaling changes in status and critical capacity warnings towards the EMM and optical and audio signals from the UPS itself.

4.5.3 Implementation Constraints

SRS (PRTTDCIS-2819)

Hard Disk Drives devices shall be removable from the servers of the ISM lite, for storage and transport.

SRS (PRTTDCIS-2822)

Foam-padded transport cases able to carry Hard Disk Drives shall be provided for that purpose.

SRS (PRTTDCIS-2821)

Transport cases shall accommodate the use of padlocks.

SRS (PRTTDCIS-2995)

xR and xU HDD shall be stored in the same Transport Case.

SRS (PRTTDCIS-2996)

xS HDD shall be stored in a dedicated Transport Case.

SRS (PRTTDCIS-2823)

All ISM lite shall, as a minimum, comply with TEMPEST requirements as per SDIP-27 Level B.

SRS (PRTTDCIS-2824)

The Elements which compose the ISM lite shall be integrated in a single MEDIUM transit case.

SRS (PRTTDCIS-3827)

The ISM Lite shall operate in OPE-1b conditions.

SRS (PRTTDCIS-2831)

For efficiency purposes (e.g. reducing global footprint, reducing component quantities...), the Contractor shall be authorized to merge the HDS function of the ISM lite with the CCA function of the CNM lite.

SRS (PRTTDCIS-2832)

For efficiency purposes (e.g. reducing global footprint, reducing component quantities...), the Contractor shall be authorized to merge the ISM lite physical integration CNM lite in a single MEDIUM transit case.

4.6 Data Diodes

NOTE (PRTTDCIS-1280)

Data Diodes are physical appliances that only allow a one-way data transfer from a lower security domain to a higher security domain.

SRS (PRTTDCIS-3044)

Data Diodes shall be Fox-IT data diode solutions, comprising 1Gbps EAL7+ Fox-IT data diode appliances, low- and high-side proxy servers, and required software and ancillaries.

4.7 User Access Modules

NOTE (PRTTDCIS-2670)

The User Access Module (UAM) is an Architectural Building Block (ABB) which enables User Access Connectivity as illustrated on following picture.

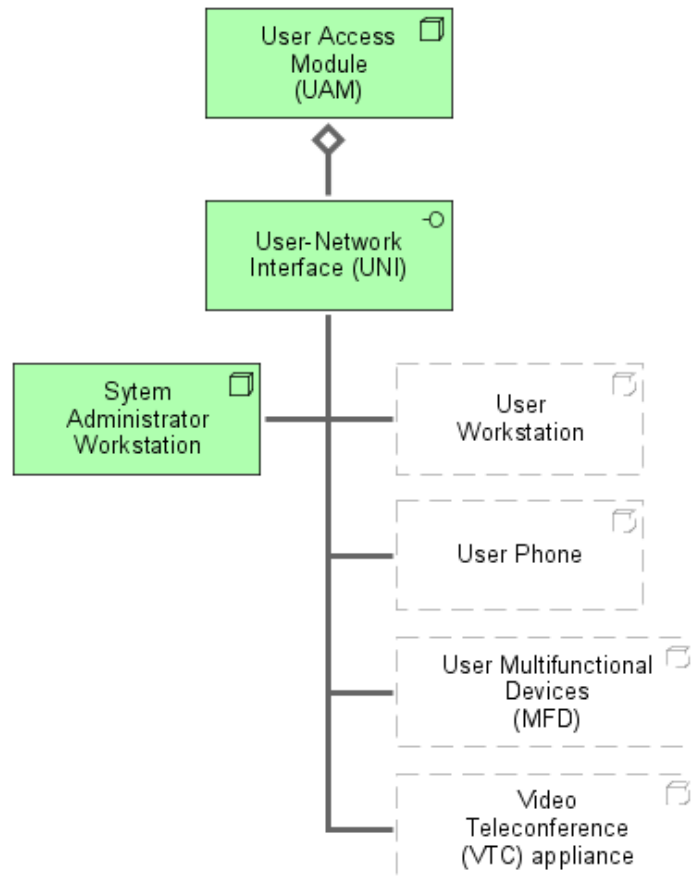


Figure 60 - UAM in context

NOTE (PRTTDCIS-2671)

UAM exist in 3 variants:

- 1) **Small:** This variant is realized through the sole usage of network ports available on components of the CNM;
- 2) **Medium:** This variant is realized through the usage of a single detachable Access Breakout Box (BoB);
- 3) **Large:** This variant is realized through the combination of a single Distribution BoB and multiple Access BoB.

SRS (PRTTDCIS-2672)

This project shall only implement Small and Medium variants of UAM.

SRS (PRTTDCIS-2673)

The Small UAM shall adhere to the architecture illustrated on following picture.

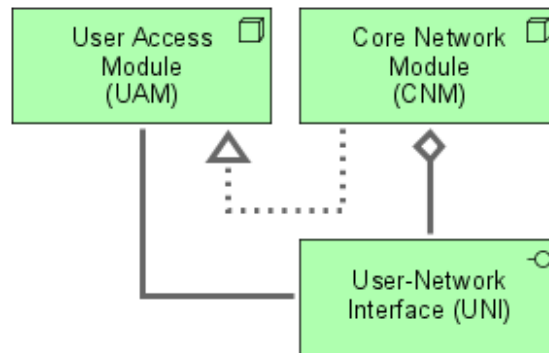


Figure 61 - Small UAM architecture

SRS (PRTTDCIS-2674)

The Medium UAM shall adhere to the architecture illustrated on following picture.

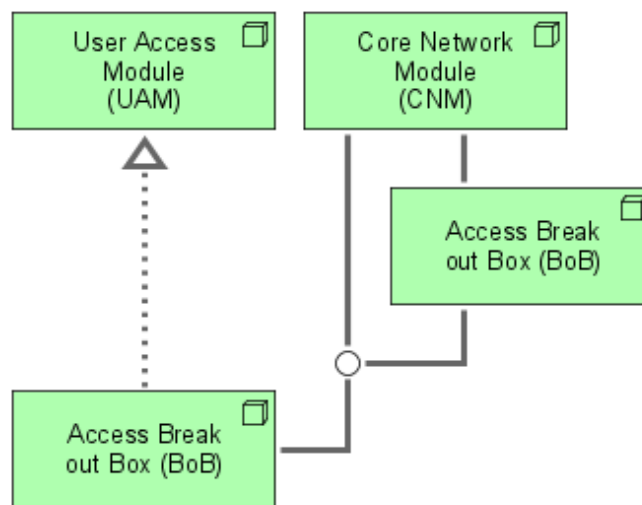


Figure 62 - Medium UAM architecture

4.7.1 Functional Requirements

SRS (PRTTDCIS-1273)

The Access BoB shall be detachable.

SRS (PRTTDCIS-2675)

The Access BoB shall connect directly to the CNM.

SRS (PRTTDCIS-2676)

TDCIS design shall allow to daisy chain Access BoB.

SRS (PRTTDCIS-1786)

The UAM shall deliver Power over Ethernet (PoE) to xU, xR and xS voice appliances.

SRS (PRTTDCIS-2457)

The UAM shall not deliver Power over Ethernet (PoE) to NS Kit voice appliances.

SRS (PRTTDCIS-1787)

The UAM shall implement a dedicated Uninterrupted Power Supply (UPS) functionality, giving the UAM the ability to continue to operate through mains power outage and power quality deficiencies, including the PoE power for xU, xR and xS voice appliances, but not including power for client laptops.

SRS (PRTTDCIS-1788)

The UAM shall be built such that accommodating removable/attachable ECUs is possible, in the event they deploy in non-temperature controlled indoors environments.

SRS (PRTTDCIS-1278)

The UAM-xU shall offer both wired and WiFi user access.

SRS (PRTTDCIS-1279)

UAM-xR and UAM-xS shall only offer wired user access.

4.7.2 Technical Requirements

SRS (PRTTDCIS-1797)

The Access BoB interfaces shall be implemented as follows:

- 1) Interface to the CNM; and,
- 2) Interface to a second UAM; and,
- 3) Interface to the user appliances (laptop, phones, VTC appliances, printer/scanners...), wired; and,
- 4) Interface to the user appliances (laptop, phones, VTC appliances, printer/scanners...), wireless on UAM-xU only.

NOTE (PRTTDCIS-1798)

Given the number of ports required, no connectorized front panels for the UAM are required.

SRS (PRTTDCIS-1799)

Interfaces to the CNM and to a second UAM shall be implemented on bulkhead connectors

SRS (PRTTDCIS-1814)

The UAM-xU shall include a Wireless Access Point (WAP).

SRS (PRTTDCIS-3095)

All Wireless Access Points (WAP) shall be positioned to provide at least 2m separation from any CIS processing xS information.

SRS (PRTTDCIS-3100)

The UAM-xU Wireless Access Point (WAP) shall support the wireless controller function.

SRS (PRTTDCIS-1795)

The UPS element shall implement UPS monitoring signaling changes in status and critical capacity warnings towards the EMM and visual and audio signals from the UPS itself.

SRS (PRTTDCIS-1794)

The UPS element shall implement a graceful shutdown mechanism of the subsystems making up the UAM that require such.

SRS (PRTTDCIS-1793)

The UPS element shall implement ability for the UAM to continue to operate through:

- 1) Mains or generator power blackout for at least 30 minutes for xS, xR and xU not including telephones; and,
- 2) Mains or generator power blackout for at least 10 minutes for xU, xR and xS including 75% of the ports powering a PoE powered VoIP telephone; and,
- 3) Mains or generator power brownouts indefinitely for xS, xR and xU.

SRS (PRTTDCIS-1792)

The UPS element shall implement power conditioning protecting the UAM against surges, against spikes, against excessive line noise, against under voltage, brownout and sags, and against swells/overvoltage.

SRS (PRTTDCIS-1800)

The detailed system design of the Access BoB xU shall adhere to the breakdown depicted on the following figure:

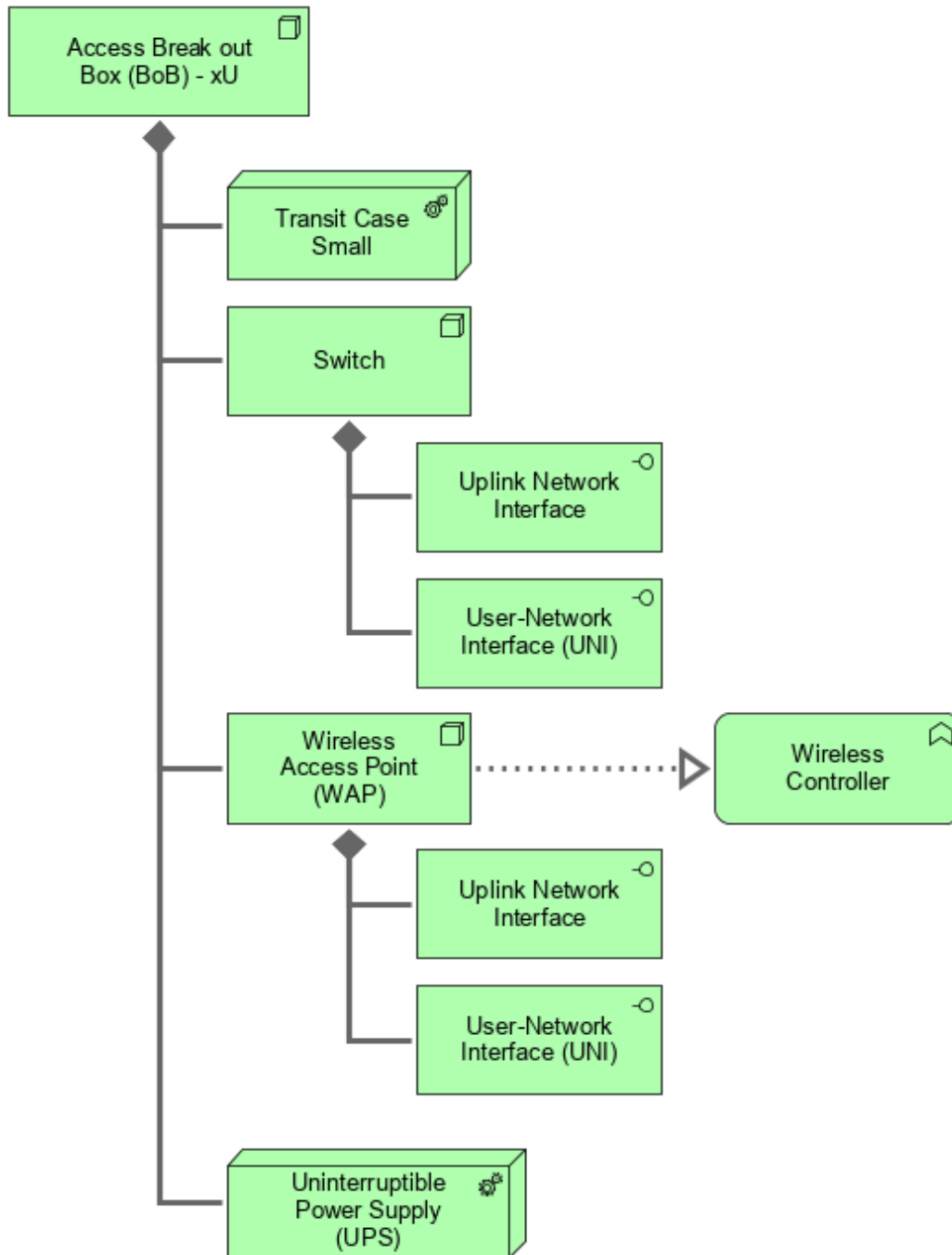


Figure 63 - Access BoB xU breakdown

SRS (PRTTDCIS-3242)

The detailed system design of the Access BoB xR shall adhere to the breakdown depicted on the following figure:

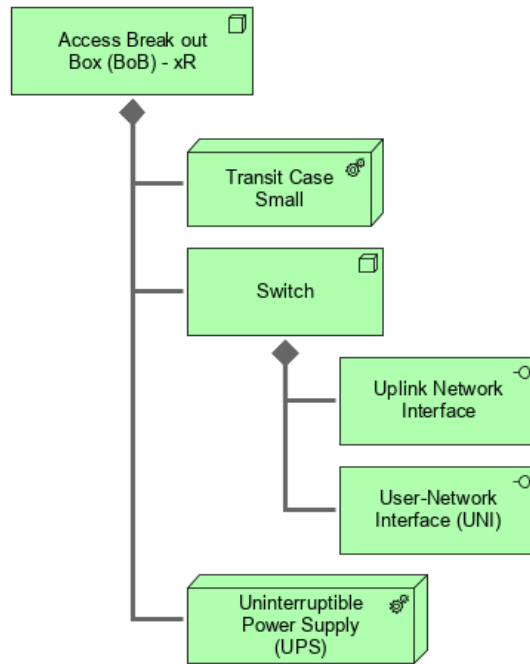


Figure 64 - Access BoB xR breakdown

SRS (PRTTDCIS-3243)

The detailed system design of the Access BoB xS shall adhere to the breakdown depicted on the following figure:

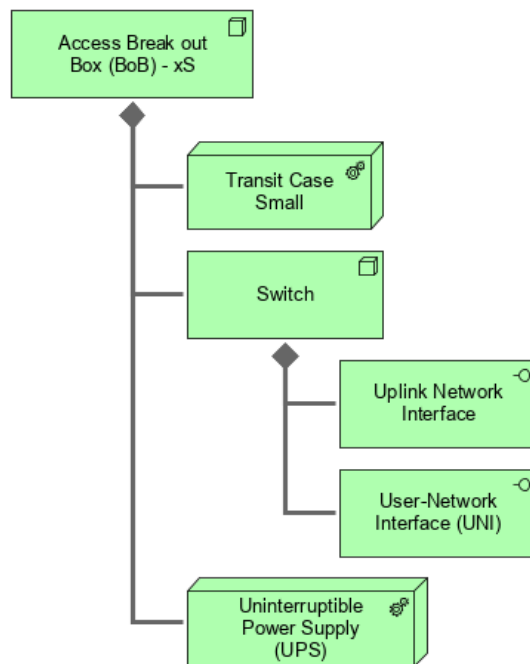


Figure 65 - Access BoB xS breakdown

4.7.3 Implementation Constraints

SRS (PRTTDCIS-1789)

The Network element of the Access BoB shall be implemented with 24-port Ethernet switching capability including buffers of minimum 16Mb and featuring copper based (STP) ports with PoE, in support of laptops and VoIP phones.

SRS (PRTTDCIS-1801)

Access BoB switches shall implement 10 Gbps uplinks to the core switches in the corresponding CNM.

SRS (PRTTDCIS-1803)

The interface to a second Access BoB shall be 10Gbps.

SRS (PRTTDCIS-1804)

The Elements which compose the detachable Access BoB shall be integrated in SMALL transit cases.

SRS (PRTTDCIS-1805)

Access BoB shall, as a minimum, comply with TEMPEST requirements as per following table.

	Minimum TEMPEST
Access BoB-xU	Level C
Access BoB-xR	Level C
Access BoB-xS	Level B

Table 28 - TEMPEST levels for Access BoB

SRS (PRTTDCIS-1274)

Inside the Shelter, there shall be two (2) local Ethernet interfaces per network dedicated for local administration.

SRS (PRTTDCIS-2677)

Inside the Shelter, there shall be two (2) local Ethernet interfaces per security domain realizing the Small UAM.

SRS (PRTTDCIS-1275)

Each shelter shall also provide wireless xU network access via a WAP installed in the shelter.

NOTE (PRTTDCIS-2316)

Due to the large quantity of ports, there is no requirements for the Access BoB CFP to contain user access ports. All other CFP interfaces requirements remain extant.

SRS (PRTTDCIS-2378)

The Access BoB shall have an electrical connection to 230VAC supply with protection against spikes, surges, overvoltage.

SRS (PRTTDCIS-2379)

The Access BoB shall operate in OPE-1b conditions.

SRS (PRTTDCIS-3229)

Each Access BoB shall be delivered with one (1) FO cable reel to be used to connect to the CNM or another Access BoB.

SRS (PRTTDCIS-3224)

The Access BoB FO Cable Reel shall contain a 250 m long, black color, FO cord suitable for tactical use with mating connectors to the ECP.

SRS (PRTTDCIS-3225)

The Access BoB FO cable reel shall be mounted on a mobile drum with belt strap and drum locking system.

SRS (PRTTDCIS-3226)

The Access BoB FO cable reel shall be painted in RAL 840R 6014, non-gloss or equivalent.

SRS (PRTTDCIS-3227)

The Access BoB FO cable reel shall include a cable retention system on both ends to protect connectors from traction.

SRS (PRTTDCIS-3228)

The Access BoB FO Cable Reel shall include handle to be carried by hand.

SRS (PRTTDCIS-3823)

UAM-xU Access BoB Ethernet ports to EUD shall not be of SFP type.

SRS (PRTTDCIS-3824)

UAM-xR Access BoB Ethernet ports to EUD shall not be of SFP type.

4.8 End User Devices

4.8.1 Semi-Rugged Laptop

NOTE (PRTTDCIS-1819)

Laptops are only required for System Administrators and staff supporting the Service Desk function. Any other laptops (End User Workstations) are PFE.

SRS (PRTTDCIS-1821)

The laptops shall implement client applications of Service Management and Control services, as required.

SRS (PRTTDCIS-1823)

Service Desk Laptops shall meet or exceed the following specification:

Attribute	Value
TEMPEST Certification	SDIP-27 Level C (for xU and xR security domains) SDIP-27 Level B (for xS security domains)
Processor	Intel Core i7
Display	14" LCD, 1920x1080
Memory	16GB DDR4
Optical	DVD optical drive
Keyboard	Portuguese language keyboard layout
Pointing device	Touchpad
Internal Storage	ViaSat Eclipt Core 600 SATA SSD 7mm - 128GB (xS laptops) 1TB Solid State Disk (xU and xR laptops)
Network Adapter	* 100BASE-FX 1300nm multimode (SC) Network Adapted (NS Kit laptops) * Integrated 10/100/1000 Gigabit Ethernet Network Adapter (xU, xR and xS laptops)
I/O Ports	2x USB 3.0 port, 1x VGA port, 1x RJ45 Ethernet
Power Rating	< 90 W
Environmental constraint	Semi-Rugged MIL-STD-810-G compliant

Table 29 - Service Desk Laptop reference specification

SRS (PRTTDCIS-2462)

Beside any other tools as specified in other sections, all Laptops shall be installed with latest available version of following software:

- Adobe Acrobat Reader; and,
- Microsoft Windows; and,
- Microsoft Office.

4.8.2 VoIP phones**SRS** (PRTTDCIS-1828)

The IP Phone for the xS security domain shall meet the SDIP27 Level B requirements.

SRS (PRTTDCIS-1831)

The IP Phone for the xS security domain shall meet or exceed the features of the baseline EUD types of Standard (i.e. Cisco 8841), Enhanced (i.e. Cisco 8865) and Conference (i.e. Cisco 8832).

SRS (PRTTDCIS-1832)

The IP phones for the xS security domain shall connect to the UAM-xS over a 10/100/1000BASE-T RJ45 interface.

SRS (PRTTDCIS-1833)

The IP phones for the xU and xR security domain shall meet the SDIP27 Level C requirements.

SRS (PRTTDCIS-1829)

The IP phones for the xU and xR security domain shall meet or exceed the features of the baseline EUD types of Standard (i.e. Cisco 8841), Enhanced (i.e. Cisco 8865), Conference (i.e. Cisco 8832) and Wireless (i.e. Cisco 8821).

SRS (PRTTDCIS-1834)

The IP phones for the xU and xR security domain shall connect to the corresponding UAM over a 10/100/1000BASE-T RJ45 interface.

SRS (PRTTDCIS-1835)

The Wireless IP phones for the xU security domain shall meet the SDIP27 Level C requirements.

SRS (PRTTDCIS-1836)

The Wireless IP phones for the xU security domain shall meet or exceed the features of the baseline EUD type of Wireless (i.e. Cisco 8821).

SRS (PRTTDCIS-1837)

The wireless IP phones for the xU security domain shall connect to any UAM-xU WiFi Access Point (e.g. Shelter or detachable UAM).

SRS (PRTTDCIS-1830)

The IP phones shall be delivered with the corresponding user licenses to enable required features for operation with the MMA subsystem of the CNM.

4.8.3 Keyboard Video Mouse

SRS (PRTTDCIS-1827)

The KVM shall be a rackmount drawer including a 17" monitor and a Portuguese language keyboard layout.

4.9 Remote Network Module lite

SRS (PRTTDCIS-2718)

The design of the RNM lite shall adhere to the architecture presented in following figure.

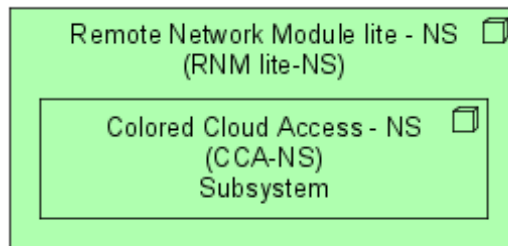


Figure 66 - Remote Network Module (RNM) lite Architecture

SRS (PRTTDCIS-2719)

The detailed system design of the Remote Network Module (RNM) lite shall adhere to the subsystem breakdown in the following figure

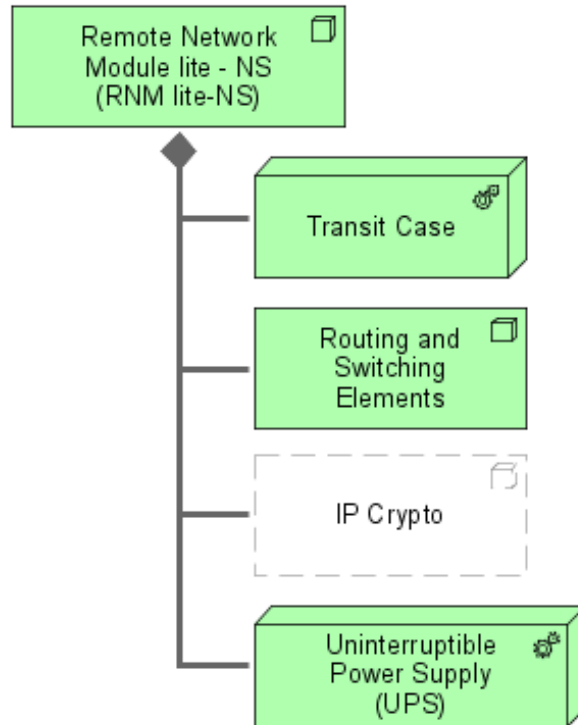


Figure 67 - RNM subsystems breakdown

4.9.1 Functional Requirements

SRS (PRTTDCIS-2701)

The RNM lite shall implement the Coloured Cloud Access (CCA) function.

SRS (PRTTDCIS-2706)

The RNM lite shall implement a dedicated uninterrupted power supply (UPS) functionality, giving the RNM lite the ability to continue to operate through mains power outage and power quality deficiencies.

4.9.2 Technical Requirements

4.9.2.1 CCA subsystem

SRS (PRTTDCIS-2710)

The CCA subsystem in the RNM lite shall implement the functions listed under the CCA function in the CNM.

SRS (PRTTDCIS-2711)

The CCA subsystem in the RNM lite shall meet the same technical requirements formulated for the CCA subsystem of the CNM, excluding the 10G Core Switching core, and shall implement IP throughput performances of at least 2 Gbps, without IPsec encryption enabled.

SRS (PRTTDCIS-2712)

The CCA subsystem of the RNM lite shall, as a minimum, implement interfaces as per the table below. The need for additional interfaces, or interfaces different from those listed below, as well as their specification, shall be design-driven and shall be justified, based on component selection and functionality sought.

ID	Interface to:	Subsystem	Qty.	Remarks
1	TDCIS Node	CNM-PCA	2	1 Gbps, direct interface on CCA routing platform
2	UAM	N/A	2	10 Gbps, direct interface on CCA routing platform

Table 30 - RNM lite CCA subsystem interfaces

SRS (PRTTDCIS-2713)

CCA subsystem in the RNM lite shall support IP throughput performances up to 4 Gbps without IPsec enabled.

SRS (PRTTDCIS-2740)

CCA subsystem in the RNM lite shall support IP throughput performances up to 1.5 Gbps with IPsec enabled.

4.9.2.2 UPS subsystem

SRS (PRTTDCIS-2714)

The UPS subsystem shall implement power conditioning protecting the RNM lite against surges, against spikes, against excessive line noise, against under voltage, brownout and sags, and against swells/overvoltage.

SRS (PRTTDCIS-2715)

The UPS shall implement ability for the RNM lite to continue to operate through:

- 1) Mains or generator power blackout for at least 20 minutes; and,
- 2) Mains or generator power brownouts indefinitely.

SRS (PRTTDCIS-2716)

The UPS subsystem shall implement a graceful shutdown mechanism of the subsystems making up the RNM lite that require such.

SRS (PRTTDCIS-2717)

The UPS subsystem shall implement UPS monitoring signaling changes in status and critical capacity warnings towards the EMM and optical and audio signals from the UPS itself.

4.9.3 Implementation Constraints**SRS** (PRTTDCIS-2720)

The CCA subsystems of the RNM lite shall be implemented using routers and switches compatible with the element management system for routing and switching platforms.

SRS (PRTTDCIS-2721)

Any switches and routers in the RNM lite shall be fitted with redundant power supplies.

SRS (PRTTDCIS-2734)

Crypto devices shall be removable from the transit cases of the RNM lite, for storage and transport.

SRS (PRTTDCIS-2742)

The removal of the crypto devices shall be compatible with the implementation of TEMPEST requirements in the transit cases.

SRS (PRTTDCIS-2744)

Foam-padded transport cases able to carry one TCE-621/B shall be provided for that purpose.

SRS (PRTTDCIS-2743)

Transport cases shall accommodate the use of padlocks.

SRS (PRTTDCIS-2735)

All RNM lite shall, as a minimum, comply with TEMPEST requirements as per SDIP-27 Level B.

SRS (PRTTDCIS-2741)

The Elements which compose the RNM lite shall be integrated in a single MEDIUM transit case.

SRS (PRTTDCIS-3828)

The RNM Lite shall operate in OPE-1b conditions.

NOTE (PRTTDCIS-2979)

The INM provides the Interconnection to Nations Function which contains:

- **Network Services Federation** which combines Network and Communication Services; and
- **Core Services Federation** which combines Infrastructure and Business Support Services.

SRS (PRTTDCIS-2980)

The INM shall rely on following elements:

- From the CNM:
 - The Network Interconnection Point (NIP) interface which physically connects Mission Partners; and
 - Routing services to federate at network layer; and,
 - Session Border Control (SBC) services to federate Communication Services; and
- From the ISM:
 - The Active Directory (AD) for DirSync to enable the federation; and
 - The Email software to federate Informal Messaging Service (IMS) service; and
 - The Active Directory Federation Service; and
 - The Domain Name Server (DNS) to enable DNS hosting and Resolver for the federation.

SRS (PRTTDCIS-2981)

The INM-xS DNS Server shall also enable Root DNS.

4.11 Element Management Module

SRS (PRTTDCIS-2827)

The design of the Element Management Module (EMM) shall adhere to the architecture presented in following figure.

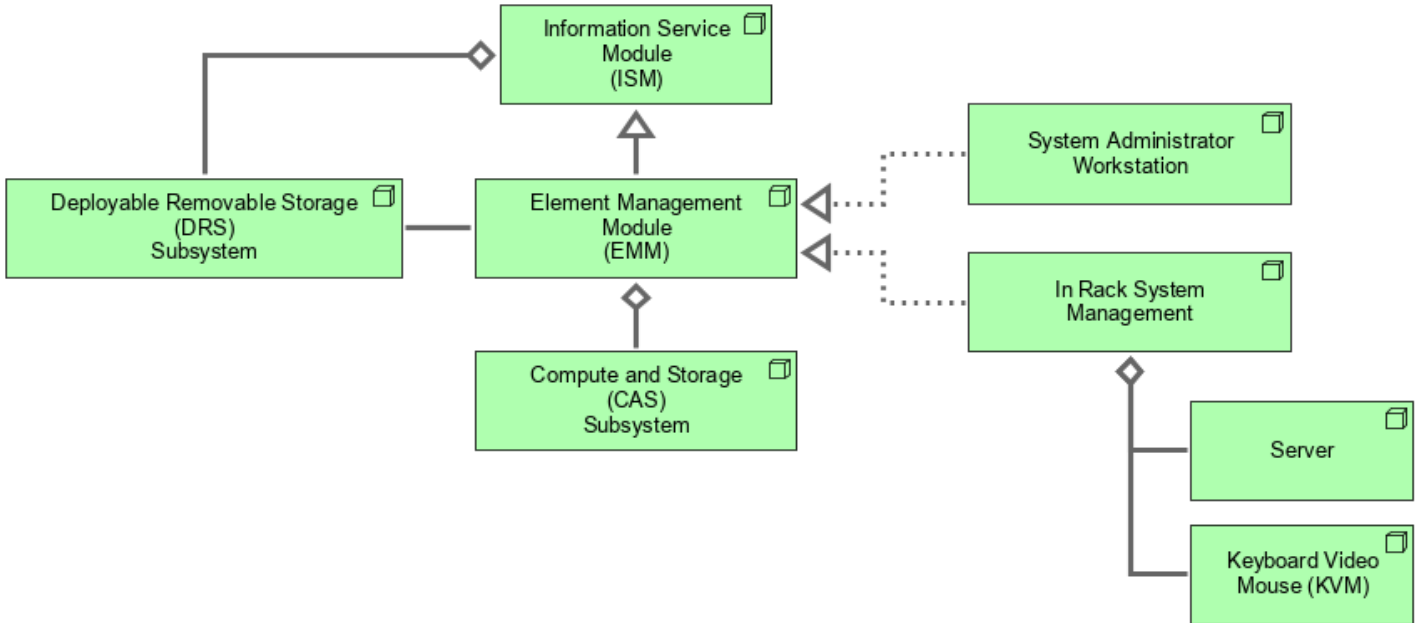


Figure 69 - Element Management Module (EMM) architecture

NOTE (PRTTDCIS-2991)

The Element Management Module (EMM) is a specific implementation of an ISM, dedicated to Element Management and Configuration.

SRS (PRTTDCIS-2993)

The EMM shall have two implementations in each security domain of each Node:

- The In Rack System Management; and
- The System Administrator Workstation

SRS (PRTTDCIS-2994)

Both EMM implementations shall be independent from each other allowing each to work in isolation from the other and providing the exact same user experience, functionalities and performances.

4.11.1 Functional Requirements

SRS (PRTTDCIS-2982)

The EMM shall implement a Compute And Storage (CAS) subsystem.

4.11.2 Technical Requirements

SRS (PRTTDCIS-2983)

The CAS subsystem in the EMM shall implement the functions listed under the CAS subsystem of the ISM.

SRS (PRTTDCIS-2985)

The EMM shall not implement High Availability Cluster.

SRS (PRTTDCIS-2984)

The CAS subsystem in the EMM shall meet the same technical requirements formulated for the CAS subsystem of the ISM.

SRS (PRTTDCIS-2986)

The EMM shall not implement HDS and shall connect directly to the CCA.

SRS (PRTTDCIS-2987)

The EMM shall not implement DRS and shall benefit from the ISM DRS

SRS (PRTTDCIS-2992)

The ISM DRS shall offer to the EMM, the same functionalities and performance to the EMM as for the ISM.

4.11.3 Implementation constraints

SRS (PRTTDCIS-2988)

Hard Disk Drives devices shall be removable from the servers of the In Rack System Management, for storage and transport.

SRS (PRTTDCIS-2989)

In Rack System Management HDD shall be stored in the same transport cases as ISM HDD of the same classification level.

SRS (PRTTDCIS-2990)

Transport cases shall accommodate the use of padlocks.

SRS (PRTTDCIS-2999)

There shall be a Keyboard Video Mouse (KVM) tray in each rack for the operator to interface with the In Rack System Management implementation of the EMM.

4.12 Element Management Module lite

NOTE (PRTTDCIS-3000)

The Element Management Module (EMM) lite is a reduced version of the EMM which shares the same description, functionalities and characteristics.

SRS (PRTTDCIS-3001)

The EMM lite shall comply with all EMM specifications unless specifically specified otherwise.

SRS (PRTTDCIS-2828)

The design of the Element Management Module (EMM) lite shall adhere to the architecture presented in following figure.

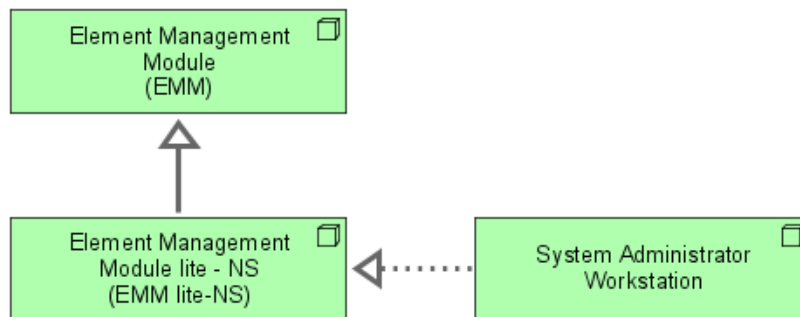


Figure 70 - EMM lite architecture

SRS (PRTTDCIS-3002)

The EMM lite implementation shall be limited to the System Administrator Workstation.

5 Bearers

5.1 Datalink

SRS (PRTTDCIS-3057)

The datalinks shall interface the PCA subsystem of the CNM-PCN as IP bearer.

SRS (PRTTDCIS-3058)

The datalink Outdoor Units (ODU) shall be deployed on the top of the telescopic masts of Shelter.

SRS (PRTTDCIS-3059)

Each mast shall allow the installation of 1 or 2 MiniLOS or HCLOS ODU.

SRS (PRTTDCIS-3061)

The datalinks ODUs, once mounted on the telescopic masts and deployed for operation, shall not interfere with, or be interfered by, any other transmission device or antenna of the node.

SRS (PRTTDCIS-3062)

The ODU of the datalinks shall be connected through an ad-hoc pass-through connector in the shelter's ELOS RP to the datalink IDU (if required) and from there to the PCA subsystem.

SRS (PRTTDCIS-3232)

The ODU of the datalinks power supply shall be Power over Ethernet (PoE).

SRS (PRTTDCIS-3063)

The datalink antennae shall be directional in support of a Peer-to-Peer (P2P) connection.

SRS (PRTTDCIS-3064)

The datalink antennae shall be equipped with an automatic pointing and alignment system (azimuth and elevation) that automatically establishes the P2P link to the selected remote peer datalink.

NOTE (PRTTDCIS-3065)

The aperture of the antenna is a design driven based on the deployment time, throughput, link distance, power, among other characteristics.

SRS (PRTTDCIS-3066)

The datalinks shall be Federal Information Processing Standards (FIPS) 140-2 Level 2 certified.

SRS (PRTTDCIS-3067)

The datalinks shall implement embedded AES-256 data encryption FIPS 197 certified.

SRS (PRTTDCIS-3068)

The datalinks shall support Traffic Flow Security (TFS).

SRS (PRTTDCIS-3069)

The datalinks shall support interference control and mitigation.

SRS (PRTTDCIS-3070)

The datalinks shall implement adaptive modulation.

SRS (PRTTDCIS-3071)

The datalinks shall implement Ethernet interfaces supporting IPv4, transparent Ethernet Bridge, Precision Time Protocol (PTP), Dynamic Host Configuration Protocol (DHCP) and IPv6 pass-through

SRS (PRTTDCIS-3072)

The datalinks shall be enabled for monitoring and control over Ethernet and Over The Air (OTA).

SRS (PRTTDCIS-3073)

The datalinks shall be Field and OTA upgradeable via HTTP/HTTPS.

5.1.1 Mini LOS Radio

SRS (PRTTDCIS-3081)

The MiniLOS datalink shall enable a Line of Sight (LOS) P2P IP datalink.

SRS (PRTTDCIS-3083)

The MiniLOS datalink shall operate in the 2.297-2.482 GHz and the 5.89-6.41 GHz bands.

SRS (PRTTDCIS-3084)

The MiniLOS datalink shall be configurable to channel widths of 5, 10, 20 and 40 MHz with a 5MHz spacing.

SRS (PRTTDCIS-3085)

The MiniLOS datalink shall have a minimum LOS range of 40 km, featuring at this distance not less than 2.5 Mbps throughput.

SRS (PRTTDCIS-3086)

The MiniLOS datalink shall have a maximum throughput of not less than 50 Mbps.

5.1.2 HCLOS Radios**SRS** (PRTTDCIS-3077)

The HCLOS datalink shall operate in NATO Band IV (4.4 - 5 GHz).

SRS (PRTTDCIS-3078)

The HCLOS datalink shall be configurable to channel widths of 5, 10, 20 and 40 MHz with a 5MHz spacing.

SRS (PRTTDCIS-3079)

The HCLOS datalink shall have a minimum LOS range of 50 km, featuring at this distance not less than 10 Mbps throughput.

SRS (PRTTDCIS-3080)

The HCLOS datalink shall have a maximum throughput of not less than 200 Mbps.

5.2 Broadband IP Radio**SRS** (PRTTDCIS-3045)

The Broadband Radio shall be the Rohde & Schwarz SOVERON VR with following specifications:

- Model Type: VR5000;
- Model Name: VEHICULAR TACTICAL RADIO;
- Manufacturer Part Number: 6154.0062K02
- Firmware build: SRT 6.41;
- Modules references: VR5000-BSM, GS5000AW, KS5100VR;
- Year of manufacture: 2020 or 2021;
- Waveforms:
 - Fixed Frequency; and,
 - GS5000SP (Secom-P voice); and,
 - GS5000AW-HDR-WB (UHF WB); and,
 - GS5000AW-HDR-AJ-WB (UHF WB-AJ); and,
 - Secom-P IPoA.

5.3 Commercial SATCOM

5.3.1 Functional Requirements

SRS (PRTTDCIS-2047)

The Commercial SATCOM shall provide data and voice subscriber access services using the BGAN service of Inmarsat. This shall involve:

- 1) IP connectivity using Background Service, pay per byte, to any location in the Internet; and,
- 2) IP connectivity using Background Services, pay per byte, or Streaming Services, pay per minute, to the PRT Static Infrastructure, without involving any Internet transit; and,
- 3) PSTN connectivity.

5.3.2 Technical Requirements

SRS (PRTTDCIS-2050)

The Commercial SATCOM terminal shall provide 492 kbps shared standard IP data rate (best effort) and up to 256 kbps streaming IP data rate, with QoS at intermediate data rates of 32 kbps, 64 kbps, and 128 kbps.

SRS (PRTTDCIS-2051)

The Commercial SATCOM terminal shall support BGAN X-stream mode up to the service maximum bandwidth of 384 kbps.

SRS (PRTTDCIS-2052)

Changes to the mode of operation (standard IP, streaming, X-stream) shall be possible without the use of an external laptop.

SRS (PRTTDCIS-2063)

The Commercial SATCOM terminal shall be compatible with future INMARSAT (INMARSAT IV+) constellation; upgradeable to future operations on Wide-Band Streaming L-Band (WiSL).

SRS (PRTTDCIS-2053)

The Commercial SATCOM terminal shall support circuit-switched telephony access to the Public Switched Telephone Network (PSTN).

SRS (PRTTDCIS-2054)

The Commercial SATCOM terminal shall support the use of PFE SIM cards and connectivity-related specific settings, and use of specific terminal settings including disabling of interfaces, administrator access, allowed services, maximum session duration.

SRS (PRTTDCIS-2056)

The Commercial SATCOM terminal shall operate outdoors over a temperature range from -20 deg. C to +55 deg. C

SRS (PRTTDCIS-2058)

The Commercial SATCOM terminal shall implement IP 56 protection against water and dust, or higher.

5.4 Military SATCOM

NOTE (PRTTDCIS-2064)

The Military SATCOM terminal will provide reach-back connectivity to PRT static infrastructure.

NOTE (PRTTDCIS-2665)

The Military SATCOM terminal will only be used in Point-to-Point topology.

NOTE (PRTTDCIS-2668)

The Military SATCOM terminal will provide intra-theatre connectivity.

SRS (PRTTDCIS-2066)

The Military SATCOM Terminal shall be understood as the complete system to enable IP communications over this bearer.

5.4.1 Functional Requirements

SRS (PRTTDCIS-2073)

The Military SATCOM Terminal shall allow a single setting auto-acquisition of selected satellites, including.

- 1) automatic deployment and stowing; and,
- 2) peaking and optimization; and,
- 3) Internal movement detector.

SRS (PRTTDCIS-2074)

The Military SATCOM Terminal shall drive to calculated position based on GPS, Flux-Gate Compass (or Internal Reference Unit) data and satellite signal peaking.

SRS (PRTTDCIS-2075)

The Military SATCOM Terminal shall enable an emergency Hand-crank/manual deployment and stowage, on Azimuth and Elevation axis.

SRS (PRTTDCIS-2076)

The Military SATCOM Terminal shall be certified for auto-commissioning on United States Wideband Global SATCOM (WGS) services.

SRS (PRTTDCIS-2077)

Should the terminal not be certified and prior to acquisition, the Contractor shall provide evidences to confirm that the terminal meets WGS performance requirements to achieve “phase 2” in the WGS certification process.

SRS (PRTTDCIS-2078)

The Contractor shall be solely responsible to achieve the terminal WGS certification.

SRS (PRTTDCIS-2079)

The Military SATCOM Terminal shall include an embedded Antenna Control Unit (ACU) with separate one (1) Rack Unit Controller Interface unit; supporting monitoring and control interface for the terminal.

SRS (PRTTDCIS-2080)

The SATCOM Terminal ACU shall provide real-time health and status of terminal, accessible on a local and remote console through a standard web browser, as a minimum the latest Purchaser's supported versions of WEB Browsers at the time of FDR without the need of special plugins. Support of HTML5 is highly recommended.

SRS (PRTTDCIS-2081)

The Military SATCOM Terminal deployment time shall be less than 15 minutes, 8 minutes typical.

SRS (PRTTDCIS-2082)

The Military SATCOM terminal shall operate under OPE-1a conditions.

SRS (PRTTDCIS-2083)

The Military SATCOM Terminal shall meet additional wind specifications:

- Antenna deployed and terminal being operated: 72 km/h (with gusts up to 95 km/h) with Maximum Pointing Loss of
 - 2 dB peak Ka Band; and,
 - 1.5 dB in X-Band; and,
- Antenna stowed: 161 km/h.

SRS (PRTTDCIS-2086)

The SATCOM Terminal shall include a spectrum analyser to monitor L-Band interfaces, co-located with the modem units.

SRS (PRTTDCIS-2087)

The Spectrum analyser shall feed into the monitoring and control software suite.

SRS (PRTTDCIS-2088)

The Military SATCOM Terminal shall include an L-Band Switching matrix, which allows for switching of modems on the 2.4M antenna RF chain(s), while allowing for simultaneous spectrum monitoring by the spectrum analyser.

SRS (PRTTDCIS-2089)

The SATCOM Terminal shall include a Health and Status management software for the local terminal.

SRS (PRTTDCIS-2090)

The Health and status management software shall feature:

- 1) Antenna subcomponents health and status, as drawn from Terminal ACU; and,
- 2) Spectrum Monitoring, as drawn from spectrum analyser; and,
- 3) Display of health and status information in a block diagram format, with colours reflecting current health and status of Line replaceable units (LRUs) in the following convention:
 - 1) Green – good acceptable performance within nominal parameters; and,
 - 2) Amber – unacceptable performance outside of nominal parameters; and,
 - 3) Red – failure of the component performance.

5.4.2 Technical Requirements

SRS (PRTTDCIS-2065)

The TDCIS Military SATCOM terminal shall operate in X-band and Ka-band.

SRS (PRTTDCIS-2067)

The Military SATCOM Terminal Antenna shall be a 2.4 m foldable antenna, configured for simultaneous operation for both X-band and Ka-band, with a single common RF feed.

SRS (PRTTDCIS-2068)

The antenna design shall support both bands operating in both left-hand and right-hand polarizations.

SRS (PRTTDCIS-2069)

The antenna design shall support Low Passive Intermodulation (Low-PIM) feed, for frequency accuracy and emissions control.

SRS (PRTTDCIS-2070)

The antenna reflector shall fold on the sides that auto-deploys and stows as needed.

SRS (PRTTDCIS-2071)

The Military SATCOM Terminal shall bear up to 20 Mbps on both bands.

SRS (PRTTDCIS-2072)

Should the Contractor conclude that a higher throughput is required, this shall be fully justified and left for the Purchaser to assess and approve.

5.4.3 Implementation Constraints

SRS (PRTTDCIS-2084)

For compatibility with the extant systems in PRT, the Military SATCOM Terminal shall include:

- 1) iDirect 950 MP series modems; and,
- 2) Comtech SLM5650B (STANAG 4486 Compliant), as a direct replacement (suitable substitute) for the Radyne DMD20 LBST modem.

SRS (PRTTDCIS-2085)

The Military SATCOM Terminal shall include 1RU slot blanking plate, to allow for future addition of new modem (future STANAG 5646).

5.5 Combat Net Radio (CNR)

NOTE (PRTTDCIS-2105)

The CNR belong to the proprietary PRC-525 ecosystem by EID which englobes the transceivers, power amplifiers, docking stations, remote consoles, etc.

NOTE (PRTTDCIS-2106)

The CNR support both voice and data in the xR security domain.

NOTE (PRTTDCIS-2107)

The radios are installed in single or double Radio Docking stations that host one or two radios and its associated amplifier respectively.

NOTE (PRTTDCIS-2108)

The rear link TR-525AH has a 500 W power amplifier associated.

NOTE (PRTTDCIS-1265)

The MMA-xR RoIP integrator is the ICC-204 IP Intercom Systems model, which is PFE.

5.6 IP HF Radio

NOTE (PRTTDCIS-2100)

The HF link data capability from the RL node operates as an PCN bearer both for reach-back and intra-theatre links.

NOTE (PRTTDCIS-2101)

The HF link is implemented by

- 1) The EID PRC-525 Combat Net Radio (CNR), supporting IP services and SIP client; and,
- 2) A Rohde & Schwarz VK4150 power amplifier together with the required Rohde & Schwarz IN4150 power source.

NOTE (PRTTDCIS-2102)

The software used is the Rohde & Schwarz STANAG 5066.

NOTE (PRTTDCIS-2103)

The expected IP service to be employed is e-mail (i.e. using the CFTP client of STANAG 5066).

6 Housing Elements

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-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.

6.1 Power Generation Unit

NOTE (PRTTDCIS-3481)

This section contains all Power Generation Unit (PGU) specifications common to all DPOP PGU. Housing element specific (Shelter, Trailer...) PGU specifications are captured in the section dedicated to this specific housing element.

6.1.1 General

SRS (PRTTDCIS-2168)

The PGU continuous rating shall be established for Voltage, Phase, Frequency and Speed at 230VAC, 50 Hz and 1500 to 1800rpm.

SRS (PRTTDCIS-2172)

The refueling port shall accept hose or canister refueling without mechanical obstacles.

SRS (PRTTDCIS-2174)

The PGU shall have a full diagnostic and control panel interfacing with the Management Subsystem.

SRS (PRTTDCIS-2175)

The PGU shall be capable of being remotely controlled from the remote Management Subsystem.

SRS (PRTTDCIS-2176)

The PGU system noise level (dB) shall be ≤ 57 dB(A) at a distance of 7 meters in the outside of the shelter or inside the shelter (with the door closed) under full load.

SRS (PRTTDCIS-3043)

One (1) dedicated 6 kg portal ABC dry powder fire extinguishers Class ABC and suitable for fires involving electronic equipment up to 1000 V shall be located close to the Power Generator Unit (PGU) and mounted in such a manner that it is easily accessible from the ground.

SRS (PRTTDCIS-3147)

The PGU fire extinguisher shall meet requirements as stipulated in following standards:

- EN 3-7:2004+A1:2007 Portable fire extinguishers. Characteristics, performance requirements and test methods; and,
- EN 3-8:2006 Portable fire extinguishers. Additional requirements to EN 3-7 for the construction, resistance to pressure and mechanical tests for extinguishers with a maximum allowable pressure equal to or lower than 30 bar; and,
- EN 3-10:2009 Portable fire extinguishers. Provisions for evaluating the conformity of a portable fire extinguisher to EN 3-7.

SRS (PRTTDCIS-3337)

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

SRS (PRTTDCIS-3338)

The PGU shall meet the safety requirements as specified in ISO 8528-13:2016 Reciprocating internal combustion engine driven alternating current generating sets, Part 13: Safety

SRS (PRTTDCIS-3339)

PGU shall be designed and provided with equipment to meet requirements for power generators rated as Continuous Operating Power (COP) according to ISO 8528-1:2018.

SRS (PRTTDCIS-3340)

The PGU shall be able to provide continuous power on variable loads for minimum of 4000 hours per year.

SRS (PRTTDCIS-3341)

If the local power grid is available, the PGU shall be capable and equipped with necessary accessories to operate in standby mode, ready to automatically activate, when necessary.

SRS (PRTTDCIS-3342)

The sound isolation shall be non-hydroscopic.

SRS (PRTTDCIS-3343)

The PGU enclosure shall be equipped with rodent barriers on inlets and outlets.

SRS (PRTTDCIS-3344)

The PGU enclosure shall be equipped with appropriate input and output soundproof louvers.

SRS (PRTTDCIS-3345)

The PGU shall be removable from the enclosure to support maintenance activities.

SRS (PRTTDCIS-3346)

The PGU integration shall be not prevent the shelter to be washable with a nozzle.

SRS (PRTTDCIS-3347)

The PGU shall be mounted on oil resistant vibration isolation elements.

SRS (PRTTDCIS-3348)

The PGU enclosure shall be provided with internal LED lighting with micro-switches.

SRS (PRTTDCIS-3349)

The PGU enclosure lighting shall support the same modes as the shelter (Normal, Combat...).

SRS (PRTTDCIS-3352)

The enclosure shall be provided with inspection doors.

SRS (PRTTDCIS-3353)

The inspection doors shall be equipped with snap handles.

SRS (PRTTDCIS-3354)

The inspection doors shall be equipped with padlock.

SRS (PRTTDCIS-3355)

At least one of the inspection doors shall be provided with a document holder installed on the inside of the door.

SRS (PRTTDCIS-3356)

The PGU and all its components (Air filter, Oil filters...) shall be considered as an outdoor assembly for its environmental conditions compliance.

SRS (PRTTDCIS-3357)

The PGU shall be of compact type and easy to maintain.

SRS (PRTTDCIS-3358)

The PGU capacity is design driven. The Contractor shall design the PGU with an minimum of an additional 10% of capacity to accommodate future system expansion.

SRS (PRTTDCIS-3359)

The engine/generator assembly shall be a standard product of current manufacture, from one company regularly engaged in production of such equipment.

SRS (PRTTDCIS-3360)

The contractor shall provide engine manufacturer's recommended lubricants / coolants and data concerning their equivalents, including the manufacturer and supplier details.

SRS (PRTTDCIS-3361)

Operation angle for the PGU shall be minimum 20 degrees on any direction.

SRS (PRTTDCIS-3362)

An authorised technical surveillance authority, recognized by NATO, shall approve the mechanical and electrical safety. This includes the allowance for transport of the power generator on public roads, aircrafts, trains and ships.

SRS (PRTTDCIS-3363)

The PGU shall be supplied with CE mark and EC Declaration of Conformity in compliance with the Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC.

SRS (PRTTDCIS-3364)

The PGU shall include at least following components:

- Electrical starter; and,
- Fuel meters to measure the net consumption of fuel by the engine in grams and litres. The meters shall have temperature correcting capability; and,
- Heavy-duty tube oil cooler with the temperature controlled by a thermostat valve; and,
- Lubricating oil pump; and,
- Fuel transfer pump; and,
- Radiator and belt-driven fan with mechanical protection, capable of cooling the engine on full load at all environmental conditions; and,
- Exhaust silencer; and,
- Oil pressure and temperature meters; and,
- Coolant temperature meter; and,
- Hot and moving parts protection; and,
- Anti-vibration, oil resistant shock absorbers; and,
- Reinforced lifting hooks for crane hoisting; and,
- Ground connection of electrical installation with ground spike; and,
- Digital diagnostic control panel; and,
- Supply and spill fuel-lines with fittings and fitted to the day-tank; and,
- Exterior (piped to the edge of the enclosure) flexible oil and coolant drain lines with interior valves for ease of service; and,
- Fill of suitable lubricating oil, and anti-freeze for cooling system to assure performance at all environmental conditions.

SRS (PRTTDCIS-3365)

The PGU shall provide at least following functionalities:

- Safety shutdown system for low oil pressure, high temperature, over-speed and low fuel level with LED, re-settable indicators of the manual reset type; and,
- Dual fuel (fuel and fuel / water), oil and air filters in accordance with the manufacturer's specifications; and,
- Low oil pressure alarm; and,
- Over speed alarm; and,
- Low coolant level alarm; and,
- High coolant temperature alarm.

SRS (PRTTDCIS-3480)

PGU Lighting Protection and Grounding shall be integrated with those of the housing element hosting the PGU.

SRS (PRTTDCIS-3489)

PGU shall be provided with one (1) maintenance tool kit stored in a Stowage box, designed to restrict the entry of water and the tools shall be secured in place.

SRS (PRTTDCIS-3492)

Stowage Box shall be provided in the same colour as the PGU enclosure.

SRS (PRTTDCIS-3490)

PGU shall be provided with plate or plates (as required), located in convenient position without creating confusion with each other, imprinted on photosensitive anodized aluminium, conforming to type H, MIL-DTL 15024G, with a matt black background with following information printed:

- Operating instructions, emergency procedures, precautionary instructions to avoid personnel injury or equipment damage, servicing instruction, electrical schematics, technical characteristics, nomenclature and serial number; and,
- Centre of gravity marking with matt black colour; and,
- Information pertaining to air (as internal cargo-load and as helicopter external load), land, maritime and railways transportation.

6.1.2 Engine**SRS (PRTTDCIS-3366)**

The engine shall be of a quick start, water-cooled industrial type.

SRS (PRTTDCIS-3367)

The engine shall be designed for continuous power rating.

SRS (PRTTDCIS-3368)

The engine shall be directly coupled to the synchronous electrical alternator.

SRS (PRTTDCIS-3369)

The engine power shall be such to drive the alternator at full load with power factor 0.8 lagging under all environmental conditions.

SRS (PRTTDCIS-3370)

The engine shall be capable of operating at light loads for extended periods of time and shall provide means to reduce carbonisation without requiring periodic cleaning of exhaust parts.

SRS (PRTTDCIS-3371)

The engine shall meet requirements for performance class G2 or better according to ISO 8528-2:2018 Reciprocating internal combustion engine driven alternating current generating sets, Part 2: Engines.

SRS (PRTTDCIS-3372)

De-rating due to extreme operating conditions and high altitude shall be addressed by the Contractor. However, the reduction of available power shall be less or equal than 3.5% per each 300m above 1200m of altitude.

SRS (PRTTDCIS-3373)

The declaration of power, fuel and lubricating oil consumption shall be determined in accordance with ISO 3046-1:2002 Reciprocating internal combustion engines, Performance, Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods, Additional requirements for engines for general use.

SRS (PRTTDCIS-3374)

The Specific fuel consumption and power output shall be quoted at standard (ISO) ambient conditions and at 45 degrees Celsius.

SRS (PRTTDCIS-3375)

The Contractor shall provide in technical documentation the de-rating curves or correction curves, formulae or calculations applicable to the generator for the power de-ration and fuel consumption for all environmental conditions.

SRS (PRTTDCIS-3376)

The engine shall be started electrically using batteries.

SRS (PRTTDCIS-3377)

The engine shall be equipped with a preheating system to keep the engine ready to start and take the full load, from 0 to 100%, within 15 seconds from standstill.

SRS (PRTTDCIS-3378)

The engine shall be multifuel ready and able to operate with at least the following fuels: diesel, DL-1, DL-2, JP-5, JP-8.

SRS (PRTTDCIS-3379)

The PGU start system shall allow to be operated locally (directly on the next to the PGU) and remotely.

SRS (PRTTDCIS-3380)

During each initial start of the engine, the PGU shall include a pre-lube at low idle speed system. When the internal oil pressure reaches the manufacturer predetermined safe value, the engine speed shall then increase to reach the alternator set operating speed.

SRS (PRTTDCIS-3381)

Convenient access for maintenance shall be assured. There shall be no need to remove the PGU from its enclosure to access coolant refill gauge, change oil and filters etc.

SRS (PRTTDCIS-3382)

Injection pumps and injection valves shall be of a type not requiring adjustment in service and shall be of a design allowing quick and field replacement by technicians without special diesel engine experience.

SRS (PRTTDCIS-3383)

The engines shall have an individual electronically controlled injection pump and injection valve for each cylinder, any one of which shall be removable and replaceable from stock parts.

SRS (PRTTDCIS-3384)

Fuel lines between injection pumps and valves shall be of heavy seamless tubing.

SRS (PRTTDCIS-3385)

Where applicable, air filters including pre-filters and dust traps shall be mounted in such a way to not to restrict the access to rocker covers and fuel injection pump.

SRS (PRTTDCIS-3386)

The oil sump shall preferably be equipped with a screw-in type stop that is easily accessible that drained oil can be caught in a vessel under the unit. If not possible, the oil sump shall include a cock with a pipe stopped by a mounted screw-on type stop. The pipe shall be long enough that drained oil can be caught in a vessel beside the unit. If the oil cannot be drained by gravity flow, the engine sump shall be equipped with a hand pump.

SRS (PRTTDCIS-3387)

The engine shall meet following characteristics:

- Engine Type: 4-stroke; and,
- Engine speed: 1500/1800 rpm; and,
- Insulation: H class or better; and,
- Protection: IP 23 or better according to IEC 60529: 1989/ AMD2: 2013/ COR1:2019.

6.1.3 Engine Cooling

SRS (PRTTDCIS-3388)

The engine cooling system shall be capable of adequately cooling the generator engine when it is supporting full load at the specified most extreme hot environmental conditions.

SRS (PRTTDCIS-3389)

The on-skid radiator cooling system shall be provided with the following:

- Water pumps for jacket water and turbocharger intercooler cooling complete with thermostatic bypasses; and,
- Water-air heat exchanger(s) for jacket water and turbocharger intercooler cooling complete with all necessary interconnection(s) to the on-board radiator; and,
- Automatic control of radiator fans, including automatic cycling for even running hours; and,
- Alarms and trip sensors for high/low coolant levels and temperatures.

SRS (PRTTDCIS-3390)

All cooling system components shall be monitored and alarmed by the control system.

SRS (PRTTDCIS-3391)

The cooling system shall include a heavy-duty, tropical-type radiator, constructed for high ambient/engine temperatures, and prevailing all environmental conditions.

SRS (PRTTDCIS-3392)

The engine shall be provided with a thermostatic valve placed in the jacket water outlet between the engine and the cooling source.

SRS (PRTTDCIS-3393)

This valve shall maintain the proper jacket water temperature under all load conditions.

SRS (PRTTDCIS-3394)

A flexible connecting section shall be provided between the radiator and discharge louver frame.

SRS (PRTTDCIS-3395)

The radiator shall be mounted on skid with oil resistant anti vibration mountings.

6.1.4 Engine Heaters

SRS (PRTTDCIS-3396)

The engine shall be equipped with a thermostat controlled coolant immersion heater to aid engine starting, in most extreme cold environmental conditions.

SRS (PRTTDCIS-3397)

The thermostat controlled coolant immersion heater shall be powered from the auxiliary power distribution

SRS (PRTTDCIS-3398)

The heater shall be automatically switched off, when the engine is running.

6.1.5 Lubrication System

SRS (PRTTDCIS-3399)

The lubrication system shall comprise an engine driven pump to circulate lubricating oil under pressure.

SRS (PRTTDCIS-3400)

Full flow filters shall be provided together with replaceable elements.

SRS (PRTTDCIS-3401)

Lube oil make-up shall be automatic monitored and alarmed by the control system.

SRS (PRTTDCIS-3402)

The lubrication system shall be provided with alarms and trip sensors for high/low oil levels and temperatures and fitted with a crankcase heater if required.

6.1.6 Exhaust System**SRS (PRTTDCIS-3403)**

The engine exhaust system shall be composed of:

- 1) The exhaust silencer of a non-spark type, equipped with spark arrestor capable of the following:
 - 1) Low-pressure drop; and,
 - 2) Damping engine pulsations, backfiring and preventing any engine resonance; and,
 - 3) Sound attenuation as required to meet the noise level specified; and,
- 2) The discharge pipe work ; and,
- 3) Flanged flexible stainless steel thermal expansion bellows at the diesel engine exhaust outlet; and,
- 4) Support structures and fixings.

SRS (PRTTDCIS-3404)

The exhaust shall be stainless steel

SRS (PRTTDCIS-3405)

The exhaust shall be insulated as required.

SRS (PRTTDCIS-3406)

The exhaust outlet shall be stainless steel provided with a mechanical closing valve.

SRS (PRTTDCIS-3407)

The discharge stack and exhaust systems shall be supplied complete with roof, wall and floor mountings equipped with anti-vibration supports as required.

SRS (PRTTDCIS-3408)

Noise control measures including splitter attenuators and acoustic linings shall be considered with regard to reducing the noise levels.

SRS (PRTTDCIS-3409)

The complete exhaust system shall be designed such as not to exceed the noise limit of 65 dBA at a distance of about 7 meters from the output of the exhaust (in accordance with ISO 1996-1:2016) at full continuous load.

SRS (PRTTDCIS-3410)

The silencer shall be connected to the set through an INOX (stainless steel) compensator.

SRS (PRTTDCIS-3411)

Flanges shall help the pipes and the silencer to be easily disconnected.

SRS (PRTTDCIS-3412)

Fixation of exhaust pipes and silencer shall take into account thermal expansion and vibration.

SRS (PRTTDCIS-3413)

Purge valves shall be foreseen at the low points to evacuate any condensation.

SRS (PRTTDCIS-3414)

Exhaust emission shall meet requirements as specified in Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016.

SRS (PRTTDCIS-3415)

The fuel level emission shall be measured according to ISO 8178-4:2020 Reciprocating internal combustion engines, Exhaust emission measurement, Part 4: Steady-state and transient test cycles for different engine applications

6.1.7 Insulation

SRS (PRTTDCIS-3416)

The Contractor shall provide and install thermal insulation on the generator and supplied auxiliaries where required for the efficiency of the works, to meet regulatory requirements and safety of personnel.

SRS (PRTTDCIS-3417)

All insulation materials shall not contain any asbestos or asbestos based products.

SRS (PRTTDCIS-3418)

No part of the works that can be touched during normal operation shall have a surface temperature in excess of 50 degrees Celsius.

SRS (PRTTDCIS-3419)

All insulation applied to pipe work, machinery, works, and ducting shall be clad with aluminum or stainless steel cladding of appropriate thickness not less than that conforming with BS 5970:2012 Thermal insulation of pipework, ductwork, associated equipment and other industrial installations in the temperature range of -100 degrees Celsius to +870 degrees Celsius, Code of practice.

SRS (PRTTDCIS-3420)

All insulation exposed to the weather shall be sufficiently clad to be completely weatherproof.

SRS (PRTTDCIS-3421)

Insulation and cladding shall be designed and applied with proper allowance for expansion and contraction.

6.1.8 Fuel Supply**SRS** (PRTTDCIS-3430)

The tank shall be provided with the necessary equipment to supply the generator with fuel and as a minimum shall include the following:

- A fuel level indicator; and,
- A pump with in and out pressure gauges and automatic and manual ON/OFF operation; and,
- Low and high level alarms (sound alarms shall be capable of being disabled for tactical reasons) ; and,
- An auxiliary hand pump and associated manual valves; and,
- A fuel strainer on supply pump inlet with water separator; and,
- A vent cap; and,
- A drain valve with locking handle; and,
- Engine return pipes; and,
- A fuel leak detector; and,
- A fuel consumption meter.

SRS (PRTTDCIS-3429)

The fuel supply system shall be equipped with an automatic stop system due to lack of fuel.

SRS (PRTTDCIS-3428)

A de-fuelling system shall be provided to meet commercial and military air transport regulations.

SRS (PRTTDCIS-3427)

Refilling by hand from jerry cans or locally from a mobile tank with electric pump shall be possible during operation of the PGS.

SRS (PRTTDCIS-3426)

The fuel inlet cap shall be secured with a padlock.

SRS (PRTTDCIS-3425)

External fuel inlet with warning light for full tank shall be provided with lockable cap.

SRS (PRTTDCIS-3424)

The daily tank shall be reinforced with non-cutting edge bulkheads.

SRS (PRTTDCIS-3423)

The PGU Fuel tank shall be compliant with the latest European Safety Regulations.

SRS (PRTTDCIS-3422)

PGU shall be provided with an integrated day tank, housed inside the PGS enclosure, of the capacity assuring at least 12 hours continuous operation under rated continuous power.

6.1.9 Alternator**SRS** (PRTTDCIS-3431)

The alternator shall be a synchronous, regulated, drip proof industrial type.

SRS (PRTTDCIS-3432)

The alternator shall be self-excited of a rotating field brushless design.

SRS (PRTTDCIS-3433)

The alternator shall be provided with sealed-for-life bearings.

SRS (PRTTDCIS-3434)

The alternator shall be rated for a nominal continuous output and overload capacity at the specified environmental conditions

SRS (PRTTDCIS-3435)

The alternator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 per cent above or below rated voltage.

SRS (PRTTDCIS-3436)

The instantaneous voltage dip shall not exceed 20% of rated voltage when full load, at rated power factor, is suddenly applied.

SRS (PRTTDCIS-3437)

Recovery of stable operation shall occur within 5 seconds. Steady state modulation shall not exceed +0.5%.

SRS (PRTTDCIS-3438)

Alternator windings shall be braced for full line ground fault currents, with solidly grounded neutral system.

SRS (PRTTDCIS-3439)

The alternator output shall be wired to heavy-duty terminations, via an appropriately rated, moulded case circuit breaker, with overload and short circuit protection.

SRS (PRTTDCIS-3440)

The insulation to windings shall have an oil, moisture, salt air, fungus proof finish and epoxy coated with surface which will not retain dust or condensation.

SRS (PRTTDCIS-3441)

It shall be possible to put the set in service after long periods in unheated storage without the necessity for drying up insulation.

SRS (PRTTDCIS-3442)

The winding insulation shall be minimum Class H according to IEC 60085:2007 Electrical insulation - Thermal evaluation and designation.

SRS (PRTTDCIS-3443)

The exciter shall be a fast response type, with a rotating full-wave bridge.

SRS (PRTTDCIS-3444)

The exciter shall have a low time constant and large capacity to minimize voltage transients under severe load changes.

SRS (PRTTDCIS-3445)

The alternator shall be controlled by a digital Automatic Voltage Regulator (AVR).

SRS (PRTTDCIS-3446)

The regulator shall include phase voltage sensing, automatic short circuit protection and shall include automatic under frequency protection to allow the generator to operate at no load at less than synchronous speed for engine start-up and shutdown procedures.

SRS (PRTTDCIS-3447)

The AVR shall be capable of maintaining voltage between +1.0% and -1.0% of any value within 10% of the nominal voltage throughout the full range of rated load and power factor conditions.

SRS (PRTTDCIS-3448)

Droop, stability and voltage set point adjustments shall be done by operator interface.

SRS (PRTTDCIS-3449)

The AVR shall be capable of preventing sustained over voltage during over speed conditions following the loss of load.

SRS (PRTTDCIS-3450)

After a sudden load rejection at rated power factor, rated voltage shall be restored within 2 seconds.

SRS (PRTTDCIS-3451)

Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceed 110% of the rated current of the generator set on any phase for more than 60 seconds.

SRS (PRTTDCIS-3452)

The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown).

SRS (PRTTDCIS-3453)

Controls shall be provided to individually monitor phases of the output for short circuit conditions.

SRS (PRTTDCIS-3454)

The control/protection system shall monitor the current level and voltage.

SRS (PRTTDCIS-3455)

The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown).

SRS (PRTTDCIS-3456)

Controls shall be provided to monitor the kW load on the generator set, and initiate an alarm condition (overload) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds.

SRS (PRTTDCIS-3457)

All software, programming leads and software dongles and the like shall be provided if a computer programmable system is offered.

SRS (PRTTDCIS-3458)

The excitation system shall include the following features and facilities as the minimum:

- Voltage setting control; and,
- Power factor control; and,
- Protection against AVR failures (e.g. over/under excitation combined with over/under voltage) ; and,
- Supervised fault detection; and,
- An excitation system which will withstand short circuits and synchronising of the machine up to 90 degrees out of phase without failure of the components; and,
- A brushless excitation system.

SRS (PRTTDCIS-3459)

The alternator shall have following characteristics:

- Nominal Voltage: 230VAC, single phase; and,
- Nominal frequency: 50 Hz; and,
- Rated output: to be determined by the Contractor; and,
- Power factor: 0.8 lagging; and,
- Efficiency: min 90% at power factor 0.8 lagging.

6.1.10 Coupling**SRS** (PRTTDCIS-3460)

The elastic coupling between the engine and the alternator shall be such as to prevent abnormal wear and overheating of the bearings due to slight misalignment within the specified tolerances.

SRS (PRTTDCIS-3461)

Any part of the elastic coupling subject to wear shall be easily accessible for inspection and replacement.

6.1.11 Engine Starting System**SRS** (PRTTDCIS-3462)

The engine shall be provided with an on-skid dual 12/24 VDC electric starting system.

SRS (PRTTDCIS-3463)

The engine starting system, as the minimum shall be composed of:

- The electric starting motors; and,
- Low maintenance starting batteries; and,
- Ventilated battery housing; and,
- Vibration-free battery rack/tray; and,
- Interconnection cables; and,
- 230VAC battery chargers.

SRS (PRTTDCIS-3464)

The battery chargers shall be capable of re-charging the batteries to full potential within one hour after a cranking cycle and shall be adjustable to compensate for the battery self-discharge rate during standby periods.

SRS (PRTTDCIS-3465)

The starting batteries shall be lead acid, maintenance free type with a minimum of 5 years expected life time.

SRS (PRTTDCIS-3466)

The batteries and starters shall be capable of ten (10) starts per hour with a minimum of 5 consecutive start attempts.

SRS (PRTTDCIS-3467)

All battery system components shall be monitored and alarmed by the control system

SRS (PRTTDCIS-3468)

The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and number of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.

SRS (PRTTDCIS-3469)

The control system shall include time delay start (adjustable from 0 to 300 seconds) and time delay stop (adjustable from 0 to 600 seconds) functions.

SRS (PRTTDCIS-3470)

Lockable battery isolator switch shall be provided for use during maintenance and storage.

6.1.12 Digital Diagnostic Control Panel

SRS (PRTTDCIS-3471)

The digital Diagnostic Control Panel shall be mounted on the power generator in such a way that it would allow monitoring of basic parameters through a visor without opening any doors or flaps.

SRS (PRTTDCIS-3472)

The digital Diagnostic Control Panel shall be behind door mounted.

SRS (PRTTDCIS-3473)

The digital Diagnostic Control Panel visor shall be secured with padlock, tampered and weatherproof.

SRS (PRTTDCIS-3474)

The digital Diagnostic Control Panel shall contain as the minimum:

- 1) The static battery charger; and,
- 2) The starting procedure; and,
- 3) The command equipment:
 - 1) One 3 position switch: OFF-AUTO-MANUAL; and,
 - 2) Two push-buttons: START - STOP for use in manual position; and,
 - 3) One emergency stop push-button; and,
 - 4) A push button to stop the audible alarm; and,
 - 5) An alarm reset push-button; and,
 - 6) An alarm lamp test button; and,
 - 7) A button to select the enclosure lighting mode; and,
- 4) A Command & Control system able to show the following information:
 - 1) Generator load; and,
 - 2) Generator voltage; and,
 - 3) Generator current; and,
 - 4) DC battery voltage; and,
 - 5) DC battery current; and,
 - 6) Running time meter (engine hour counter); and,
 - 7) Frequency; and,
 - 8) Oil pressure; and,
 - 9) Oil temperature; and,
 - 10) Coolant temperature; and,
 - 11) Engine speed (rpm) ; and,
 - 12) Status indicator for the alarms; and,
 - 13) Audible alarm (10 dB over generator noise) ; and,
- 5) The following displayed digital information and alarms:
 - 1) Coolant high temperature; and,
 - 2) Oil high temperature; and,
 - 3) Low oil pressure; and,
 - 4) High oil pressure; and,
 - 5) Missed start; and,
 - 6) Battery charger failure; and,
 - 7) Over speed; and,
 - 8) Under speed; and,
 - 9) Over voltage; and,
 - 10) Under voltage; and,
 - 11) Low fuel tank level; and,
 - 12) AVE alarms.

SRS (PRTTDCIS-3475)

In case of an alarms occurs, the following sequence shall be followed:

- 1) The corresponding alarm appears on the control panel and the audible alarm is activated; and,
- 2) The audible alarm is stopped by means of the related push-button; and,
- 3) After the audible alarm is stopped the visual alarm stays on; and,
- 4) The visual alarm disappears after activation of the reset push-button.

SRS (PRTTDCIS-3476)

The Emergency stop push-button shall be a mushroom type push button, red colour.

SRS (PRTTDCIS-3477)

The Emergency stop push-button shall be protected to prevent inadvertent operation.

SRS (PRTTDCIS-3478)

The Emergency stop push-button activation shall be possible without opening any panels, flaps, doors or any other type of covers with easy access and no obstructions.

SRS (PRTTDCIS-3479)

The Emergency stop push-button shall be in conformity with the requirements of following directives and standards: MD 2006/42/EC, LVD 2014/35/EU, IEC 60947-5-1:2016, IEC 60204-1:2016, ISO 13849-1:2015, IEC 60947-5-5:1997 + AMD1: 2005 +AMD2:2016 CSV.

6.1.13 Circuit Breakers

SRS (PRTTDCIS-3482)

Main line, moulded case circuit breaker mounted upon and sized to the output of the generator at 50 Hz shall be installed as a load circuit interrupting and protection device.

SRS (PRTTDCIS-3483)

It shall operate both manually for normal switching functions and automatically during failure events.

SRS (PRTTDCIS-3484)

The breaker shall also include ground fault sensing that will trip the breaker on ground fault conditions.

SRS (PRTTDCIS-3485)

The circuit breakers on the generator power supply outlet shall be covered by flex glass internally and externally for protection against electrical hazards.

SRS (PRTTDCIS-3486)

The circuit breakers shall be complaint with IEC 60947:2021 series and with IEC 60898.

6.1.14 Fuel Jerry Cans

SRS (PRTTDCIS-2446)

Jerry Cans (portable petrol storage containers) shall meet the performance requirements for the carriage of petrol under the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR).

SRS (PRTTDCIS-3202)

Jerry Can shall be made of metal (steel sheet or aluminum) with nominal capacity of 20 liters each.

NOTE (PRTTDCIS-3203)

The nominal capacity of the container is the maximum volume of liquid the container is intended to hold at 20 °C.

SRS (PRTTDCIS-3204)

The total capacity of Jerry Can shall be between 10% and 15% more than the nominal capacity (i.e. the maximum volume of liquid that the container would hold if filled to the brim).

SRS (PRTTDCIS-3205)

The lids or tops shall be well-fitting and made of suitable material to remain secure and prevent the escape or leakage of liquid or vapor, with the closure providing an effective seal at all times when applied.

SRS (PRTTDCIS-3206)

The closure shall not show any visible signs of leaking even if the container is on its side or accidentally tipped over.

SRS (PRTTDCIS-3207)

Any opening for filling shall allow for the safe filling of petrol from a petrol pump without using a funnel.

SRS (PRTTDCIS-3209)

Any opening shall allow for the safe filling of the PGU without using a funnel.

SRS (PRTTDCIS-3210)

Jerry Can shall be delivered with a Petroleum, Oil and Lubricant (POL) compliant foldable bucket to be used when the Jerry can is put on the ground and avoid any potential fuel leak to be release in the environment.

SRS (PRTTDCIS-3211)

Jerry Can shall be marked or labelled in a legible and indelible form with:

- the words 'PETROL' and 'HIGHLY FLAMMABLE'; and,
- an appropriate hazard warning sign; and,
- the nominal capacity in liters; and,
- the manufacturer's name and the date and month of manufacture.

SRS (PRTTDCIS-3491)

Jerry Cans shall be provided in the same colour as the PGU enclosure.

6.2 Shelter

SRS (PRTTDCIS-1241)

To achieve better maintainability and supportability, all Shelters shall be designed and built the same and share a common baseline to support any Node configuration.

SRS (PRTTDCIS-1374)

The node-configured Shelter shall only be fitted with those assets required for the specific nodal functionality.

SRS (PRTTDCIS-1375)

All Shelters shall have a common base structure consisting of:

- Mechanical; (i.e. Container, racks, etc.); and,
- Electrical Power; and,
- Environmental Control Unit; and,
- External Termination Boards; and,
- Satellite and Antenna Masts Supports; and,
- Ancillary Equipment.

NOTE (PRTTDCIS-2111)

TDCIS Nodes are composed of one or two shelters. When a statement refers to the Node Shelter, it refers to all shelters composing the node, without any consideration for quantities.

SRS (PRTTDCIS-1813)

The Node Shelter shall accommodate a fixed storage space for all UAMs of the node.

SRS (PRTTDCIS-1818)

The Node Shelter shall accommodate a fixed storage space for all project deliverable EUDs of the node.

SRS (PRTTDCIS-2259)

The shelter shall support compartments to accommodate HCLOS and Mini-LOS system according to the following;

- Up to four radio systems (i.e. antennas, radios, rotors, fixing/installing equipment) in total; and
- Associated installation cable reels (e.g. power, data); and
- Mast stabilization fixtures and accessories (e.g. guy wires, pickets, etc.).

SRS (PRTTDCIS-1369)

The interior surfaces of shelters shall be painted white in accordance with the colour standard mat paint RAL 9010.

NOTE (PRTTDCIS-3197)

Shelter will not include a camouflage net and will benefit from the Vehicle Camouflage Net.

SRS (PRTTDCIS-2467)

Shelters shall be painted with Infra-Red Reflective (IRR) properties, permitting a subsequent application of a top coat with Chemical Agent Resistant Coating (CARC) characteristics, in accordance with Def Stan 80-208 (Issue 3, Amend. 1) and Def Stan 80-215 (Issue 2)

6.2.1 Mechanical**SRS** (PRTTDCIS-1376)

The shelter shall be capable of being transported on a wheeled 4x4 Medium Tactical Vehicle (MTV) procured by the Portuguese Army, which is designed to transport a 10ft ISO container.

SRS (PRTTDCIS-1377)

All node-configured shelter, when dismounted from the MTV, shall be capable of being transported within a suitable military aircraft (e.g. C-130H, KC-390) currently in service with the Portuguese Army.

SRS (PRTTDCIS-1378)

The shelter shall be designed to be lifted and transported, when installed with all necessary elements, by the following means:

- Forklift (from each of its longer sides); and,
- Crane; and,
- Helicopter.

SRS (PRTTDCIS-1379)

Any node-configured shelter total gross weight shall not exceed 3500 kilograms.

SRS (PRTTDCIS-3544)

The Contractor shall aim for all node-configured shelter variants to be the lighter possible.

SRS (PRTTDCIS-3144)

The Shelter shall be designed in accordance with and certified compliant to: 6516/SHCPE/86-88.

SRS (PRTTDCIS-1380)

The shelter shall be constructed based on ASTM E1925.

SRS (PRTTDCIS-2112)

The shelter wall, ceiling and floor panels shall have a "sandwich structure" (as per 6516/SHCPE/86-88) while remaining compliant with ISO 1496.

SRS (PRTTDCIS-1381)

The shelter shall support "ISO corner" mounting in accordance with ISO 1161:2016.

SRS (PRTTDCIS-1382)

The shelter external floor base dimensions shall adhere to the ISO 10' foot container type structure in accordance with ISO 668:2013 (i.e. L 10ft x W 8ft).

SRS (PRTTDCIS-1387)

The shelter, when ready for transportation (i.e. not deployed), shall not have any protruding or attached parts within the "free area" envelope:

- Laterally, all shelter parts shall be within the external 8ft width limit of an ISO 10ft container; and,
- Longitudinally, attached parts may protrude up to 976 mm (3.2ft) in the front and in the aft of the shelter (maximum length of communications shelter and protruding parts shall be 16.4ft \approx 5m); and,
- Vertically, all communications shelter parts shall be within the maximum external height of 8ft 6in.

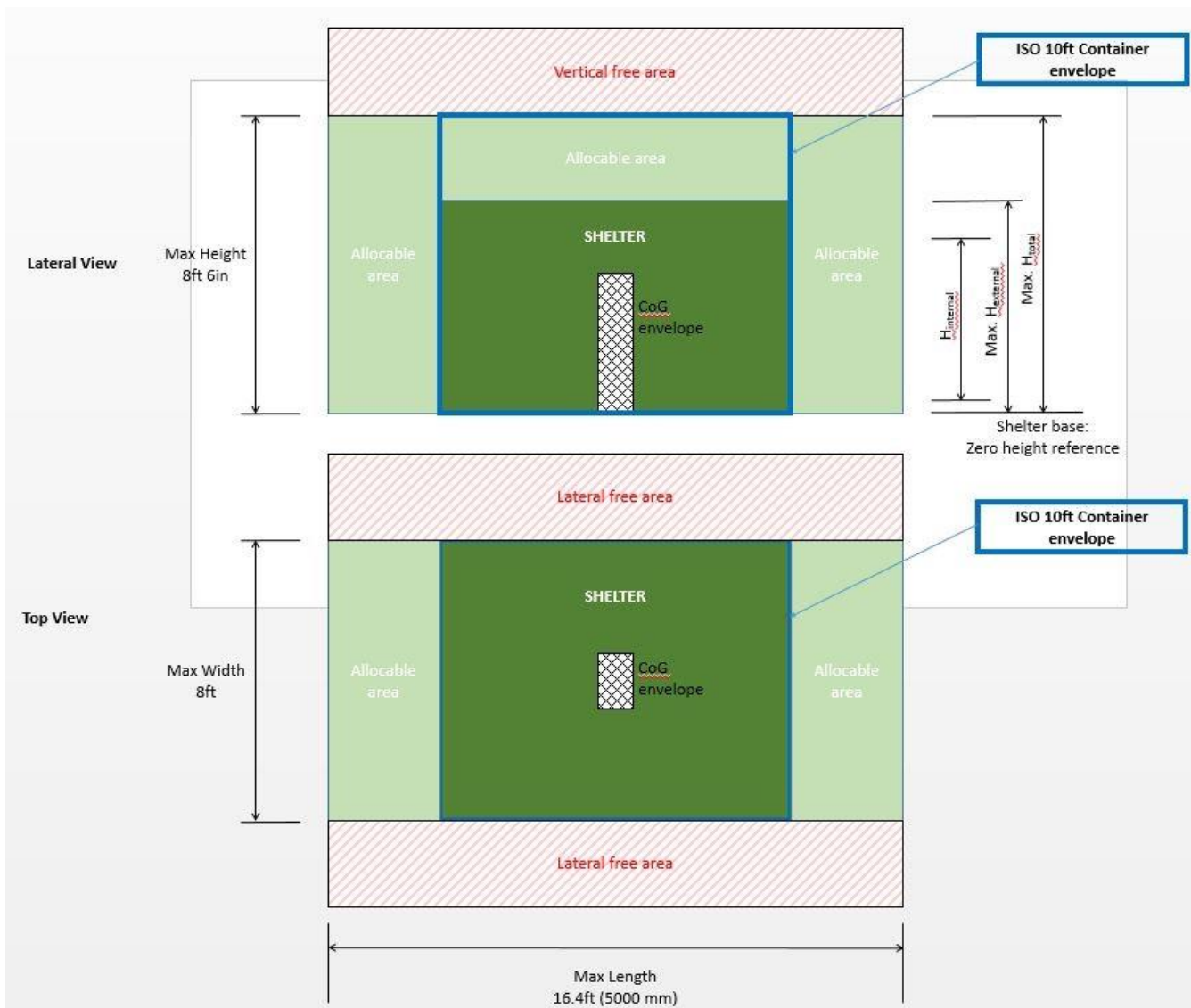


Figure 71 - Shelter Mechanical Envelope

NOTE (PRTTDCIS-2114)

Note that when the shelter is operationally deployed, the above specified envelopes are not applicable.

SRS (PRTTDCIS-1383)

The maximum external height of the shelter (for all possible shelter configurations) excluding all roof mounted ancillary equipment (e.g. foldable satellite dish) shall not exceed 2000 mm.

SRS (PRTTDCIS-2113)

The maximum external envelope height of the shelter (for all possible shelter configurations) in transport mode including all roof mounted ancillary equipment (e.g. foldable satellite dish) shall not exceed 8ft 6in (i.e. 2590.8mm).

SRS (PRTTDCIS-1384)

The shelter minimum internal height when measured from the floor to ceiling shall be 1750mm.

SRS (PRTTDCIS-1385)

The shelter external vertical height zero reference measurement point shall be considered the bottom of the shelter base.

SRS (PRTTDCIS-1386)

Fully loaded shelter shall have the Center of Gravity (CoG) within the envelope as specified below (extracted from ISO 8323:1985) and illustrated in Figure 71 - Shelter Mechanical Envelope:

- +/- 10% of the external width, measured from the geometric center; and,
- +/- 5% of the external length, measured from the geometric center; and,
- Below a height of 1219 mm (4ft = half height of an ISO 10ft container), measured from the bottom of the base.

SRS (PRTTDCIS-1388)

The shelter accessories shall preferably be located within the lateral fore and lateral aft areas.

NOTE (PRTTDCIS-2115)

The shelter accessories will preferably not be located on the top of the shelter.

SRS (PRTTDCIS-1389)

The shelter walls shall be mechanically robust to support input/output panels and anchorage points for the attachment of equipment racking systems and accessories.

SRS (PRTTDCIS-1392)

The shelter internal wall structure, floor and ceiling shall implement NATO C-profile railing (as per 6516/SHCPE/86-88) to support the attachment and installation of equipment, railing and ancillary items, etc. to be installed inside the shelter.

SRS (PRTTDCIS-1394)

The shelter internal wall structure shall support cable trunking mechanisms to support internal cable harnesses.

SRS (PRTTDCIS-1395)

The shelter back wall shall have a door for easy access of personnel and equipment to the shelter interior. The door shall:

- Support a 6 point locking mechanism; and,
- Support an opening system operable from the outside and inside; and,
- It shall be possible to open the door from the inside in 3 seconds, even when closed from the outside; and,
- Have the maximum possible height possible, depending on the overall height of the shelter and a width of between 800 mm – 860 mm; and,
- Have a locking device (e.g. padlock, with min 4 digit security code).

SRS (PRTTDCIS-1396)

The shelter back wall shall support a 100 mm diameter aperture for the insertion of cabling between the inside/outside of the shelter. When not in use, this cable aperture shall be sealed with a cap ensuring Shelter water ingress specifications.

SRS (PRTTDCIS-2118)

The shelter shall employ a 19in racking system for the installation of all the CIS equipment (e.g. power, radios, CIS, etc.) inside the shelter.

SRS (PRTTDCIS-2119)

The shelter shall support four (4) isolated 19in racking system designed for the different security domains (xS, xR, xU) and the PCN.

SRS (PRTTDCIS-2120)

The racking system shall accommodate project deliverable components and integrate PFE elements.

SRS (PRTTDCIS-2121)

Each rack shall provide - at least - additional room of two (2) RU for future equipment.

SRS (PRTTDCIS-2122)

The racking systems location shall be designed to minimize the internal cable lengths.

SRS (PRTTDCIS-2123)

The racking system shall support shock and damping systems to protect the mounted CIS equipment from the shock and vibration levels to which the shelter is exposed.

SRS (PRTTDCIS-2125)

Racks shall be equipped with meshed doors with locks and removable side panels without impacting air-flow and cooling performances of components mounted in the rack.

SRS (PRTTDCIS-2127)

During Maintenance activities, all racks shall provide 400mm clearance at the back.

SRS (PRTTDCIS-1390)

The shelter external roof panel shall be mechanically robust and covered with an "anti-slip" to support the presence and movement of military personnel.

SRS (PRTTDCIS-3125)

The "anti-slip" coating shall meet requirements as stipulated in STANAG 4698, Edition1 and its associated AEP-63, Edition 1: Performance requirements for non-skid coating systems.

SRS (PRTTDCIS-3126)

The shelter roof assembly shall be able to withstand a static load of 300 kg/m².

SRS (PRTTDCIS-3127)

The shelter roof assembly shall allow for personnel to walk on its surface without introducing any deformation or damage to the surface or paint coatings.

SRS (PRTTDCIS-1391)

The shelter interior floor panel shall be mechanically robust to support the weight of the internally installed equipment, ancillary items and the presence of military personnel.

SRS (PRTTDCIS-3128)

The shelter floor panels shall be capable of supporting a uniform load of 320 kg/m² in accordance with ASTM E1925-18.

SRS (PRTTDCIS-3129)

The shelter floor panels shall be capable of supporting a concentrated load of 900 kg over a 0.37m² area at the center of the floor.

SRS (PRTTDCIS-3130)

The shelter floor panels shall be capable of supporting a point load of 57 kg over a 650mm² area.

SRS (PRTTDCIS-3131)

The loads shall not cause any permanent deformation of the shelter floor panels or cause any deflections that interferes with proper shelter operation.

SRS (PRTTDCIS-3132)

The shelter floors shall be horizontal and flat, with only a minimal sill at the doorframes.

SRS (PRTTDCIS-3133)

The shelter floor panels shall have water drains that shall be closed by default, but capable of being opened without tools.

SRS (PRTTDCIS-3134)

The shelter floor panel water drains shall be located at accessible points.

SRS (PRTTDCIS-3135)

The shelter floor panel water drains shall have EMI shielded closing covers/lids, and ant-insect mesh.

SRS (PRTTDCIS-3136)

The floors shall be of heavy-duty industrial type with surface finish.

SRS (PRTTDCIS-3137)

The floor surfaces shall be non-reflecting.

SRS (PRTTDCIS-3138)

The floor surfaces shall be fire-resistant to Fire class A1, according to EN 13501-1:2018.

SRS (PRTTDCIS-3139)

The floor surfaces shall be non-toxic.

SRS (PRTTDCIS-3140)

The floor shall neither attract nor harbour dust and be easy to clean. Therefore, no carpeting material shall be used.

SRS (PRTTDCIS-3141)

The floor shall be anti-slip resistant to damp and commercial disinfectants and detergents.

SRS (PRTTDCIS-3142)

The floors shall maintain electrostatic dissipative (ESD) and conductive coating performance without the need for special ESD waxes or polishes.

SRS (PRTTDCIS-3143)

The floor shall meet requirements stipulated in:

- 1) EN 61340-5-1:2016 Electrostatics. Protection of electronic devices from electrostatic phenomena; and,
- 2) EN 61340-4-1:2004+A1:2015 Electrostatics. Standard test methods for specific applications. Electrical resistance of floor coverings and installed floors.

SRS (PRTTDCIS-2117)

The cable trunking shall provide, where necessary, for physical and/or electrical isolation/separation of the different internal cable harnesses.

SRS (PRTTDCIS-3145)

Metallic information technology cabling and electrical power cabling shall be separated as specified in EN 50174-2:2018 - Information technology. Cabling installation. Installation planning and practices inside buildings

SRS (PRTTDCIS-3146)

The cable trunking shall be composed of a metallic reinforced frame for robustness.

6.2.2 Electrical System

NOTE (PRTTDCIS-1406)

The Shelter contains subsystems working at 230VAC 50Hz and others working at 24 VDC. The electrical power concept of the system is illustrated on the following picture:

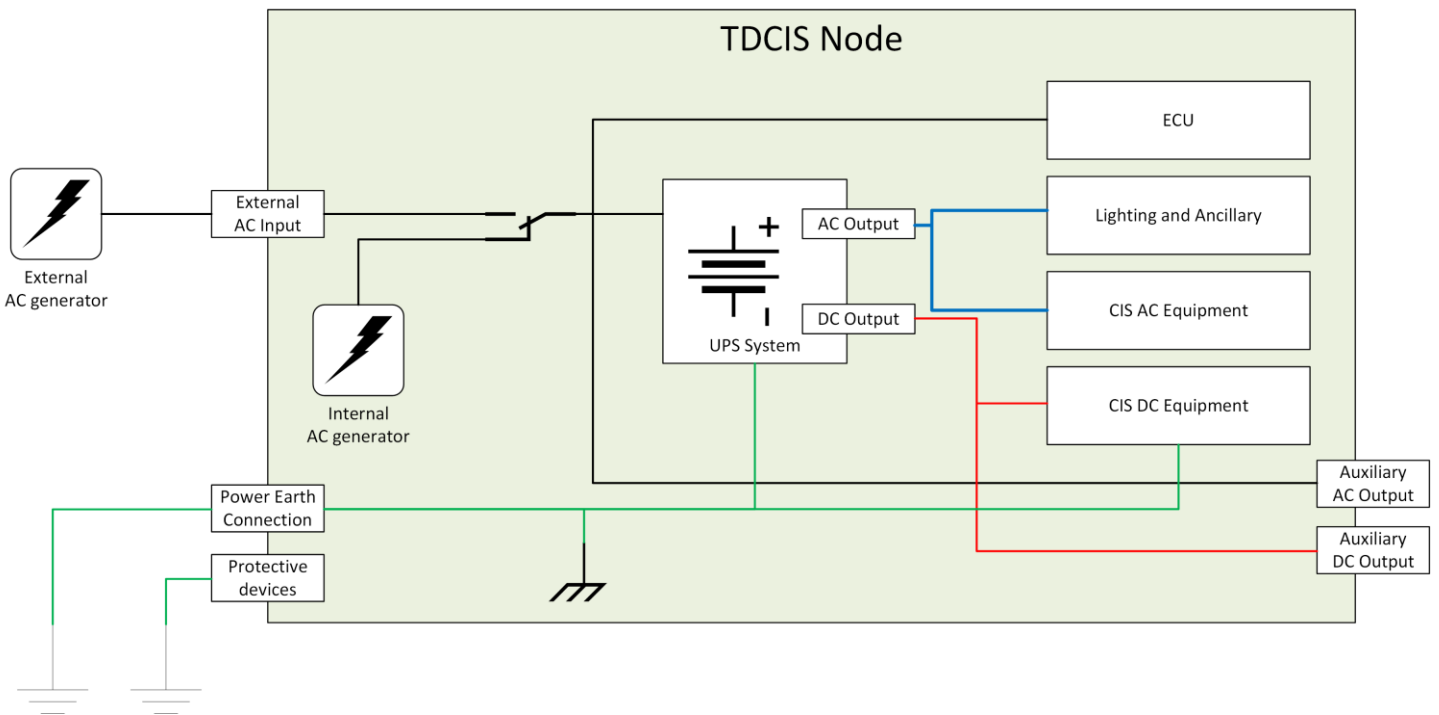


Figure 72 - Node Electrical Concept

SRS (PRTTDCIS-3246)

The Shelter main power input shall be of 230VAC single phase type.

6.2.2.1 Electrical Distribution

SRS (PRTTDCIS-2144)

It shall be possible to power the TDCIS Node electrical system by an external AC Power Source (Mains).

SRS (PRTTDCIS-2145)

It shall be possible to power the TDCIS Node electrical system by a shelter internal Power Generator Unit (PGU).

SRS (PRTTDCIS-2146)

The external AC Input shall protect the internal electrical system against surges and spikes as well as incorporate an isolation transformer to isolate the power earth references of the external AC generator and the Node Power Earth.

SRS (PRTTDCIS-2219)

The AC output terminals shall be protected with an isolator transformer and surge and spike arrestors.

SRS (PRTTDCIS-2147)

The AC sources shall power:

- the ECU subsystem; and,
- the UPS subsystem; and,
- the Auxiliary AC Output.

SRS (PRTTDCIS-2148)

The UPS subsystem shall power with uninterrupted and filtered (clean) power following circuits:

- The lightning and ancillary equipment; and,
- The AC supplied CIS equipment (230VAC 50Hz) circuits; and,
- The DC supplied CIS equipment (24 VDC) circuits; and,
- The Auxiliary DC Output (24 VDC).

SRS (PRTTDCIS-2149)

The electrical distribution in the shelter shall be in accordance to Portuguese National Regulations.

SRS (PRTTDCIS-2150)

The electrical distribution system shall segregate the power circuits by:

- Each Rack; and,
- Environmental Control Unit; and,
- Lighting; and,
- User appliances sockets.

SRS (PRTTDCIS-2151)

The electrical power available at the racks shall be 230VAC and 24VDC.

SRS (PRTTDCIS-2152)

The Power distribution system shall support the external CNR electrical powering.

SRS (PRTTDCIS-2153)

The shelter, its components, its ancillaries and systems electrically connected to it shall be able to be powered by:

- External power (mains); and,
- The internal generator; and,
- The UPS (limited to the systems connected downstream to the UPS).

SRS (PRTTDCIS-2154)

Switching between mains and generator shall be performed manually.

SRS (PRTTDCIS-2155)

The shelter shall contain an electrical switchboard with the necessary circuit breakers and Residual Current Breakers (RCB).

SRS (PRTTDCIS-2156)

The electrical switchboard shall contain the AC Distribution Panel.

SRS (PRTTDCIS-2157)

The AC distribution panel shall display real time measurement of Voltage, Current and Frequency of the AC.

SRS (PRTTDCIS-1952)

It shall be possible to daisy-chain up to two shelters on a single Main AC input.

6.2.2.2 Power Generation Unit**SRS** (PRTTDCIS-2167)

Each shelter shall be equipped with a multifuel Power Generator Unit (PGU).

SRS (PRTTDCIS-2169)

The PGU will be the primary source of electrical power and shall be capable to provide continuous power to:

- All internal CIS (i.e. communications equipment, servers, etc.); and,
- All non-CIS systems (i.e. lighting, Environmental Control Unit (ECU), auxiliary equipment, etc.); and,
- Recharge simultaneously the UPS batteries in less than 3 hours.

SRS (PRTTDCIS-2170)

The Shelter PGU shall provide power for a minimum period of 12 hours without refueling.

SRS (PRTTDCIS-2171)

The refueling of the PGU shall be performed from the outside of the shelter.

SRS (PRTTDCIS-2173)

The PGU enclosure shall be realized as a weatherproof cab tunnel or engineering cabinet of the shelter, providing sound isolation to the main working area of the shelter.

NOTE (PRTTDCIS-2448)

Fuel Jerry Cans to refill the Shelter PGU will be stored on the Vehicle transporting the Shelter. These are not to be considered as a Shelter payload. Shelter PGU Jerry Cans are PFE to this project.

SRS (PRTTDCIS-3487)

The Shelter PGU shall be remotely monitored and controlled from within the shelter.

SRS (PRTTDCIS-3350)

It shall be possible to couple the PGU enclosure lighting to the mode selected for the Shelter.

SRS (PRTTDCIS-3351)

It shall be possible to set the PGU enclosure lighting mode independently from the mode selected for the Shelter.

SRS (PRTTDCIS-3488)

There shall be a PGU Control Panel inside the shelter which provides all functions and features of the Shelter PGU local Digital Diagnostic Control Panel.

6.2.2.3 Uninterruptible Power Supply

SRS (PRTTDCIS-2177)

All shelters shall contain an Uninterruptible Power Supply (UPS) battery system providing regulated 24VDC (output between 22VDC and 26VDC) and 230VAC 50 Hz.

SRS (PRTTDCIS-2178)

Output power levels of the UPS shall be in accordance to the power requirements of the installed CIS and non-CIS equipment.

SRS (PRTTDCIS-2179)

The UPS battery system shall be capable of providing sufficient power to:

- Run the CIS equipment and the auxiliary equipment for a period of 30 minutes; and,
- Run the CNR for 12 hours; and,
- Run the lighting for 12 hours.

NOTE (PRTTDCIS-2180)

The UPS battery will not power the ECU during the loss of AC power.

SRS (PRTTDCIS-2181)

After the specified UPS battery life period for the CIS equipment is over, enough battery power shall be available to perform a graceful shutdown of the CIS systems.

SRS (PRTTDCIS-2182)

The UPS shall have an interface to the Management Subsystem for management and to trigger the graceful shutdown.

SRS (PRTTDCIS-2183)

The UPS and its battery system shall be designed to meet the power demand of the most power consuming shelter type.

SRS (PRTTDCIS-2184)

The UPS and its battery system shall be fitted identically to all shelter types without resizing.

SRS (PRTTDCIS-2185)

The UPS battery system shall be capable of operating in a low ventilation environment (i.e. without air conditioning).

6.2.2.4 Lighting

SRS (PRTTDCIS-2194)

The Shelter lightning system shall be ceiling mounted

SRS (PRTTDCIS-2186)

The shelter internal lighting system shall operate in two different modes:

- Normal; and,
- Combat.

SRS (PRTTDCIS-2193)

When the lighting system is in Normal Mode it shall automatically switch to Combat Mode when the shelter door is opened.

SRS (PRTTDCIS-2188)

The shelter internal lighting system shall be controlled through a "Lighting Control Panel".

SRS (PRTTDCIS-2189)

The Lighting Control Panel shall support the following switch modes:

- OFF; and,
- Garrison Operation Mode (in which the lights are always white); and,
- Normal Operation Mode (in which the lights are normally white and change to red when the door opens); and,
- Combat Mode (in which the lights are always red).

SRS (PRTTDCIS-2190)

The Normal Mode lighting system shall be measured in Kelvin and have a colour temperature between 2,800K and 3,000K.

SRS (PRTTDCIS-2191)

The Combat Mode lighting system shall have wavelength between 625nm and 650nm.

SRS (PRTTDCIS-2192)

The shelter internal lighting system shall provide a minimum illumination at the floor level of 300 lux/m².

SRS (PRTTDCIS-2187)

The shelter internal lighting system shall have a life cycle duration of 20,000 hours.

6.2.2.5 Power Earth and Grounding**SRS** (PRTTDCIS-2195)

All shelters shall include a set of four grounding stakes with 3m long connecting meshes to establish a low impedance physical contact between the shelter and the ground.

SRS (PRTTDCIS-2196)

The grounding stakes and meshes shall be transported and stored inside the shelter.

SRS (PRTTDCIS-2197)

The shelter ground resistance from any point to earth shall be in accordance with the PRT regulations and where possible, be 5 ohms or less.

6.2.2.6 Lightning Protection**SRS** (PRTTDCIS-2198)

The contractor shall design and present the most suitable solution for the shelter to ensure lightning protection of the container itself, all electrical compliance and human life.

SRS (PRTTDCIS-2202)

The equipment shall not be damaged and the CIS equipment shall continue to operate without degradation when subjected to the lightning waveforms conforming to STANAG 4370 edition 6, AECTP 250 - leaflet 254 atmospheric electricity and lightning.

SRS (PRTTDCIS-2203)

Appropriate surge protection devices (SPD) and other lightning protection measures according to IEC 61643-11:2011, IEC 61643-12:2008, IEC 62305:2013 SER, IEC 61643-21:2000+AMD1:2008+AMD2:2012 CSV, IEC 61643-22:2015 shall be used to provide sufficient protection for the equipment.

SRS (PRTTDCIS-2204)

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 compliance with IEC 62305 and IEC 60364.

SRS (PRTTDCIS-3212)

Surge Protective Devices (SPD) shall be provided of at least T1+T2 class for AC systems and T3 for sensitive communication systems.

6.2.3 Environmental Control Unit

SRS (PRTTDCIS-2205)

The Environmental Control Unit (ECU) shall ensure that the cooled airflow will efficiently be directed to the racks and equipment.

SRS (PRTTDCIS-2206)

Under the specified most extreme operation conditions, the ECU shall be capable of;

- Maintaining an air temperature of +18°C, ± 2 °C inside the shelter, at minimum outside temperature exposure; and
- Maintain an air temperature of +20°C, ± 2 °C inside the shelter, at maximum outside temperature and solar radiation exposure.

SRS (PRTTDCIS-2207)

The ECU shall be capable of being controlled and monitored via an "ECU Remote Control Unit" located inside the shelter and reachable by an operator.

SRS (PRTTDCIS-2208)

The ECU Remote Control Unit shall support the selection of the following modes:

- Refrigeration; and,
- Heating; and,
- Ventilation (i.e. using air from outside); and,
- Recirculation (i.e. blocking air from outside).

SRS (PRTTDCIS-2209)

The ECU Remote Control Unit shall be integrated in the SMC.

SRS (PRTTDCIS-2395)

The shelter shall be designed in overpressure meaning that during operation, the overall internal pressure of the shelter will always be higher than the external pressure in all operating conditions.

SRS (PRTTDCIS-3107)

The shelter shall be designed to provide fresh-air ventilation.

SRS (PRTTDCIS-3026)

ECU components requiring regular maintenance (e.g. filters) shall be easily accessible for a technician without having to remove TDCIS node components (other than opening a hatch or a vent) or interrupt any services.

6.2.4 Termination Panels

SRS (PRTTDCIS-2210)

All shelters shall support the following External and Internal Termination Panels.

- External Power Panel (EPP); and,
- External Communications Panel (ECP); and,
- External Line of Sight Roof Panel (ELOS RP); and,
- External SATCOM Roof Panel (ESATRP); and,
- External RF Panels (ERFP); and,
- External Commercial Communication Roof Panel (ECCRP); and,
- Internal RF Panels (IRFP).

NOTE (PRTTDCIS-2211)

The external panels can be located on any of the shelter's walls or roof, as long as these do not protrude into the identified "free area" envelope illustrated in Figure 71 - Shelter Mechanical Envelope.

SRS (PRTTDCIS-2212)

All Communications shelter external panels shall be protected by a hinged flap door with rubber side protections unfolding when opened.

SRS (PRTTDCIS-2213)

The hinged flap door shall open along the horizontal top axis of the door.

SRS (PRTTDCIS-2214)

The hinged flap door shall have a locking mechanism when closed and a support mechanism when opened to prevent cable damage.

SRS (PRTTDCIS-2215)

All panels shall be labelled beneath the protective flap door.

SRS (PRTTDCIS-2216)

All connectors shall be labelled with a reference and keyword as to its functionality (e.g. AC INPUT, Protective Power Earth, Ethernet, etc.).

SRS (PRTTDCIS-2217)

All external connectors shall be easy to access from the outside of the shelter. No outer parts or structures shall interfere with the ease of connection and fixation of the connector.

SRS (PRTTDCIS-3231)

All External Termination Panels shall include lightning and surge protection components for all connectors where applicable (Power, RF, Copper base network ports...).

6.2.4.1 External Power Panel (EPP)**SRS** (PRTTDCIS-2218)

The External Power Panel (EPP) connectors quantities are design driven. EPP shall support, as a minimum:

- One panel mounted IEC 60309 2 pole connector (single phase) and Power Earth with protective cap and ingress protection to IP67 or better, labelled as INPUT; and,
- One panel mounted 230VAC, 50/60 Hz, 16 A, 3 poles output "Auxiliary Service" socket with protective cap and ingress protection to IP67 or better, labelled as OUTPUT; and,
- One pair of binding posts (press button type) for 24V DC distribution, labelled as OUTPUT; and,
- Two Power Earth Stub Connectors.

SRS (PRTTDCIS-2220)

The DC output terminals shall be protected with surge and spike arrestors.

SRS (PRTTDCIS-3230)

The GAR-T electrical sockets shall be as follows;

- External input electrical socket: Mennekes INB.WCD 16A 2P+Earth 230VAC IP67 SCHUKO TM or equivalent, in colour RAL 840R 6014, non-gloss or equivalent; and,
- External output electrical socket: Mennekes INB. Contact Box 16A 3P 6H 230VAC IP67 TM or equivalent, in colour RAL 840R 6014, non-gloss or equivalent.

6.2.4.2 External Communications Panel (ECP)

SRS (PRTTDCIS-2221)

The External Communication Panel (ECP) shall support:

- MIL-DTL-38999 standard RJFTV (square flange receptacle) Class D / Cat. 6 or better Ethernet sockets supporting female RJ45 back termination; and,
- Two channel Single Mode (SM) HMA flange mount bulkhead optical connectors; and,
- Pairs of press (binding posts) for Single Pair, High Speed Digital Subscriber Line (SHDSL) and Plain Old Telephone System (POTS) circuits; and,
- Umbilical harness military connector in support of double shelter nodes.

SRS (PRTTDCIS-2222)

The minimum quantity of connectors required on the ECP is design driven. The ECP shall support additional connectors quantities as per following table:

	RJ45	HMA	Binding Post	Umbilical Harness
xU	4	4	-	1
xR	4	4	-	1
xS	4	4	-	1
PCN	4	4	4	-

Table 31 - ECP additional connectors quantities

SRS (PRTTDCIS-2223)

The different security domain connectors shall be grouped together and colour labelled on the ECP.

6.2.4.3 External Line of Sight Roof Panel (ELOS RP)

SRS (PRTTDCIS-2224)

The shelter shall support two (2) External Line of Sight Roof Panels (ELOS RP) to pass communication, power and control signals to the HCLOS and Mini LOS radios systems.

SRS (PRTTDCIS-2225)

Each ELOS RP panel shall be located adjacent to the electrically motorised telescopic mast mounting point.

SRS (PRTTDCIS-2226)

The ELOS RP shall support a set of panel connectors to pass communication signals to the HCLOS and Mini LOS radios systems and a set of panel connectors to pass power and control signals to the HCLOS and Mini LOS radios systems.

SRS (PRTTDCIS-2227)

The ELOS RPs shall include surge arrester filters

6.2.4.4 External SATCOM Roof Panel (ESATRP)**SRS** (PRTTDCIS-2228)

The shelter shall support one (1) External SATCOM Roof Panel (ESATRP) to pass communication signals, power and control to the Outdoor Units (ODU) of the SATCOM X/Ka Band Terminal antenna system (e.g. dish and other ancillary equipment).

SRS (PRTTDCIS-2229)

The ESATRP shall support a set of panel connectors to pass communication signals to the SATCOM X/Ka Band Terminal antenna system and a set of panel connectors to pass power and control signals to the SATCOM X/Ka Band Terminal antenna system.

SRS (PRTTDCIS-2230)

The ESATRP shall include surge arrester filters.

6.2.4.5 External RF Panels (ERFP)**SRS** (PRTTDCIS-2231)

The communications shelter shall support six (6) External RF Panels (ERFP) to pass communication signals to the whip antennas.

SRS (PRTTDCIS-2232)

Each ERFP panel shall be located adjacent to the whip antenna mounting point.

SRS (PRTTDCIS-2233)

Each ERFPs shall include, as a minimum, two (2) type N female coaxial connectors and two (2) type TNC female coaxial connectors.

SRS (PRTTDCIS-2234)

All ERFPs shall include surge arrester filters.

SRS (PRTTDCIS-2235)

The shelter shall provide a structure within the “allocable area”, as shown in Figure 71 - Shelter Mechanical Envelope for the installation of the CNR 150W HF Antenna Tuning Unit (ATU) having the approximate following dimensions and weight:

- Dimension 147 x 72 x 225 mm (W x D x H); and,
- Weight 2Kg

SRS (PRTTDCIS-2236)

The shelter shall support an additional ERFPP located on the lateral side of the shelter in support of the RL Node HF antenna mounted on the GAR-T Rear link version, with a high power capable (1kW CW) RF interface.

6.2.4.6 External Commercial Communication Roof Panel (ECCRP)**SRS** (PRTTDCIS-2237)

The communications shelter shall support an External Commercial Communication Roof Panel (ECCRP) to pass BGAN, Iridium and IMT Network communication signals to the BGAN, Iridium and IMT Network antennas.

SRS (PRTTDCIS-2238)

The ECCRP shall support both type N female coaxial connectors and type TNC female coaxial connectors.

NOTE (PRTTDCIS-2239)

The exact type and number of ECCRP connectors will be design-driven from the type of antenna system selected by the contractor.

SRS (PRTTDCIS-2240)

The ECSRP shall include surge arrester filters.

6.2.4.7 Internal RF Panels (IRFP)**SRS** (PRTTDCIS-2241)

The shelter shall support an internal RF Panel (IRFP) to patch and route RF signals between the Indoor Communication Units and all the ERFPPs.

SRS (PRTTDCIS-2242)

The IRFP shall be located adjacent to the rack hosting radio IDU.

SRS (PRTTDCIS-2243)

The quantities and types of IRFP connectors shall be equivalent to the matching ERFPP connectors.

6.2.5 Antennas

SRS (PRTTDCIS-2245)

The shelter shall support, on the shelter roof, the specified terminal and antennas in size and quantities, e.g.

- The Military SATCOM terminal; and,
- The Commercial SATCOM terminal; and,
- The Iridium terminal outdoor unit; and,
- Two vehicle mounted (voice/data) IMT Network antennas.

SRS (PRTTDCIS-2246)

The Military SATCOM terminal shall remain mounted on the roof of the shelter, when in transport (i.e. folded) and when in operation (i.e. deployed)

SRS (PRTTDCIS-2247)

All shelters shall support, on the roof or on the sides, the following:

- Six (6) mobile vehicle mounted “whip” antennas; and,
- Two (2) electrically motorized telescopic masts in support of the HCLOS and MiniLOS ODUs.

NOTE (PRTTDCIS-2248)

The mobile vehicle mounted “whip” antennas supporting the CNR are PFE.

SRS (PRTTDCIS-2249)

Each mobile vehicle mounted “whip” antenna (CNR or Broadband Radio) shall be mounted on a “mounting point” located within the “allocable area” as shown in Figure 71 - Shelter Mechanical Envelope or on the shelter roof.

SRS (PRTTDCIS-2250)

Mobile vehicle mounted “whip” antennas mounting points shall be in accordance with the NATO 4-hole mounting base specification, as shown in following figure:

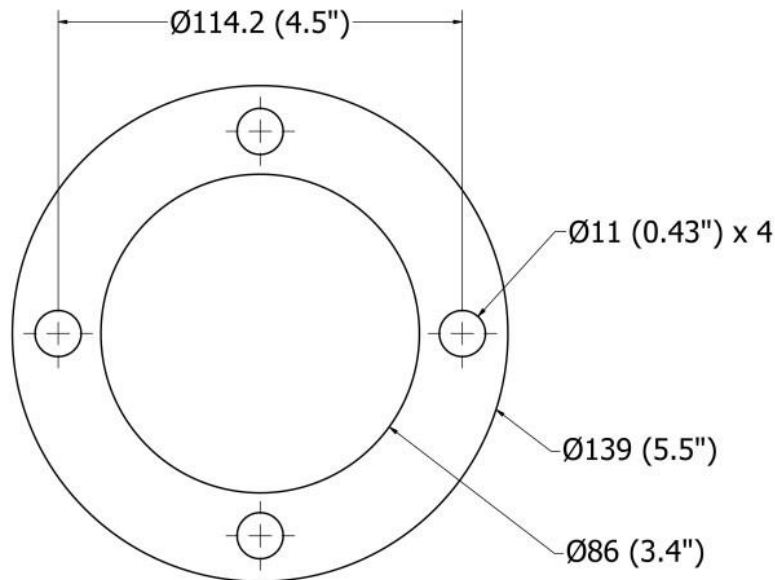


Figure 73 - NATO 4-hole base pattern

SRS (PRTTDCIS-2251)

The two electrically motorised telescopic masts shall be fixed to the communications shelter external side panels.

SRS (PRTTDCIS-2252)

When these masts are retracted (during transport), the full body shall fall within the “allocable area” of the shelter envelope.

SRS (PRTTDCIS-2253)

The two electrically motorised telescopic masts shall when fully extended; have a height of $\geq 10.5\text{m}$ measured from the shelter “zero height reference”.

SRS (PRTTDCIS-2254)

The two electrically motorised telescopic masts shall (together) support up to a maximum of four radio systems (e.g. 4 HCLOS or 3 Mini-LOS plus 1 HCLOS).

SRS (PRTTDCIS-2255)

It shall be possible to raise and lower the two motorised telescopic masts with all equipment mounted (i.e. antennas, rotors, radios adapters, cables, etc.).

SRS (PRTTDCIS-2256)

The motorised telescopic masts shall be powered by the shelter power system, whether by generator, mains or UPS.

SRS (PRTTDCIS-2257)

Operation of the two motorised telescopic masts shall be possible through the use of a remote control system.

SRS (PRTTDCIS-2258)

It shall be possible to raise and lower the motorised telescopic masts manually (i.e. in case of total power failure) by a single operator within 600 seconds.

6.2.6 Ancillary Equipment

SRS (PRTTDCIS-2165)

All shelters shall include the following internal ancillary equipment to be stowed inside the shelter;

- Storage compartment(s) for the transportation and accommodation of general purpose equipment and accessories; and,
- One (1) Magnetic “white” marker board” having approximate dimensions of 430 x 840 mm; and,
- Two (2) folding steel table painted in RAL 840R 6014, non-gloss or equivalent; and,
- Two (2) folding steel chairs for use with the folding table, painted in RAL 840R 6014, non-gloss or equivalent; and,
- One (1) pickaxe, with a handle shaft approx. 46cm long and drop forged carbon steel head, hardened and tempered for durability, painted in RAL 840R 6014, non-gloss or equivalent; and,
- One (1) sledge hammer, with handle shaft approx. 70cm long, 40mm in diameter, painted in RAL 840R 6014, non-gloss or equivalent; and,
- One (1) shovel, with a handle shaft approx. 70cm long, approx. 17cm wide carbon steel blade with collar at the handle/socket connection for added strength, forward turned step for secure foot placement, painted in RAL 840R 6014, non-gloss or equivalent; and,
- One (1) 6 kg portal ABC dry powder fire extinguishers Class ABC and suitable for fires involving electronic equipment up to 1000 V, mounted in such a manner that it is located in highly visible and easily accessible place; and,
- One (1) First Aid kit located in a highly visible location with provision adequate for two (2) staff.

SRS (PRTTDCIS-3148)

The fire extinguisher shall meet requirements as stipulated in following standards:

- EN 3-7:2004+A1:2007 Portable fire extinguishers. Characteristics, performance requirements and test methods; and,
- EN 3-8:2006 Portable fire extinguishers. Additional requirements to EN 3-7 for the construction, resistance to pressure and mechanical tests for extinguishers with a maximum allowable pressure equal to or lower than 30 bar; and,
- EN 3-10:2009 Portable fire extinguishers. Provisions for evaluating the conformity of a portable fire extinguisher to EN 3-7.

SRS (PRTTDCIS-2166)

All shelters shall include the following external ancillary equipment;

- One (1) anodised aluminium plate providing information pertaining to air (as internal cargo load and as helicopter external load), land, maritime and railways transportation.
- Retractable supports to access the shelter roof. The supports shall be placed on the outside of the communications shelter.
- One (1) adjustable folding ladder, painted in RAL 840R 6014, non-gloss or equivalent, providing access to all areas of the communications shelter structure. The ladder shall be stowed on the outside of the communications shelter.

SRS (PRTTDCIS-3037)

Shelters equipped with Radio and SATCOM Bearers shall include a portable Spectrum Analyzer suited to Bearer specifications to perform trouble shooting activities.

SRS (PRTTDCIS-3215)

Shelter shall be equipped with wind tie-downs to cater for the environmental conditions it has to comply with.

SRS (PRTTDCIS-3216)

When designing the wind tie-downs the Contractor shall consider the shelter sitting on the Vehicle with Vehicle stabilization legs deployed as the worst case scenario.

SRS (PRTTDCIS-3335)

All cable reels (Electrical, FO, STP...) shall meet following characteristics:

- Heavy duty, ruggedized for field military applications; and,
- Painted with the same colour (or black) and type of painting as the shelter; and,
- Roll-formed channel frame for heavy-duty applications; and,
- Non-sparking ratchet assembly; and,
- Declutching arbour to prevent damage from reverse winding; and,
- Fold-in swivel handles; and,
- Lightweight aluminium structure with protecting frame; and,
- Easy access to the inner end; and,
- Fixings to secure cable ends for transport, handling and storage.

6.2.6.1 FO Cable Reels

SRS (PRTTDCIS-2159)

The FO Cable Reel shall contain a 250 m long, black color, FO cord suitable for tactical use with mating connectors to the ECP.

SRS (PRTTDCIS-2160)

The FO cable reel shall be mounted on a mobile drum with belt strap and drum locking system.

SRS (PRTTDCIS-2161)

The FO cable reel shall be painted in RAL 840R 6014, non-gloss or equivalent.

SRS (PRTTDCIS-3031)

The FO cable reel shall include a cable retention system on both ends to protect connectors from traction.

SRS (PRTTDCIS-3034)

The FO Cable Reel shall include handle to be carried by hand.

6.2.6.2 STP Cable Reels

SRS (PRTTDCIS-2162)

The Shielded Twisted Pair (STP) Cable Reel shall contain three (3) 50 m long, black color, Cat. 6 or better cables suitable for tactical use with matting connectors to the ECP.

SRS (PRTTDCIS-2163)

The Shielded Twisted Pair Cable Reel shall be mounted on a mobile drum with belt strap and drum locking system.

SRS (PRTTDCIS-2164)

The Shielded Twisted Pair Cable Reel shall be painted in RAL 840R 6014, non-gloss or equivalent.

SRS (PRTTDCIS-3032)

The STP cable reel shall include a cable retention system on both ends to protect connectors from traction.

SRS (PRTTDCIS-3035)

The STP Cable Reel shall include handle to be carried by hand.

6.2.6.3 Sys Admin Tent

SRS (PRTTDCIS-3010)

Each Shelter shall be delivered with a tent for the System Administrators helpdesk.

SRS (PRTTDCIS-2750)

Tents shall be stored into the shelter.

SRS (PRTTDCIS-2751)

Each tent shall be provided with a set of installation tools.

SRS (PRTTDCIS-2752)

Each tent shall be equipped with three repair and maintenance kits, one for echelon/level 1 repairs, one for echelon/level 2 repairs and one for echelon/level 3 repairs.

SRS (PRTTDCIS-2754)

Tents shall implement rigid exoskeletons of light weigh in order to allow operation under heavy snow without collapsing inward.

SRS (PRTTDCIS-3013)

The Tent shall include floor and table power distribution for the O&M equipment and lighting consisting of fluorescent light Units (or LED) similar to those used in the shelter.

SRS (PRTTDCIS-2755)

It shall be possible to switch lights inside the tents from white to red (combat mode).

SRS (PRTTDCIS-2756)

Tents shall implement sufficient air flow to avoid the accumulation of heat in any space.

SRS (PRTTDCIS-2758)

All visible tent surfaces shall be the same color as for the Shelters external surfaces.

SRS (PRTTDCIS-2763)

The Tent shall be suitable to host two (2) staff members with their working position and the furniture stored in the shelter while taking into consideration the separation distance required between elements of belonging to different security domains.

SRS (PRTTDCIS-3011)

It shall be possible to create bigger tent by attaching multiple tents together.

SRS (PRTTDCIS-3012)

Each Shelter shall include a Helpdesk tool kit to the benefit of the System Administrators while working in the Tent, consisting of:

- One (1) semi-ruggedized network switch with a maximum of 5 PoE ports for each security domain (including PCN); and,
- Sufficient table-top fixable heavy duty power strips; and
- Sufficient patch and power cables to connect from the shelter Termination Panel to the Tent and inside the Tent.

SRS (PRTTDCIS-3014)

The Shelter UPS endurance shall include all helpdesk elements (network components, lighting...), at the exception of System Administrator workstations, in its computation.

SRS (PRTTDCIS-2753)

Tents shall be deployable in all climatic areas and on soft or hard surfaces (i.e. concrete surface), therefore adequate sunshields and weights (i.e. water ballast) shall be delivered with the tents.

SRS (PRTTDCIS-3166)

The tent configuration shall assure rapid deployment without aid of ancillary equipment.

SRS (PRTTDCIS-3167)

The tent configuration shall assure that packaging allows the tent to be moved / stowed by two (2) people.

SRS (PRTTDCIS-3168)

The tent shall have vertical sidewalls of minimum 150 cm height to maximize usable space on its floor.

SRS (PRTTDCIS-3169)

The tent height at the apex shall be minimum 210 cm.

SRS (PRTTDCIS-3170)

The tent doors shall be at both ends with double ties and overlap.

SRS (PRTTDCIS-3171)

The tent fabric shall be UV resistant.

SRS (PRTTDCIS-3172)

The tent shall be equipped with at least one roof vent cap.

SRS (PRTTDCIS-3173)

The tent shall be equipped with at least one sealable (for example with a cover with Velcro fasteners) opening in the sidewalls to allow installation of flexible ducting from external HVAC unit.

NOTE (PRTTDCIS-3174)

The tent HVAC unit is not a deliverable of this project.

SRS (PRTTDCIS-3175)

The tent floor shall be vinyl and flame retardant.

SRS (PRTTDCIS-3176)

The tent shall withstand wind load of 89 km/h with gusts up to 105 km/h.

SRS (PRTTDCIS-3177)

The tent shall withstand snow load of 50 kg/m² for minimum 12 hours.

6.2.7 Lifting Jacks Kit

SRS (PRTTDCIS-3515)

Six (6) kits of Shelter Lifting Jacks shall be delivered.

NOTE (PRTTDCIS-3542)

The Lifting Jacks Kit will be used to load and unload a shelter from a Vehicle. It is to be considered as a Material Handling Equipment (MHE) which will be transported in separate Vehicle than the Shelter carrier. Therefore it is not to be considered as part of the Shelter payload.

SRS (PRTTDCIS-3516)

Each Lifting Jacks Kit shall be composed by four (4) electrically operated jacks.

SRS (PRTTDCIS-3517)

The Lifting Jacks Kit shall include all necessary components to be powered by a 24VDC power source.

SRS (PRTTDCIS-3518)

The Lifting Jacks Kit shall include all necessary components to be powered by a 230VAC - single phase power source.

SRS (PRTTDCIS-3521)

Each Lifting Jacks Kit shall be controlled via a cabled or wireless remote control console, capable of operating over a distance of not less than 15 meters.

SRS (PRTTDCIS-3524)

The Lifting Jacks Kit shall allow a maximum Shelter-Ground clearance of 1650 mm.

SRS (PRTTDCIS-3526)

The Lifting Jacks Kit shall be capable of raising and lowering the shelter when fully loaded with all components, equipment and accessories.

SRS (PRTTDCIS-3537)

The Lifting Jacks Kit shall be capable of raising and lowering ISO certified containers of any dimension.

SRS (PRTTDCIS-3538)

The Lifting Jacks Kit minimum lift capacity shall be 5000kg.

NOTE (PRTTDCIS-3529)

The Lifting Jacks Kit will be operated on solid ground (e.g. concrete or tarmac) with a maximum ground slope not exceeding 5 degrees across the area of the container being lifted.

SRS (PRTTDCIS-3532)

The Lifting Jacks Kit shall be CE certified and designed according to EN 1494:2000+A1:2008 Mobile or movable jacks and associated lifting equipment.

SRS (PRTTDCIS-3533)

The Lifting Jacks Kit shall be equipped with a tilt sensor.

SRS (PRTTDCIS-3534)

The Lifting Jacks Kit shall be equipped with a control system synchronising the action of all the kit's lifting jacks, when raising a single container.

SRS (PRTTDCIS-3535)

The Lifting Jacks Kit shall embed safety mechanisms preventing its operation, in the event it has not been fitted to a container and prepared for operation in the correct manner.

SRS (PRTTDCIS-3536)

Each Lifting Jacks Kit shall control the automatic leveling of the shelter while it is loaded on and unloaded from a Vehicle.

SRS (PRTTDCIS-3539)

The Lifting Jacks Kit shall require a maximum of 2 trained operators for its installation and operation.

SRS (PRTTDCIS-3540)

The Lifting Jacks Kit operating temperature range shall be from -10 degrees Celsius to +40 degrees Celsius.

SRS (PRTTDCIS-3541)

Installation of the Lifting Jacks Kit shall only rely on the standard locking mechanism of ISO corners.

SRS (PRTTDCIS-3543)

The Lifting Jacks Kit shall be delivered in transport cases containing all its elements and meeting all transportation constraints.

6.2.8 Maintenance Platform

SRS (PRTTDCIS-3149)

The Contractor shall provide two (2) Shelter maintenance platforms.

NOTE (PRTTDCIS-3150)

Shelter maintenance platform is not to be stored in any container or vehicle. It will be used at PRT Peacetime Location maintenance facility or deployed to a forward logistic support unit.

SRS (PRTTDCIS-3151)

The Shelter Maintenance Platform shall be foldable, aluminium, waterproofed, light but sturdy structure, easily installed and detachable from the shelter.

SRS (PRTTDCIS-3152)

The Shelter Maintenance Platform shall be equipped with wheels that support easy movement over hard surfaces with wheel breaking mechanism.

SRS (PRTTDCIS-3153)

The Shelter Maintenance Platform shall be manually adjustable in height enabling elevation of the platform deck to the same level as the shelter roof when the shelter is resting on fully extended lifting legs and on the vehicle.

SRS (PRTTDCIS-3154)

The Shelter Maintenance Platform shall be equipped with stairs (manually adjustable height), with railing on at least one side, that provides access to the platform deck when the platform is extended at full height.

SRS (PRTTDCIS-3155)

The Shelter Maintenance Platform stairs at their upper/top end shall be equipped with self-closing and latching inward opening.

SRS (PRTTDCIS-3156)

The Shelter Maintenance Platform deck shall be equipped with railing mounted along the deck edge facing outwards the platform.

SRS (PRTTDCIS-3157)

The Shelter Maintenance Platform deck as well as the stairs shall form non-slip, self-draining surface.

SRS (PRTTDCIS-3158)

The Shelter Maintenance Platform shall have a load bearing capacity minimum 200 kg/m².

SRS (PRTTDCIS-3159)

The Shelter Maintenance Platform deck width shall be minimum 80 cm.

SRS (PRTTDCIS-3160)

The Shelter Maintenance Platform stairs width shall be minimum 60 cm.

SRS (PRTTDCIS-3161)

The Shelter Maintenance Platform deck railing height shall be minimum 110 cm.

SRS (PRTTDCIS-3162)

The Shelter Maintenance Platform stairs railing height shall be minimum 90 cm.

SRS (PRTTDCIS-3163)

The Shelter Maintenance Platform deck shall form a "U" shape in order to enable access to shelter roof from three (3) sides at the same time.

SRS (PRTTDCIS-3164)

The Shelter Maintenance Platform including stairs, railing and its other components shall be compliant with ISO 14122 series.

SRS (PRTTDCIS-3165)

The Shelter Maintenance Platform shall be able to withstand the same climatic and environmental conditions as the DPOP.

6.3 Trailer

6.3.1 Common Base

SRS (PRTTDCIS-2266)

The GAR-T Trailer shall support;

- Electrical power generation and/or distribution; and,
- One electrically motorized telescopic mast and associated equipment; and,
- Electrical command and control interface for the operation of all the electrical equipment (e.g. generator, masts, etc.); and,
- Ancillary equipment; and,
- Mast stabilization fixtures and accessories (e.g. guy wires, pickets, etc.).

6.3.1.1 Mechanical

SRS (PRTTDCIS-2267)

The GAR-T shall be assembled on a single two wheeled trailer.

SRS (PRTTDCIS-2268)

The maximum weight of the trailer including all installed equipment shall not exceed ~~1500~~ 2000 kg.

SRS (PRTTDCIS-2422)

The Trailer overall dimensions, weight, and axle loading shall comply with the European Traffic Regulation

SRS (PRTTDCIS-2269)

The GAR-T maximum dimensions shall fit within the same footprint as the shelter, including the allocable areas (i.e. max. LxWxH 5000mm x 2438 x 2590mm).

SRS (PRTTDCIS-2270)

The GAR-T shall be suitable for on-road and off-road traffic when towed by a range of tactical vehicles.

SRS (PRTTDCIS-2272)

The towed Trailer shall be meet following speed limits

- Road speed: ≥ 90 km/h; and,
- All terrain speed: ≥ 30 km/h.

SRS (PRTTDCIS-2273)

The Trailer shall include four mechanically operated stabilization retractable legs (two at the rear and two and the front) equipped with "bulls-eye" level systems.

SRS (PRTTDCIS-2537)

The trailer stabilization legs shall be designed to ensure sufficient stability to the trailer when its payload (Power Generator, Antenna ...) are operating or being maintained while the trailer is disconnected from the vehicle.

SRS (PRTTDCIS-2274)

The maximum installation ground slope for trailer payload operation shall be considered to be 20 degrees in any direction.

SRS (PRTTDCIS-2423)

The Trailer Towing Eye shall be compliant with NATO STANAG 4101.

SRS (PRTTDCIS-2514)

The Towing Eye shall allow the maximum possible articulation between tractor and trailer in compliance with STANAG 4101 and DIN74050.

SRS (PRTTDCIS-2421)

The Trailer shall comply with following limits

- Exit angle: ≥ 27 degree; and,
- Turning angle: ≥ 80 degree; and,
- Wading: ≥ 760 mm.

SRS (PRTTDCIS-2424)

The height above the ground level of the Trailer towing eye (trailer towing bar) shall be adjustable between 45 cm and 105 cm.

SRS (PRTTDCIS-2526)

The jockey wheel height shall be continuously adjustable when in vertical position.

SRS (PRTTDCIS-2428)

The Trailer braking systems shall be built in accordance with EEC Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009.

SRS (PRTTDCIS-2429)

The Trailer braking system shall include Anti-lock Braking System (ABS) connections.

SRS (PRTTDCIS-2430)

The trailer shall be equipped with an efficient hydraulic or compressed air braking system on all wheels and a mechanical hand-brake able to keep the fully loaded trailer in standing position on an incline of minimum 30 degrees.

SRS (PRTTDCIS-2431)

The trailer shall be equipped with tie down hooks/lugs for anchoring the equipment inside aircraft or on other transportation means during transit as well as with a set of lashing material that assure safe and secure tie down.

SRS (PRTTDCIS-3179)

The lashing straps with buckle shall be in accordance with the European Standard for lashing: EN-12195 series.

SRS (PRTTDCIS-2524)

The trailer shall be equipped with reinforced metallic mudguards and pneumatic tires designed for use on motorway as well as off-road (rough terrain).

SRS (PRTTDCIS-2432)

The Trailer tires shall be Multi-Purpose Tires (MPT) steel belted radial military.

SRS (PRTTDCIS-2507)

The tyres shall be "Run Flat" type, tread with mud and snow profile mounted on heavy duty type wheels.

SRS (PRTTDCIS-2506)

The overall trailer dimensions, weight, and axle loading shall be in accordance with the European Traffic Regulation.

SRS (PRTTDCIS-2433)

A spare wheel, with spare tire mounted on it, shall be installed on each trailer.

SRS (PRTTDCIS-2439)

The trailer shall be equipped with a retractable jockey wheel, which shall be very rigidly and safely fixed to the towing attachment.

SRS (PRTTDCIS-2440)

The jockey wheel height shall be continuously adjustable when in vertical position;

SRS (PRTTDCIS-2441)

Any trailer fixed side boards, and droppable and removable tailgate shall be equipped with restraining chains

SRS (PRTTDCIS-2442)

The Trailer shall include adequate draining holes.

SRS (PRTTDCIS-2443)

The Trailer ground clearance shall not be less than 300mm.

SRS (PRTTDCIS-2504)

Prior to delivery to and acceptance by the Purchaser, the Contractor shall adjust and service each trailer for immediate operational use, including at least the following:

- adjusting braking system; and,
- checking electrical system; and,
- inflating all tires; and,
- completely lubricating all running gear with grades of lubricants specified by the Contractor for the ambient temperature at the delivery point.

SRS (PRTTDCIS-2525)

The tires (including the spare tire) shall comply with Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009.

SRS (PRTTDCIS-2509)

Sufficient space around the wheels shall be foreseen to allow the safe operation of the trailer with tire chains.

SRS (PRTTDCIS-2508)

The spare wheel shall be easily accessible for dismounting and re-mounting by maximum two (2) staff.

SRS (PRTTDCIS-2511)

The trailer shall be fabricated from aluminium or steel, or stainless steel, or austenitic stainless steel.

SRS (PRTTDCIS-2512)

The trailer deck assembly shall have an "anti-slip" finish to support the presence and movement of personnel.

SRS (PRTTDCIS-2515)

The trailer shall be equipped with a retractable jockey wheel, which shall be very rigidly fixed to the towing attachment.

SRS (PRTTDCIS-2516)

The trailer shall be equipped with minimum 4 (four) lifting eyes for lifting with a crane and for helicopter under slung transportation.

SRS (PRTTDCIS-2517)

The Contractor shall ensure that the fully equipped trailer weight is evenly distributed.

SRS (PRTTDCIS-2527)

The longitudinal weight distribution shall be such that the trailer is easily manoeuvrable and stable on all kinds of ground.

SRS (PRTTDCIS-2528)

The fully loaded configuration of the trailer shall have the center of gravity marked with matt black color paint on its structure

SRS (PRTTDCIS-2518)

The trailer shall include operation plates and designation plates imprinted on photosensitive anodized aluminium, conforming to type H, MIL-DTL 15024F, with a matt black background.

SRS (PRTTDCIS-2530)

Plates shall be located in convenient position without creating confusion with each other.

SRS (PRTTDCIS-2531)

Plates shall include as the minimum:

- operation instructions; and,
- servicing instruction; and,
- precautionary instructions to avoid personnel injury or equipment damage (red background); and,
- emergency procedures; and,
- hydraulic schemes; and,
- characteristics; and,
- identification; and,
- serial numbers,

SRS (PRTTDCIS-2519)

The trailer shall give sufficient load on the towing hook to ensure a good road holding.

SRS (PRTTDCIS-2532)

The trailer shall be equipped with two handles at the rear and two handles at the towing attachment to facilitate movement by hand.

SRS (PRTTDCIS-2522)

The trailer suspension shall be independent progressive with a telescopic shock absorber per wheel.

6.3.1.2 Electrical

SRS (PRTTDCIS-2271)

The GAR-T trailer electric system shall be 24 V DC.

SRS (PRTTDCIS-2284)

The GAR-T shall include an electrical management system for the operation of the electrical equipment, electrical protection systems and exterior interfaces.

SRS (PRTTDCIS-2285)

The GAR-T electrical management system shall be housed in an environmentally proof cabinet with a lockable door.

SRS (PRTTDCIS-2544)

The GAR-T electrical management cabinet shall contain LED-based illumination light source with following modes:

- Turned OFF; and,
- White Light; and,
- Combat Lights.

SRS (PRTTDCIS-2545)

The GAR-T electrical management cabinet illumination light source in combat mode shall meet following characteristics:

- 625nm to 650nm wavelength; and,
- Connected to a control panel that allows combat mode On/Off which; and,
- Shall be automatically engaged and bypass White light mode when respective door is open; and,
- Powered from UPS with autonomy of at least 30 minutes; and,
- Equipped with a test button.

SRS (PRTTDCIS-2286)

The GAR-T electrical management system shall include:

- Operational indicators - green colour; and,
- Malfunction indicators - red colour; and,
- Electrical protection for equipment and operators; and,
- Mast controller system; and,
- One external power input; and,
- One external power output; and,
- An Emergency stop push-button that meets the following:
 - A Red Mushroom type push button; and,
 - Protected to prevent inadvertent operation; and,
 - With an activation that shall be possible without opening any panels, flaps, doors or any other type of covers with easy access and no obstructions; and,
 - Conforms to the following directives and standards: MD 2006/42/EC, LVD 2014/35/EU, IEC 60947-5-1:2016, IEC 60204-1:2016, ISO 13849-1:2015, IEC 60947-5-5:1997 +AMD1:2005+AMD2:2016 CSV.

SRS (PRTTDCIS-2287)

The GAR-T electrical sockets shall be as follows;

- External input electrical socket: Mennekes INB.WCD 16A 2P+Earth 230VAC IP67 SCHUKO TM or equivalent, in colour RAL 840R 6014, non-gloss or equivalent; and,
- External output electrical socket: Mennekes INB. Contact Box 16A 3P 6H 230VAC IP67 TM or equivalent, in colour RAL 840R 6014, non-gloss or equivalent.

SRS (PRTTDCIS-2425)

The trailer electrical connectors for connection to a towing vehicle shall meet requirements stipulated in STANAG 4007 edition 2.

SRS (PRTTDCIS-2523)

The lighting on the trailer shall consist of:

- normal service lighting and reflectors in accordance with Regulation (EC) No 661/2009 of the European Parliament and of the Council – Lighting and Light-signaling Devices; and,
- blackout and convoy lighting in accordance with the requirements of the latest issue of STANAG 4381.

SRS (PRTTDCIS-2534)

The trailer shall include a 12-core type connection cable to connect the trailer to the Vehicle.

SRS (PRTTDCIS-2535)

The length of the connection cable shall be such as to extend at least 500 mm beyond the towing eye.

SRS (PRTTDCIS-2536)

The cable connection plug shall be equipped with a spring-loaded metallic protective cap.

SRS (PRTTDCIS-2533)

The Trailer shall be equipped with a junction box fixed to the trailer chassis and terminated by a NATO 12-pin receptacle (socket) in accordance with STANAG 4007 edition 2.

6.3.1.3 Ancillary Equipment**SRS** (PRTTDCIS-1427)

The GAR-T shall include the following ancillary equipment;

- One (1) 6 kg dry chemical power dry powder fire extinguishers Class ABC and suitable for fires involving electronic equipment up to 1000 V mounted in such a manner that it is easily accessible from the ground; and,
- Two high intensity LED cold white light directional spotlights; and,
- One aluminum box to store equipment and accessories (e.g. cable reels, stakes, etc.), with dimensions appropriated to the available space on GAR-T; and,
- Earthing stakes in adequate size and quantities to assure effective and safe earthing, "T" shape, with threaded cone end and mechanic couplings to connect to the copper braid earthing straps; and,
- Copper braid earthing straps in adequate size and quantities to assure effective and safe earthing of at least 10 meters in length each; and,
- Two metal wheel-arresting wedges; and,
- Two snow chains; and,
- A storage box including wheel changing tools (a tire jack, lug wrench, and strong-arm bar). The box shall be designed to restrict the entry of water and the tools shall be secured in place; and,
- Aluminum plate or plates (as required) with black background with following information printed:
 - Operating instructions, emergency procedures, electrical schematics, technical characteristics, nomenclature and serial number;
 - Center of gravity marking in yellow in accordance with the colour standard mat paint RAL 1007; and,
 - Information pertaining to air (as internal cargo-load and as helicopter external load), land, maritime and railways transportation.

SRS (PRTTDCIS-3180)

The fire extinguisher shall meet requirements as stipulated in following standards:

- EN 3-7:2004+A1:2007 Portable fire extinguishers. Characteristics, performance requirements and test methods; and,
- EN 3-8:2006 Portable fire extinguishers. Additional requirements to EN 3-7 for the construction, resistance to pressure and mechanical tests for extinguishers with a maximum allowable pressure equal to or lower than 30 bar; and,
- EN 3-10:2009 Portable fire extinguishers. Provisions for evaluating the conformity of a portable fire extinguisher to EN 3-7.

SRS (PRTTDCIS-2436)

The Trailer shall be delivered with a camouflage net stored on the trailer.

SRS (PRTTDCIS-3046)

As a set together with Vehicle Camouflage Net, the nets shall cover the entire trailer and its associated Shelters, and disguise its shapes.

SRS (PRTTDCIS-3048)

The net shall be composed of disruptive patterning for the European Theatre of Operations (woodland).

SRS (PRTTDCIS-3184)

Camouflage net shall be in compliance with Allied Engineering Publication AEP-31e(1) Reference Document of Colors for Disruptive Camouflage for Military Equipment In Use In NATO.

SRS (PRTTDCIS-3185)

Camouflage net materials shall be resistant to mould growth and shall withstand limited contamination by the most relevant fungal species listed in Table 1 of AECTP 300 Edition D, version 1, test method 308 without substantial degradation. The mould growth shall manifest as no greater than 'Trace' when tested in accordance with method 308.

SRS (PRTTDCIS-3186)

Camouflage net shall be 100% waterproof and will not become logged or heavy due to wet or damp conditions.

SRS (PRTTDCIS-3187)

Camouflage net shall be UV deterioration and infra-red treated, of a non-toxic fabric, but lightweight, strong and durable.

SRS (PRTTDCIS-3188)

Camouflage net shall resemble normal foliage in natural conditions and blend into the natural surroundings while being as quiet and rustle free as possible.

SRS (PRTTDCIS-3189)

Camouflage net shall be specially coated to reduce shine and glare.

SRS (PRTTDCIS-3190)

Camouflage net shall remain pliable in the extreme environmental conditions the associated housing element is to be compliant with.

SRS (PRTTDCIS-3191)

Special flame retardant treatments shall have been applied to Camouflage net.

SRS (PRTTDCIS-3192)

Camouflage net shall be easily compressed and packed into a storage bag for ease of transportation and storage.

NOTE (PRTTDCIS-3193)

The use of lightweight modern waterproof textiles is recommended.

SRS (PRTTDCIS-3194)

Camouflage net storage bag shall be sized to allow repacking under field conditions.

SRS (PRTTDCIS-3195)

Camouflage net shall be provided with all the necessary associated equipment in order to set-up the nets over the housing element and to anchor it. This might include, but is not limited to strings, spikes, arch and bars. All shall be stored with the nets.

SRS (PRTTDCIS-3198)

TDCIS shall continue to meet all requirements (functional, technical, performance, operational, safety, environmental conditions...) while the camouflage nets are fitted on the trailers and on other pieces of equipment.

SRS (PRTTDCIS-3199)

The design of the trailer shall include any device to allow the camouflage net fitting.

SRS (PRTTDCIS-3200)

The design of the trailer shall provide space for storage of the camouflage net.

SRS (PRTTDCIS-3201)

The design of the trailer shall ensure TDCIS operation and safety shall not be affected by the camouflage net.

SRS (PRTTDCIS-2437)

The Trailer shall be delivered with a maintenance road kit including all necessary tools and spares.

SRS (PRTTDCIS-2438)

The Trailer maintenance road kit shall be stored on the trailer.

SRS (PRTTDCIS-2444)

The Trailer shall include two metal wheel arresting wedges.

6.3.1.4 Telescopic Mast**SRS** (PRTTDCIS-2291)

The GAR-T shall support one electrically operated telescopic antenna mast to support either a Beyond Line of Sight (BLOS) HF Rotating Log-periodic Antenna or two HCLOS radio systems.

SRS (PRTTDCIS-2292)

The GAR-T mast dimensions shall be measured from the ground and be:

- Height when fully retracted shall fit within the GAR-T foot print; and,
- Height when fully extended; ≥ 10.5 m.

SRS (PRTTDCIS-2293)

It shall be possible to raise and lower the GAR-T motorised telescopic mast with all equipment installed (antennas, rotors, radios adapters, cables, etc.).

SRS (PRTTDCIS-2294)

The GAR-T motorised telescopic mast shall be raised and lowered when powered by the main electrical power supply (external or generator) or when powered by the UPS (i.e. Shelter UPS or Trailer UPS for the HCLOS relay variant).

SRS (PRTTDCIS-2295)

Operation of the GAR-T motorised telescopic mast shall be possible through the use of a remote control system.

SRS (PRTTDCIS-2296)

It shall be possible to raise and lower the GAR-T motorised telescopic mast manually (i.e. in case of total power failure) by a single operator within 600 s.

SRS (PRTTDCIS-2538)

The Contractor shall include supplementary wind tie-downs in the trailer design to cater for the Climatic and Geographical Conditions GAR-T variants are to operate.

SRS (PRTTDCIS-2539)

The wind tie-downs shall be securely stored within each trailer to be deployed on set up.

SRS (PRTTDCIS-2543)

When designing the wind tie-downs, the Contractor shall keep the quantities of ground anchor points to the strict minimum necessary.

SRS (PRTTDCIS-2540)

When designing the wind tie-downs, the Contractor shall consider the trailer disconnected from any vehicle, with fully extended telescopic antenna mast and antenna mounted on it (whichever variant poses greater load when combined with wind load) in its worst-case scenario.

6.3.2 GAR-T HF Rear Link Variant**NOTE** (PRTTDCIS-2283)

The GAR-T HF Rear Link variant electrical power will be provided by the power generator system of the associated Rear Link communications shelter.

SRS (PRTTDCIS-2290)

The GAR-T HF Rear Link variant shall include an antenna positioner control panel.

SRS (PRTTDCIS-2298)

The GAR-T HF Rear Link telescopic shall support one Log-Periodic HF antenna and its positioner for angular orientation.

SRS (PRTTDCIS-2299)

The GAR-T HF Rear Link telescopic mast shall provide a structure for the installation of a Antenna Tuning unit (ATU) having the approximate dimensions:

- Installed without shock absorbers 333 x 443 x 120 mm (L x W x H), max weight 10 kg; and,
- Installed with shock absorbers 333 x 443 x 180 mm (L x W x H), max weight 14.5 kg.

SRS (PRTTDCIS-2300)

In addition to those specific in the GAR-T Common Base, the HF Rear Link variant shall include compartments to accommodate the following;

- One Log-Periodic HF antenna system (ATU, Positioner and Antenna); and,
- One reel containing a 100m RF coaxial cable terminated with N-type male plug, adequate for the RF signal between the shelter and the ATU; and,
- One reel containing a 100m power cable adequate for the GAR-T Rear Link Variant power rating.

6.3.3 GAR-T HCLOS Relay Variant

SRS (PRTTDCIS-1363)

The GAR-T HCLOS Relay variant design shall adhere to the design concept presented in following figure:

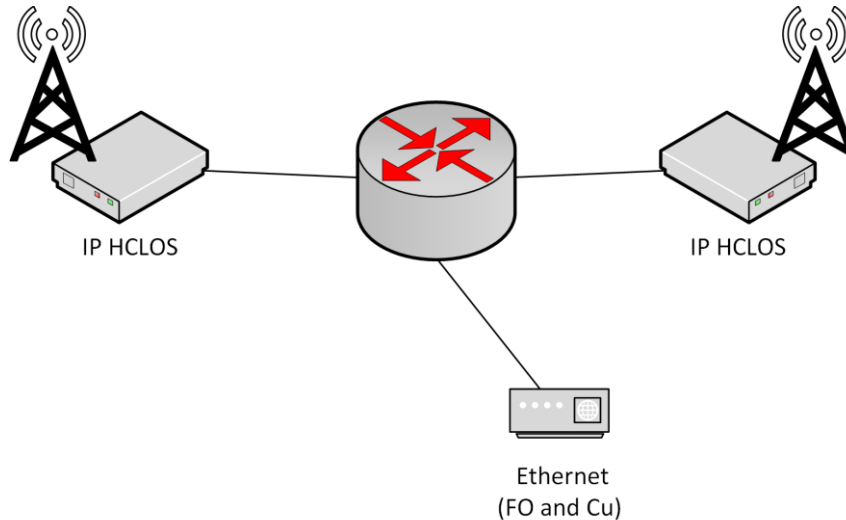


Figure 74 - GAR-T HCLOS Relay design concept.

SRS (PRTTDCIS-2302)

The GAR-T HCLOS Relay variant shall be built by two (2) HCLOS radios systems, mounted on a GAR-T autonomous trailer.

SRS (PRTTDCIS-2303)

The GAR-T HCLOS Relay shall route the IP traffic from one (receiving) HCLOS radio to the other (relaying) HCLOS radio when used as a relay.

SRS (PRTTDCIS-2304)

The GAR-T HCLOS Relay shall route the IP traffic from nodes to nodes over a maximum of two HCLOS links when used in Enabling or Augmenting Node HCLOS capacity configuration.

SRS (PRTTDCIS-2305)

The HCLOS routing function shall provide basic connectivity to the TDCIS Nodes through:

- Two (2) 1 Gbps *Eth-FO* interfaces, and
- Two (2) 1 Gbps *Eth-Cu* interfaces.

SRS (PRTTDCIS-2301)

The GAR-T HCLOS Relay telescopic mast shall support two HCLOS Radio Systems.

SRS (PRTTDCIS-2297)

In addition to those specified in the GAR-T Common Base, the HCLOS relay variant shall support compartments to accommodate the following;

- Two HCLOS Radio systems (antennas, radios, rotors, fixing/installing equipment); and,
- Associated installation cable reels (power, data) for two HCLOS radio systems.

SRS (PRTTDCIS-3038)

The GAR-T HCLOS Relay shall include a portable Spectrum Analyzer suited to Bearer specifications to perform trouble shooting activities.

SRS (PRTTDCIS-3039)

The GAR-T HCLOS Relay, when used as a relay, shall support working in isolation of any TDCIS Node.

6.3.3.1 Electrical Distribution**SRS (PRTTDCIS-2288)**

In addition to the GAR-T common base, the HCLOS Relay variant electric management system shall also include:

- Power generator supervisory and control system; and,
- Measurement instruments (volt meters, amp meters, frequency meter).

SRS (PRTTDCIS-2289)

The GAR-T HCLOS relay variant electrical command and control panel shall support provisions (e.g. cover) to “blackout” the command and control system indicators.

6.3.3.2 Power Generator Unit**SRS (PRTTDCIS-2275)**

The GAR-T HCLOS relay variant shall include a PGU.

SRS (PRTTDCIS-2276)

The GAR-T HCLOS relay variant PGU shall be capable of providing sufficient power to all the GAR-T HCLOS relay variant systems including the electrical generator starter battery and GAR-T UPS battery banks for a minimum period of up to 24 hours on one full fuel tank.

SRS (PRTTDCIS-2278)

The GAR-T HCLOS relay variant power generator unit shall include:

- Digital command panel; and,
- Battery charger; and,
- Starter protection; and,
- Electronic voltage stabilization.

SRS (PRTTDCIS-2279)

The GAR-T HCLOS relay variant electrical generator system noise level (dB) shall be \leq 55/65/70 at distance (m) of 7/5/3 respectively.

SRS (PRTTDCIS-2445)

Jerry Cans to refuel the power generator shall be included and stored on the Trailer.

SRS (PRTTDCIS-2447)

The Trailer shall include enough Jerry Cans to withstand two (2) PGU full Fuel tank refill.

6.3.3.3 Uninterruptible Power Supply

SRS (PRTTDCIS-2280)

The GAR-T HCLOS relay variant shall include a UPS battery system.

SRS (PRTTDCIS-2281)

The GAR-T HCLOS relay variant UPS battery system shall be charged by the power generator or the external power input.

SRS (PRTTDCIS-2282)

The GAR-T HCLOS relay variant UPS battery system shall be capable of providing sufficient power to operate all the equipment (i.e. radio system, masts, lighting, auxiliary equipment, etc.) for a period of 12 hours.

6.4 Casing

6.4.1 Transit Cases

NOTE (PRTTDCIS-2382)

Transit Case is the term used to denote those cases carrying active CIS equipment (including cryptographic devices) integrated in 19in rack chassis frames. Transit Case components include the shell or housing (e.g. latches, covers, power and signal external terminal boards).

SRS (PRTTDCIS-2318)

The components making the CIS Module shall be integrated in 19in frames, mounted in transit cases.

SRS (PRTTDCIS-2780)

For Access BoB only, the contractor shall aim for the smallest and lightest possible transit case integration possible and is authorized to ignore the 19in rack transit case dimensioning constraint.

SRS (PRTTDCIS-2319)

The complete assembly of components and transit case shall meet the Climatic and Environmental requirements of the CIS module it houses.

SRS (PRTTDCIS-2320)

Dependent on the intrinsic mechanical hardening of the components inside the transit case, shock absorbers mechanically isolating the frame in the transit case shall be introduced.

SRS (PRTTDCIS-2322)

Transit Cases, fully assembled and enclosed ready for transport, shall not exceed the external sizes and weights as specified in following table, including lids.

Case Size	Maximum Width x Height x Depth	Maximum Weight
SMALL	60 x 25 x 50 cm	30 kg
MEDIUM	65 x 45 x 65 cm	50 kg

Table 32 - Transit cases maximum size and weights.

SRS (PRTTDCIS-2323)

Any environmental control units that can be coupled to the transit cases are not included in the limits above. Any transport cases required to carry or store those units when not in use shall not exceed the limits specified for the small cases in the table above.

SRS (PRTTDCIS-2324)

Once the active components in the transit cases are configured for a given security classification, their affiliation to the security domain shall be visually identifiable through the use of coloured tags in line with security domain color scheme. These tags shall be firmly attached to the surface of the cases, to avoid accidental removal.

NOTE (PRTTDCIS-2325)

Upon removal of the configuration, and sanitation of non-volatile storage from the active elements, the security domain tags will be removed.

SRS (PRTTDCIS-2326)

The transit cases shall be of a welded frame construction, stackable and equipped with lifting handles, auto pressure release valves, and humidity indicators.

SRS (PRTTDCIS-2327)

The transit cases shall be equipped with handles and removable or retractable casters to allow easy handling.

SRS (PRTTDCIS-2328)

The components in a transit case shall be mounted on shock absorbers and vibration dampers, or otherwise hardened, such that the transit case with mounted components as a whole meets the transport condition specifications.

SRS (PRTTDCIS-2329)

Transit cases shall implement 19in racks chassis frames, mounted into the outer casing of the cases in ways such that the electronic equipment is appropriately protected against shock and vibration and the transit case and mounted components as a whole meets the transport conditions specifications.

SRS (PRTTDCIS-2330)

Unless stated otherwise, Transit cases shall all be equipped with a Connectorized Front Panel (CFP).

SRS (PRTTDCIS-2331)

The CFP shall be removable for maintenance or for re-patching of connectors to equipment ports by the Purchaser, without assistance from the Contractor.

SRS (PRTTDCIS-2332)

The CFP shall include signal and power interfaces presented on a front panel that is fixed to the Transit case.

SRS (PRTTDCIS-2333)

CFP shall be protected by a removable lid for transport and storage.

SRS (PRTTDCIS-2334)

Any EMC/EMI protection in the form of panels shall allow air to flow through.

SRS (PRTTDCIS-2335)

The 19in rack chassis frame shall be accessible from all sides to allow maintenance on the enclosed equipment.

SRS (PRTTDCIS-2336)

Each Transit case shall implement a pressure release valve and humidity indicator.

SRS (PRTTDCIS-2337)

Pressure release valves shall avoid also soaking water into the case. This can occur for example (but not only) due to the negative pressure when a case is rapidly cooled down during rain after being exposed long to the sun.

SRS (PRTTDCIS-2338)

Each Transit case shall implement heavy duty handles (minimum of four for cases heavier than 40 kg).

SRS (PRTTDCIS-2339)

Each Transit case shall implement a re-settable and re-usable device to detect shocks and tilt, including the direction and angle of impact.

SRS (PRTTDCIS-2340)

Transit Cases packed for transport shall be capable of being transported via road, rail, sea, and air transport.

SRS (PRTTDCIS-2341)

Transit Cases shall be capable of being secured to anchor points to prevent theft and movement in order to avoid damage during transportation.

SRS (PRTTDCIS-2342)

For Road Transport, Transit Cases, transported in the shelter of the node it supports, shall support all roads (motorway, unpaved road and country road) without sustaining any damage (for example due to shock or vibrations).

SRS (PRTTDCIS-2343)

For Rail Transport, Transit Cases, transported in the shelter of the node it supports, shall be capable of withstanding, without damage, the shocks and vibrations normally induced by rail transport.

SRS (PRTTDCIS-2344)

For Sea Transport, Transit Cases shall be transportable under deck of freighters suitable for container transport and an authorised technical surveillance authority shall certify the compliance with the requirements for sea transport (ISO 1496-1).

SRS (PRTTDCIS-2345)

For Air Transport, Transit Cases, transported in the shelter of the node it supports, shall be capable of being loaded into and transported by military transport aircraft.

SRS (PRTTDCIS-2348)

The racks shall be mounted with shock and vibration dampers and sliding bases, as required, to allow easy maintenance. Vibration damping shall be selected in accordance with the weight range to be expected.

SRS (PRTTDCIS-2349)

Transit cases shall be stackable on Standard Euro Pallets (EUR 1, 1,200 by 800 by 144 millimetres) not exceeding these dimensions.

SRS (PRTTDCIS-2350)

Any removable EMC protection to the CIS Modules transit cases shall count against the maximum weight for the specified transit case and shall be carried for transport within the transit case.

6.4.2 Transit Case Cooling**NOTE** (PRTTDCIS-2351)

Heating, Ventilation and Air Conditioning (HVAC) elements are intended to maintain the controlled elements within adequate temperature margins, independently from the external climatic and environmental conditions. Transit Cases housing CIS elements may require an additional Environmental Control Unit (ECU) to meet their environmental endurance targets.

SRS (PRTTDCIS-2380)

ECU extension for Transit Case shall only be implemented if necessary. i.e. if CIS elements integrated in the Transit Case meet the environmental endurance target, no additional ECU shall be required.

SRS (PRTTDCIS-2352)

Sizing of any environmental control element shall be done according to the climatic and environmental conditions the Transit Case it supports has to meet.

SRS (PRTTDCIS-2353)

Any forced airflow cooled CIS components subject to integration in transit cases shall be cooled with front-to-back airflows. This shall allow stacking equipment without top or bottom clearance, therefore reducing the required rack space in transit cases.

SRS (PRTTDCIS-2354)

All transit cases, when operated in a temperature controlled environment, shall not require any active cooling elements to be integrated in the case, other than fans or other heat exchange mechanisms.

SRS (PRTTDCIS-2355)

Unless stated otherwise, all transit cases shall be fitted for the use of external Environmental Control Units (ECU) attached to the case, as a cooling lid, powered through the power distribution element of the transit case.

SRS (PRTTDCIS-2356)

The use of ECU shall be compatible with and shall not alter the TEMPEST compliance.

SRS (PRTTDCIS-2357)

The installation and operation of ECUs on transit cases shall be compatible with SDIP 27 Level B requirements specified in this SRS.

SRS (PRTTDCIS-2358)

It shall be possible to couple and de-couple the ECUs from the transit cases, based on need.

SRS (PRTTDCIS-2359)

ECU shall be interchangeable between cases of the same size.

6.4.3 Transport Cases

NOTE (PRTTDCIS-2381)

Transport Case is the term used to denote those cases carrying equipment not installed in 19in rack chassis frames. Transport Cases contains padding or shock-absorbing material to carry components or user appliances.

SRS (PRTTDCIS-2360)

Transport Cases shall be stackable. The stacks shall be secure through the use of interlocks or equivalent mechanisms.

SRS (PRTTDCIS-2361)

Transport Cases shall be protected against ingress of particles and liquids at IP65 or higher.

SRS (PRTTDCIS-2362)

Transport Cases shall feature heavy duty handles (minimum of four for cases heavier than 40 kg).

SRS (PRTTDCIS-2363)

Transport Cases shall contain pressure release valves and humidity indicators.

SRS (PRTTDCIS-2364)

Pressure release valves shall avoid also soaking water into the case. This can occur for example (but not only) due to the negative pressure when a case is rapidly cooled down during rain after being exposed long to the sun.

SRS (PRTTDCIS-2365)

Each Transit case shall implement a re-settable and re-usable device to detect shocks and tilt, including the direction and angle of impact.

SRS (PRTTDCIS-2366)

Transport cases shall be stackable on Standard Euro Pallets (EUR 1, 1,200 by 800 by 144 millimetres) not exceeding these dimensions.

6.4.4 Material Handling Equipment (MHE)

NOTE (PRTTDCIS-2367)

The DPOP will need to be set up in different operational scenarios. Therefore different assets for material handling and installation are required.

SRS (PRTTDCIS-2368)

A total of 4 carrying poles shall be provided, per Node, for lifting and transporting transit cases or transport cases. The carrying poles shall be dimensioned to allow adequate and normative weight distribution (0 to 25 kg one man lift, 26 to 50kg 2 man lift, 51 to 100 kg 4 man lift).

SRS (PRTTDCIS-2369)

A total of 8 carrying pole slings shall be provided, per DPOP. The carrying slings shall be dimensioned individually to carry the heaviest equipment of the DPOP.

SRS (PRTTDCIS-2370)

The carrying pole slings shall be sewed textile slings long enough to tie a "girth hitch" around the handle or frame of the equipment to lift and insert the carrying pole through the carrying loop.