

ANNEX 1.1 TO THE TECHNICAL OFFER

Response to the special requirements in the task book

Project: ROMD00495 "Cross-Border Interconnected Mobile Networks for Education and Innovation"
(CONNECTINNO)

Contract: Hybrid private 5G network solution (local UPF)

This annex complements the main technical offer and describes how the proposed solution addresses UTM's special requirements regarding: technology evolution, implementation plan and timeline, project governance, implementation and operations team, preventive and corrective monitoring, detailed SLAs, reporting, 2-year operational support and the training program for the use of private 5G network functionalities.

1. Proposed technical solution

The proposed solution is based on a SHNPN 5G SA architecture, with a locally deployed simplex Nokia UPF, interconnected with the Nokia CMU 5G SA core in the Future Networks Bucharest laboratory and with the infrastructure of the Iasi laboratory through standard 3GPP interfaces as showcased in Figure 1. This interconnection will dictate the performance and future compatibility of the UTM network with the desired use cases and applications to be implemented, the end-to-end system being limited to the Bucharest Future Networks laboratory features and resources. The local transport network is based on one Cisco Nexus 93180YC-FX switch, integrated in an IPFABRIC paradigm with the Bucharest lab and interconnected with the UPF through BGP. For indoor radio access, an Ericsson solution composed of BB6631, IRU 1648, Radio Dot 4479 and Power 6309 rectifier is proposed, dimensioned to cover a 100 m² area.

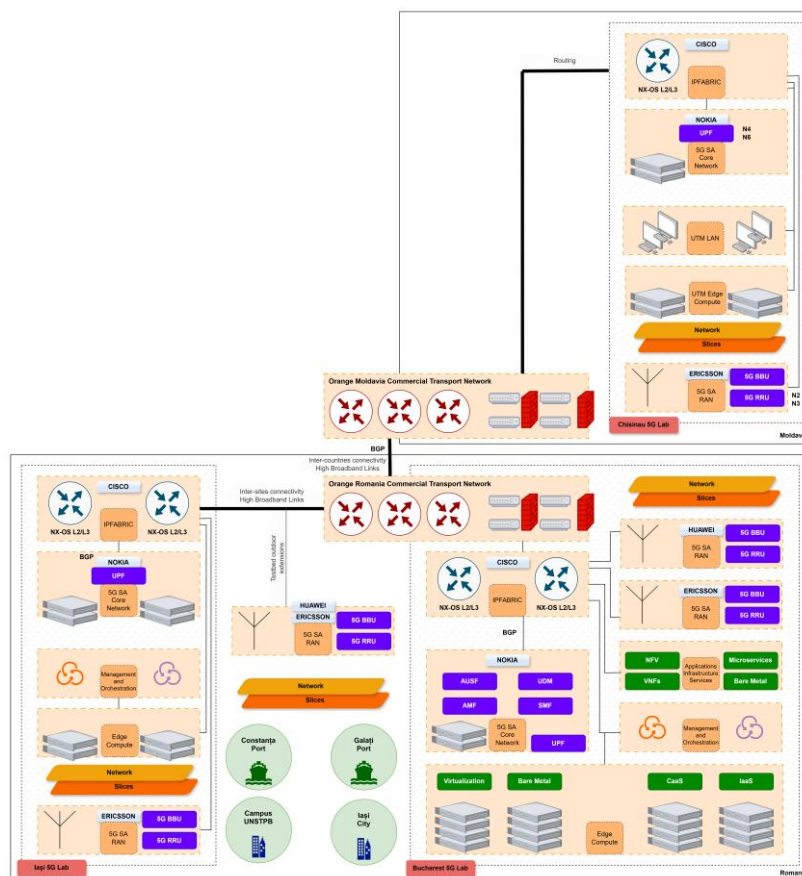


Figure 1. UTM 5G SA SHNPN architecture

1.1 Compliance matrix

Requirement from the task book	Task book reference	Response in this annex
Implementation Gantt chart	5.1.1 / 5.1.2 / 6.2.2	Section 2 – implementation plan, milestones, resources and acceptance conditions
Collaboration and reporting framework	4.1 / 6.2 / 6.2.2	Section 3 – governance model, working framework, reports and committees
Implementation and operations team	6.2.1 / 6.2.2	Section 4 – roles, responsibilities, profiles and availability
Preventive and corrective monitoring	6.1	Section 5 – monitoring, maintenance, working windows, change management
SLA and incident management	6.3.1–6.3.3	Section 6 – dedicated channel, incident classification, response times and operational KPIs
Network usage training	6.4	Section 7 – curriculum, organization, deliverables and delivery timeframe
2-year software support and upgrades	1.2.1 -1.2.2 from „4. List of requested goods/services” table / 5.1.2	Section 8 – lifecycle support, patching, major/minor upgrades and laboratory validation

2. Implementation plan and timeline

The implementation will be structured so that the Operation phase starts no later than the seventh month after the contract enters into force, in line with UTM requirements. Within the first 30 calendar days after contract activation, the schedule of periodic meetings will be agreed and after installation is completed the technical and operational acceptance protocol will be executed.

2.1 Stages, durations and deliverables

Stage	Estimated duration	Main activities	Deliverables
T0 Kick-off	Week 1	Contractual kick-off, collection of input data, team assignment, meetings calendar, access to sites, equipment orders	Kick-off minutes; RACI matrix
T1 5G RAN coverage activation	Months 1-2	Indoor radio survey, validation of equipment placement, IP network design for RAN, power and cabling plan, 5G RAN equipment installation and cell activation over the Bucharest Future Networks laboratory 5G Core infrastructure	5G RAN survey, installation and cell activation; radio coverage available within 2 months
T2 Supply, HLD/LLD and UPF preparation	Months 1-4	Equipment supply, HLD/LLD preparation for the UPF deployment, definition of SIM profiles, migration plan for commissioning	HLD, LLD, SIM profiles definition; equipment delivery status
T3 UPF installation and integration	Months 5-6	Installation of UPF and L2/L3 switch, interconnection between UTM and Future Networks laboratories, activation of basic services; N2/N3/N4/N6 connectivity	First integration results
T4 Testing, optimization	Month 7	Functional, performance and coverage tests; optimizations; quantitative and qualitative acceptance	Performance test results; acceptance report

Stage	Estimated duration	Main activities	Deliverables
and acceptance			
T5 Training	Within 40 working days after final acceptance	Handover of documentation and training sessions delivered remotely, in one or two sessions	Manuals and training completed
T6 Operation	Months 7-24	Operation, maintenance, SLA management, reporting, approved changes and upgrades	Reports

2.2 Proposed Gantt chart

Activity	M1	M2	M3	M4	M5	M6	M7
Kick-off, requirements collection and 5G RAN activation							
Supply, HLD/LLD and UPF preparation							
UPF installation and integration							
Testing and optimization							
Acceptance and training							

Installation and commissioning timeframe depends on Hardware delivery lead time.

3. Governance, collaboration and reporting

The proposed operating model combines a formal governance framework, with clear responsibilities and defined escalations, and an operational framework based on regular meetings, periodic reports and change control.

3.1 Meetings and committees

Considerations:

- Kick-off meeting at the start of the project to confirm objectives, dependencies and schedule
- Monthly technical meetings during implementation to track activities, risks and blockers
- Quarterly operational committee during service operation to review SLA, KPIs, incidents, changes and preventive actions
- Semi-annual management review for contractual compliance, evolution roadmap and improvement initiatives

3.2 Reports and delivery documents

Considerations:

- HLD/LLD document and interface matrix (N2/N3/N4/N6, LAN/WAN, BGP configuration/VLANs/VRFs)
- Radio survey report and final indoor equipment placement plan

4. Implementation and operations team

The proposed team complies with the minimum qualification requirements in the terms of reference and covers all necessary disciplines: project management, Core/UPF, IP transport, RAN, operations, support and training. The structure below is an operational one; the nomination of named persons and the supporting documents will be attached to the tender documentation, in line with the procedure requirements.

Role	Main responsibilities	Dominant phase	Availability	Remarks
Contract Manager	Strategic leadership, contractual relationship, semi-annual SLA reviews and escalations	Implementation + Operation	On demand / monthly	Higher education; PM certification; min. 3 years of general experience; experience in a similar project
Core/UPF Expert	Staging and integration of Nokia CMG/CMU, N4/N6, policy/QoS, subscriber profiles, upgrades	Implementation	Planned	5GC / UPF / CNF-NFV expertise
IP Transport Architect	IP design, BGP, VLAN/VRF, Cisco Nexus integration in IPFABRIC, redundancy and troubleshooting	Implementation + Operation	Planned	DC/IP fabric and L2/L3 switching expertise
RAN Expert	Survey, radio parameterization, BBU-IRU-DOT integration, coverage and capacity optimization	Implementation	Planned	Experience in indoor 5G / DAS / Dot systems
Field Engineer	Physical installation, cabling, labelling, acceptance, as-built	Implementation	On-site	Installation qualifications

5. Preventive and corrective monitoring; change management

The service will be monitored, primarily from the tenderer's locations, with controlled access to the UTM infrastructure for interventions requiring on-site presence. Planned maintenance will be carried out only in maintenance windows agreed and authorized by UTM, outside the laboratory's normal working hours.

5.1 Proposed operating model

Considerations:

- Supervision of the core, transport and radio elements: alarms, interface status, availability, load, throughput, latency, QoS and security events
- Alarm correlation and service dashboards for early identification of degradations before major incidents occur
- Remote intervention as the default option; on-site intervention when physical remediation or local measurements are required
- Change management through RFC, impact assessment, approved window, post-change validation and documented rollback
- Update of the operational documentation after each relevant configuration, software version or topology change

5.2 Tools and capabilities used

Considerations:

- Nokia platforms for fault, configuration, accounting, performance and security management for CMG/UPF
- Management and health monitoring interfaces for Nokia and Cisco equipment; operational dashboards and aggregated metrics

- Transport observability through NX-OS / IP fabric, including BGP state, ports, utilization and failover events

6. Detailed SLA, incident management and operational KPIs

The communication channel for support and incidents will be a dedicated one, with direct human involvement through the Contract Manager and the support team. The tStop time applies only to cases where resolution is blocked by causes external to the tenderer, according to the task book methodology.

6.1 Incident classification and committed times

Priority	Incident type	Operational description	Max. response time	Max. resolution time
P1	Critical	Total hybrid private 5G network failure / total service unavailability for the components deployed within the scope of this task book (local UPF, RAN and L2/L3 networking equipment)	< 8 hours	< 24 hours
P2	Serious	Partial hybrid private 5G network failure / partial service unavailability for the components deployed within the scope of this task book	< 12 hours	< 48 hours
P3	Minor	All other situations, including limited degradations, non-critical defects and remediation requests without major impact	< 16 hours	< 96 hours

6.2 Technical support and clarifications

Indicator	Description	Max. response time	Max. resolution time
Clarification / consultancy request	Technical consultations or change proposals submitted by UTM regarding the hybrid private 5G network	< 14 business days	< 28 business days
Standard planned change	Agreed configuration change, without critical impact, executed in an approved window	according to the approved plan	according to the approved plan

6.3 Availability and performance KPIs

KPI	Measurement method / remarks	Periodicity	Commitment
Transport + Core availability	Availability of the locally deployed UPF and L2/L3 IP network equipment, independent of the peering with the Bucharest Future Networks laboratory	Monthly, within normal working hours (Monday-Friday, 9-17)	≥ 90%

KPI	Measurement method / remarks	Periodicity	Commitment
Radio availability	Availability of the indoor radio station dedicated to UTM	Monthly, within normal working hours (Monday-Friday, 9-17)	≥ 90%
Maximum DL/UL speed	Measurement in the laboratory with a single active user and radio resources reserved for UTM	Monthly, within normal working hours (Monday-Friday, 9-17)	DL ≥ 100 Mbps; UL ≥ 20 Mbps
Reference speed for 95% of users	Compliance with the user experience level across the entire covered area	At acceptance and periodic campaigns	DL ≥ 50 Mbps; UL ≥ 10 Mbps
Latency	Measurement for small packets under normal operating conditions	Monthly, within normal working hours (Monday-Friday, 9-17)	< 50 ms

6.4 Escalation flow

Levels of support:

- Level 1 – Service Desk: incident intake, triage, validation, ticket opening, UTM notification
- Level 2 – subject-matter expert (Core/IP/RAN): technical analysis, remote remediation or scheduling of on-site intervention
- Level 3 and 4 – Contract Manager: cross-functional coordination, communication with UTM, operational decision and risk control, strategic escalation, contractual impact, corrective actions and possible exceptions

7. Training plan for the use of network functionalities

The training program will be completed within a maximum of 40 working days from the final quantitative and qualitative acceptance of the network, and may be delivered remotely, in one or two sessions, so as not to affect UTM activities.

Module	Minimum content	Duration	Format	Deliverables
M1 Solution architecture	Hardware/software components, functional roles, E2E topology, integration with UTM and Future Networks	2 h	Remote / live	Slide deck, meeting recording

Module	Minimum content	Duration	Format	Deliverables
M2 Basic configuration and SIM management	SIM lifecycle management, activation/deactivation, profiles and basic examples of service and equipment configuration	2 h	Remote / live	Operator guide, configuration examples/templates
M3 Basic troubleshooting	Routine checks, alarm interpretation, KPI verification, incident opening	1 h	Remote / live	Support guide
M4 Advanced functions	Concepts related to slicing, QoS, edge integration / use cases	2 h	Remote / live	Slide deck, meeting recording

8. Support services and software upgrades for 2 years

Throughout the 24-month contractual support period, support, maintenance and lifecycle management services will be provided for the UPF, the local IP transport and the indoor radio equipment. The services include operational support, patching, fixes, relevant minor and major software versions, as well as updates required to preserve compatibility with the Future Networks ecosystem.

Considerations:

- Security updates and critical patches will be prioritized according to severity and impact
- Major software versions will be introduced after compatibility validation and functional testing, preferably in the Future Networks laboratories before being applied at UTM
- Each upgrade will be accompanied by an execution plan, impact assessment, pre-/post-change checks and rollback
- The documentation will be updated after each relevant version or configuration change if needed

Regards,

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