ANNEX II + III: TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

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

Contract title: *Hybrid Private 5G Network Extension (local UPF)*

MTender ID: ocds-b3wdp1-MD-1781161220358

NAME OF TENDERER: I.M. „Orange Moldova” S.A.

Columns 1-3 should be completed by the contracting authority
Columns 4-5 should be completed by the tenderer

Annex III - the contractor's technical offer

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offered specifications.

1. Item number	2. CPV code	3. Specifications required		4. The models offered / Country of origin	5. Specifications offered
LOT 1: Technical solution for private 5G UTM hybrid network					
1.1 Network equipment					
1.1.1	32524000-2	**5G UPF system, including accessories and installation materials (1 pcs.)**	**Technical solution that implements the 5G network service – User Plane Function (UPF) – as part of a Standalone Hybrid Non-Public Network (SHNPN) architecture, fully compliant with 3GPP Release 16 (and upward compatible).** The solution must be **virtualized (NFV)**, implement **Service Based Architecture (SBA)**, **network slicing**, and **Local BreakOut (LBO)**. **It includes:** • The distributed UPF deployed in UTM's data center rack; • Necessary networking equipment (L2/L3 routing/switching with **min. 1 × 10 Gbps SFP+ port** for LAN interconnection); • Accessories and installation materials; • Full integration with the central 5GC of the Future Networks laboratories in Bucharest (UNSTPB) and Iași (TUIASI) via **N3, N4, and N6 interfaces**. **Key features:**	1 x Nokia 5G UPF 1 x Nokia 5G UPF software - NF-5G PMR UPF B2B SW 1 x Cisco L2/L3 switch - Nexus 93180YC-FX **Manufacturer origin:** Nokia - Finland Cisco - USA	**Architecture:** End-to-end SHNPN 5G SA solution compliant with 3GPP Release 16 and upward compatible, using a distributed Nokia local UPF deployed for UTM private traffic and Local BreakOut operation. **Deployment scope:** The distributed UPF will be deployed in the UTM data-center rack and integrated with the UTM local network, LAN/WAN and Internet access through the N6 interface and the agreed Future Networks VPN/MPLS or dedicated L2/L3 connectivity. **Virtualization and 5GC integration:** NFV/CNF-based UPF function integrated with the central Nokia 5GC of the Future Networks laboratories in Bucharest (UNSTPB) and Iasi (TUIASI). Service Based Architecture, subscriber/SIM management, slicing profiles and policy control are supported through the central 5GC components. **Interfaces and transport:** N3, N4 and N6 are provided on the local UPF; N1/N2 are supported end-to-end

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			• Support for **minimum 50 simultaneous users**; • **SIM management platform** (activation/deactivation of SIM cards); • **N6 interface** to UTM LAN/WAN and Internet (via Future Networks labs VPN/MPLS or dedicated L2/L3 connectivity); • Guaranteed minimum performance: **≥ 100 Mbps DL / ≥ 20 Mbps UL** peak per user (under ideal conditions), reference speeds **≥ 50 Mbps DL / ≥ 10 Mbps UL**, latency **< 50 ms**; • Compliant with **ENISA 5G Security Toolbox**. The UPF must ensure secure, high-performance routing of private traffic to UTM equipment and servers while maintaining full interoperability with the partner laboratories' 5G infrastructure.		through the gNodeB and central 5GC architecture. The Cisco L2/L3 switch provides SFP+ transport connectivity, with at least 1 x 10 Gbps SFP+ LAN interconnection and capability for 2 x 10/25GE SFP+/SFP28 interconnection, MTU >= 1500 bytes, routing/switching and BGP/IP fabric integration as required. **Capacity and performance:** Supports at least 50 simultaneous users and private MEC/server interconnection. Offered performance targets meet the Task Book requirements: peak DL >= 100 Mbps, peak UL >= 20 Mbps, reference DL >= 50 Mbps, reference UL >= 10 Mbps and latency < 50 ms under the stated radio and transport conditions. **Security:** The solution will be configured in line with the ENISA 5G Security Toolbox principles: traffic separation, secure 5GC interworking, controlled management access, logging, configuration backup, patching and maintenance under agreed windows.

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1.1.2	32524000-2	**5G gNodeB radio system, including accessories and installation materials (1 pcs.)**	Dedicated indoor 5G SA radio solution (pico-cell / small-cell or equivalent) compliant with **3GPP Release 16** (and upward compatible), designed to provide reliable coverage over a **100 m² laboratory room** at UTM. The solution must ensure: • Dedicated radio resources of **minimum 20 MHz** in the **3.4–3.8 GHz TDD band** (exclusively reserved for UTM, with possibility of expansion up to 100 MHz); • Support for a **minimum of 50 simultaneous users**; • Full integration with the local UPF (via **N3 interface**) and with the central 5GC of the Future Networks laboratories in Bucharest (UNSTPB) and Iași (TUIASI) via **N1 and N2 interfaces**; • All necessary accessories, power and data cables, optical fibers, and installation materials. **Performance requirements:** • Maximum DL throughput: ≥ **100 Mbps** (single user, ideal conditions); • Maximum UL throughput: ≥ **20 Mbps**;	1 x Ericsson baseband unit (BBU) BB6631 1 x Ericsson indoor radio unit (IRU) 1648 1 x Ericsson Dot 4479 B78K 1 x Ericsson Power 6309 rectifier **Manufacturer origin:** Ericsson - Sweden	**Architecture:** Indoor 5G NR SA RAN based on Ericsson BB6631 BBU + IRU 1648 + Dot 4479 B78K with Power 6309 rectifier, compliant with 3GPP Release 16 and upward compatible. **Coverage and spectrum:** Dedicated indoor coverage for the selected 100 m2 UTM laboratory room. Final Dot placement and configuration will be validated through an indoor radio survey. The offered configuration uses dedicated Orange Moldova spectrum of minimum 20 MHz in the 3.4-3.8 GHz TDD/n78 range, with roadmap expansion up to 100 MHz subject to spectrum availability and project approval. The RTU licenses for ecquipment's operation within Orange Moldova spectrum band are not transferable. **Integration:** The gNodeB will be connected to the local L2/L3 transport and integrated with the local UPF through N3, while N1/N2 control-plane integration is provided with the central Future Networks 5GC in Bucharest and Iasi.

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			• Reference DL speed (95th percentile): **≥ 50 Mbps**; • Reference UL speed (95th percentile): **≥ 10 Mbps**; • Latency: **< 50 ms**. The radio system must be fully integrated into the **SHNPN** hybrid private 5G architecture and deliver the performance levels specified in the Task Book.		**Accessories and installation:** The offer includes the required power, data and optical cabling, installation materials, rack/indoor mounting accessories, configuration and commissioning activities. **Capacity and KPIs:** Supports minimum 50 simultaneous users. Offered KPI targets comply with the Task Book: peak DL throughput >= 100 Mbps, peak UL throughput >= 20 Mbps, 95th percentile DL >= 50 Mbps, 95th percentile UL >= 10 Mbps and latency < 50 ms. **Scalability:** IRU 1648 and BBU BB6631 support expansion with additional radio Dots, allowing extension to two additional rooms and future interworking with outdoor 5G SA coverage solutions.
1.1.3	32524000-2	**SIM cards for the hybrid private 5G UTM network (20 pcs.)**	5G SA compatible SIM cards (USIM) provisioned in the UTM hybrid private 5G network as part of the **SHNPN** architecture. The SIM cards must be: • Fully compatible with **5G Standalone (SA)** technology and 3GPP Release 16; • Provisioned and integrated into the hybrid private 5G network with	20 x Sysmocom sysmoISIM-SJA5 5G SA UICC / SIM cards **Manufacturer origin:** Sysmocom - Germany	**Scope:** 20 physical 5G SA UICC/USIM cards provisioned for the UTM hybrid private 5G network profile and integrated with the Future Networks 5GC in Bucharest and Iasi. **Compatibility:** Compatible with 5G Standalone technology, 3GPP Release 16, the offered Ericsson/Nokia SHNPN architecture, network slicing profiles and local breakout operation.

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			connectivity to the Future Networks laboratories in Bucharest and Iași; • Delivered in the physical format requested by UTM (MiniSIM, MicroSIM, or NanoSIM). The exact quantity per format will be specified by UTM during the implementation phase. **Additional requirements:** • The offer includes a **dedicated SIM management platform** allowing activation, deactivation, provisioning, and full lifecycle management of the SIM cards throughout the entire project duration (implementation + 2 years of support); • All necessary procedures for activation, management, and support of the SIM cards must be provided both during the implementation phase and during the exploitation phase.		**Physical formats:** Delivered in the format requested by UTM during implementation: MiniSIM, MicroSIM, NanoSIM or triple-cut format. **SIM management platform:** Activation, deactivation, subscriber provisioning, profile assignment and lifecycle management will be performed through the management platform for the implementation phase and the 2-year exploitation/support period. **Procedures:** Operational procedures will be provided for activation, suspension/reactivation, replacement, decommissioning and basic troubleshooting of the UTM SIM card fleet.
1.2.1	32524000-2	**Annual support services for 5G UPF (2 years)**	**Technical description:** Full support, maintenance, and software upgrade services for the deployed **5G UPF system**, associated networking equipment (L2/L3 transport), and related Core components installed at	Orange engineering O&M UPF HW/SW maintenance UPF software update and upgrade services	**Service term:** 24 months support for the deployed Nokia local UPF, Cisco L2/L3 transport equipment and related integration with the central Future Networks 5GC and UTM network. **Included services:** Preventive and corrective maintenance, 24x7 network

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			UTM, for a period of **2 years** (Exploitation Phase). The services must include: • **Preventive and corrective maintenance**, 24×7 network surveillance and monitoring; • **Incident management** according to the SLA defined in the Task Book (Section 6.3); • **Technical support** (remote and on-site as required); • **Performance monitoring** (throughput, latency, availability); • **Software updates** and upgrades to ensure compatibility with future 3GPP releases; • **Security maintenance** in accordance with the **ENISA 5G Security Toolbox**; • Project management, periodic reporting, coordination meetings, and governance activities with UTM. **SLA Compliance (key indicators):** • **Transport & Core network availability**: ≥ 90% monthly (within normal working hours); • **P1 (Critical) incident**: Acknowledgement < 8 hours, Resolution < 24 hours;	Cisco transport equipment support **Service origin:** Republic of Moldova, Romania + vendor support	surveillance and monitoring, remote diagnostics, on-site intervention as required, HW/SW support, configuration backup/restore, software updates/upgrades and security patches. **Operations and governance:** Incident management via a dedicated human-operated technical communication channel with UTM, planned maintenance windows, project management, periodic reporting, coordination meetings and governance activities in accordance with Task Book Sections 6.1-6.3. **Performance monitoring:** Throughput, latency, availability and main service KPIs will be monitored and reported for the UPF and associated transport network. **Security maintenance:** Security updates, configuration hardening, access-control reviews and maintenance actions aligned with the ENISA 5G Security Toolbox principles are included. **Committed SLAs:** Transport and Core network availability >= 90% monthly within normal working hours; P1 acknowledgement < 8 h / resolution < 24 h; P2

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			• **P2 (Serious) incident**: Acknowledgement < 12 hours, Resolution < 48 hours; • **P3 (Minor) incident**: Acknowledgement < 16 hours, Resolution < 96 hours; • **Technical support response**: < 14 business days; • **Technical support resolution**: < 28 business days. All services must be provided in accordance with the governance model, maintenance windows, and quality requirements specified in Sections 6.1–6.3 of the Task Book.		acknowledgement < 12 h / resolution < 48 h; P3 acknowledgement < 16 h / resolution < 96 h; technical support response < 14 business days and resolution < 28 business days.
1.2.2	32524000-2	**Annual support services for gNodeB 5G (2 years)**	Full support, maintenance, and software upgrade services for the deployed **5G gNodeB radio system** (indoor pico-cell / small-cell solution) and all associated equipment for a period of **2 years** (Exploitation Phase). The services must include: • **Preventive and corrective maintenance**, 24×7 network surveillance and monitoring; • **Incident management** according to the SLA defined in the Task Book (Section 6.3); • **Technical support** (remote and on-site as required);	Orange engineering O&M Ericsson RAN support services RAN software update and upgrade services **Service origin:** Republic of Moldova, Romania + vendor support	**Service term:** 24 months support for the deployed Ericsson indoor 5G gNodeB radio system, including BBU, IRU, Dot, power and associated installation components. **Included services:** Preventive and corrective maintenance, 24x7 network surveillance and monitoring, technical support, remote diagnostics, on-site intervention as required, configuration management, software updates/upgrades and periodic performance monitoring. The supply

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			• **Radio network performance optimization**, coverage verification, and parameter tuning (antenna orientation, emission levels, etc.); • **Software updates** and upgrades to ensure compatibility with future 3GPP releases; • **Configuration management** and periodic performance monitoring; • Coordination with UTM for maintenance windows (scheduled outside normal working hours). **SLA Compliance (key indicators):** • **Radio network availability**: ≥ 90% monthly (within normal working hours Monday-Friday 9-17); • **Maximum DL throughput**: ≥ 100 Mbps (single user, ideal conditions); • **Maximum UL throughput**: ≥ 20 Mbps; • **Latency**: < 50 ms; • **P1 (Critical) incident**: Acknowledgement < 8 hours, Resolution < 24 hours; • **P2 (Serious) incident**: Acknowledgement < 12 hours, Resolution < 48 hours;		of spare parts is not included, subject to separate quotation. **Radio optimization:** Coverage verification, parameter tuning, antenna/Dot placement validation, emission-level adjustment and KPI/QoS supervision are included for the UTM laboratory environment. **Operations and governance:** Incident management via a dedicated human-operated technical communication channel with UTM, coordinated maintenance windows outside normal working hours and reporting in accordance with Task Book Sections 6.1-6.3. **Committed SLAs and KPIs:** Radio network availability >= 90% monthly within normal working hours Monday-Friday 9-17; peak DL >= 100 Mbps, peak UL >= 20 Mbps and latency < 50 ms under the stated measurement conditions; P1 acknowledgement < 8 h / resolution < 24 h; P2 acknowledgement < 12 h / resolution < 48 h; P3 acknowledgement < 16 h / resolution < 96 h.

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			• **P3 (Minor) incident**: Acknowledgement < 16 hours, Resolution < 96 hours. All services must be provided in accordance with the governance model, maintenance windows, and quality requirements specified in Sections 6.1–6.3 of the Task Book.		

Note: Full compliance with the Task Book / Technical Specifications is mandatory.

Date: 15.07.26

Regards,

Dana Argint

Corporate Sales and ICT Solutions Director

I.M. „Orange Moldova” S.A.

Annexes:

- *ANNEX 1.1 TO THE TECHNICAL OFFER (Response to the special requirements in the task book)*
- *ANNEX 1.2 TO THE TECHNICAL OFFER (Compliance with task book requirements)*

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