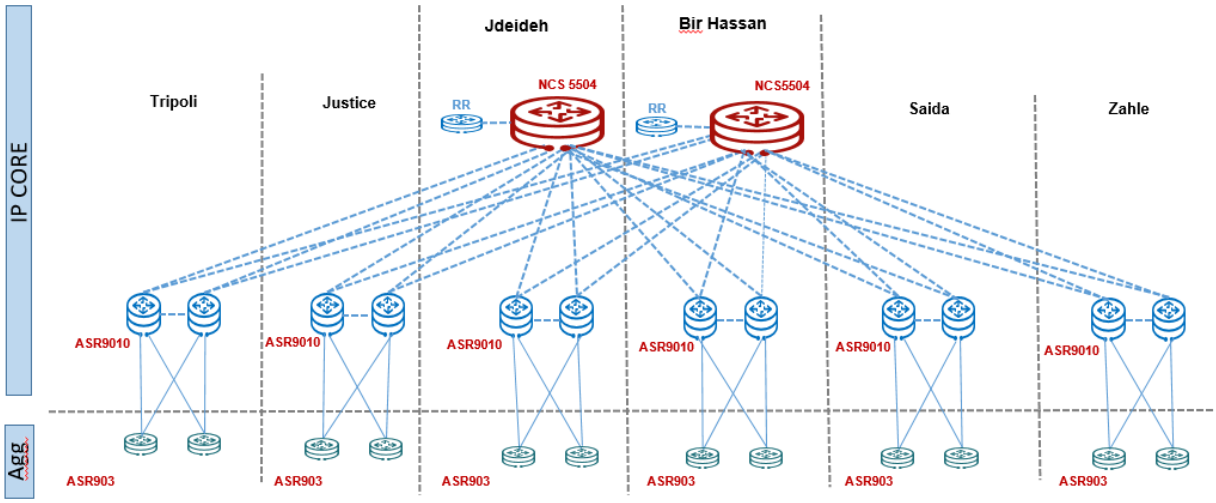
IPBB modernization Technical Specification

A. Introduction

MIC2 IPBB network consists of:

- 2 P routers (NCS5504, SW version 7.7.21)
- 2 Route Reflectors (ASR9001, SW version 6.2.2)
- 12 PE routers (ASR9010, SW version 6.7.3 & 6.2.25) connected in a dual homing setup
- Each PE router located in Tripoli, Saida, Bir Hassan and Jdeideh, is connected to a switch (Cisco 6506) in order to increase its ports density

The aggregation network consists of 43 x ASR903 routers which are also dual homed with the PEs.
The following diagram illustrates the current network topology, without showing the C6506 switches:



The purpose of this tender is to modernize the IPBB, which includes:

- 12 new PE routers (each current PE-C6506 will be replaced with one new PE)
- 2 new Route Reflectors
- 2 new P routers:
  For the current vendor (Cisco), the same P routers can be upgraded in case found suitable else, new P routers should be provided while the current P routers will be redeployed in the aggregation network.

For other vendors, new P routers should be provided while the current P routers will be redeployed in the aggregation network.

- 60 new Aggregation routers replacing 30 out of 43 ASR903 in addition to implement 30 new router locations.
- Management and performance monitoring system for all the newly provided network elements.

The following tables show the number of ports in the current IP Core routers.

Location	NE Type	Available 1/10 GE	Used 1 GE	Used 10 GE	Available 10/25GE	Used 10GE	Used 25GE	Available 40/100GE	Used 40GE	Used 100GE
Bir Hassan	P (NCS)	64	10	10	32	0	0	8	0	0
Jdeideh	P (NCS)	64	9	9	32	0	0	8	0	0

Table 1

Location	NE Type	Available 10 GE	Used 10 GE	Available 1GE	Used 1GE
Bir Hassan	PE1 (9K)	40	22	136	64
	PE1 Switch (6500)	10	4	99	52
	PE2 (9K)	16	15	136	47
	PE2 Switch (6500)	10	4	99	50
Jdeideh	PE1 (9K)	40	24	136	121
	PE1 Switch (6500)	10	4	99	69
	PE2 (9K)	16	15	136	90
	PE2 Switch (6500)	10	4	99	62
Saida	PE1 (9K)	16	15	96	47
	PE1 Switch (6500)	10	8	99	54
	PE2 (9K)	16	14	96	30
	PE2 Switch (6500)	10	8	99	50
Tripoli	PE1 (9K)	16	9	96	34
	PE1 Switch (6500)	10	4	99	37
	PE2 (9K)	16	7	96	25
	PE2 Switch (6500)	10	4	99	35
Zahle	PE1 (9K)	4	4	56	34
	PE2 (9K)	4	3	56	30
Justice	PE1 (9K)	4	4	160	86
	PE2 (9K)	4	3	160	86

Table 2

B. Main technical requirement

Within the same layer, only one router product/model can be offered:

- Both P routers should be of the same router model
- Both Route Reflectors should be of the same router model
- All PE routers should be of the same router model
- All Aggregation routers should be of the same router model
- The new P router locations are the same as the current ones
- The new Router Reflector locations are the same as the current ones
- The new PE router locations are the same as the current ones
- The new Aggregation routers locations are the same as the ones that are being replaced or in a new location in case of newly added Aggregation router to the network

1. Routers main technical requirement:

Each new router should be equipped with:

- Redundant Route Processors
- Redundant Fabrics
- Redundantly Power Supply
- A minimum of 2 Line cards to accommodate for the needed ports per router.

1.1 The new P Routers:

Current Vendor, being Cisco, should upgrade the current P routers with the needed licenses and SFPs to have 20 x 1Gbps and 24 x 10Gbps available for use per P router.

New vendors should provide new routers that are equipped with the same number and type of ports as the current P routers while having the needed licenses and SFPs for at least 20 x 1Gbps and 24 x 10Gbps available for use (per P router).
Accordingly, the new P routers should be offered with the following port density:

Location	NE Type	Available 1/10 GE	Available 10/25GE	Available 40/100GE
Bir Hassan	P	64	32	8
Jdeideh	P	64	32	8

Table 3

The extra 1/10GE ports that are not requested to have their SFPs and licenses are kept for future use.
Also the 25GE, 40GE and 100GE ports are needed without their related licenses and SFPs for the time being, they are needed for future use.

The provided P router chassis should be capable to host the above requested ports while having at least 40% of its usable slots empty.

For the P routers, all 1GE ports are Single Mode and all 10GE ports and Multimode.

1.2 The new PE Routers:

New PE routers should be equipped with the following port density:

Location	NE Type	Available 10 GE	Available 1GE	Available 100GE	Future Support 100GE	Future Support 50GE	Future Support 25GE	Future Support additional 10GE
Bir Hassan	New PE 1	40	175	4	4	8	30	15
	New PE 2	40	175	4	4	8	30	15
Jdeideh	New PE 1	40	230	4	4	12	43	17
	New PE 2	40	230	4	4	12	43	17
Saida	New PE 1	30	130	4	2	3	40	18
	New PE 2	30	130	4	2	3	40	18
Tripoli	New PE 1	30	110	4	2	6	27	12
	New PE 2	30	110	4	2	6	27	12
Zahle	New PE 1	12	55	2	4	4	20	12
	New PE 2	12	55	2	4	4	20	12
Justice	New PE 1	10	130	2	2	4	2	12
	New PE 2	10	130	2	2	4	2	12

Table-4

For the time being, the new PE routers should be provided while equipped with the ports listed in the “available 100GE, available 10GE and available 1GE” columns in the above Table-4.

The provided PE router should be capable to support the ports in the “Future support” columns in the above Table-4 with the addition of new line cards and licenses.
The future support ports are not to be included and neither provided in the current offer, however their related cost should be presented part of a pricing catalogue and to have their cost locked and fixed for whenever needed in future upgrades.

The provided PE router chassis should be capable to host both available and future ports while having at least 40% of its usable slots empty.

All 100GE ports should be 100GBASE-SR4
All PEs 10G ports are Multimode
1GE port should follow the following distribution:

			1G Ports Distribution		
Location	**NE Type**	**Total 1G Ports**	**1G Copper**	**1G SM**	**1G MM**
Bir Hassan	New PE 1	175	60	90	25
	New PE 2	175	90	60	25
Jdeideh	New PE 1	230	73	97	60
	New PE 2	230	94	65	71
Justice	New PE 1	130	50	20	60
	New PE 2	130	50	20	60
Saida	New PE 1	130	15	105	10
	New PE 2	130	45	75	10
Tripoli	New PE 1	110	10	90	10
	New PE 2	110	35	65	10
Zahle	New PE 1	55	10	40	5
	New PE 2	55	40	10	5

Table-5

1.3 The Route Reflectors Routers:

2 new Route Reflectors (RR) should be provided.

One RR will be located at Bir Hassan and connected to Bir Hassan P router while the second RR should be located in Jdeideh and connected to Jdeideh P router.
The RR should be a dedicated standalone node on a physical router and not a virtual solution.
Each Route Reflector should have the capability of handling a 5G IP network with at least 300 working 5G routers.
The provided solution should be scalable, able to handle a large number of routes typical in 5G networks, considering the expected growth in the number of connected devices and network elements.

1.4 Aggregation Routers

New 60 Aggregation routers should be equipped with the following port density:

NE Type	Available 10GE SM	Available 10GE MM	Available 1GE SM	Available 1GE Copper	Future Support 100GE/50GE	Future Support 25GE	Future support 10GE
New Agg	2	8	16	8	2	2	8

Table-6

For the time being, the new Aggregation routers should be provided while equipped with the ports listed in the “available 10GE and available 1GE” columns in the above Table-6.

The provided Aggregation router should be capable to support the ports in the “Future support” columns in the above Table-6 with the addition of new line cards and licenses.
The future support ports are not to be included and neither provided in the current offer, however their related cost should be presented part of a pricing catalogue and to have their cost locked and fixed for whenever needed in future upgrades.

Additional 7 Line cards each supporting a minimum of 8 x 1GE SM should be included in the offer, to be used where and when needed.

The provided Aggregation router chassis should be capable to host both available and future ports while having at least 40% of its usable slots empty.

C. General requirement

- All product and Software versions to be the latest.
- All routers to be part of the Service Provider category.
- All routers to be part of the vendor 5G portfolio.
- Slots occupation should not exceed 40% of the total available slots per chassis.
  At least 40% of the usable slots per router should remain free for future needs.
  In the case of the PE and Aggregation routers, the needed 40% is after accommodating for the available ports and the future support ports as well.
- For the PE routers with high number of 1GE ports, virtual expansions for the 1GE line cards are accepted as long as the expansion acts as a line card part of the initial PE router and will not be seen as a new router or switch.
- Switching capacity not less than 16Tbps per chassis for P/ PE routers and not less than 0.8Gbps for the Aggregation routers
- Switching capacity per node type (P, PE and Aggregation) should be mentioned, vendor providing the highest switching capacity will receive the full grade for this requirement. Vendor with the second highest switching capacity will receive half the grade and 0 grade for the remaining vendors.
- Packet forwarding per second not less than 15000 Mpps per chassis
  Packet forwarding per second per node type (P, PE and Aggregation) should be mentioned, vendor providing the highest Packet forwarding per second will receive the full grade for this requirement. Vendor with the second highest Packet forwarding per second will receive half the grade and 0 grade for the remaining vendors.
- P and PE routers should support, for future need, the following interfaces:
  - 400GE
  - 100 GE
  - 50 GE
  - 40 GE
  - 25 GE
- All routers should support the following synchronization and provided with the related licenses:
  - Synch E
  - IEEE 1588v2
  - G8275.1
  - Class A, B & C
    Optional item: Class D
  - ACR (Adaptive Clock recovery)
- Reliability (for all provided routers):
  - NSR (Nonstop routing)for OSPF/RIP/LDP/RSVP-TE/PIM/MSDP/IGMP/ARP/L3VPN/ ISIS/BGP/VLL/VRRP
  - Graceful restart: BGP/OSPF/ISIS/LDP/VLL/VPLS/RSVP/L3VPN/PIM
  - Bidirectional Forwarding Detection (BFD)
  - Fast convergence of BGP/IGP/multicast routes

    - Ethernet OAM, Y.1731
- Security
    - ACL-based packet filtering, SNMPv3 encryption and authentication, URPF, GTSM, DHCP snooping, ARP attack defense, and SSHv2
    - Security on management layer (Access Lists for controlling Access to the Appliance, Authentication to console via TACACS+ or RADIUS,…)
    - AAA integration (Centralized management, Multiple Privilege Levels,…)
    - Supports defense against ARP attacks
    - Operating system should be NESAS and SCAS certified
    - Adherence to international standards such as ISO/IEC 27001 and NIST Cybersecurity Framework
    - Compliance with GSMA Network Equipment Security Assurance Scheme (NESAS)
    - Encryption of data in transit: IPSec, TLS 1.3, or equivalent for management and user traffic
    - Supports AES256
    - Supplier must ensure secure storage, handling, and transportation of equipment to prevent tampering during the supply chain process
    - Supplier must declare country of origin for all hardware and software components
    - Supplier shall conduct forensic investigation and root cause analysis for any security breach tied to their equipment or services and provide a detailed Root Cause Analysis
    - Supplier to undergo background checks and sign NDAs for all on-site engineers
- Provided features/Licenses:
    - Layer 2 features:
      IEEE 802.1q QinQ, VLAN mapping, IEEE 802.1p, IEEE 802.3ad, IEEE 802.1ab, and STP/RSTP/MSTP, VLAN switching
    - IPv4/IPv6:
      Static routes and IPv4 dynamic routing protocols, such as RIP, OSPF, BGP, and IS-IS IPv4/IPv6 dual stack
      IPv6 static routes and dynamic routing protocols, such as BGP4/BGP4+, RIPng, OSPFv3, and IS-ISv6 IPv6 neighbor discovery, PMTU discovery, TCP6, ping IPv6, tracert IPv6, socket IPv6, and IPv6 policy-based routing
    - L2VPN/L3 VPN:
      LDP over TE, VPLS/H-VPLS, and VPN policy-based routing, MPLS/BGP L3VPN
    - Multicast:
      IGMPv1/v2/v3, IGMP snooping, IPv6 multicast, static multicast routing
    - QoS:
      Multiple service traffic classification methods and identification policies to flexibly differentiate services and ensure fair scheduling
      WRED, multi-level HQoS
      Support for both DiffServ and IntServ models
    - Y1731 ETH-BN
      Ethernet Bandwidth Notification

When the dynamic bandwidth notification function is enabled on the microwave nodes to notify the router of the real-time bandwidth and when the bandwidth decreases to below what is needed for the traffic, then the router will kicks in traffic shaping along with QOS in order to relieve the congestion.

- All routers to be provided as T-BC (Telecom Boundary Clock) including the needed licenses and features.
- All routers to have Programmable network processor (shipset) to support future new technologies evolution
- Solution should include a network controller for the SR-MPLS, SR-V6 and traffic engineering
- All needed licenses and features to be provided for Segment Routing SR IPv4, SRv6, SR-TE, SR-BE, SR-MPLS and SRv6 Micro-Segment (uSID)
- The proposed nodes shall support basic transition technologies such as dual stack mode required for smooth transition from IPv4 to IPv6
  The proposed solution shall support IPv6 without any hardware upgrade
  The proposed solution shall support hardware based IPv6 forwarding
- Typical power consumption for P, PE and Aggregation routers to be provided following the requested configuration and port density.
  Vendor providing the lowest power consumption will receive the full grade for this requirement. Vendor with the second lowest power consumption will receive half the grade and 0 grade for the remaining vendors.
- Energy saving features to be included in order to reduce the energy consumption.
- QOS to be designed and implemented on all inter-router links:
  Following the limited bandwidth on the fiber and Microwave connectivity between these network elements, in case of congestion, QOS is needed in order to protect the high priority traffic.
- Offered solution should support Routed optical network in case needed in the future.
- Features and Licenses that are needed to be supported for future 5G readiness but not necessary provided at the time being (in case not provided, their cost should be part of the pricing catalogue):
  - EVPN
  - Flex E, network slicing
  - IPsec
  - MACsec
  - SDN NetConf YANG and Telemetry for future evolution
  - DDOS attacks protection from user side
  - eCPRI and RoE (Radio over Ethernet) for distributed networks
  - Orchestration and automation including:
    - Auto-configuration
    - Failure Prediction in Advance
    - Self-Optimization
    - Self-Healing network
- Device latency not to exceed 15 microseconds

- Device latency per node type (P, PE and Aggregation) should be mentioned, vendor providing the lowest device latency will receive the full grade for this requirement. Vendor with the second lowest device latency will receive half the grade and 0 grade for the remaining vendors.
- New HW/SW that follows a license subscription model should be offered with at least 4 years license period.
  For the current vendor, Cisco, in case the same NCS were used and upgraded for the P routers, their related subscription should be extended in line with the newly proposed PE and Aggregation routers (the current NCS subscription ends by September 30, 2026)
  In case the license subscription is applicable, the cost for years 5 to 8 should be added to the pricing catalogue
- Guarantee of a minimum 8 years before reaching the end of support date.
- Guarantee of a minimum 4 years before reaching the end of sales date.
- Only DC (-48V) power supply is to be provided.
- DCN (including out of band management) design and implementation should be included in the offer
- Only self-manufactured HW and SW products are accepted, third party equipment are not accepted.
  The only exceptions are for the accessories, cables and passive parts.
- In case the provided Line cards can accommodate for more ports then what is requested, all remaining ports should be provided with their corresponding SFPs. All ports are requested to be populated with their SFP. If this case is applicable, the new additional ports should be equipped with either 10G (MM) or 1G (distribution for the new additional ports: 40% copper, 40% SM and 20% MM).
  In case the additional ports can work in 1G/10G mode, then 60% of the ports to be equipped with 10G MM, 15% with 1G copper, 15% with 1G SM and remaining 10% with 1G MM.
  This is applicable for the 10G and 1G ports only; in case the provided Line Card has 25G, 50G, 40G or 100G ports, their related SFPs are not to be included in this project unless they are requested to be currently available.
- Offered solution should be compatible with current MIC2 platforms (Cisco ASR9K, Cisco NCS, ASR900, Cisco switches, Huawei RTN900, RNC, BSC, TMGW, MGW, Nokia Airframe, Huawei vEPC, Astelia, etc..) in addition to Ogero's fiber and IPMPLS network.
- Offered solution should be able to support long range SFP, up to 100Km.
- Environment operations:
  - Long-term ambient temperature: 0°C to 45°C
  - Short-term ambient temperature: –5°C to +55°C
  - Long-term relative humidity: 5% to 85%
  - Short-term relative humidity: 0% to 100%
- Implementation, integration and service reshuffle from current equipment to the new routers should be included.
  The service migration shall cover all connected and active links and services on the current devices, refer to above Table 1 and Table 2 columns for the P and PE used ports.

Note that the number of used ports may vary by the time of the service migration following the daily work on the network. The winner of this RFP shall migrate all services that are active by the date of the reshuffle and should not be limited to the numbers in the above table.

The same as above is also applicable for the Aggregation routers service migration; number of connected devices and services will be delivered to the winning bidder

- The newly implemented IP core network should be planned and implemented based on SR-V6 uSID, or SR-MPLS while ensuring smooth migration towards SRv6 uSID for the furfure.
- Detailed Service Connectivity Matrix, needed for the service reshuffling shall be delivered only to the winner of the RFP.
  This Matrix shall be built by the winner of the RFP following site surveys and configuration files exported from the current routers.
- Vendor should propose standard acceptance procedures for the offered solution, to be reviewed and validated by MIC2.
- Vendor shall ensure that the activities related to the scope of this RFP will have no or minimal impact on the current network traffic.
- The Vendor is fully responsible to replace any damaged network devices that occurs during the dismantling/implementation process.
- Passive equipment along with their implementation (cabinets, patch panels, patch cords, ODF,…) should be included for all above requested routers and ports.
  Vendor should also install multi-core fibers along with their ODFs (LC ports) between the routers and other connected devices and provide all needed patch cords (LC-LC), in addition to welding, testing, and labeling all ODF ports
- Power cables, lugs, circuit breakers and cable trays should be included along with their implementation.
- Custom clearance should be fully handled by the clearance (DDP).
- The Vendor shall be responsible for providing the warehouse for the equipment to be installed throughout the complete project duration.
- The Vendor shall be responsible for delivering the equipment to site from their own warehouse.
- The PIP time line should be completed with the minimum amount of time taking into consideration the latest possible start and finish times for project activities, the uncertainties, the risks and assumptions (less than 9 months from PO issuance)
- The offer should include a responsibility matrix clearly splitting the role of the bidder and the operator. This matrix shall be reviewed and approved by MIC2.
- The vendor's Implementation proposal should cover but not limited to the following: installation, dismantling, swapping, traffic migration, configuration, integration, interoperability…
- All dismantled material should be carefully packed, bubble wrapped and delivered by the vendor to any location advised by MIC2 within Lebanon in the conditions they were before the dismantling process
- Equipment delivery time shall be less than 90 days from PO issuance.

- Proposal includes satisfactory minimum number of resources with their qualifications & proposed organization structure during implementation and support, which is subject to MIC2 approval.
- Spare Parts Management:
  - In case the spares are managed by the vendor:
    Vendor to insure hardware availability in Lebanon for all type of equipment and to handle the repair process
  - In case the spares are managed by MIC2:
    7% of the requested HW should be provided as spares and included in the BoQ. The spares BoQ should be separate from the main BoQ
- Dedicated BoQ for the spare parts
- Faulty hardware should be sent for reparation, the cost of shipment, customs clearance as well as on site delivery, installation and dismantling of the defected hardware shall be borne by the winner bidder
- Trainings for the proposed solution should be included in the offer (each course should be delivered in 2 sessions)
  Training courses should cover all the newly introduced network elements, in addition to topics covering the SR-MPLS and SRv6 and to the proposed NMS solution.
  Minimum 6 engineers per course session.
- Knowledge transfer and provide the appropriate training program to have MIC2 engineers acquiring the needed knowledge and expertise and receiving the relevant hands-on knowledge transfer
- Optional solutions, products and services are not accepted.
  Vendor needs to present his one and best solution for the requested requirement.
- A Quantity of 4 x 10Gbps SM SFP with 40Km range should be added to the offer.
- A Quantity of 10 x 10Gbps SM SFP with 10Km range should be added to the offer.
- Same vendor providing the Hardware and the Software should also provide the requested services
- Additional information:
  - SM SFP should be 1310nm LC
  - MM SFP should be 850nm LC

D. Management System

- The vendor needs to include all NMS requirements in his solution and offer covering FM, PM, CM, inventory, security, account management, system diagnostics, software management, and administration parts along with the necessary NBI licenses and features in addition to MML automated commands and inventory features
- Main and Standby NMS should be provided for redundancy.

- Virtual servers are highly recommended, vendor will supply all needed requirements (licenses, softwares…) to host the solution in Touch's virtual environment.
  Note that the preferable virtual environment is based on Openstack.
  In case the needed virtual resources cannot be accommodated by our current platforms, then dedicated servers need to be delivered for this solution at no additional cost.
- Integration with Touch's Active Directory.
- Integration with INMS by providing available types of NBIs.
- Vendor to provide the MIB files related to the offered solution
- In-band detection solution for service level SLA monitoring including traffic flow quality and fault demarcation solution:
  Report data measurement in real time and displays the results on geographical user interface
- Customized utilization reports
- Utilization storage granularity:
    - 30 seconds over period of 1 Day
    - 1 minute over period of 1 week
    - 15 minute over period of 1 month
    - 1 hour over period of 6 months
    - 1 day over period of 3 years
- For the 15 minutes, 1 hour and 1 day granularity, 3 values should be available, MAX, MIN and AVG for the aggregated samples during this period
- Notifications should be generated when utilization exceeds a certain limit, the notifications can be manually enabled and corresponding threshold value can be modified
- Various KPI measurement such as delay/latency, jitter, packet loss rate per link and per end-to-end service and traffic volume per interface
- Routing table track and comparison highlighting the changes including their time and the reason behind the routing change (user command, network fault…)
- Layer 3 end-to-end performance measurement (at IP flow level)
- Network map visualization with:
    - Network physical topology
    - L3 network real time awareness showing the link status based on:
      Hope by hope bandwidth utilization, latency and packet loss rate (to be displayed on the links).
      IGP topology changes updated every 1 minute
    - Node energy consumption
    - Slicing layer
    - Service view layer
- Dashboard with real time data covering:
    - Top links with poor KPIs
    - Top links with good KPIs
    - CPU and memory usage
    - High traffic links and usage

    - Network traffic type distribution per link (percentage of traffic used for a particular service)
    - Network elements EOX
- The provided solution should support multivendor, mainly Cisco, Huawei, Juniper and Nokia.
  Once implemented, the provided solution should manage the remaining Cisco ASR903 located in aggregations HUBs and connected to the newly provided PE routers.
- The provided solution should support a minimum of 100 devices with 5000 links
- The provided solution should be upgradable to support 500 devices with 20000 links
- The proposed system must include a robust Application Programming Interface (API) that allows for seamless reading and retrieval of data, Pull API. The API should support standard data formats such as JSON or XML for data interchange.
- NMS Installation, commissioning and integration should be completed as a prerequisite for the implementation of the new routers.

E. Support, SLAs and KPIs:

- 4 years support for all above new HW/SW. The warranty period starts after signing the PAC for all the sites.
- Support fees for years 5 to 8 should be added to the pricing catalogue.
- For the current vendor, Cisco, in case the same NCS were used and upgraded for the P routers, their related support should be extended in line with the newly proposed PE routers (the current NCS support ends by September 30, 2026)
- Support coverage is 24 hours a day, 7 Days a week including holidays
- Local support team available in Lebanon ready for immediate site intervention if needed.
- Resident engineer, with a minimum of 5 years of experience working in such network environment, dedicated for the day to day work on these new equipment for a period of 18 months starting from the PAC date.
- Health check Assessment: to audit all configuration changes that occurred on the network and validate it with best practices, Health check to be conducted twice per year.
- All software patch/updates/releases/upgrades should be included, delivered and installed once available during the support period.
  Also the cost covering years 5 to 8 should be added to the pricing catalogue.
- On-site visits (environmental check and preventive maintenance to be conducted twice a year)
- System availability time [%] >99.999%
- For P1 (Critical/Emergency) incidents, response time 1 hour, restoration time 3 hours, and resolution time 6 hours
- For P2 (Major) incidents, response time 3 hour, restoration time 6 hours, and resolution time 24 hours

- For P3 (Non Service Impacting) incidents, restoration time 24 hours, and resolution time 5 calendar days

F. Documentation

The documentation shall include the following items:

- High level design solution description covering the implementation and the migration procedure
- For every proposed router, a layout showing the used slots along with the card types inserted in every slot. Layout should also show the remaining number of empty slots.
- Data sheets, technical specifications and manuals.
- Roadmap for both Hardware and Software
- List of all the features and licenses supported by the hardware and highlighting which are included in the offer
  Features and licenses that are supported but not included in the current offer should have their related cost part of the pricing catalogue
- Qualifications (CV) & proposed organization structure during implementation and support.
- Implementation and support team members should have the official certificates related to operation of such devices in a service operator environment.
- The winner of the RFP shall present detailed planning documents and low level implementation and migration solution documents during the preparation period and before the start of implementation.
- The winner of the RFP, and following the site surveys should present:
  - Floor layout showing the location of the new equipment racks in each site
  - Power consumption per site
  - Heat Dissipation per site

G. References

- Bidder should mention references for **his** deployment of the proposed routers in a mobile operator environment with live 5G network. Minimum 3 references.
- Bidder should mention references for the proposed routers in a mobile operator environment with live 5G network. Minimum 3 references.

- Bidder should mention references for the support and maintenance services he currently or previously provided on similar products in a mobile operator environment. Minimum 3 references.
- Details of the reference need to be provided: Operator, Country, implemented equipment models and date of implementation.