

Annex 1: Technical requirement

1.1. Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			38	230	0
A	Technical requirement for gNodeB Massive MIMO 64T64R 2600MHz	1968	2900					
A.I	Hardware, Licenses, Accesories	1968	2900					
I	General requirement	995	1005					
1	Technical solutions and documents	620	620					
1.1	<p>For each gNodeb (2.6GHz), the Bidder provides solutions, including hardware and software, features, permanent licenses for gNodeB/eNodeB, permanent licenses for OMC to simultaneously run 5G SA and NSA, in which:</p> <p>a) Bidder must provide additional sites with the latest products and commercial software version with all 5G features and licenses (basic + optional) at the time of supply:</p> <p>+ 1 site 1800MHz 4T4R (1BBU+ 3 RRUs; 3 NR cells and 3 LTE cells 20MHz 4T4R can run DSS, at least 40w/port).</p> <p>+ 1 site 1800MHz 4T4R (excluding BBU; 3 RRUs; 3 NR cells and 3 LTE cells 20MHz 4T4R can run DSS, at least 40w/port)</p> <p>+ 1 site dualband 1800/2100MHz 4T4R (1 BBU+ 3 RRUs; 6 NR cells and 6 LTE cells 20MHz 4T4R can run DSS, at least 40w/port/band)</p> <p>+ 1 site dualband 700/900 4T4R (excluding BBU +3 RRUs; 6 NR cells and 6 LTE cells 10MHz 4T4R can run DSS, at least 40w/port/band).</p> <p>+ RRU shall support the frequency: Band 1800MHz (frequency range: UL 1710 - 1785 MHz and DL 1805 - 1880 MHz, Instantaneous bandwidth (IBW)≥ 60MHz). Band 2100MHz (frequency range: UL 1920 - 1980 MHz and DL 2110 - 2170 MHz, IBW≥ 60MHz). Band 900Mhz (frequency range: UL 890 – 915 MHz and DL 935 – 960 MHz, IBW ≥ 25MHz), Band 700MHz (frequency range: UL 703 – 748 MHz and DL 758 – 803 MHz, IBW ≥ 40MHz). BBU must be enough capacity to run above configuration. Each site uses separate BBU.</p> <p>+ All accessories for each site, including: Power cable for RRU ≥40m/RRU, power cable for BBU ≥2.5m/BBU, power connector, patch cord, SFP module, ground cable ≥ 5m/01 RRU, label, clamp ≥ 40 / 01 site, C-tap, optical cables ≥60m/RRU, feeder (4 cables with 10m length/RRU, for each jumper has 1 connector is DIN 7/16 male Straight and 1 connector can connect to RRU), other items, if any.</p>	300	300	<p>300 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description document and commitment		x	

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	b) In EN-DC mode, each sector of the gNodeB can run Dual Connectivity with the configurations: 1 CC 5G (Band 2.6GHz) + 2 CC 4G (2 in 4 bands 700, 900, 1800, 2100MHz) DL and 1CC 5G + 1 CC 4G (1 in 4 bands 700, 900, 1800, 2100MHz) UL. c) In 5G SA mode, each sector of the gNodeB can run Carrier Aggregation with the configurations: 1 CC 5G (band 2.6GHz) + 2 CC 5G (2 in 4 bands 700, 900, 1800, 2100MHz) DL and 1CC 5G (Band 2.6GHz) + 1 CC 5G (1 in 4 bands 700, 900, 1800, 2100MHz) UL.							
1.2	+The Bidder must provide the latest commercial products for gNodeBs. +The Bidder must provide the latest commercial software version with all 5G features and licenses (basic + optional) at the time of supply.	300	300	300 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
1.3	+The Bidder must provide equipment that shall be compliant with 3GPP Specifications (eNodeB complies with release 8,9,10,11,12,13,14 and gNodeB complies with release 15,16,17 & higher of 3GPP Release). '+ Equipment must be compliant with QCVN47:2015/BTTTT, QCVN18:2022/BTTTT, QCVN 110:2023/BTTTT. + Equipment must not collect and send network data to any unrelated parties without Viettel's permission.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	
1.4	The Bidder must provide documents for the following items for eNodeB, gNodeB, OMC: + Documents describing device hardware, installation equipment + Documents describing the software roadmap + Documents describing the all features + Documents describing operation and maintainent + Documents describing and guiding license management + Documents describing the 4G, 5G coverage planning and capacity dimensioning + Document describing all alarms, faults and solution to solve. + Document describing KPIs, counters, callflow and trigger points of counters, KPIs, targets should be setup to optimize for main KPIs. + Document, guideline about 4G, 5G radio network optimization, including but not limitation: Coverage optimization, parameter optimization; KPI PSR, CSSR, CDR, Downlink, uplink throughput optimization, guideline of capacity expansion, beamforming management... + Document about baseline parameters for 5G NSA/SA, EN-DC,...	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.5	The Bidder provides document describing about capacity per each card of one BBU + Maximum Total of bandwidth (MHz)	5	5	5 points: Bidder provide full document describling capacity	Refer to the bidder's description document		x	

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	+ Maximum Number of RRC connected User + Maximum Number of TAU per second + Maximum PDU session additions and releases (for Data, VoNR, SMS services) per second + Maximum of Call attempt per second: + Maximum of Intra-gNodeB handovers per second + Maximum of Inter-gNodeB handovers per second + Total signalling messages can be processed per second. + All parameters relate to capacity			per each card per one gNodeB. 0 points: Not provide or provide document but don't have informations				
2	gNodeB Configuration	321	325					
2.1	The 5G gNodeB supports both NSA (at least option 3x) and SA (at least option 2) architectures.	3	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
2.2	The 5G gNodeB operates in both NSA and SA modes simultaneously on the same baseband card	3	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.3	The 5G gNodeB supports a minimum of 3 MORAN PLMNs simultaneously.	NA	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.4	The 5G gNodeB supports a minimum of 3 MOCN PLMNs simultaneously.	NA	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.5	For each gNodeB has configuration including: 3 AAUs + 1 BBU + Accessories (including 3 GNSS receiver sets). In which, minimum configuration of each AAU is 64T64R, minimum output power per each AAU is 320W.	15	15	15 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
2.6	For each gNodeB, the Bidder must provide solutions including hardware, software and all related permanent licenses in order to run any configurations below: + 3 sectors: each sector can run 1 cell TDD NR100MHz 16DL/4UL 320W 64T64R. + 3 sectors: each sector can run 1 cell TDD NR80MHz 16DL/4UL 64T64R + 1 cell TDD LTE 20MHz 64T64R, MIMO Layer is at least 8DL/4UL. In the case that	300	300	300 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	

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	sectors do not use the LTE TDD 20MHz cell, Viettel has the right to allocate it to another sector to run the configuration 1 cell TDD NR 60MHz 16DL/4UL 64T64R + 2 cells TDD LTE 20MHz 64T64R, MIMO Layer is at least 8DL/4UL.							
3	Licenses, Security	54	60					
3.1	License management							
3.1.1	Bidder shall describe in details the definition of each license, how does it limit network function and performance. Bidder shall also describe the license management mechanism in technical proposal.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.1.2	When demanded resources controlled by license file exceeds the purchased quantity, the system can only limit the usage of exceeded resource.The system shall not block purchased resources under any circumstances	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.1.3	Bidder shall describe in details all parameters/licenses of system that limit equipment's capacity/resource . Bidder shall show detailed dimension for those parameters/licenses and ensure that dimensioned quantity can satisfy the Viettel's requirement.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.1.4	+All new licenses related to 5G TDD Massive MIMO FR1 are pooled between contracts. +All new licenses related to 4G TDD Massive MIMO are pooled between contracts.	NA	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	
3.1.5	+The Bidder must commit to adjusting 4G Licenses (BW, Hardware activation code, MIMO, Power, VoLTE, DL/UL throughput...)—if any, 5G Licenses (BW, Hardware activation code, Massive MIMO DL/UL Layer, Power, VoNR, DL/UL throughput...)—if any, among eNodeBs/gNodeBs in the system supplied, when receiving a request from Viettel. Viettel can adjust, or the bidder supports transferring the free licenses mentioned above without any conditions. +The Bidder shall provide extra 20% FOC of total license quantity per each OMC for backup purpose (When one or several OMCs down, Viettel can move gNodeBs/eNodeBs to other OMCs)	30	30	30 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	
3.1.6	License delivery: + First delivery: The first license part will be delivered to Viettel within 3 days after Viettel's official request. + Licenses are managed at gNodeB/eNodeB level: Bidder shall support Viettel (Free of Charge) at least 6 times or events per year to change license between	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	

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	gNodeBs/eNodeBs or load license from second part to existing gNodeBs/eNodeBs. Bidder shall commit to provide new license files within one week after Viettel's request.							
3.1.7	In case of emergency (example disaster, festival event,...), Viettel will have the right to use full hardware capacity at gNodeB/eNodeB or/and OMC (by deactivating the license limit). It is required at least 3 times per year, each time for at least 1 week period.	NA	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	
3.1.8	Viettel can transfer all licenses from a failure hardware to replacement hardware.	3	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	
3.2	Information security criteria for gNodeB							
3.2.1	The equipment firmware must be the latest version announced by the manufacturer and must be upgradable (if needed).	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and Bidder's commitment		x	
3.2.2	The administrating interface must comply with these conditions: - Using TLS 1.3 if administrate by web interface or any GUI interface. - Using SSH 2.0 if administrating by CLI	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
3.2.3	All device administrator accounts must be authenticated, and the factors used for authentication must be changeable.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
3.2.4	The administrating web page (if there is one) must be compatible with the latest web browsers such as Firefox, Chrome and not contain any outdated plugins like Adobe Flash, Java applet, NPAPI technology.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
3.2.5	The CLI and GUI administration interface (if there is one) must have the same authentication database and devices must authenticate users before performing any actions including monitoring, administrating.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
3.2.6	Equipment must have ACL (Access Control List) to limit the IP addresses which are allowed to administrate devices.	2	2	2 points: Full compliance with all requirements.	Refer to the bidder's description document. System check		x	

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				0 points: Not comply at least 01 of technical requirement				
3.2.7	All credentials on the device must be able to change the password or private key or any factor that is used to authenticate its users.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
3.2.8	Prohibit user access to the gNodeB/eNodeB to prevent any adverse effects or security breaches targeting other components within the Viettel network.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and Bidder's commitment		x	
II	Hardware (BBU +Accessories)	296	443					
1	Baseband Unit (BBU)	256	403					
1.1	General							
1.1.1	+ The Bidder must offer for the latest commercially available BBU and associated module cards for 5G. + The maximum number of Baseband cards in one BBU that meets following requirement must be ≤ 2: In Massive MIMO TDD NR + Massive MIMO TDD LTE + LTE FDD mode, BBU supports the configuration: 6 TDD NR carriers (64T64R 60Mhz bandwidth, 16DL Layers and 4UL Layers) + 6 TDD LTE carriers (64T64R 20Mhz bandwidth, 8DL Layers and 4UL Layers) + 12 FDD LTE carier (at least 4T4R 20Mhz bandwidth)	50	50	50 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and Bidder's commitment	x		
1.1.2	The proposed BBU's size must be less than or equal to 3U.	3	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. Equipment check	x		
1.1.3	Bidder must provide documents and lab test results to declare the power consumption of BBU to meet the requirements for this configurations (3AAUs, each AAU has one cell TDD NR100MHz Massive MIMO 16DL/4UL) under the conditions of room temperature (25°C), without power saving features and: + Power of each AAU is 200W with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%, 3 AAUs are running at the same time. + Power of each AAU is 320W with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%, 3 AAUs are running at the same time. + Power of each AAU is 400W with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%, 3 AAUs are running at the same time (if any).	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	- Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB		x	

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1.2	Capacity and Performance							
1.2.1	<p>Bidder must provide documents clearly describing the capacity of the proposed BBU (i.e. number of NR or LTE cell carriers) with different modes:</p> <p>(1) TDD NR Massive MIMO only (2) TDD LTE Massive MIMO only (3) TDD NR Massive MIMO + TDD LTE Massive MIMO (4) TDD NR Massive MIMO + FDD LTE 2T/4T (5) TDD NR 2T/4T/8T + FDD LTE 2T/4T (6) TDD NR Massive MIMO + TDD LTE Massive MIMO + FDD LTE 2T/4T (7) TDD NR Massive MIMO + FDD NR 2T/4T (8) TDD NR Massive MIMO + FDD NR 2T/4T + FDD LTE 2T/4T</p>	10	10	<p>10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description document		x	
1.2.2	In 5G only mode, number of Massive MIMO TDD NR carriers (FR1, 64T64R 100Mhz bandwidth, 16DL Layers and 4UL Layers) can be supported per one Baseband card ≥ 3	10	50	<p>One Baseband card supports a number of cells (X): + X < 3: 0 points + 3 \leq X < 6: 10 points + X \geq 6: 50 points</p>	- Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.3	The proposed BBU must support tripple mode: LTE TDD Massive MIMO, NR TDD Massive MIMO, LTE FDD MIMO 4*4 simultaneously.	10	10	<p>10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description documents. System check		x	
1.2.4	The proposed BBU must support in Massive MIMO TDD NR + Massive MIMO TDD LTE mode + LTE FDD with the following configuration: 6 TDD NR carriers (64T64R 60Mhz bandwidth, 16DL Layers and 4UL Layers) + 6 TDD LTE carriers (64T64R 20Mhz bandwidth, 8DL Layers and 4UL Layers) + 12 FDD LTE carrier 4T4R.	10	10	<p>10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description documents and Bidder's test results.		x	
1.2.5	With solution (hardware and software, without licenses) proposed by Bidder: in Massive MIMO TDD NR + Massive MIMO TDD LTE, the number of TDD NR carriers (64T64R 60Mhz bandwidth, 16DL Layers and 4UL Layers) can be supported ≥ 6	20	50	<p>In NR +LTE TDD Massive MIMO Mode: Max Number of NR TDD cells 60MHz, 16 layer DL/4 layer UL (X) : + X < 6: 0 points. + 6 \leq X < 9: 20 points. + X \geq 9: 50 points.</p>	- Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.6	With solution (hardware and software, without licenses) proposed by Bidder : in	10	30	In NR +LTE TDD Massive MIMO: Max Number of TDD	- Refer to the bidder's description		x	

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	Massive MIMO TDD NR + Massive MIMO TDD LTE, the number of TDD LTE carriers (64T64R 20Mhz bandwidth, 8DL Layers and 4UL Layers) ≥ 6			LTE carriers, 20Mhz bandwidth, 8DL Layers and 4UL Layers) (X): + X < 6: 0 points. + 6 \leq X < 9: 10 points. + X \geq 9: 30 points.	documents and Bidder's test results. Testing at bidder's Lab			
1.2.7	The proposed BBU must operate in TDD NR Massive MIMO + 2T/4T FDD LTE mode.	3	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	- Refer to the bidder's description documents. System check		x	
1.2.8	BBU supports triple-mode: TDD NR Massive MIMO + FDD NR 2T/4T + FDD LTE 2T/4T per one Baseband card.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	- Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.9	The proposed BBU must operate in 2T/4T TDD NR + 2T/4T FDD LTE mode.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
1.2.10	Total Downlink and uplink layer 1 throughput per BBU (Gbps) ≥ 8 Gbps	15	20	The proposed BBU comprising hardware, software, and accompanying licenses to ensure the total throughput layer 1 DL+UL per gNodeB (Gbps) (X): + 0 points: X < 8 Gbps. + 15 points: 8 \leq X < 10 Gbps. + 20 points: X \geq 10 Gbps.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.11	The number of RRC connected users per BBU ≥ 3000	5	10	The proposed BBU comprising hardware, software, and accompanying licenses to ensure the Max RRC Connected User Number per BBU (X): +0 points: X < 3000.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	

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				+ 5 points: $3000 \leq X < 6000$. + 10 points: $X \geq 6000$.				
1.2.12	The number of RRC connected users per NR cell ≥ 1200	5	10	The proposed BBU comprising hardware, software, and accompanying licenses to ensure the Max RRC Connected User Number per NR Cell (X) as follows: + 0 points: $X < 1200$. + 5 points: $1200 \leq X < 1500$. + 10 points: $X \geq 1500$.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.13	The number of RRC connected users per LTE cell ≥ 600	5	10	The proposed BBU comprising hardware, software, and accompanying licenses to ensure the Max RRC Connected User Number per LTE Cell (X) as follows: + 0 points: $X < 600$. + 5 points: $600 \leq X < 1200$. + 10 points: $X \geq 1200$.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.14	The number of Data Radio Bearers per BBU ≥ 12000	5	10	The proposed BBU comprising hardware, software, and accompanying licenses to ensure the maximum number of Dedicated Radio Bearer (DRB) per BBU (X): + 0 points: $X < 12000$. + 5 points: $12000 \leq X < 50000$. + 10 points: $X \geq 50000$.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
1.2.15	The proposed BBU can support 5G mmWave cell carriers	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and Bidder's test results.		x	

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					Testing at bidder's Lab			
1.3	Interface							
1.3.1	The number of backhaul interface ports that supports 10/25GE ≥ 2	5	5	Number of Backhaul Interface Port support 10/25GE (X): + X < 2: 0 points + X ≥ 2 : 5 points	Refer to the bidder's description document. Equipment check	x		
1.3.2	The proposed BBU must have GNSS Interface port	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. Equipment check	x		
1.3.3	The number of 10/25Gbps line rate eCPRI or CRPI ports that proposed BBU supports ≥ 6	5	20	Max number of eCPRI or CRPI Port 10/25Gbps (X): + X < 6 : 0 points + 6 \leq X < 12 : 5 points + 12 \leq X \leq 24 : 10 points + X > 24 : 20 points	Refer to the bidder's description document. Equipment check	x		
1.3.4	The proposed BBU must support Input Voltage Range from -57V DC to -40V DC	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. Equipment check	x		
1.3.5	The proposed BBU must support Nomial Input Voltage -48V DC	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. Equipment check	x		
1.3.6	The proposed BBU must has external alarm port and supporting at least 8 following alarm types: Power supply, Smoke, Generator, Insufficient power, Power outage, Overheating, Open door, DC power system)	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
1.3.7	The proposed BBU must have LED Indicators that indicate its current working state and port status	5	5	BBU (Control Card+ Baseband card....) has led indicator indicate working state of: All BBU equipment, all of supported port: + Support: 5 points	Refer to the bidder's description document. System check		x	

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				+ Not support or lack of any port: 0 points				
1.3.8	The proposed BBU must have Grounding Interface	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. Equipment check	x		
1.3.9	The proposed BBU must have Local Maintainance Terminal port	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. Equipment check	x		
1.4	Synchronization							
1.4.1	The proposed BBU must support GNSS (GPS, GLONASS, GALILEO,...) as primary clock synchronization source	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.4.2	The proposed BBU must support backup clock synchronization source solutions including 1588v2 and G.8275.1 and G.8275.2	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.4.3	Bidder must provide solution including features and licenses to guarantee that gNodeBs/eNodeBs be able to automatically switching between GNSS and backup synchronization sources (1588V2, G.8275.1 and G.8275.2)	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.4.4	The gNodeB/eNodeB must automatically generate alarms when synchronization signal is lost and automatically shut down cells when the duration of synchronization signal loss exceeds holdover time. After the synchronization signal is restored, the gNodeB must automatically restart cells to restore service.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.4.5	The Time and Phase Synchronization holdover time (with accuracy $\pm 1.5 \mu s$) ≥ 2 hour	10	20	The Time and Phase Synchronization holdover time (X) hour: + 0 points: $X < 2$ hour. + 10 points: $2 \leq X < 36$ hour. + 20 points: $X \geq 36$ hour.	Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB		x	
2	Accessories	40	40					

[illegible]

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	clamps/ 01 gNodeB. The clamp must be compatible with power cable and optical cable. + Other accessories attached if any							
2.2	Global Navigation Satellite System receiver (GNSS receiver): Bidder provide: GNSS receiver set connects both gNodeB and eNodeB at the same time. + Lightning arrestors, connectors, accessories if any. + Feeder/Signal Cable: 30m-50m/01 gNodeB. + Clamp for Feeder/Signal Cable: 30 clamps/ 01 GNSS receiver set. The clamp must be compatible with Feeder/Signal Cable. + GNSS receiver: - Gain: at least 32 dBi (include LNA) - Noise Figure: $\leq 3\text{dB}$	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. Equipment check	x		
III	AAU	329	451					
1	General							
1.1	The Bidder must offer product that supports Massive MIMO 64T64R.	50	50	50 points: Bidders must offer a massive MIMO product that supports at least 64T64R. 0 points: Bidders offering a massive MIMO product that supports less than 64T64R.	Refer to the bidder's description document		x	
1.2	The Bidder must offer product that GA time (General Availability) from Q1/2022 onwards	10	10	10 points: Bidders must offer a product that was General Availability from Q1/2022 onwards. 0 points: Bidders offering a product that was General Availability before Q1/2022	Refer to the bidder's description document		x	
1.3	The Bidder must offer software with the latest commercial version.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.4	The product must support LTE band 41 and NR band n41 with frequency range from 2496MHz to 2690MHz	2	2	The AAU: + 2 points.Support for frequency band 2496-	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				2690MHz (B41 and N41). + 0 points: Does not support for frequency band 2496-2690MHz (B41 andN41).				
1.5	The AAU's Instantaneous Bandwidth ≥ 100 MHz	5	10	IBW: + IBW(MHz) <100: 0 points + $100 \leq \text{IBW(MHz)} < 194$: 5 points + IBW(MHz) = 194: 10 points	Refer to the bidder's description document		x	
1.6	The AAU's Operating Bandwidth ≥ 100 MHz	5	10	OBW: + OBW(MHz) <100: 0 points + $100 \leq \text{OBW(MHz)} < 190$: 5 points + OBW(MHz) ≥ 190 : 10 points.	Refer to the bidder's description document		x	
1.7	The maximum output power of the AAU ≥ 320 W	10	20	The AAU has hardware that supports Total Power Output (P): + 20 points: $P \geq 400$. + 10 points: $400 > P \geq 320$ (w). +0 points: $P < 320$ (w).	Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB		x	
1.8	Both hardware and software of the AAU must support 03 modes: LTE only, NR only and LTE + NR simultaneously.	2	2	The AAU has hardware and software: + 2 points: Supports modes: LTE, NR, LTE+NR. + 0 points: Does not support 1 of 3 modes: LTE, NR, LTE+NR.	Refer to the bidder's description document		x	
1.9	The AAU's weight (excluding bracket) < 37 kg	50	50	The AAU with weight excluding bracket (X): + 0 points: $X \geq 37$ kg. + 50 points: $X < 37$ kg.	Refer to the bidder's description documents. Equipment check	x		
1.10	The height of the AAU <1000 mm	4	4	The height of the AAU (X): + 4 points: $X < 1000$ mm. + 0 points: $X \geq 1000$ mm.	Refer to the bidder's description	x		

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
					documents. Equipment check			
1.11	The with of the AAU < 550 mm	4	4	The with of the AAU (X): + 4 points: X < 550mm. + 0 points: X ≥ 550mm.	Refer to the bidder's description documents. Equipment check	x		
1.12	The depth of the AAU < 200 mm	3	3	The depth of the AAU (X): + 3 points: X < 200 mm. + 0 points: X ≥ 200 mm.	Refer to the bidder's description documents. Equipment check	x		
1.13	Cooling system	10	20	+ 20 points: Liquid cooling + 10 points: Natural cooling + 0 points: Forced convection (fan)	Refer to the bidder's description documents. Equipment check	x		
1.14	Front Wind load at 150 km/h ≤ 1100 N	10	30	Front Wind load at 150 km/h(X): + 30 points: X ≤ 800 N. + 20 points: 800 < X ≤ 900 N. + 10 points: 900 < X ≤ 1100 N. +0 points: X > 1100N.	Refer to the bidder's description document	x		
2	Capacity and Performance							
2.1	Supported NR carrier bandwidths at least 60/80/100 MHz	10	15	The AAU: + 0 points: Does not support all NR Carrier BW configurations: 60/80/100 MHz. + 10 points: Support for all NR Carrier BW configurations: 60/80/100 MHz. + 15 points: Support for all NR Carrier BW configurations: 40,50,60,70,80, 90,100 MHz.	Refer to the bidder's description documents and Bidder's test results. Equipment test		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
2.2	Hardware ready for: The maximum number of NR carriers per AAU when operating in NR only mode ≥ 2	5	5	Maximum NR Carriers in NR only mode (X): + X ≥ 2 : 5 points. + X < 2: 0 points.	Refer to the bidder's description documents. System check		x	
2.3	Number of NR Downlink layers that the AAU (including both hardware and software) can support when working on NR only mode ≥ 16	5	10	The AAU with hardware and software that supports (X) Layer DL MIMO: + 0 points: X < 16. + 5 points: X = 16. + 10 points: X > 16.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
2.4	Number of NR Uplink layers that the AAU (including both hardware and software) can support when working on NR only mode ≥ 4	4	10	The AAU with hardware and software that supports (X) Layer UL MIMO: + 0 points: X < 4. + 5 points.: $4 \leq X \leq 8$. + 10 points: X > 8.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
2.6	The AAU must support 4G+5G mixed mode	5	5	The AAU with hardware and software: + 5 points: Support 4G/5G Mixmode. +0 points: Does not support 4G/5G Mixmode.	Refer to the bidder's description document		x	
2.7	The maximum number of LTE carriers per AAU when operating in 4G+5G mixed mode ≥ 2	NA	10	The AAU with hardware and software that supports (X) LTE carriers/AAU in Mixedmode: + 0 points:X < 1. + 5 points.: $1 \leq X < 2$. + 10 points: X ≥ 2	Refer to the bidder's description document		x	
2.8	The maximum number of NR carriers per AAU when operating in 4G+5G mixed mode ≥ 1	5	30	The AAU with hardware and software that supports (X) NR carriers/AAU in Mixedmode: +0 points: X < 1. +5 points: X = 1. +10 points: X = 2. + 30 points: X > 2.	Refer to the bidder's description documents and Bidder's test results. Equipment test		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
2.9	Supported LTE carrier bandwidths 20MHz	5	10	The AAU with hardware and software: +0 points: Does not support LTE BW 20MHz configuration. + 5 points: Support for LTE BW 20MHz configuration. +10 points: Support for LTE BW 10,20MHz configuration.	Refer to the bidder's description document		x	
2.10	The maximum number of LTE carriers per AAU when operating in 4G only mode ≥ 2	10	15	The AAU with hardware and software that supports (X) LTE Carriers operating in LTE only mode: + 5 points: $X < 2$. + 10 points: $X = 2$. + 15 points: $X > 2$.	Refer to the bidder's description document		x	
2.11	Power Consumption Document: The Bidder must declare the power consumption of each AAU (AAU has one cell TDD NR100MHz Massive MIMO 16DL/4UL), each RRU(MIMO 2x2, MIMO 4x4, 20MHz BW/cell, 20w/cell) under the conditions of room temperature (25°C), without power saving features and: + Power of AAU is 200W, with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. + Power of AAU is 320W, with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. + Power of AAU is 400W (if any) with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. + Power of RRU (running single band mode, MIMO 2x2, one cell) with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. + Power of RRU (running single band mode, MIMO 4x4, one cell) with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. + Power of RRU (running dual band mode, MIMO 2x2, two cells) with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. + Power of RRU (running dual band mode, MIMO 4x4, two cells) with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. Testing at Viettel's lab		x	
2.12	The Maximum power consumption of AAU Massive MIMO <1290 w	20	20	Maximum Power consumption of AAU under the conditions of room temperature, no additional	Refer to the bidder's description documents and lab test results.		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				features with 100% load, 320W (X): + $X \geq 1290$ W: 0 points + $X < 1290$ W: 20 points.	Testing in Viettel's LAB			
3	Antenna							
3.1	<p>Bidder must provide documents describing Broadcast and Traffic beams which include at least the following information:</p> <p>1. Traffic beams</p> <ul style="list-style-type: none"> + The maximum number of beams + Average gain (dBi) + Vertical and horizontal beam steering angle range + Average vertical and horizontal 3dB beamwidth + The maximum number of horizontal beams at a fixed vertical angle + The maximum number of vertical beams at a fixed horizontal angle + Support change electrical tilt for traffic beam and electrical tilt range. <p>2. SSB beams</p> <ul style="list-style-type: none"> + The maximum number of beams + Average vertical and horizontal 3dB beamwidth + Average gain (dBi) + Remote electrical tilt capability and electrical tilt range. The impacts of adjusting electrical tilt of the SSB beams on the traffic beams 	10	10	<p>10 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description document	x		
3,2	<p>Bidder must provide:</p> <ul style="list-style-type: none"> + Antenna pattern files in text (*.txt) format of all SSB and traffic beams at all tilts for frequency band 2.6GHz. + Test result: The measurement results of each parameter must be fully reflected in the bidder's test lab. The measurement requirements include: <ul style="list-style-type: none"> - Beam: all beam traffic and beam broadcast that the AAU can run. - Output results: EIRP, gain, vertical beam width, horizontal beam width. 	10	10	<p>10 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description documents. Testing in Bidder's LAB		x	
3.3	Number of Antenna Elements ≥ 192	5	5	<p>Number Antenna Element (X):</p> <ul style="list-style-type: none"> + $X < 192$: 0 points. + $X \geq 192$: 5 points. 	Refer to the bidder's description document	x		
3.4	Average Antenna Gain of traffic beam (dBi) ≥ 22	5	5	<p>Average Antenna Gain of traffic beam (X)</p> <ul style="list-style-type: none"> + 5 points: $X \geq 22$ (dBi) + 0 points: $X < 22$ (dBi) 	Refer to the bidder's description documents. System check		x	

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						HOC	TAM	TAC
4	Mechanical Properties							
4.1	Operational temperature: -40 °C...+55 °C.	5	5	The AAU: + 5 points: Operates over the entire operating temperature range of -40 °C...+55 °C. + 0 points: Operates outside of the operating temperature range of -40 °C...+55 °C.	Refer to the bidder's description document and bidder's test report	x		
4.2	The AAU complies at least IP65 (IEC60529 protection standards)	5	5	+5 points: Full compliance with technical requirement +0 points: Not comply with technical requirement	Refer to the bidder's description document	x		
4.3	Support mechanical tilt change	5	5	5 points: The AAU support mechanical tilt change 0 points: The AAU does not support mechanical tilt change	Refer to the bidder's description document	x		
5	Interface							
5.1	Number of Input Power Port =1	5	5	Number of Power Port per AAU (X): + X = 1: 5 points. + X > 1: 0 points	Refer to the bidder's description document. Equipment check	x		
5.2	Power Supply Range: at least from -38V to -57V	5	5	5 points: Full compliance with technical requirement. 0 points: Not comply with technical requirement.	Refer to the bidder's description document and bidder's test report	x		
5.3	Nominal Input Voltage: -48V	5	5	DC input voltage (X): + X = - 48VDC: 5 points. + X ≠ - 48VDC: 0 points.	Refer to the bidder's description document or Bidder's commitment	x		
5.4	Number of eCPRI or CPRI with Line Rate 25Gbps/port ≥ 2	5	5	Number of eCPRI or CPRI with Line Rate 25Gbps/port (X): + X < 2: 0 points + X ≥ 2: 5 points	Refer to the bidder's description documents. Equipment check	x		

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
5.5	Number of Fronthaul eCPRI or CPRI line required for one AAU for NR 100MHz, 16 Layer DL /4 Layer UL =1	NA	10	Number of Fronthaul eCPRI or CPRI line required for one AAU for NR 100MHz, 16 Layer DL /4 Layer UL: +X =1: 10 points +X >1: 0 points	Refer to the bidder's description documents. Equipment check	x		
5.6	LED Indicator: Power Supply and Optical port and AAU operation state	5	5	LED Indicator in AAU: + Power Supply and Optical port and AAU operation state: 5 points + If not support Power Supply or Optical port or AAU operation state: 0 points	Refer to the bidder's description document. Equipment check	x		
5.7	Support Grounding Interface	5	5	The AAU: + 5 points: Support Grounding Interface. + 0 points: Not support Grounding Interface.	Refer to the bidder's description documents. Equipment check	x		
5.8	Support external alarm Port.	NA	1	The AAU: +1 point: Support external alarm port. +0 points: Not support external alarm port.	Refer to the bidder's description document. Equipment check	x		
IV	Feature 5G	255	549					
1	Gernal Requirement							
1.1	The system shall be compliant with 3GPP standards R15, R16, R17 and planned 5G-NR RAN releases R18. The vendor shall provide its Statement of Compliance of all relevant TS38.xxx series. Radio Layer 1: TS 38.104, TS 38.211, TS 38.212, TS 38.213, TS 38.214, TS 38.215. Radio Layer 2: TS 38.304, TS 38.321, TS 38.322, TS 38.323, TS 38.331. Radio Layer 3: TS 38.401, TS 38.410, TS 38.411, TS 38.412, TS 38.413, TS 38.414, TS 38.415, TS 38.420, TS 38.421, TS 38.422, TS 38.423, TS 38.424, TS 38.425, TS 38.455, TS 38.460, TS 38.461, TS 38.462, TS 38.463, TS 38.470, TS 38.471, TS 38.472, TS 38.473, TS 38.474, TR 38.801.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document or Bidder's commitment		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	RAN WG4: TS 38.113, TS 38.133, TS 38.171. SA WG2: TS23.501, TS23.502.							
1.2	- The Bidder must provide documents describing all Basic and Optional Features in the latest commercial SW versions of gNodeB and OMC. - The Bidder must provide documents describing in detail all Licenses and License management mechanisms at gNodeB and OMC.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.3	The Bidder must provide permanent licenses for all features in gNodeB and OMC according to the latest SW version for all gNodeBs of bidding scope.	30	30	30 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents Check list licenses/features		x	
1.4	Support 5G NSA and SA Architecture: + NSA: Option 3,3a,3x,7,7a,7x,4,4a + SA: Option 2,5 + Dual mode (SA and NSA) simultaneously in one gNodeB	5	10	10 points: The gNodeB can supports all Option, and both NSA and SA mode can operate simultaneously. 5 points: The gNodeB supports both Option 3x and Option 2; moreover, both Option 3x and Option 2 can operate simultaneously. 0 points: The gNodeB does not support either Option 3x or Option 2.	Refer to the bidder's description documents and Bidder's test results.		x	
1.5	'The Bidder must provide a technical solution that includes: software, features and permanent licenses for the existing eNodeB; ensuring each gNodeB can run EN-DC, user data (Downlink, Uplink) is transmitted simultaneously on both 4G leg and 5G leg, Interworking 4G-5G (Cell Reselection, Redirection, Fast Return, Handover, Inter-vendor Mobility...) with the existing eNodeB.	NA	25	25 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.6	Support flexible intra-site and inter-site anchor cell selection in NSA option 3x with all frequencies (b1, b3, b8, b28, b40): Define NSA anchor priority, support flexible intra-site and inter-site anchor selection according to anchor priority in NSA	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
1.7	Support NSA option 3x and SA option 2 dual architecture in the same hardware (BBU, baseband board, control board, AAU)	2	2	2 points: Full compliance with all requirements.	Refer to the bidder's description		x	

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						HOC	TAM	TAC
				0 points: Not comply at least 01 of technical requirement	documents. System check			
1.8	The gNodeB shall support Cloud CU and Virtual CU: - Cloud RAN: Cloud RANs are cloud-native, centralized cellular network architecture. Cloud RANs also provide great benefits in network scalability and performance. - vRAN is a new architecture enhancing the flexibility of Centralized RAN (C-RAN) by virtualizing the functions of basebands in a common resource pool made up of the Commercial Off-the-Shelf (COTS) servers located in centralized Hub, allocating resources in a flexible manner according to traffic conditions.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and Bidder's test results.		x	
1.9	The gNodeB must support: + IPv4 + IPv6. + IPsec	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.10	- The gNodeB must support AMF pool and UPF pool. - All services supported by gNodeB such as SA (VoNR, Network Slicing,...) and NSA can operate with Other vendors's Core Network.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.11	The gNodeB shall support Non Public Network (NPN) or Private Network: Identified by a PLMN ID and Network ID (NID) broadcast in SIB1 Closed Access Group (CAG) identifies permitted access	5	10	10 points: Both Public Network and Private Network can operate simultaneously in one gNodeB. 5 points: the gNodeB can operate either Public Network or Private Network. 0 points: the gNodeB does not support Non Public Network (NPN) or Private Network	Refer to the bidder's description document		x	
1.12	The gNodeB shall support NR carrier channel bandwidths for FR1 (n41, n77, n78): 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz.	5	10	10 points: the gNodeB supports all NR Carrier BW: 20/30/40/50/60/70/80/90/100 MHz. 5 points: the gNodeB supports all NR Carrier BW: 60/80/100 MHz.	Refer to the bidder's description documents and Bidder's test results. Equipment test		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				0 points: the gNodeB does not support all NR Carrier BW : 60/80/100 MHz.				
1.13	BBU Hardware and Software support SCS Configuration: 15KHz (FDD), 30KHz (TDD) for sub 6GHz Band and 120KHz for mmWave.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.14	The gNodeB must support at least 2 Frame structures below: + 4:1 (DDDSU) + 4:2:4 (DDDSUDDDD) in mixmode NR+LTE with Special Slot Configurations: 6DL:4G:4UL	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
1.15	The gNodeB shall support frame structures: + 7:3 (DDDSUDDSUU) + 8:2 (DDDDDDDSUU) + 6:4 (DDDSUUDSUU) + 5:5 (DDDSUUUUUU) + 5:5 (DDSUUDSUUU) + 3:7 (DDSUUUUUUU)	NA	10	10 points: Full compliance with all requirements. 4 points: Comply with 2 frame structures. 2 points: Comply with 1 frame structure. 0 points: Not comply with any frame structure.	Refer to the bidder's description documents and Bidder's test results. Equipment test		x	
1.17	Peak DownLink user throughput required: + In NSA mode, conduct laboratory testing for one user with the following scenario (1 LTE cell B3 20MHz 4T4R + 1 NR cell 100MHz n41 Massive MIMO 16DL Layer - Frame structure 4:1): Peak DL user throughput must be \geq 1.6Gbps, and the UE (user plane data) must utilize both the 4G and 5G legs simultaneously + In SA mode, conduct laboratory testing for one user with the following scenario (1 NR 100MHz Massive MIMO 16 DL Layer): Peak DL user throughput must be \geq 1.4Gbps	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB		x	
1.18	Peak UpLink user throughput required: In NSA/SA mode, conduct laboratory testing for one user with the following scenario (1 NR cell 100MHz n41 Massive MIMO 16DL Layer): Peak UL user throughput must be \geq 180Mbps	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
2	Supported Services							

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
2.1	The gNodeB is ready to support SMS service for 5G SA: SMS over IP and SMS over NAS.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
2.2	The gNodeB must support VoNR and EPS Fallback	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
2.3	The gNodeB shall support ViNR to provide video call for 5G SA	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.4	The Bidder must provide all features +licenses with maximum hardware capabilities related to URLLC services, ensuring compliance with 3GPP release 16, 17, 18 standards and beyond.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.5	The Bidder must provide all features +licenses with maximum hardware capabilities related to Redcap, mMTC services, ensuring compliance with 3GPP release 16, 17, 18 standards and beyond.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.6	The gNodeB must support Carrier Bandwidth Part following with 3GPP Standard related to 5G.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
2.7	Support Positioning Features: + Downlink time difference of arrival (DL-TDOA) + Uplink time difference of arrival (UL-TDOA) + Downlink angle-of-departure (DL-AoD) + Uplink angle-of-arrival (UL-AOA) + Multi-cell round trip time (RTT) + Cell ID-based positioning + Enhanced cell ID (E-CID) - based positioning	NA	10	10 points: Support all Features. 8 points: Support at least Cell ID-base positioning. 0 points: Not support Cell ID-base positioning.	Refer to the bidder's description document		x	
2.8	The Bidder must provide a Roadmap for developing features related to V2X services, ensuring compliance with 3GPP release 16, 17, 18 standards and beyond.	NA	5	5 points: Full compliance with all requirements.	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				0 points: Not comply at least 01 of technical requirement				
3	Accessibility							
3.1	The system shall support Direct RRC Signaling for NSA Mode 3x Operation (SRB3).	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.2	The Bidder must provide all Features related to resource allocation control for subscribers accessing the network.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.3	The Bidder must provide all permanent features and licenses related to access control /admission control in the following scenario: + The initial service request at idle mode + Radio bearer activation at connected state + Handover request	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.4	The Bidder must provide all the features and permanent licenses related to Power Control for both downlink and uplink channels, ensuring enhanced coverage, reduced interference, and improved spectrum utilization.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.5	The Bidder must provide all the features and permanent licenses along with the latest commercial software version, related to load balancing.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.6	The Bidder provide all the features and permanent licenses to ensure that when the cell's load falls into an Overload state, the gNodeB takes actions to release connections and restrict access.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
3.7	X2 interface between gNodeB and eNodeB must support the following function: + Interface Management: Interface setup, reset, configuration update,.. + UE Context Management: + Mobility Management + Dual Connectivity. + Load Management + Message Transfer	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	+ EN-DC + Secondary RAT data usage report + User data Transfer: + Flow Control: Polling, discarding duplicated data, status indicator for retransmission,...							
4	Coverage							
4.1	The system shall support RACH preamble formats: + RACH preamble format 0. + RACH preamble format 1. + RACH preamble format C2. + RACH preamble format A3. + RACH preamble format B4.	2	3	3 points: Support formats 0, 1, C2, A3, B4 . 2 points: Support formats 0, C2. 0 points: Not support formats 0, C2.	Refer to the bidder's description documents and Bidder's test results.		x	
4.2	TDD SSB coverage extension: + Support SSB Power Boost, coverage extension up to 6dB. + Support multi-beam SSB configuration for different coverage requirement scenarios.	5	10	10 points: Support both SSB Boost and multi-beam SSB Configuration . 5 points: Support SSB Boost or multi-beam SSB Configuration . 0 points: Not support SSB Boost or multi-beam SSB Configuration.	Refer to the bidder's description document		x	
4.3	Support ROHC (Robust header compression).	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
4.4	VoNR Enhancement: + (1) Support power compensation for PDSCH . + (2) DTX CCE aggregation level increase (maximum level 16) are performed for ViNR services. + (3) Enable UL CoMP for VoNR service quality improvement. + (4) The gNB TDD FR1 support the usage of a BandWidth Part of 20 MHz in order to optimise the UE battery consumption for the VoNR Standalone connection.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
4.5	NR TDD cells support Extended Cell Range to 60 Km.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
4.6	NR FDD cells support Extended Cell Range to 100 Km.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
4.7	NR TDD cells Support to configure High-Speed UE (speed > 120km/h) .	1	1	1 point: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.8	High-speed UE support (up to 300 km/h).	NA	2	2 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.9	Support Remote Interference Management (RIM): Provide interference management feature for Atmospheric Duct Scenario, including interference source detection and mitigation for 5G NR TDD.	5	5	5 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.10	Cross-link interference (CLI): gNodeb can measure and report inter-/intra-cell interferences caused by neighboring gNodeB with different TDD configurations.	NA	5	5 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.11	The system shall support Interference Rejection Combining (IRC) for FR1 TDD Cells.	1	1	2 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.12	The system shall support Maximum Ratio Combining (MRC) Receiver for FR1 TDD Cells.	NA	2	2 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.13	Support NR FDD/TDD Cell Combination: The feature enables the configuration of at least 4 radio units acting as one logical cell.	NA	2	2 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.14	Support DL/UL CoMP: Coordinated multipoint transmission/reception (CoMP) can be used to improve user experience of such UEs. CoMP enables the serving cell and	NA	5	5 points: Full compliance with all requirements.	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	intra-frequency neighboring cells of CEUs (cell edge users) in the overlapping area to jointly process their traffic channel data, increasing user experience of CEUs.			0 points: Not comply at least 01 of technical requirement				
4.15	NR SSB Time Shift Mid-Band: The feature introduces a different SSB index for NR cells in Mid-Band. This SSB is shifted in the time domain to reduce interference from PDSCH and neighbor cell SSBs. The feature uses a different SSB time index that is configured based on mod 3	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
4.16	Automatic SSB weight adjustment is applicable to automatic coverage adjustment after a cell is out of service: When a cell is out of service, neighboring cells support fast automatic SSB beam pattern optimization for coverage compensation.	NA	5	5 points: Full compliance with technical requirement. 0 points: Not comply with technical requirement.	Refer to the bidder's description documents. System check		x	
4.17	Support SSB Muting: providing simple means to prevent sending DL signal from gNB towards some direction(s) around gNB • One or several SSB beams per cell can be muted by operator configuration • The refined beams under the muted are not used either • UEs located in the problematic direction need to use other UEs located in the problematic direction need to use other frequency	NA	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
5	Capacity							
5.1	Support all DL modulation methods: QPSK, 16QAM, 64QAM, 256QAM.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
5.2	Support all UL modulation methods: QPSK, 16QAM, 64QAM, 256QAM.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
5.3	Support PUCCH Format 1, 3, 4.	2	4	4 points: Support formats 1, 3 and 4. 2 points: Support formats 1 and 3. 0 points: Not support format 1 or 3.	Refer to the bidder's description documents. System check		x	
5.4	The system shall support UL/DL Scheduling: The feature introduces the ability to schedule multiple UEs by distributing the frequency resources among them in a single slot. It provides the following benefits:	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	<ul style="list-style-type: none"> - More than one UE can be scheduled per slot. - Latency is reduced due to a lower amount of time needed for scheduling. - Resource allocation is calculated based on UE needs. - Increase throughput and capacity. 							
5.5	gNodeB support UL/DL Scheduling: The system shall support Priority-Controlled scheduling. The system shall support NR Relative Priority Scheduling. The system shall support Pre-scheduling/Proactive Scheduling.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
5.6	The Bidder must support to configure any combination set, ENDC, DC, CA among these bands (can be unlimited configured to 2CC, 3CC, 4CC,...), including but not limited: + Carrier Aggregation, Dual Connectivity: n1, n3, n8, n28, n40, n41, n77, n78,... in FR1 + ENDC, CA+ENDC: b1, b3, b8, b28, b40, b41 and n1, n3, n8, n28, n40, n41, n77, n78... in FR1. Support Carrier Aggregation/Dual Connectivity DL/UL with any combination band above in any senario following: + Intra gNodeB CA. + Inter mode FDD and TDD. + Intra FR inter band CA. + 4G and 5G. The Bidder provides all features and accompanying permanent licenses for gNodeB to operate: + NR CA: At least 2CC in n1, n3, n8, n28, n40, n41, n77, n78 + LTE CA: At least 3CC in b1, b3, b8, b28, b40, b41 + ENDC: Support ENDC at least 1CC LTE + 1CC NR (DC_1-n41, DC_3-n41, DC_28-n41, DC_8-n41,... in FR1) + ENDC + CA: Support at least 2CC LTE + 2CC NR (DC_1-3_n41-n78, DC_1-3_n41-n77, DC_3-1_n41-n78, DC_3-1_n41-n77, DC_1-28_n41-n78, DC_1-28_n41-n77, DC_3-28_n41-n78, DC_3-28_n41-n77,... in FR1)	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	<ul style="list-style-type: none"> - Refer to the bidder's description documents - Testing Bidder's Lab all following requirements: +Feaure: ENDC: 2CC LTE + 2 CC NR; CA DL: 2 CC, 3 CC, 4 CC; CA UL: 2CC (Intra gNodeB, Intra/Inter frequency band). + Other: All expenses associated with this testing for the two Viettel engineers from Vietnam to Bidder's Lab Test. 		x	
5.7	Support PDSCH Extension in SSB and TRS slots.	NA	5	5 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
5.8	Support full TX power in uplink transmission FR1 (Support UE power class 2, 1.5).	1	1	1 point: Full compliance with all requirements.	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				0 points: Not comply at least 01 of technical requirement				
5.9	Downlink/Uplink Data and DMRS Multiplexing: The feature transmits downlink/uplink data in unused resource elements in symbols carrying NR PDSCH/PUSCH DMRS.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
5.10	BBU Hardware and Software support channel bandwidth for NR FDD Channel BW: 5MHz, 10 MHz ,15MHz and 20 MHz.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB		x	
5.11	BBU Hardware and Software support NR FDD large-carrier bandwidths: 25MHz & NR 30MHz in n1 and n28 frequency band.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and Bidder's test results.		x	
5.12	The Bidder must provide BBUs with Hardware and Software supporting FDD Dynamic Spectrum Sharing (DSS) configuration	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
5.13	Support DSS with RAN sharing (MORAN or MOCN).	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
5.14	NR Traffic Steering Feature: traffic steering to the UE based on coverage and UE capabilities for increasing UE downlink throughput.	NA	5	5 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
5.15	NR Intelligent SCell Management: support UEs to maintain high throughput in EN-DC if the NR SCell coverage deteriorates. NR SCells that have poor coverage are deconfigured and the eNodeB performs a new evaluation to configure more LTE SCells.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
5.16	TDD PCell Support for DL Carrier Aggregation: + Downlink carrier aggregation with a TDD cell as PCell and an FDD cell as SCell + Mixed TDD Pattern Support for DL Carrier Aggregation	5	5	5 points: Full compliance with all requirements.	Refer to the bidder's description documents and lab		x	

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						HOC	TAM	TAC
				0 points: Not comply at least 01 of technical requirement	test results. Testing in Viettel's LAB			
5.17	NR DL Carrier Aggregation support: + 3CC + 4CC + 5CC	NA	6	6 points: Support 3CC, 4CC and 5CC NR DL CA 4 points: Support 3CC and 4CC NR DL CA 2 points: Support 3CC NR DL CA 0 points: Not support 3CC NR DL CA	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
5.18	Support DL modulation 1024QAM	NA	10	10 points: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
6	Mobility							
6.1	The Bidder must provide all features and permanent licenses related to subscribers procedures, such as: Cell selection, cell reselection (intra, inter, interRAT), paging, and location updates in both NSA and SA modes.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
6.2	The Bidder must provide all features and permanent licenses related to mobility procedures in NSA mode, including but not limited to the procedures below: + Support Intra-MeNB handover without SgNB change initiated by the MeNB + Support X2- based Inter-MeNB handover without SgNB change initiated by the MeNB + Support S1-based Inter-MeNB handover without SgNB change initiated by the MeNB + Support adding NR SCG (Secondary Cell Group) + Support adding NR SCG (Secondary Cell Group) without measurement when LTE and NR are co-site + Support Intra-site SCG (Secondary Cell Group) modification based on coverage in NSA Architecture + Support Inter-site SCG (Secondary Cell Group) modification based on coverage in NSA Architecture	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	+ Inter-Frequency Mobility with MeNB Coordination +Inter-Frequency Mobility without MeNB Coordination							
6.3	The Bidder must provide all features related to mobility procedures in SA mode, including but not limited to the procedures below: + (1): Support RRC inactive state and RNA (RAN-based Notification Area) + (2):Support 5G NR Intra-RAT and Intra-frequency handover based on coverage + (3):Support 5G NR Intra-RAT and Inter-frequency handover based on coverage + (4):Support 5G NR Intra-RAT and Inter-frequency handover based on service + (5):Support Xn-based Handover + (6):Support NG (N2&N3)-based Handover	5	10	10 points: support all procedures in list: 1,2,3,4,5,6 5 points: support all procedures in list: 1,2,3,5,6 0 points: does not support all procedures in list: 1,2,3,5,6	Refer to the bidder's description documents. System check		x	
6.4	Support inter-vendor X2/Xn based handover	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and bidder's test report	x		
6.5	The Bidder must provide all features and permanent licenses related to Inter-RAT mobility between NG-RAN and E-UTRAN procedures, including but not limited to the procedures below: + Support Cell Reselection from NG-RAN to E-UTRAN based on frequency priority + Support Cell Reselection from NG-RAN to E-UTRAN based on coverage + Support coverage-based Inter-RAT Redirection from NG-RAN to E-UTRAN + Support coverage-based Inter-RAT Handover from NG-RAN to E-UTRAN + Direct data forwarding during iRAT HO (5G->4G)	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
6.6	Support inter-RAT handover from VoNR to VoLTE	1	1	1 point: Full compliance with technical requirement. 0 points: Not comply with technical requirement	Refer to the bidder's description documents. System check		x	
7	Massive MIMO & Beamforming							
7.1	The Bidder provides detail documents about Beamforming & Massive MIMO algorithms for Downlink and Uplink broadcast and traffic channels: + Mechanism to create Broadcast Beam, Traffic Beam and number of beams, patterns for each type. + SSB Sweeping. + Beam Maintenance, Beam Recovery. + PMI-based Beamforming and Wideband SRS-based Beamforming. + Support Subband SRS-based Beamforming	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
7.2	The Bidder provides all the features and permanent licenses to ensure the operation of Massive MIMO and Beamforming algorithms.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents Check list licenses/features		x	
7.3	Supports tilt adjustment for SSB Beam by beamforming or electrical tilt: Bidder provides tilt range of SSB beam in both case and documents to prove it.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
7.4	Support 3D (horizontal + vertical) beam forming (Full dimension)	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
7.5	gNodeB support PMI and SRS-based Beamforming	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
7.6	gNodeB shall support Aperiodic CSI Reporting on PUSCH for Beamforming FR1 TDD Cells	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
7.7	Support at least 4 DL layers for NR SU-MIMO Support at least 2 UL layers for NR SU-MIMO	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
7.8	Support at least 16 DL layers for NR MU-MIMO Support at least 4 UL layers for NR MU-MIMO	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and Bidder's test results.		x	
7.9	Bidder should provide features and licenses at least 8 UL layers for NR MU - MIMO before June 2025.	NA	2	2 points: Full compliance with technical requirement. 0 points: Not comply with technical requirement	Refer to the bidder's description document and commitment		x	
7.10	gNodeB must support rank 4 for each MU-MIMO user	NA	5	5 points: Full compliance with technical requirement.	Refer to the bidder's description		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				0 points: Not comply with technical requirement	documents. System check			
8	QoS and Network Slicing							
8.1	The Bidder provides all features and permanent licenses to support scheduling, resource allocation for subscribers and services based on QCI/5QI to ensure high-priority subscribers and services have service quality better than threshold (flexible configuration) and better than normal-priority subscribers and services.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
8.2	gNodeB supports access control and admission control: Enables high-priority UEs to pre-empt resources of low-priority UEs to ensure experience of high-priority UEs.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
8.3	Support FWA service: + PRB control for FWA UEs On a network with both eMBB and FWA services + DL experience-based scheduling for FWA Ues On a network with both eMBB and FWA services + Differentiated QoS services are provided to ensure FWA private line user experience	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
8.4	Support UE Grouping Framework: Define UE Group based on the UE-related parameters provided by the Core Network (SPID or RFSP, QCI or 5QI, ARP, PLMN, S-NSSAI, Masked IMEI-SV, IMEI-TAC, IMEI-SVN, RedCap UE,...).The mobility, CA, loadballancing are configured differently according to each group of UEs.	2	10	10 points: Support feature (3), detailed parameter feature description as below 4 points: Support feature (1) & (2), detailed parameter feature description as below 2 points: Support feature (1), detailed parameter feature description as below 0 points: Support only feature (2), detailed parameter feature description as below List features/parameters: (1): SPID or RFSP (2): QCI or 5QI (3): SPID or RFSP, QCI or 5QI, ARP, PLMN, S-NSSAI,	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				Masked IMEI-SV, IMEI-TAC, IMEI-SVN, RedCap UE,...				
8.5	The Bidder provides all features and permanent licenses with maximum hardware capabilities to support the functions below (including but not limited): + Network slicing Configuration. + Network slicing resource management + Network slicing QoS + Network slicing Mobility	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
8.6	The Bidder Provides Network Slicing has advanced features	2	8	8 points: Support 4/4 features, detailed parameter feature description as below. 6 points: Support 3/4 features, detailed parameter feature description as below. 4 points: Support 2/4 features, detailed parameter feature description as below. 2 points: Support 1/4 features, detailed parameter feature description as below. 0 points: Not supporting any features. List features/parameters: (1) Configure resource allocation flexibly, scheduling by TTI or by PRB, by both TTI and PRB. (2) Configure Dedicated Resource for each slice (3) Can limit the number of UE Register in 1 slice (4) Can configure the Guaranteed bitrate for 1 slice	Refer to the bidder's description documents. System check		x	
8.7	gNodeB support UE QoS Control in Uplink (support allocate resources with selected periodicity or/and priority for each DRB)	10	10	10 points: Full compliance with technical requirement.	Refer to the bidder's description		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				0 points: Not comply with technical requirement.	documents. System check			
9	KPI Improvement							
9.1	The system shall support NR RRC Connection Re-establishment in 5G SA mode.	NA	6	6 points: Support 4/4features, detailed parameter feature description as below 4 points: Support 3/4 featuresm, detailed parameter feature description as below 2 points: Support 2/4 features, detailed parameter feature description as below 0 points: Support less than 2/4 features, detailed parameter feature description as below List features/parameters: + (1): RRC Re-establishment with serving cell only + (2): RRC Re-establishment with NRCells in the same gNodeB (Intra-gNodeB) + (3): RRC Re-establishment with NRCells in the different gNodeB (Inter-gNodeB) + (4): RRC Muti-Target Re-establishment	Refer to the bidder's description document		x	
9.3	- Support TDD Coordinated scheduling (CS) & Coordinated beamforming (CBF) + CS is a time-frequency-based interference coordination technology, to reduce the interference to the UEs in the overlapping area, improving performance of victim UEs. + CBF is a beam domain-based interference coordination technology, to reduces the interference to victim UEs while ensuring that the loss of interfering UEs is controllable. The cooperating cell adjusts the weights of interfering UEs to change the directions of interfering beams. This significantly reduces the interference to victim UEs while ensuring that the loss of interfering UEs is controllable, thereby improving the demodulation performance of CEUs as well as user experience	NA	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
9.8	gNodeB support SCG Failure Handling: The feature is to provide the functionality for 5G gNB and LTE eNB to handle Secondary Cell Group (SCG) failure. The feature performs failure handling by suspending, changing, or releasing the SgNB/SCG or by changing the PSCell. This reduces the impact of data service in the EN-DC mode. - Benefit: Reduce the impact on the data service during SCG failure.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
10	SON							
10.1	Bidder must provide all features and permanent licenses for gNodeB to optimize relation (Add/Remove) automatically: Support ANR: + Intra/inter frequency + inter-RAT + EN-DC and SA-DC	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
10.2	SON must support Xn/X2-ENDC Automatic configuration.	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
10.3	SON must support PCI conflict detection and create report or alarm	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
10.5	The Bidder provides all features and permanent licenses to perform the function: Load Balancing inter-RAT.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
10.6	Mobility Robustness Optimization (MRO) intra/inter frequency intra site threshold: + Cell-level: The gNodeB can automatically identify cell-level abnormal handover scenarios during intra-frequency handovers and collect statistics on abnormal handovers. Based on the statistics, the gNodeB automatically optimizes the cell-level handover parameters to suit the live network. + UE-level: The gNodeB can automatically identify UE-level abnormal handover scenarios (only ping-pong handovers can be identified in this version) during intra-frequency handovers and collect statistics on abnormal handovers. Based on the statistics, the gNodeB automatically optimizes the UE-level handover parameters to suit the live network	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
10.7	Automatic NR Sleeping Cell Detection and Recovery: + Sleeping cell detection provides functionality to identify sleeping cell and to generate an alarm for operator. + Once the sleeping cell is detected, the gNodeB attempts to recover it, by executing automated recovery actions: cell reset, baseband reset,...	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11	Power Saving							
11.1	The vendor provides all features and permanent licenses to optimize power consumption of gNodeB and UE. Simultaneously, deliver LAB test results or real-world environments to demonstrate the effectiveness of these features.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11.2	gNB supports symbol-level power saving: Support switch NR symbol or resource block on/off for energy saving purposes.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11.3	Support Massive MIMO Sleep Mode: + Provides energy savings by deactivating TX antenna branches for Massive MIMO Mid-Band at the configured traffic load level. + Automated Energy Saver by RAN or OSS SON	NA	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11.4	RF Channel Shutdown: Support RF Channel Shutdown and recover based on traffic load, while the coverage remains stable after shutdown.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11.5	Cell Switch-Off: This feature allows for the reduction of gNB power consumption by switching off one to all cells in a group of cells based on traffic and time windows.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11.6	When 5G cell traffic is low, the algorithm allows the AAU to establish a deep sleep state to maximise power consumption savings.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
11.7	Support UE Power Saving Feature: + Service-Adaptive Inactivity Timer + DRX + C-DRX (Connected- DRX) + eDRX (Enhanced DRX)	3	3	3 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

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						HOC	TAM	TAC
11.8	M-MIMO AAU extreme deep sleep: M-MIMO AAU can be automatically shut down after switching off all the carriers to allow higher energy savings (shutdown of maximum digital components other than PAs).Target to achieve ≤ 130W consumption per AAU in this deep sleep mode	5	16	16 points: Power consumption ≤ 20W per AAU in this deep sleep mode 5 points: Power consumption ≤ 130 W per AAU in this deep sleep mode 0 Points: Power consumption > 130W per AAU in this deep sleep mode	Refer to the bidder's description documents. System check		x	
11.9	gNodeB shall support PDCCH power boosting	NA	10	10 points: Full compliance with technical requirement. 0 points: Not comply with technical requirement.	Refer to the bidder's description documents. System check		x	
12	RAN Sharing							
12.1	5G NSA and SA support multiple PLMNs (at least 3 PLMNs).	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
12.2	Support RAN Sharing with Common Carrier (MOCN) in NSA option 3x and SA option 2 architecture.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
12.3	Support RAN Sharing with Dedicated Carrier (MORAN) in NSA option 3x and SA option 2 architecture.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
12.4	Independent QoS parameter configuration for operators: In multi-operator networking scenarios, gNB supports independent QoS/5QI configurations to achieve flexible service requirements.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
13	System Performance Monitor							
13.1	The system shall support NR Key Performance Indicators for 5G SA and NSA modes.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	

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						HOC	TAM	TAC
13.2	The system will support TWAMP for transmission monitoring.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
13.3	The system shall support the Uplink Spectrum Analyzer. The feature provides an interface to check the Tx and Rx signals spectrum of NE remotely without site visit and the RF measurement equipment. Operators can use the measured Rx data to analyze the UL interference while the cell is in enable state.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
13.4	The system will support the streaming of PM events.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
13.5	The system shall support the NR Air Interface Load Generator.	1	1	1 point: Full compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
13.6	The system shall support the MR (measurement report).	1	1	1 point: Full compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
13.7	The system shall support the MDT (minimization of drive tests).	5	5	5 points: Full compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
13.8	Support collecting layer 3 messages to use in network optimisation, send it to the other node element, and export the data in readable format.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
13.9	The system will support online cell trace and UE trace.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
13.10	The system shall support monitoring power consumption per piece of equipment (RRU, AAU, BBU, etc.).	1	1	1 point: Full compliance with all requirements.	Refer to the bidder's description		x	

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				0 points: Not comply at least 01 of technical requirement	documents. System check			
13.11	Optical Link Risk Alarms: The vendor must support using the NE log, network alarm, and KPI data to check the system CPRI/eCPRI optical link subhealthy state.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
13.12	High-Frequency Intermittent Disconnection Risk Detection: The vendor should support the identification of the full set of faults that meet the high-frequency threshold, calibrate the existing diagnosis results by adding NE events or logs, diagnose the root causes of the existing top high-frequency faults, and output the demarcation causes. The vendor should support the scenario by at least including the following issues: disconnection from the OSS, cell outage, and fronthaul or optical port fault.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
14	Security Management							
14.1	The system support security solution with full integration of Certificate Authority for OAM.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
14.2	The system is able to record logs for any user access to the gNodeB.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
14.3	gNodeB supports manually block unused ports.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
14.4	The proposed gNodeB should support ACL rules, the gNodeB shall provide packets filtering according the packet attributes, such as: source IP addresses, destination IP addresses, source port numbers and destination port numbers of the packets.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
14.5	The proposed gNodeB should support the PKI (Public Key infrastructure) framework to manage digital certificate.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

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14.6	Identification and detection of 4G/5G fake base stations: Based on the statistical analysis results of abnormal events on the network side and the comparison results between neighboring cell discovery and network planning, fake base stations can be detected on the network.	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
14.7	Anti DDOS Attack over air interface	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
15	Transmission							
15.1	Link Aggregation Support for Backhaul, at least 2 port aggregation into 1 logical link	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
15.2	The gNodeB must support flexible configuration of IP address and flexible use of VLANs. Separate or common IP addressing, with or without virtual IP address should be fully configurable in order to allow all combination between Uplane, Cplane, Mplane and Splane addressing. Please precise possible combination.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
15.3	The proposed gNodeB must support multiple VLANs, at least 4 VLANs for Uplane, Cplane, Mplane and Splane.	1	1	1 point: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
15.4	The Bidder proposes a technical solution that includes: hardware (if any), software, features and license for Backhaul Throughput Testing	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
15.5	Other feature (5G): + In case Mixedmode LTE +NR Massive MIMO, LTE Cell should support 16 Downlink Layers for MIMO +X2 interface between gNodeB and eNodeB must support the following function: Energy Saving, UE Context Retrieval, Inactive Management. +The Bidder provides feature and license to support the function: Network slicing admission control +NSA Mobility: Support Cell Redirection from E-UTRAN to NG-RAN based on services; Support inter-RAT Handover from E-UTRAN to NG-RAN based on services	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and Bidder's test results.		x	

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V	The quality of similar equipment		200					
1	The Bidder's 5G equipment operating at 2.6GHz or 3.5GHz had undergone a trial period and provided services to customers in Vietnam for a minimum period of 3 months until the end of March 2025.	NA	200	200 points: Bidder has confirmation of trial period and testing results with at least 01 operator in Vietnam. 0 points: Bidder does not have confirmation of trial period and testing results with operator in Vietnam	Refer to the bidder's description document	x		
VI	Other requirements	93	252					
1	Feature 4G	93	102					
1.1	General Requirements: + The system shall be compliant with the following 3GPP specifications: TS 36.101, TS 38.101-3, TS36.104, TS36.133, TS36.141, TS36.201, TS36.211, TS36.212, TS36.213, TS36.214, TS36.314, TS36.321, TS36.322, TS36.323, TS36.331, TS36.410, TS36.411, TS36.412, TS36.413, TS36.414, TS36.420, TS36.421, TS36.422, TS36.423, TS36.424 and TS36.455. + The system shall be compliant at least with 3GPP R17 September 2022 LTE CA and Intra-band EN-DC Band Combination Alignment. + All features of proposed software version which are not described in 3GPP release 8, 9,10, 11,12, 13, 14 and 15 shall be provided as optional.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.2	The Bidder must provide the latest commercial version software with all 4G features and permanent licenses (basic + optional).	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents Check list licenses/features		x	
1.3	Signalling Profile per busy hour: + Number of Attached users per eNodeB (for 4G) ≥ 4400 + VoLTE attempts per Attached user ≥ 1 + CS Fall back call attempts per Attached user ≥ 1.25 + PS Call attempts per Attached user ≥ 250 + IntraRAT handovers (interMME+intraMME) per Attached user ≥ 12.5 + InterRAT handovers per Attached user ≥ 2 + TAU+Attach+Detach per Attached user ≥ 7.5 + SMS per Attached user ≥ 2	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

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	+ Bidder must state the calculation methods in the proposal to prove the proposed solutions (hardware and software) can support gNodeB (for 4G) profile							
1.4	The Bidder must provide solutions including hardware and software, features for gNodeB/eNodeB, features for OMC to operate 4G and 5G simultaneously. Which includes but is not limited to the following features:	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.5	Mobility - The system shall support idle mode cell reselection based on: Broadcast priority indication, Broadcast cell specific reselection parameters, Broadcast cell specific blacklists, Access class barring parameters. - The system shall support intra - LTE Handover, based on DL Reference Symbol Received Power (RSRP) or DL Reference Symbol Received Quality (RSRQ) measurements and threshold, Intra-LTE handover Types: Intra MME and SGW, Inter MME, Inter MME and SGW, Inter SGW, Over X2 interface, Using S1 interface only. - The system shall support Data Forwarding at IntraLTE Handover, both over X2 and S1 interface, Packet Forwarding at S1 Handover. - The system shall support GERAN Session Continuity, Coverage Triggered, Redirect with System Information. - The system shall support InterFrequency Session Continuity, Coverage Triggered, Coverage Triggered InterFrequency Handover, both within the same band (more than one carrier in same band) and between different bands. - The system shall support Service Triggered Mobility, Subscriber Triggered mobility, SGW relocation at X2 handover. - The Bidder shall clarify that the new equipment support handling of Doppler shift caused by terminals moving at high speed (up to 150km/h) or not. - The system shall support RRC connection reestablishment whereby outage time is minimizes in case lost connection and dropped telephony call are avoided. - The system shall support multitarget RRC connection reestablishment where reconnection is enabled in multiple 4G eNodeB. The RRC connection reestablishment should be supported in all cells with neighbor relation to the cell where the UE detected radio link failure.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document	x		
1.6	Load control/ Admission control/ Congestion Control/ Radio resource management: - The proposed Admission Control mechanism shall support admission priority levels according to predefined scenarios as: The initial service request at idle mode, Radio bearer activation at connected state, Handover request. - The proposed Admission Control shall support pre-emption functionality in case of	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

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	<p>resource limitation. The pre-emption shall be activated according to service type, QCI, ARP.</p> <ul style="list-style-type: none"> - The proposed Admission Control functions shall support configurable priority and thresholds according to the status of Activated radio bearer number, UE number in Connected state, PRB utilization. - The system shall support Differentiated Admission Control, to support Allocation Retention Priority (ARP) as defined by 3GPP. - The Bidder shall describe how Access and Retention Priority (ARP) is used to handle subscriber priority. - The proposed Congestion Control shall support uplink and downlink congestion detection to initiate Congestion Control. The congestion threshold shall be configurable. It provides overload protection for cells with a highly loaded air interface, by throttling incoming handovers and initial accesses in the cell and release of low priority GBR services. Provide details of the Radio Admission Control and Congestion Control procedure implemented. - The system shall support dynamic load control, MME overload control, load based access barring, IntraLTE Load Balancing. - The proposed system shall support Load Balancing that enables traffic distribution over multiple closely spread cells in order that radio resources remain highly utilized and the QoS of InProgress sessions are maintained to the extent possible and call / session dropping probabilities are kept sufficiently small. - The proposed system shall support Load Balancing that enables traffic distribution over multiple closely spread cells in order that radio resources remain highly utilized and the QoS of InProgress sessions are maintained to the extent possible and call / session dropping probabilities are kept sufficiently small. - Load balancing shall be possible to do between different 4G eNodeB. - The system shall support CA aware load balancing functionality to ensure that UEs with carrier aggregation capability will with high probability be moved to a carrier supporting a band combination also matching the UE's band combination capability, leading to better individual peak rate and better overall system utilization. - The proposed system shall support configurable thresholds to switch on/off Load Balancing - The Bidder shall provide details of the Radio Bearer Control, Connection Mobility Control, support multiple radio bearers per user, Admission triggered offload 							
1.7	<p>Coverage and Capacity Functionality:</p> <ul style="list-style-type: none"> - The proposed systems shall dynamically allocate the radio resources (frequency, 	2	2	2 points: Full compliance with all requirements.	Refer to the bidder's description document	x		

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	power) according to the radio characteristics and the quality of uplink/downlink in order to coordinate Inter-cell interference under same frequency networking. - The proposed system shall support NMS alarming when interference level exceeding the threshold which should be configurable. - The system shall support Interference Rejection Combining (IRC). - The following downlink and uplink modulations shall be supported: QPSK, 16QAM and 64QAM, 256 QAM. - The system shall support the following 3GPP transmission modes: Mode 1: Single Antenna Port, Mode 2: Transmit Diversity, Mode 3: Open Loop 2*2 Spatial Multiplexing, Mode 4: Closed Loop 2*2 Spatial Multiplexing. - The hardware shall support extended cell range of up to 77 km. - The system shall support robust header compression to reduce the size of IP packet header and improve payload/header ratio			0 points: Not comply at least 01 of technical requirement				
1.8	Scheduler: - The system shall support QoS Aware Scheduler. - The configuration of the scheduler shall be fully controlled by the operator and be able to set differently for different QCIs. - The eUTRAN shall support a flexible scheduler scheme that shall provide the flexibility of trading system capacity with fairness among users on cell level. The scheduler shall support, but not be limited to these functionality: Max C/I, Proportional Fair, Equal bit rate. - The system shall support Minimum Rate Proportional Fair Scheduling. - The system shall support Relative Priority Scheduling. - The system shall support UL/DL frequency selective scheduling.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document	x		
1.9	QoS: - The proposed system shall support GBR services (QCI 1 ~ 4) and nonGBR services (QCI 5 ~ 9). Support to establish at least two nonGBR bearer and one GBR bearer for each UE, excluding the default bearer. - The proposed system shall support expansion of QCI, and support customized the QCI levels and the corresponding parameters. - The proposed system shall support MBR (Maximum Bit Rate) and GBR (Guaranteed Bit Rate), UEAMBR QCI (Priority, PDB, PER) parameters for scheduling based on QoS parameters. Support differentiation of subscribers based on maximum bit rate. - The proposed system shall support QoS parameter ARP (Allocation and Retention Priority), used for admission control and user level recognition.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

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	<ul style="list-style-type: none"> - The configuration of the scheduler shall be fully controlled by the operator and be able to set differently for different QCIs. - The Bidder shall explain how the quality of low priority broadband services is ensured in the presence of voice services. - The eUTRAN system shall support that the QoS requirements signalled to the 4G eNodeB over the S1 interface are used to determine how the bearers should be handled in a resource limited situation and explain which QoS parameters are supported over the S1 interface. - The system shall support the possibility to dynamically change any QoS parameter for one or more EPS bearers. - The system shall provide the ability for a user to have several simultaneous data bearers with different QoS. State number of simultaneous data bearers. - The system shall be capable of differentiating data flows towards same user for different QoS. - Describe how Access and Retention Priority (ARP) is used to handle subscriber priority. - The proposed solution shall support QoS parameters over S1U, S1MME, X2 interface. Bidder shall describe the traffic classification, marking and QoS enforcement on 4G eNodeB S1 and X2 interfaces in detail. - The system should support of weighted scheduling in DL and UL. - Support CQI feedback modes, aperiodic CQI reports etc. - Radio bearer reconfiguration due to service Bit rate downgrade/upgrade - Support uplink synchronous adaptive HARQ. - The Vendor shall describe the QoS capabilities (traffic shaping, classification, marking, scheduling, rate management, congestion management, queuing, use of pbit 802.1q/p, use of DiffServ/DSCP/AF classes) for each physical interface. The Vendor should clarify their operating mechanisms (detailed in hardware and software). They shall be applicable with no limitation on the 4G eNodeB CPU performance. - The 4G eNodeB, without any additional cell site device, must support Ethernet switching with QoS awareness (according to DSCP or Pbit) so that the 4G eNodeB shall be connected in star, chain or tree topology - The Vendor shall describe the buffer size and the types of queue (FIFO, SPQ and WFQ, etc.) of 4G eNodeB and the Vendor will list the queuing/scheduling algorithms supported in transport interface of 4G eNodeB - The Vendor shall state his compliance to the following specifications: TOS with 							

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	RFC 791, DSCP with RFC 2474/3260, Assured Forwarding Classes (AF11 through AF43) and Expedited Forwarding RFC 3246/3247.							
1.10.	<p>Voice Support:</p> <ul style="list-style-type: none"> - Bidder shall describe in detail the solution for Viettel to deploy VoLTE service Separately for hardware and software or adapt with Viettel existing systems. - The system shall support VoIP bearer as defined in 3GPP, VoLTE as defined in GSMA IR.92 and IP Multimedia Subsystem (IMS) based VoLTE. Allow for prioritization of VoLTE scheduling requests over other traffic. - The system shall support TTI Bundling, VoLTE frequency hopping in the Uplink for increased coverage for VoLTE call on top of TTI Bundling. - The system shall support DRX for Connected UE, service specific DRX parameters that change depending on the services that are established. It shall be based on the QCI values of the bearers that have been established for the UE. - The system shall support RLC UM (Unacknowledged Mode) for services that tolerate a higher packet loss rate but require lower latency, e.g. VoLTE. - The system shall support CS fallback as defined in 3GPP, CS Fallback with System Information to GERAN and UTRAN; support SRVCC Handover to UTRAN, GSM. - The system shall support emergency call handling for CS Fallback. It shall be possible to apply separate priorities for CS fallback for emergency calls as compared to CS fallback for ordinary voice calls. - The system shall support measurement based CSFB target selection. RAT/frequency shall be selected based on interRAT measurements. This shall allow the CSFB to be directed towards a RAT/frequency where there is known coverage. - The system shall support PSHO base CSFB procedures to UTRAN. This shall reduce the outage time for ongoing PA service. It shall be possible to configure both bind as well as measurement based PSHO. 	2	2	<p>2 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description document	x		
1.11.	<p>Security management:</p> <ul style="list-style-type: none"> - The system shall support security features and mechanisms as specified in 3GPP TS 33.401 and 33.210 - Bidder shall specify the type of encryption/Ciphering supported on: Control/signalling plane, user plane of S1 interface of EUTRAN and LTEUu (Air) interface - The EUTRAN shall support the following encryption algorithms (but not limited to):EEA0, EEA1,EEA2 and integrity protection algorithms (but not limited to): EIA0, EIA1, EIA2. - Bidder shall clearly mention the type of security supported over S1 and X2 	2	2	<p>2 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description document	x		

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	<p>interface.</p> <ul style="list-style-type: none"> - The EUTRAN shall support security protocols such as secure FTP (sFTP), Secure Socket Layer (SSL), and IP Security (IPSec). - The EUTRAN shall support IPSEC for user plane, control plane and management plane. - The 4G eNodeB shall support IPSec with Public Key Infrastructure (PKI) according to 3GPP TS 33.210, TS 33.401 and TS 33.310 as LTE transport security solution. - The proposed LTE Transport Security Solution must provide automatic authentication of 4G eNodeB and Security Gateway by using Certificate Authority and PKI. It shall also support certificate revocation. - The Vendor solution must require authentication for management access in both operating system and the applications that are essential for its operation. Authentication will be required in access through physical ports and through remote user access to the system or applications with capability to accept network connections - The EUTRAN shall support TLS (Transport Layer Security) for security between 4G eNodeB and OMS system. - The EUTRAN shall support integrated IPSec with nonblocking transport throughput performance, i.e. the transport interface must not become the bottleneck or throughput limitation for the 4G eNodeB. - The 4G eNodeB must support Autoconnection and Auto configuration (Plug & Play) functionality whereby the whole connection (including IPSec and TLS) can be setup automatically - The Bidders proposed EUTRAN shall support the following services to ensure the security, integrity, and availability of the system:Encryption of key information of the user, User account management and authentication, Control over access rights of the user, Support of security protocols such as secure FTP (SFTP), Secure Socket Layer (SSL), and IP Security (IP Sec), Automatic record of the account usage information, Security certificate - The 4G eNodeB must support device certificates & the offered Certificate Authority System must be compliant to 3GPP. - The proposed solution shall log locally any access to the 4G eNodeB and have the capability to block all unused 4G eNodeB ports. - 4G eNodeB should support the IP Security (IPsec) framework for data confidentiality, integrity, and authentication between participating hosts. IPsec provides these security services at the IP layer by establishing IPSec Tunnel with 							

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						HOC	TAM	TAC
	SGW. - 4G eNodeB should support ACL rules, the 4G eNodeB provides packets filtering according the packet attributes, such as, source IP addresses, destination IP addresses, source port numbers and destination port numbers of the packets. - 4G eNodeB should support the authentication and authorization of 802.1x by using framework of EAP (Extensible Authentication Protocol) - 4G eNodeB should support the PKI (Public Key infrastructure) framework to manage digital certificate.							
1.12.	Radio Network Functionality: - Support Config: TDD frame structure config 1 (DSUUD) and config 2 (DSUDD); special subframe config 5 (3:9:2) and config 7 (10:2:2). - The system shall support 20MHz carrier bandwidth. - The system shall support Contention Free Random Access (CFRA). - The system shall support antenna supervision to detect faults in antenna system. - All the features to support 4Rx Diversity Mode must be declared and included in the proposal - The proposed EUTRAN shall support for GTPU tunnel monitoring. - The system shall support cell sleep mode where it automatically turn off not required capacity. It is fully automatic both in regards of execution and in setup. The relationship between capacity cells and coverage cells is automatically setup and continuously updated. Capacity cells are turned off and on based on current traffic load. - The system shall support MIMO sleep mode where it automatically reconfigures the antenna system from MIMO to SIMO mode and back based on traffic load. The not needed RUS's are deactivated and thus their power amplifiers (PAs) are shut off and the power consumption is reduced. - The system shall support to collect last reported value of the following parameters at disconnection to provide radio related data for analysing causes of abnormal disconnections: CQI, RI, PUSCH SINR, Number of granted PRBs - The system shall support to add timing advance data in trace results. It enables, when postprocessing the trace data, locating events geographically - The system shall support to order UEs to perform specific UE Measurements and report the result in Measurement Reports message, for Measurement Objects and Measurement Configurations that are different than the default traffic measurements. - The system shall support to send information about user location to core network when call is released. User information includes Enhanced Cell Global Identifier	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	(ECGI) and Tracking Area Id (TAI). - The system shall support to provide the counter for received noise and interference power per PRB to detect the external interference in uplink							
1.13.	LTE-A: - The vendor should be ready to support FDD, TDD carrier aggregation. - It must be possible to aggregate carriers where different Transmission Modes (TM) are used in the aggregated cells. - The system shall support dynamic selection of secondary cells for carrier aggregation, both between candidate secondary cell frequency layers as well as between cells within a layer. - The system shall support Carrier aggregation: + DL CA 2CC (B41 with B1, B3, B8, B28, B41...) + DL CA 3CC (B41 with B1, B3, B8, B28, B41...) + DL CA 4CC (B41 with B1, B3, B8, B28, B41...) + UL CA 2CC.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.14.	SMS and MMS: - Proposed system shall support SMS over SGs/ S1MME interface. - Proposed system shall support MMS over LTE	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.15.	Location Base Service - The proposed solution shall support LCS (Location Services) which provides a method to identify UE's geographical location through radio signal measurement. - The system shall support Cell ID Based Location Support. - The system shall support Enhanced Cell ID Location for both Control Plane and User Plane. - The system shall support LPPa protocol based ECID. - The system shall support OTDOA Location for both Control Plane and User Plane.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.16.	LTE Massive MIMO - Support MU-MIMO at least 8 layers DL and 4 layers UL - Support SU-MIMO 4 layers DL and 1 layers UL - Support TM7, TM8. - Dynamic Transmission Mode Switch for TM3, TM7, TM8. - Intra-LTE Inter-Mode Handover	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
1.17.	ENDC: LTE-NR Dual Connectivity Option 3x Dynamic Trigger for LTE-NR DC Option 3x	5	5	5 points: Full compliance with all requirements.	Refer to the bidder's description		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Data Buffer Trigger for EN-DC MFBI (Multi-Frequency Band Indicator) Support in EN-DC			0 points: Not comply at least 01 of technical requirement	documents. System check			
1.18.	X2 link management: + EN-DC X2 setup + gNB initiated EN-DC Configuration Update + X2 Reset, Partial Reset with gNB + Increased Number of X2 Links to gNB upto 128 links Support handover inter-vendor	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.19.	CA with ENDC: + Blind Carrier Aggregation with LTE-NR DC Option 3x + Flexible LTE CA with EN-DC	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
1.20.	NSA Mobility: + Inter-eNB handover for LTE-NR DC option 3x + Intra-eNB Handover for LTE-NR DC Option 3x + Inter-SgNB Mobility for LTE-NR DC Option 3x + Intra-eNB for LTE-NR DC option 3x + S1 Handover for LTE-NR DC option 3x + Inter-RAT handover + SPID forwarding in EN-DC option 3x + UE MR-DC capabilities-based handover + EN-DC capability-based handover to preferred layer + RRC Re-establishment to Serving Cell with EN-DC + EN-DC Establishment Robustness + SgNB-Initiated Co-ordination of NR Measurements + Support Cell Redirection from E-UTRAN to NG-RAN based on coverage + Support Cell Reselection from E-UTRAN to NG-RAN based on coverage + Support Cell Reselection from E-UTRAN to NG-RAN based on frequency priority + Support inter-RAT Handover from E-UTRAN to NG-RAN based on coverage + Support fast return to 5G when finished call in LTE + Support handover inter-vendor	NA	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
1.21	ENDC optimization: + LTE Optimized EN-DC Band Combination Selection + UE MR-DC Capabilities-Based Handover + EN-DC Capability-Based Handover to Preferred Layer	5	5	5 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	+ EN-DC Control per Mobility Profile + Bandwidth Combination Set Check for EN-DC + LTE MIMO Optimized EN-DC Band Combination Selection + LTE-NR DC Option 3x Multiple Non-GBR SCG Split Bearers + eNB-initiated Measurement Gaps Coordination in EN-DC							
1.22	The Bidder provides detail documents about Beamforming & Massive MIMO algorithms for Downlink and Uplink broadcast and traffic channels: + Mechanism to create Broadcast Beam, Traffic Beam and number of beams, patterns for each type.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.23	The Bidder provides all the features and permanent licenses to to ensure the operation of Massive MIMO and Beamforming algorithms.	10	10	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents Check list licenses/features		x	
1.24	Supports electric tilt adjustment for Broadcast Beam: Bidder provides electric tilt ranges of Broadcast Beam and documents to prove it.	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
1.25	Support 3D (horizontal + vertical) beam forming (Full dimension)	2	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.44	Other feature (4G): +TDD UpPTS, TDD Frame Synchronized Operation, TDD Support for Random Access Preamble Burst Format 4. + The system should support SCTP stream flow control to prevent SCTP association exceptions caused by SCTP signalling congestion, Transport resource overload control, capable of avoiding outgoing handovers of inactive UEs in high load to reduce the signalling load to increase overall system capacity, paging messages are prioritized in overload situations based on a priority provided by the MME. +Interfrequency measurements search efforts and load distribution shall be optimized based on hit rate (i.e. ratio of measurement reports triggered on a specific cell in relation to all configured measurements on that carrier) towards another frequency layer. This shall ensure faster load distribution; support load triggered Interfrequency session continuity based on release with redirect . + The hardware shall support extended cell range of up to 100 km.	NA	2	2 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	<p>+ The hardware shall support combined cell feature (all sector carriers that are present in the same cell are considered as one logical cell with the same Physical Cell Identity (PCI).</p> <p>- The system shall support 5, 10, 15 and 20MHz carrier bandwidth.</p> <p>- The system shall support sharing of LTE RAN (4G eNodeB) between operators while still enabling dedicated spectrum per operator. Please explain what parts that can be shared.</p> <p>+ The system shall support to collect last reported value of the following parameters at disconnection to provide radio related data for analysing causes of abnormal disconnections: PUSCH received power.</p> <p>+ The system shall support to provide the counter for received noise and interference power per antenna branch to detect the external interference in uplink</p> <p>+ LTE Massive MIMO: Support MU-MIMO 16 layers DL and 4 layers UL; - Support TM9; Dynamic Transmission Mode Switch for TM9.</p> <p>+ EN-DC scheduling weight boost.</p> <p>+ The system shall support 5, 10, 15MHz carrier bandwidth.</p>							
2	Evolution technology	0	150					
2.1	<p>The Bidder provides documents to prove:</p> <p>+ The gNodeB manufacturer actively researches and develops 5G Radio Access Network (RAN) equipment according to Open RAN architecture to be more intelligent, open, virtualized, and fully interoperable.</p> <p>+ The gNodeB manufacturer has a long-term roadmap (at least 2 years) to develop 5G Radio equipment according to Open RAN architecture.</p> <p>+ The proposed AAU and BBU hardware are ready to support the Open RAN interface.</p>	NA	50	<p>50 points: The bidder provides documents to meet all the following requirements:</p> <p>+ The gNodeB manufacturer is publicly announced on the O-RAN ALLIANCE website as a member or contributor and has documents proving participation in O-RAN ALLIANCE for at least 1 year until the end of March 2024.</p> <p>+ The roadmap of the gNodeB manufacturer in research, development, and supply of 5G equipment according to OpenRAN architecture in at least 2 years. It includes the roadmap for hardware, software, features, ability to</p>	Refer to the bidder's description document	x		

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				connect other vendors' equipment, and current achieved results. + The documents of the gNodeB manufacturer demonstrate that AAU and BBU hardware are ready to support the Open RAN interface. 0 points: The bidder does not comply with at least 01 of the above requirements.				
2.2	The Bidder provides equipment from gNodeB manufacturer that: + By the end of March 2024, the gNodeB manufacturer's equipment has been used to deploy 5G Open RAN in at least 1 network operator in the world with a minimum scope of 100 stations (or at least 300 radio units) + The manufacturer's Radio/BBU equipment can connect to the BBU/Radio of at least 3 different manufacturers.	NA	50	50 points: The bidder provides documents to meet all the following requirements: + A letter approved by the representative (one of the following positions: President, Vice president, CTO, CEO, Director in charge of radio/wireless, technical segment) of the network operator that has deployed 5G Open RAN or providing an announcement, links on websites which include the following information: They used manufacturer's equipment to deploy 5G according to Open RAN architecture with a minimum scope of 100 stations (or at least 300 radio units) and Radio/BBU of the gNodeB manufacturer connected with BBU/Radio of other	Refer to the bidder's description documents. Testing at Lab of manufacturer or visit operators who deployed ORAN using manufacturer' gNodeB		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Triple mode_Type 2	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
				<p>manufacturers. + Documents proving that: The manufacturer's Radio/BBU equipment can connect to BBU/Radio of at least 3 different manufacturers.</p> <p>0 points: The bidder does not comply with at least 01 of the above requirements.</p>				
2.3	The bidder commits to do the trial of at least 10 gNodeBs with Viettel according to Open RAN architecture: The AAU/BBU provided by the bidder in this bidding will connect to the BBU/AAU manufactured by Viettel.	NA	50	<p>50 points: The bidder commits to do the trial with Viettel according to the above requirements.</p> <p>0 points: The bidder does not commit to do the trial with Viettel according to the above requirements</p>	Refer to the bidder's description document and commitment		x	
B	Services	100	100					
1	Services: The Bidder offers all services in accordance with the requirements stated in Chapter V of bidding document.	100	100	<p>100 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	Refer to the bidder's description document and commitment		x	

1.2. Technical requirement for Centralized management and monitoring system (OMC)

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	Total Technical requirement and Services/Deploying Solutions	800	1000				0	49	43
A	Technical requirement for OMC System	750	950						
1	Hardware and software requirements for OMC	380	480						
1.1	General requirements	80	80						
1.1.1	<p>+ The Bidder provides technical solutions and supplies necessary equipment to ensure that OMC hardware can support the total number of gNodeBs/eNodeBs/AAU/BB and 4G/5G cells of the bidding package.</p> <p>+ Bidder provides accompanying documents on dimensions and calculations to demonstrate OMC's capabilities.</p> <p>+ Bidder provides technical solutions including hardware, software and all related features so that OMC can manage, monitor, operate and do maintenance for all gNodeB/eNodeB within the scope of the bidding package. OMC includes 02 client stations for for configuration, feature testing, and troubleshooting.</p>	50	50	Yes (Technical requirement is allowed to be adjusted the total number of gNodeBs/eNodeBs/AAU/BB and 4G/5G cells based on the bidding package)	50 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
1.1.2	The Bidder shall provide permanent licenses for all OMC's features in the latest commercial software version.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and commitment Check list licenses/features		x	
1.1.3	The Bidder shall be responsible for surveying and providing enough supplies and services for the installation and commissioning of the OMC; Bidder also supports Viettel so that Viettel's management systems can connect to the Bidder's OMC.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
1.1.4	The equipment's firmware and operating system (OS) must be the latest version as announced by the manufacturer and they are upgradable. Operate in an OS environment still under support (OS not EOL) for at least 3 years	10	10	No	10 points: Full compliance with all requirements. 0 points: Not	Refer to the bidder's description document and commitment		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
					comply at least 01 of technical requirement				
1.2	System architecture	20	40						
1.2.1	OMCs can be deployed in any provinces or cities of Vietnam	NA	10	Yes (Country is allowed to be adjusted)	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's commitment		x	
1.2.2	Software Architecture: - The software of OMC must meet the requirements of all services (4G, 5G, Core, etc.). To run these services, only loading licenses on the OMC is required. - The software must provide a dashboard interface for monitoring the overall system status (resources, services, databases, etc.).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.2.3	Expandable: - The system should be scalable (scale out) for adding new network elements (NE) in core and access networks. - Modular expansion is required to accommodate additional functionalities. - The system can be scalable for new services. - The system operates without interruption during the expansion of resources	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check		x	
1.2.4	Network Infrastructure Architecture: - Separate networks for services and management/surveillance. - All traffic must pass through the Layer 3 aggregation switch (OMC's internal switch) before integrating into the network. - All hardware devices (switches, servers, storage, chassis) must have a remote administration connection. - OMC's software must ensure sufficient bandwidth to process data exchange between the OMC and NEs system and between OMC and Viettel's softwares.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check		x	
1.3	Technology	10	20						
1.3.1	For physical infrastructure: The bidder must provide the products which are the latest commercial ones	10	10	Yes (Technical requirement is allowed to be adjusted the	10 points: Full compliance with all requirements.	Check the product in the BoQ, compare it with the document			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
				version of physical infrastructure platform)	0 points: Not comply at least 01 of technical requirement	describing the product road map provided by the contractor. Directly inspect the equipment and compare it with the product road map that the contractor declared with the bid documents			
1.3.2	Support new technologies: Virtualization (VMware, OpenStack, etc.), container (Docker), and microservices, etc.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check		x	
1.4	System Availability	10	10						
1.4.1	System Availability Requirement: 99,99%	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
1.5	Integration Capabilities	20	20						
1.5.1	Core/Access System: The OMC (Operations and Maintenance Center) must integrate with the Core and Radio systems according to vendor device compatibility standards.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.5.2	- Support protocols to integrate with NMS Viettel System such as SNMP, CorBa, Database connection, FTP/SFTP, SSH 2.0/Telnet, AMOS, CLI, API/webservice (REST/SOAP/RPC/gRPC). - OMC support Northbound Interface (NBI) in list below: + NBI Security Management + NBI Log Management (INE command log, OMC	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	command log) + NBI FM (Alarm Monitor) + NBI Configuration Management + NBI Performance Management + NBI Inventory Management								
1.6	Surveillance, System Administration Ability	70	80						
1.6.1	- Hardware Monitoring and Alarms: + The system must be capable of self-monitoring and generating alerts for hardware components' failures in any OMC system, including: CPU, RAM, HDD/SSD, motherboard, power module, network card, fan, and high CPU temperature. + This monitoring applies to all system devices, including servers, storage, and switches. - Server, OS, and Network Monitoring and Alarms: The system shall be capable of self-monitoring and generating alerts for the following conditions: + Hard drive capacity exceeding a predefined threshold. + CPU or memory usage of servers exceeds a predefined threshold. + I/O read and write exceed a predefined threshold. + Operating system errors. + Network errors, including connection loss and port downtime.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.6.2	OMC applications & database monitoring and alarm: Capable of self-monitoring, generating alerts:- Process status.- Database status (dead or alive)- Application high availability (HA) status (ensure switchover availability is indicated)	10	10	No	10 points: Full compliance with all requirements.0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.6.3	Alarm Level Definition: The OMC system allows configuration of the severity levels (e.g., Critical, Major, Minor, Warning) for internally generated alerts.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.6.4	OMC Alert Management: Allows querying and exporting to file all types of alerts (current alarms, historical alarms, and events).	10	10	No	10 points: Full compliance with all requirements.	Refer to the bidder's description			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
					0 points: Not comply at least 01 of technical requirement	documents and system check			
1.6.5	Alert Data Retention Period: Alert data is stored in the OMC system for a minimum of 14 days.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.6.6	Alarm Management: - Allows actions on alarms: clear alarm, resolve alarm, acknowledge unknown alarm - Add, edit, delete, and duplicate alarms/events - Enable/disable alarms/events - Mark alarms/events by rule - Define alarms/events	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.6.7	Alarm Synchronization between OMC and Viettel NMS: OMC shall automatically synchronize alarms to the Viettel NMS software (in real-time or according to a defined schedule) for monitoring and processing. Upon alarm resolution, OMC shall automatically delete the alarm and send a clear notification to Viettel NMS.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.6.8	Management of All OMC System Components: Allows administrative interaction: Reboot/shutdown server; restart/stop/start applications, network database through one of the following interfaces: - Local console - SSH 2.0/Telnet/Remote Desktop - Web GUI	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.7	Data migration capabilities		10						
1.7.1	Data Migration Capability: - Supports migrating all configuration data (KPI templates, counters) and user account data from the current same-vendor OMC system to the new OMC system. - Supports migrating all user account data from the current OMC system of the same vendor to the new OMC system.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check		x	
1.8	Redundancy capabilities	30	30						

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
1.8.1	Application Module and Database High Availability:- Application modules in the system run in active-active or active-standby mode, ensuring no single module is a point of failure.- Servers running the main functions (user interface and data processing center) must be clustered in an active-active or active-standby configuration.- System functionality continues uninterrupted even if a module fails. The remaining active module can handle transactions originally processed by the downed module.- Each OMC system database is designed for high availability using either active-active or active-standby mode, or by having a Disaster Recovery (DR) backup solution. This allows for automatic failover to the standby database node in case of a primary node outage, minimizing service disruption.- The system allows for automatic or manual backup and restore of the OMC configuration (including OS, database applications, etc.). The maximum backup file storage time is 3 days.	10	10	No	10 points: Full compliance with all requirements.0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.8.2	Network Redundancy: To ensure uninterrupted operation, all devices connect with two links to separate switches. Trunk link solutions may be implemented to increase uplink bandwidth based on system traffic load.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.8.3	Physical Redundancy (Server, Storage, Switch, Power): - All critical components (servers, storage, and network switches) are connected to redundant power supplies, enabling hot-swappable replacement of faulty devices without service interruption. - Internal redundancy ensures continued operation even if a single server, storage unit, or switch fails.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents and system check			x
1.9	Performance criteria	30	30						
1.9.1	Server CPU Load: Target CPU utilization should be below 65% on all servers.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
1.9.2	RAM Server Load: Maximum RAM usage should be below 80% on all servers.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
1.9.3	Data storage capacity: Maximum data storage utilization should be below 70%.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
1.10	Self-protection	10	20						
1.10.1	The overload protection mechanism allows configuration of an upper threshold (maximum limit) for the number of concurrent sessions. This applies to sessions from Viettel' NMSs to OMC and from OMC to the network element (NE) through AMOS, CLI, MML, Webservice, and API (REST/SOAP) interfaces. - Reject: To ensure system performance and prevent application crashes, new sessions will be rejected if the number exceeds the configured threshold. An alarm will also be generated. - Process Load Balancing Mechanism: Processes have a mechanism to check their availability state. If unavailable (e.g., undergoing upgrade or restart), they will relinquish their load, allowing other processes of the same type to handle it. This ensures efficient load distribution and avoids overloading unavailable processes.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
1.10.2	Self-healing Ability: - The system shall automatically detect downed modules and initiate recovery procedures, including alerting appropriate personnel.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
1.11	Account Management	10	30						
1.11.1	Add/Edit/Delete User Accounts: - Administrators can create, edit, delete, and copy user	10	10	No	10 points: Full compliance with all	Refer to the bidder's description			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	accounts and assign permissions through one of the following methods: web GUI interface, import by list from a file, or CLI command. - The system must support at least 1,000 user accounts.				requirements. 0 points: Not comply at least 01 of technical requirement	documents and system check			
1.11.2	User Account Management Features:- Lock/Unlock User Accounts- Reset or Change User Passwords- Enforce Password Policy: This includes setting minimum password length, complexity requirements (number of non-repeating characters, etc.).- Limit Concurrent Sessions: Set the maximum number of online sessions allowed per user or group.- Set Account Expiration: Expired accounts will be locked out of the system.- Two-Level Policy Configuration: Define a default policy for all users and create custom policies for individual users if needed.	NA	10	No	10 points: Full compliance with all requirements.0 points: Not comply at least 01 of technical requirement	Refer to the system check		x	
1.11.3	Session Management - Logging: Records login history and user actions on the web API. - Audit Trail: Allows administrators to access and analyze access history and account actions for a specific time period. - Active User Monitoring: Displays real-time information about currently active users. - Session Management Tools: + Session Termination: Enables administrators to terminate user sessions. + Session Timeout: Provides configuration options to set session timeout after a period of inactivity. + Session Concurrency: Allows configuration to limit the number of concurrent user sessions (minimum 100 supported). - Security: + IP Access Control (ACL): Offers configuration for allowed IP addresses. + CAPTCHA: Activates a CAPTCHA mechanism after a defined number of unsuccessful login attempts. + Authentication via SSO/LDAP server. + Account Lockout: Implements a mechanism to block accounts after exceeding the allowed number of incorrect login attempts. + Multi-Factor Authentication (MFA): Supports Multi-Factor Authentication for enhanced security.	NA	10	No	10 points: Full compliance with all requirements.0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
1.12	Log Management	20	20						
1.12.1	Log Management Ability: - The OMC shall store and manage system logs, user interaction logs, application logs, abnormal event logs, security logs, and audit logs for a minimum of three months. - Allow installation of agent software (e.g., syslog, filebeat, td-agent) to push logs to a centralized log system.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
1.12.2	Supports periodic log forwarding to a centralized log server (SIEM, Graylog, or ELK).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
1.13	Information security Standards	30	40						
1.13.1	Account Privacy Policy: User Account Security Policy: - Enforcing account and password expiration - Password complexity requirements - Encrypted password storage	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
1.13.2	Connection security: Support connections using secure protocols: SSH, HTTPS, etc.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and system check		x	
1.13.3	Installing the latest commercial operating system (OS), firmware, and security SW to address information security vulnerabilities.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
1.13.4	Viettel Information Security Baseline: - The systems need to meet the requirements of the Viettel Information Security Baseline: This includes enabling and configuring IP tables or deploying a hardware/software	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not	Refer to the bidder's description document,		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	firewall or Access Control Lists (ACLs); Allow the installation of Viettel's information security monitoring agent (SRM/CyM agent)				comply at least 01 of technical requirement	commitment and system check			
1.14	Documentation standards	10	10						
1.14.1	<p>The Bidder must provide document library:</p> <ul style="list-style-type: none"> - System architecture, functions of processes, modules. - Network design and low-level design (LLD) of the system. - A detailed description of the functions and processing flow for all transactions on the system, ensuring accurate representation of the data processing flow for Configuration Management (CM), Fault Management (FM), Performance Management (PM), and Security Management (SM) operations. - A description of the meaning of parameters and fields within each process's configuration file. - A guide for integration with Core/Access and NMS Viettel systems. - A description of warning types, error codes, testing methodologies, and troubleshooting methods for abnormal cases. - A detailed document for configuring formal KPIs and counters. 	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.15.	NBI interface design standards (AMOS/MML/CLI/Web Service)	30	40						
1.15.1	The Bidder provides documents describing the maximum number of users that can simultaneously connect to the OMC and the maximum number of nodes that can simultaneously interact with the OMC	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
1.15.2	NBI interface design standards: The system shall support number of concurrent sessions using AMOS/MML/CLI/Webservice interfaces for automated execution of commands from the OMC system to gNodeBs and eNodeBs ≥ 50	10	20	No	Number of concurrent sessions (X): + $X < 50$: 0 points. + $50 \leq X < 300$: 10 points. + $X \geq 300$: 20 points.	Refer to the bidder's description document, commitment and system check			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
1.15.3	The Bidder's solution will maximize the number of users who can simultaneously connect to the OMC and the number of gNodeB/eNodeBs that can be operated simultaneously from the OMC.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2	OMC functionality Requirement with NE	370	470						
2.1	Configuration/Change management (CM)	80	80						
2.1.1	Software Update Management: - The OMC interface (Web GUI or App) allows users to upload and rollback software updates to Network Elements (NEs). - Multiple NEs can be selected for updates simultaneously, either from a list on the interface or by importing a file. - Updates can be scheduled or performed manually.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2.1.2	NE (Network Element) Configuration Management: - Supports changing NE parameter configurations and restarting services. - Supports execution of single or batch commands on network elements (NEs) simultaneously. - Supports activation of multiple NEs concurrently.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.1.3	NE Configuration Synchronization Management: - Supports automatic and manual synchronization of configurations between the OMC and NEs. - Supports time synchronization using time synchronization protocols.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.1.4	Backup and Restore of Configuration, and Database: - The system shall allow manual and scheduled backups of Network Element (NE) configuration, and database. Backups will be stored on the OMC for 30 days, labeled with version and time. - The system shall allow restoration of NE configuration from backups stored on the OMC.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.1.5	CM History Management: Enables users to review historical configurations before making changes.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not	Refer to the bidder's description document,			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
					comply at least 01 of technical requirement	commitment and system check			
2.1.6	NE command sets management: - Allow import, update, and deletion of command sets in the OMC. - Allow script management for the NE type level (each NE type has a separate set of management scripts divided by VIEW and OPERATION levels). - Allow custom definition of new command groups based on the default command set for each NE type.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.1.7	Command Execution Tool:Support command execution through any of the following interfaces:- WEB GUI interface- CLI console- MML/Webservice commands	10	10	No	10 points: Full compliance with all requirements.0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.1.8	Execute Session Management: - The system shall allow up to 50 end-users to execute commands simultaneously, including lookup and change commands. - The system shall provide a configurable session timeout for execution sessions. - All commands executed within a session shall be logged on the OMC for lookup and export to a file (with a minimum storage period of 1 year).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2.2	Counters/ KPI management	90	130						
2.2.1	KPI/Counter Management: - Allow Operator to add/edit/delete/duplicate KPIs and counters in the system. - KPIs and counters are managed in groups associated with each site or system element (e.g., eNodeB, MSC).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.2	KPI/Counter Query: - Supports peak-hour queries for any KPI. - Displays data in table or chart form. - Allows users to customize reports of KPI/counter statistics on the Web GUI interface. - Allows building reusable KPI/counter templates for	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of	Refer to the bidder's description document, commitment and system check		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	querying data. - Allows users to group KPI statistical results by Time, NE (Network Element), and Cells on different types of NEs.				technical requirement				
2.2.3	KPI/Counter Query Process Time: - For a period less than or equal to 1 week; a number of NEs <=1000; a number of KPIs/counters <=100: the query time must be < 30 seconds. - For a period less than or equal to 1 month; a number of NEs <=1000; a number of KPIs/counters <=100: the query time must be < 60 seconds.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.4	KPI/Counter Report: - Allow configuration to run KPI reports periodically, storing result data on the server. Support auto-export of results to Viettel's NMS Server (at least five NMS servers). - Allow exporting results to a file (CSV or text format).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.5	Counter Report Output Period (ROP): The system shall support configurable Counter Report Output Periods (ROP) including 15 minutes, 60 minutes, and 24 hours.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.6	OMC shall be able to query and report data for each ROP no more than 5 minutes after the measurement time.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2.2.7	KPI/Counter Data Storage Time: - ROP 15 minutes: Store data for at least 30 days. - ROP 60 minutes: Store data for at least 90 days. - ROP 24 hours: Store data for at least one year (or 365 days).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2.2.8	OMC Data Capacity: Guarantee that the combined size of Performance Management (PM) files and databases does not exceed 70% of the available system storage.	10	10	No	10 points: Full compliance with all requirements.	Refer to the bidder's description		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
					0 points: Not comply at least 01 of technical requirement	document and commitment			
2.2.9	Documents and Calculation Tools: (PM file, a number of counters, %DB):This section provides documents and tools (including PM files, counter statistics, and a capacity calculator) to help operating engineers evaluate network capacity based on NE configuration and active counters. This allows for system optimization to ensure sufficient available capacity.	NA	10	No	10 points: Full compliance with all requirements.0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2.2.10	Counters synchronization between NE and OMC: Allows configuring automatic synchronization of counters (scheduled) or manual upon user request.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.11	Monitoring and Alarming: - The system shall continuously monitor KPIs and counters. - The system shall allow configuration of alarm thresholds for KPIs and counters based on pre-defined conditions. - When a pre-defined condition is met, the system shall raise an alarm.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.12	Counters Synchronization between NEs and OMCs: The system supports synchronous configuration of counter measurement for different NE types between OMCs by exporting and importing measurement sets.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.2.13	Performance Data Management: This module provides a function to configure the KPI data storage period in the database. It allows for automatic or manual removal of old data, retaining KPIs according to the set number of days.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.3	Fault Management	50	80						

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
2.3.1	Alarm Synchronization between OMC and NE: - Configure automatic synchronization of alarms from NE to OMC (scheduled or real-time as soon as the NE has an alarm). Then, automatically synchronize alarms to Viettel NMS software for monitoring and handling. - Automatically clear alarms on the OMC when the corresponding alarms on the NE have been resolved.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.3.2	Alarm/Event Query: - Allow query and export to file: Current alarms, alarm history, and events of NEs (supported file formats: CSV, text). - Allow viewing alarms from multiple NEs simultaneously, with filtering by various criteria (e.g., time, alarm severity). - Display alarm data statistics in table or chart form, based on criteria (e.g., individual NE, NE group, time).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.3.3	Alarm data storage time: Alarm data is stored for at least 14 days.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.3.4	User alarm function: The system supports user configuration to send either SMS or email notifications for warnings based on their criticality level (e.g., Critical, Major, Minor).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.3.5	Configure NE Actions Based on Alarms: This feature allows configuration of automated actions on the Network Element (NE) in response to alarms.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.3.6	Alarm Management: The system shall allow interaction with alarms, including functions to Clear Alarm, Resolve Alarm, and handle Unknown Alarms.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of	Refer to the bidder's description document, commitment and system check		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
					technical requirement				
2.3.7	Current Alarm Query Performance: - Storage Period: At least 1 month. (assuming this relates to the previous sentence about alarm data storage) - Query Time: For up to 300 Network Elements (NEs): Less than 5 seconds.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.3.8	History Alarm Query Time: - For queries covering a period of up to 1 month and involving up to 300 network elements (NE), the query response time must be less than 5 seconds. - For queries covering a period of up to 3 months and involving up to 300 network elements (NE), the query response time must be less than 15 seconds. - For queries covering a period of up to 6 months and involving up to 300 network elements (NE), the query response time must be less than 30 seconds.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.4	Security & Grant permission with NE	40	40						
2.4.1	Configure Create/Edit/Delete Permission Groups: Administrators shall have permission to create, edit, delete, and copy permission groups that correspond to the network element (NE) groups.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.4.2	Manage Accounts Connected to Network Elements (NEs): - Grant administrators permission to create, edit, delete, and copy accounts on NEs. - Assign accounts to appropriate permission groups for each NE.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.4.3	Account Authentication for Network Element (NE) Sessions: The system uses account and password with granted permissions and authorization information to authenticate connections to Network Elements (NEs) through the OMC interface for performing NE upgrade and configuration tasks.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
2.4.4	Grant Permission by Zone and Device Type: - The system shall provide a function to define Network Elements (NEs) for each NE region. - The system shall provide a function to define permission groups (VIEW/OPERATION) based on NE command-list type. - The system shall provide a function to assign users to zones and permission groups by NE type.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.5	Equipment Management	50	50						
2.5.1	NE Management: NE Addition, Editing, and Deletion: Supports graphical interface with file import or CLI commands.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.5.2	Status Monitoring; NE Connection and OMC Alerts: - Monitors the connection status between the Network Element (NE) and the OMC. - Provides warnings when the NE connection is lost, KPI/counter data is unavailable, and triggers alarms after a configurable cycle. - Supports configuration of rules to generate alerts for abnormal data (alarms, counters, and KPIs).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.5.3	NE Topology: - Display: + Topology of all NEs + Connection status with NEs - Interactive Features: Click directly on an NE to perform actions: + Enable/Disable connection + Delete NE + Synchronize from NE	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.5.4	NE Information Synchronization: Synchronize NE hardware information and resource configuration with the OMC.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
2.5.5	Automatically clean old NE data (KPIs, counters, alarms, and system logs) after a configured period. This configuration can be set via WebGUI, applications, or scripts.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.6	Trace Function	20	20						
2.6.1	Trace Online/Offline on NE: - The system supports online/offline service trace according to NE responsiveness, including tracing NE connection protocols, individual or group subscribers (MSISDN, IMSI, IP address), or specific interfaces like cell, X2, Xn, and NG. - Traced logs are saved on the OMC server with query and export functionalities (text files for analysis). - The OMC interface allows setting up trace policies: + Trace up to 50 Network Elements (NEs) concurrently. + Define start and end times for trace activation/deactivation. - User management restricts online trace access: + Maximum 10 concurrent users. + One user per NE at a time.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.6.2	The Bidder shall provide tools, software, and licenses to decode log cell traces and user traces for both 5G SA and NSA.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.7	License Management for service on OMC	40	40						
2.7.1	Load New Service License on OMC: The OMC system shall allow loading one (1) new service license via the Web GUI or Command Line Interface (CLI).	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.7.2	Query Available Service Licenses on System: Provide a Web GUI interface to query and list available licenses loaded into the OMC system. The interface should	10	10	No	10 points: Full compliance with all requirements.	Refer to the bidder's description document,			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	display at least the following parameters for each license: - Service type: 4G, 5G, etc. - Maximum supported value: Examples: 60,000 cells; 15,000 PM files; 3,000 counters - Expiration date (if available) - License status: Active/Disabled				0 points: Not comply at least 01 of technical requirement	commitment and system check			
2.7.3	License Usage Monitoring: - Query and display statistics for actual usage values compared to the license loaded in the OMC system (both individual values and overall usage). - Generate warnings when usage exceeds a threshold (e.g., greater than 80%) of the licensed capacity.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.7.4	Export License: An automatic task exists to export NE (Network Element) and OMC (Operation and Maintenance Center) license information to a file, which is then stored on the OMC local partition for 30 days.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check			x
2.8	Tool support	0	30						
2.8.1	Fault analysis and optimization tools: - Provide tools to detect, analyze, and troubleshoot problems on the system and network element (NE): + Provide tools to detect, analyze and troubleshoot problems on the system and NE: + MTR (Mobile Traffic Recording): Records events on both uplink and downlink paths of a specific subscriber for customer complaint handling. + CER (Channel Event Recording): Measures interference on defined frequencies in a cell. + CTR (Cell Traffic Recording): Collects data about connections in a specific cell. - Provide tools for tuning and optimizing the system.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
2.8.2	System Capacity Assessment Tools: The OMC or standalone tools shall provide integrated features to:- Calculate utilized system capacity and optimal service capacity.- Plan system resources.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Min score required	Max score	Scope of modification (Yes/No)	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
2.8.3	Other function OMC: + Applications & database monitoring and alarm: Capable of self-monitoring, generating alerts: Process hangs/slow/high response-time; Database hangs/slow/high response-time/high latency; Backlog queue warning, full queue. + Self-healing Ability: The recovery time, from initial detection of a downed module to its restoration, shall be less than 10 minutes. + KPI/Counter Management: There is no limit to the number of KPIs/Counters created on the system. + The system shall support at least 300 concurrent sessions using AMOS/MML/CLI/Webservice interfaces for automated execution of commands from the OMC system to gNodeBs and eNodeBs.	NA	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document, commitment and system check		x	
B	Services and Deployment Solutions	10	50						
1	Services: The Bidder offers all services in accordance with the requirements stated in Chapter V of bidding document.	10	10	No	10 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document and commitment		x	
2	Deployment Solutions: During the installation, configuration, and integration of the new 5G/4G OMC system, the Bidder must provide a short-term solution so that after one week from the arrival of the first gNodeB/eNodeB (full accessories, equipments & softwares) at the port in Vietnam, Viettel can integrate, activate/on-air, and monitor the gNodeBs/eNodeBs.	NA	40	No	40 points: Bidder proposes solution and comply all requirements. 0 points: Bidder can not propose solution to commit all requirement	Refer to the bidder's description document, commitment and system check		x	