

Annex 1: Technical requirements

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

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
A	Technical requirement for gNodeB Massive MIMO 64T64R 2600MHz	2037	2900					
A.I	Hardware, Licenses, Accessories	2037	2900					
I	General requirement	595	605					
1	Technical solutions and documents	420	420					
1.1	The Bidder provides solutions including hardware and software, features, and permanent licenses for gNodeB/eNodeB; permanent licenses for OMC to simultaneously run 5G SA and NSA, in which: + 5G NSA: The 5G gNodeB is compatible and can run EN-DC with the 4G eNodeB currently on air in the provinces within the bidding scope. + 5G SA: The 5G 2600 TDD gNodeB is compatible and can fully run all features of 5G SA with the 5G FDD, TDD gNodeB in the provinces within the bidding scope.	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	
1.2	+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.	100	100	100 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: + Documents describing device hardware, installation equipment of gNodeB + Documents describing the software roadmap of gNodeB + Documents describing the all features of gNodeB + Documents describing operation and maintenance of gNodeB + Documents describing and guiding license management of gNodeB + Documents describing the 5G coverage planning and capacity dimensioning of gNodeB + Document describing all alarms, faults of gNodeB, OMC and solution to solve. + Document describing KPIs, counters of gNodeB, OMC, callflow and trigger points of counters, KPIs, targets should be setup to optimize for main KPIs. + Document, guideline about 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.	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) + 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	5	5	5 points: Bidder provide full document describing capacity per each card per one gNodeB. 0 points: Not provide or provide document but don't have informations	Refer to the bidder's description document		x	

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	+ Total signalling messages can be processed per second. + All parameters relate to capacity							
2	gNodeB Configuration	121	125					
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. 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 configuration 3 sectors, each sector can run 1 cell TDD NR100MHz 16DL/4UL 320W 64T64R. gNodeB can support to run 4G TDD configuration.	100	100	100 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	
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.	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	

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	+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)							
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 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.	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	
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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
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	

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	Total Technical requirement and Services	2400	3000			37	214	37
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 carrier (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
1.2	Capacity and Performance							
1.2.1	Bidder must provide documents clearly describing the capacity of the proposed BBU (i.e. number of NR or LTE cell carriers) with different modes: (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	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	
1.2.2	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	One Baseband card supports a number of cells (X): + X < 3: 0 points + 3 ≤ X < 6: 10 points + X ≥ 6: 50 points	- 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 triple mode: LTE TDD Massive MIMO, NR TDD Massive MIMO, LTE FDD MIMO 4*4 simultaneously.	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	
1.2.4	The proposed BBU's hardware can support mode: 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	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 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	In NR +LTE TDD Massive MIMO Mode: Max Number of NR TDD cells 60MHz, 16 layer DL/4 layer UL (X) :	- Refer to the bidder's description documents and			x

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				+ X < 6: 0 points. + 6 ≤ X < 9: 20 points. + X ≥ 9: 50 points.	Bidder's test results. Testing at bidder's Lab			
1.2.6	With solution (hardware and software, without licenses) proposed by Bidder : in Massive MIMO TDD NR + Massive MIMO TDD LTE, the number of TDD LTE carriers (64T64R 20Mhz bandwidth, 8DL Layers and 4UL Layers) ≥ 6	10	30	In NR +LTE TDD Massive MIMO: Max Number of TDD LTE carriers,20Mhz bandwidth, 8DL Layers and 4UL Layers) (X): + X < 6: 0 points. + 6 ≤ X < 9: 10 points. + X ≥ 9: 30 points.	- Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x
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 ≤ X < 10 Gbps. + 20 points: X ≥ 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. + 5 points: 3000 ≤ X < 6000. + 10 points: X ≥ 6000.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x
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 ≤ X < 1500. + 10 points: X ≥ 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.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x

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				+ 5 points: $600 \leq X < 1200$. + 10 points: $X \geq 1200$.				
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. Testing at bidder's Lab			x
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 + $X \geq 2$: 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 + Not support or lack of any port: 0 points	Refer to the bidder's description document. System check		x	
1.3.8	The proposed BBU must have Grounding Interface	5	5	5 points: Full compliance with all requirements.	Refer to the bidder's description document. Equipment check	x		

[illegible]

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	<p>and BBU) to run the Viettel configuration. The Optical fiber length: 80m. The SFP optical module must support at least 25 Gbps and supports distance at least 10km. Viettel requires optical fiber cables to be compatible with Bidder's AAU&BBU&SFP connectors.</p> <p>+ Grounding Cable \geq 6m/01 AAU and copper C clamps.</p> <p>+ AAU mounts: Material: Stainless steel or cast aluminum alloy or equivalent, rust-resistant, and corrosion-resistant; Allows mechanical tilt adjustment from 0°-20°, allowing the adjustment mechanism to be mounted at the top and/or bottom. The bracket can fit pipes with diameters from 60mm to 120mm, with a minimum load at least 50 kg.</p> <p>3. Others:</p> <p>+ Labels for optical fibers, power cables have index from 1, 2, 3,... for separate AAUs in one gNodeB.</p> <p>+ 01 package of plastic cable tie (100 pieces, \geq 30cm, black).</p> <p>+ Provide suitable clamps: Each clamp shall secure all optical fibers and power cables, with separate rows for optical fibers and power cables; clamp quantity \geq 60 clamps/ 01 gNodeB. The clamp must be compatible with power cable and optical cable.</p> <p>+ Other accessories attached if any</p>							
2.2	<p>Global Navigation Satellite System receiver (GNSS receiver):</p> <p>Bidder provide: GNSS receiver set connects both gNodeB and eNodeB at the same time, if the bidder does not provide the solution and equipment to connect the GPS synchronization signal from the eNodeB to the gNodeB at the same location.</p> <p>+ Lightning arrestors, connectors, accessories if any.</p> <p>+ Feeder/Signal Cable: 30m-50m/01 gNodeB.</p> <p>+ Clamp for Feeder/Signal Cable: 30 clamps/ 01 GNSS receiver set. The clamp must be compatible with Feeder/Signal Cable.</p> <p>+ GNSS receiver:</p> <ul style="list-style-type: none"> - Gain: at least 32 dBi (include LNA) - Noise Figure: \leq 3dB 	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. Equipment check	x		
III	AAU	269	400					
I	General							
1.1	The Bidder must offer product that supports Massive MIMO 64T64R.	50	50	<p>50 points: Bidders must offer a massive MIMO product that supports at least 64T64R.</p> <p>0 points: Bidders offering a massive MIMO product that supports less than 64T64R.</p>	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	<p>10 points: Bidders must offer a product that was General Availability from Q1/2022 onwards.</p> <p>0 points: Bidders offering a product that was General Availability before Q1/2022</p>	Refer to the bidder's description document		x	
1.3	The Bidder must offer software with the latest commercial version.	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	
1.4	The product must support LTE band 41 and NR band n41 with frequency range from 2496MHz to 2690MHz	2	2	<p>The AAU:</p> <p>+ 2 points: Support for frequency band 2496-2690MHz (B41 and N41).</p> <p>+ 0 points: Does not support for frequency band 2496-2690MHz (B41 and N41).</p>	Refer to the bidder's description document		x	

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	Total Technical requirement and Services	2400	3000			37	214	37
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) < 42 kg	30	50	The AAU with weight excluding bracket (X): + 0 points: $X \geq 42\text{kg}$. + 30 points: $22\text{kg} \leq X < 42\text{kg}$. + 50 points: $X < 22\text{kg}$.	Refer to the bidder's description documents. Equipment check	x		
1.10	The height of the AAU <1500 mm	3	3	The height of the AAU (X): +3 points: $X < 1500$ mm. + 0 points: $X \geq 1500$ mm.	Refer to the bidder's description documents. Equipment check	x		
1.11	The with of the AAU < 700 mm	2	2	The with of the AAU (X): + 2 points: $X < 700$ mm. + 0 points: $X \geq 700$ mm.	Refer to the bidder's description documents. Equipment check	x		
1.12	The depth of the AAU < 300 mm	2	2	The depth of the AAU (X): + 2 points: $X < 300$ mm. + 0 points: $X \geq 300$ mm.	Refer to the bidder's description documents. Equipment check	x		
1.13	Cooling system	NA	2	+ 2 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	1	1	Front Wind load at 150 km/h(X): + 1 point: $X \leq 1100$ N. + 0 points: $X > 1100$ N.	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	
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):	Refer to the bidder's description documents. System check		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
				+ X ≥ 2: 5 points. + X < 2: 0 points.				
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	5	10	The AAU with hardware and software that supports (X) Layer UL MIMO: + 0 points: X < 4. + 5 points.: 4 ≤ X ≤ 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 ≤ 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	
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) 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 with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. (any if)	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 < 1560 W	NA	20	Maximum Power consumption of AAU under the conditions of room temperature, no additional features with	Refer to the bidder's description documents and			x

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
				100% load, 320W (X): + X ≥ 1560 W: 0 points + X < 1560 W: 20 points.	lab test results. Testing in Viettel's LAB			
3	Antenna							
3.1	Bidder must provide documents describing Broadcast and Traffic beams which include at least the following information: 1. Traffic beams + 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. 2. SSB beams + 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	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		
3.2	Bidder must provide: + 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: - Beam: beam traffic and beam broadcast that the AAU can run. - Output results: EIRP, gain, vertical beam width, horizontal beam width.	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 in Bidder's LAB			x
3.3	Number of Antenna Elements ≥ 192	10	10	Number Antenna Element (X): + X < 192: 0 points. + X ≥ 192: 10 points.	Refer to the bidder's description document	x		
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 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		

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	Total Technical requirement and Services	2400	3000			37	214	37
5.2	Power Supply Range: -38V to -57V	5	5	Power Supply Range for AAU (X): + X from -38V to -57V: 5 points. + X out of -38V to -57V: 0 points	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		
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	559	780					
1	General 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. RAN WG4: TS 38.113, TS 38.133, TS 38.171. SA WG2: TS23.501, TS23.502.	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	
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	

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	Total Technical requirement and Services	2400	3000			37	214	37
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.	25	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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
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	Refer to the bidder's description documents and Bidder's test results. Equipment test		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
				Carrier BW: 60/80/100 MHz. 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 ≥ 1.6 Gbps, 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 ≥ 1.4 Gbps	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 ≥ 180 Mbps	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							
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	

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
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 follloving function: + Interface Management: Interface setup, reset, configurarion update,.. + UE Context Management: + Mobility Management + Dual Connectivity. + Load Management + Message Transfer + EN-DC + Secondary RAT data usage report	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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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	+ 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: Compliance with technical requirement 0 points: Not comply with 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.	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: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.6	NR FDD cells support Extended Cell Range to 100 Km.	NA	5	5 points: Compliance with technical requirement 0 points: Not comply with 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	1 point: Compliance with technical requirement	Refer to the bidder's description document		x	

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
				0 points: Not comply with technical requirement				
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 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.	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	
4.15	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	
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: - 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.	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	
5.5	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.	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 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).			x

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	+ 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)				+ Other: All expenses associated with this testing for the two Viettel engineers from Vietnam to Bidder's Lab Test.			
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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
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	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 lab test results. Testing in Viettel's LAB			x

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
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	Total Technical requirement and Services	2400	3000			37	214	37
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
5.19	NR DL Carrier Aggregation: The system shall support support inter-gNB Carrier Aggregation in existing eNodeB/gNodeB in provinces which belong to this bidding scope.	30	30	30 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 + Inter-Frequency Mobility with MeNB Coordination + Inter-Frequency Mobility without MeNB Coordination	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	
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	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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	Total Technical requirement and Services	2400	3000			37	214	37
	+ Support coverage-based Inter-RAT Handover from NG-RAN to E-UTRAN + Direct data forwarding during iRAT HO (5G->4G)							
6.6	Support inter-RAT handover from VoNR to VoLTE	1	1	1 point: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description documents. System check		x	
6.7	5G service continuity in case of LTE Inter-MeNB mobility:To enable UEs to maintain service continuity in EN-DC if the LTE Cell coverage deteriorates. System shall support Inter-MeNB LTE handover without en-gNB change. This feature must be supported by eNodeB/gNodeB of the tender and it must run with existing eNodeB/gNpdeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
6.8	NR Mobility:The system shall support enables gNodeBs to perform measurement-based handover, PSCell change, and redirection of UEs in both NSA and SA with existing eNodeB/gNodeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			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. + CSI-RS Beam Sweeping, Beam Maintenance, Beam Recovery. + PMI-based Beamforming và 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	
7.2	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	
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	

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
7.9	Bidder should provide features and licenses at least 8 UL layers for NR MU - MIMO before January 2026.	NA	2	2 points: 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: Compliance with technical requirement. 0 points: Not comply with technical requirement	Refer to the bidder's description documents. System check		x	
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, Masked IMEI-SV, IMEI-TAC, IMEI-SVN, RedCap UE,...	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x
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	EN-DC RAN Slicing:The system shall support RAN slicing functionality for EN-DC traffic for customized QoS and resource partitioning in existing eNodeB/gNodeB in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
9	KPI Improvement							

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
9.1	The system shall support NR RRC Connection Re-establishment in 5G SA mode.	NA	6	6 points: Support 4/4 features, detailed parameter feature description as below 4 points: Support 3/4 features, 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 NR Cells in the same gNodeB (Intra-gNodeB) + (3): RRC Re-establishment with NR Cells in the different gNodeB (Inter-gNodeB) + (4): RRC Multi-Target Re-establishment	Refer to the bidder's description document		x	
9.2	Inter-gNodeB Multi-Target RRC Connection Re-establishment Support Handover failure: The system shall support multi-target RRC connection re-establishment with existing gNodeB neighbor in provinces which belong to this bidding scope. - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in NR RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another gNodeB (neighbors existing in Viettel's network) and they are connected with an Xn interface.. The RRC Connection Re-establishment feature (3GPP TS38.401) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Handover failure	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 and Bidder's test results. Testing at bidder's Lab			x
9.3	LTE-NR Dual Connectivity: The system shall support Inter-eNB handover for LTE-NR DC option 3x" and "Intra-eNB Handover for LTE-NR DC Option 3x" with the functionality of "Master Node Based Handover in EN-DC" with existing eNodeB/gNodeB in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
9.4	EN-DC-Triggered Handover during Connected Mode Mobility: The system shall facilitate the transfer of an EN-DC-capable UE in connected mode to a neighboring LTE cell that supports EN-DC, triggered by an incoming handover, using the existing eNodeB/gNodeB infrastructure in provinces covered by this tender	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 and Bidder's test results. Testing at bidder's Lab			x
9.5	LTE-NR Dual Connectivity: The system shall provide a traffic load distribution mechanism for EN-DC-capable UEs based on reprioritizing the NR carrier frequencies used for the following procedures: EN-DC setup Secondary Node Addition EN-DC-triggered handover. This feature must be supported by eNodeB/gNodeB of the tender and it must run with existing eNodeB/gNodeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
9.6	LTE-NR Dual Connectivity: The system shall support EN-DC deployment, EN-DC BC coordination, switching of MCG and SCG Radio resources, LTE-NR aggregation, PDCP	30	30	30 points: Full compliance with all requirements.	Refer to the bidder's description documents and			x

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	Flow Control , X2 Interface Management: Interface setup, reset, configuration update. This feature must be supported by eNodeB/gNodeB of the tender and it must run with existing eNodeB/gNodeB neighbor in provinces which belong to this bidding scope.			0 points: Not comply at least 01 of technical requirement	Bidder's test results. Testing at bidder's Lab			
9.7	LTE-NR Dual Connectivity:in EN-DC deployments,The system shall support to enable inter-frequency PSCell change to frequencies with higher priority in good radio conditions with existing eNodeB/gNodeB in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
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	
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	

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	Total Technical requirement and Services	2400	3000			37	214	37
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.	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	
11.4	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	
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	
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	

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						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
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: Compliance with technical requirement 0 points: Not comply with 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: 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: 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 all requirements. 0 points: Not comply at least 01 of 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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
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.	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
				0 points: Not comply at least 01 of technical requirement				
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	
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	
V	Other requirements	318	672					
1	Feature 4G	318	322					

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
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	Total Technical requirement and Services	2400	3000			37	214	37
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 + Bidder must state the calculation methods in the proposal to prove the proposed solutions (hardware and software) can support gNodeB (for 4G) profile	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	
1.4	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	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)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	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.							
1.6	<p>Load control/ Admission control/ Congestion Control/ Radio resource management:</p> <ul style="list-style-type: none"> - 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 resource limitation. The pre-emption shall be activated according to service type, QCI, ARP. - 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 	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	
1.7	<p>Coverage and Capacity Functionality:</p> <ul style="list-style-type: none"> - The proposed systems shall dynamically allocate the radio resources (frequency, power) according to the radio characteristics and the quality of uplink/downlink in order to coordinate Intercell 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: 	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		

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	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							
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. - 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, S1-MME, 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.	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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	Total Technical requirement and Services	2400	3000			37	214	37
	<ul style="list-style-type: none"> - 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 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 interface. - 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 	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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	Total Technical requirement and Services	2400	3000			37	214	37
	<p>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</p> <ul style="list-style-type: none"> - 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 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.	<p>Radio Network Functionality:</p> <ul style="list-style-type: none"> - 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 	2	2	<p>2 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	

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	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 (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 Data Buffer Trigger for EN-DC MFBI (Multi-Frequency Band Indicator) Support in 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	
1.18.	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	

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	Total Technical requirement and Services	2400	3000			37	214	37
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	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	
1.21	ENDC optimization: + LTE Optimized EN-DC Band Combination Selection + UE MR-DC Capabilities-Based Handover + EN-DC Capability-Based Handover to Preferred Layer + 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	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	
1.22	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	
1.26	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Radio link failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope.	12	12	12 points: Full compliance with all requirements.	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	<ul style="list-style-type: none"> - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Radio link failure</p>			0 points: Not comply at least 01 of technical requirement				
1.27	Inter-eNodeB Carrier Aggregation:The system shall support inter-eNodeB Carrier Aggregation between eNodeB serving and eNodeB neighbor in provinces which belong this bidding scope. This feature enables downlink carrier aggregation between cells which are not belonged to the same eNodeB.	20	20	20 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.28	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Handover failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope. <ul style="list-style-type: none"> - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Handover failure</p>	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.29	The benefit of Inter-eNodeB Carrier Aggregation for throughput:The set of cells considered to be used as SCells is expanded across multiple eNodeBs. As a result, UEs can find a better set of cells with which to perform carrier aggregation, leading increased overall throughput.	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.30	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Mobility from E-UTRA failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope. <ul style="list-style-type: none"> - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Mobility from E-UTRA failure</p>	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.31	The benefit of Inter-eNodeB Carrier Aggregation for utilization of eNodeBs:Better utilization of eNodeBs in the network.(In the scope, planning area of the bidding package, device plugging in area of operated equipment, must support this features also)	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.32	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Integrity check failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope.	10	10	10 points: Full compliance with all requirements.	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
	<p>- The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment</p> <p>- The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface..</p> <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Integrity check failure</p>			0 points: Not comply at least 01 of technical requirement				
1.33	Interworking Inter-eNodeB Carrier Aggregation requirement:This feature must be supported by eNodeB of tender and it must run with existing eNodeB neighbor in provinces which belong to this tender	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	
1.34	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about UE connection: During an ongoing voice call (VoLTE or PTT), the UE connection is improved, and the voice connection is sustained.	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	
1.35	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about the UE and bearer retainability:The KPIs related to the UE and bearer retainability are improved because the UE stays connected with no abnormal releases.	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	
1.36	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about signaling between CN and RAN: Reduced signaling between CN and RAN	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	
1.37	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about signaling between UE and RAN:Reduced signaling between UE and RAN	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	
1.38	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about abnormal UE releases between different eNodeBs:Less abnormal UE releases between different eNodeBs	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	
1.39	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about possibility for a UE to stay connected if re-establishment procedure:UE stay connected if re-establishment procedure is triggered between cells controlled by different eNodeBs.	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	
1.40	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about KPIs related to the UE or to the bearer retainability:KPIs related to the UE or to the bearer retainability are improved.	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	
1.41	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about RRC connection re-establishment success rate: Improves RRC connection re-establishment success rate	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	
1.42	Load Balancing (LB) function:-The feature allows load ballancing in connected mode between serving eNodeB and eNodeB neighbor in provinces which belong to this bidding scope. When the 4G serving cell/site load is larger than a threshold, the serving 4G base stations can share the load to the surrounding 4G base stations	20	20	20 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)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
1.43	Interworking Load Balancing (LB) :- This feature must be supported by eNodeB of the tender and it must run with existing eNodeB neighbor in provinces which belong to this bidding scope.	20	20	20 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. + 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). - The system shall support 5, 10, 15 and 20MHz carrier bandwidth. - 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. + 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. + The system shall support to provide the counter for received noise and interference power per antenna branch to detect the external interference in uplink + LTE Massive MIMO: Support MU-MIMO 16 layers DL and 4 layers UL; - Support TM9; Dynamic Transmission Mode Switch for TM9. + EN-DC scheduling weight boost. + The system shall support 5, 10, 15MHz carrier bandwidth.	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	
2	Evolution technology	0	150					
2.1	The Bidder provides documents to prove: + 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. + The gNodeB manufacturer has a long-term roadmap (at least 2 years) to develop 5G Radio equipment according to Open RAN architecture. + The proposed AAU and BBU hardware are ready to support the Open RAN interface.	NA	50	50 points: The bidder provides documents to meet all the following requirements: + 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 January 2026. + 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 connect other vendors' equipment, and current achieved results. + The documents of the gNodeB	Refer to the bidder's description document	x		

No	Technical requirement for gNodeB M-MIMO 64T64R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
				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 January 2026, 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 manufacturers. + Documents proving that: The manufacturer's Radio/BBU equipment can connect to BBU/Radio of at least 3 different manufacturers. 0 points: The bidder does not comply with at least 01 of the above requirements.	Refer to the bidder's description documents. Testing at Lab of manufacturer or visit operators who deployed ORAN using manufacturer' gNodeB			x
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	50 points: The bidder commits to do the trial with Viettel according to the above requirements. 0 points: The bidder does not commit to do the trial with Viettel according to the above requirements	Refer to the bidder's description document and commitment		x	
3	Compatible with the existing 4G networks:							
3.1	The gNodeB of manufacture is compatible and can run 5G NSA (ENDC: Downlink data is transmitted simultaneously to subscribers on both 4G and 5G) with current 4G stations in provinces within the scope of bidding package.	NA	200	200 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
B	Services	100	100					
1	Services: The Bidder offers all services in accordance with the requirements stated in Chapter IV of bidding document.	100	100	100 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	

1.2. Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement and Services	2400	3000			37	214	37
A	Technical requirement for gNodeB Massive MIMO 32T32R 2600MHz	2037	2900					
A.I	Hardware, Licenses, Accessories	2037	2900					
I	General requirement	595	605					
1	Technical solutions and documents	420	420					
1.1	The Bidder provides solutions including hardware and software, features, and permanent licenses for gNodeB/eNodeB; permanent licenses for OMC to simultaneously run 5G SA and NSA, in which: + 5G NSA: The 5G gNodeB is compatible and can run EN-DC with the 4G eNodeB currently on air in the provinces within the bidding scope. + 5G SA: The 5G 2600 TDD gNodeB is compatible and can fully run all features of 5G SA with the 5G FDD, TDD gNodeB in the provinces within the bidding scope.	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	
1.2	+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.	100	100	100 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: + Documents describing device hardware, installation equipment of gNodeB + Documents describing the software roadmap of gNodeB + Documents describing the all features of gNodeB + Documents describing operation and maintenance gNodeB + Documents describing and guiding license management of gNodeB + Documents describing the 5G coverage planning and capacity dimensioning of gNodeB + Document describing all alarms, faults of gNodeB, OMC and solution to solve. + Document describing KPIs, counters of gNodeB, OMC, callflow and trigger points of counters, KPIs, targets should be setup to optimize for main KPIs. + Document, guideline about 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.	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) + Maximum Number of RRC connected User	5	5	5 points: Bidder provide full document describing capacity per each card per one gNodeB. 0 points: Not provide or provide document but don't have informations	Refer to the bidder's description document		x	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	+ 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							
2	gNodeB Configuration	121	125					
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. In which, minimum configuration of each AAU is 32T32R, 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 configuration 3 sectors, each sector can run 1 cell TDD NR100MHz 16DL/4UL 320W 32T32R.	100	100	100 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	
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	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	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	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)							
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 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.	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	
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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document. System check		x	
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							

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
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 +FDD NR +FDD LTE mode, BBU supports the configuration: 3 TDD NR carriers (32T32R 100Mhz bandwidth, 8DL Layers and 4UL Layers) + 6 FDD NR carriers (4T4R 20Mhz bandwidth)+6 FDD LTE carriers (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
1.2	Capacity and Performance							
1.2.1	Bidder must provide documents clearly describing the capacity of the proposed BBU (i.e. number of NR or LTE cell carriers) with different modes: (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	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	
1.2.2	In 5G only mode, number of Massive MIMO TDD NR carriers (FR1, at least 32T32R 100Mhz bandwidth, 16DL Layers and 4UL Layers) can be supported per one Baseband card ≥ 6	10	50	One Baseband card supports a number of cells (X): + $X < 6$: 0 points + $6 \leq X < 9$: 10 points + $X \geq 9$: 50 points	- 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 operate in Massive MIMO TDD NR +FDD LTE mode at the same time.	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	
1.2.4	The proposed BBU's hardware must operate in Massive MIMO TDD NR +FDD LTE mode with the following configuration: 3 TDD NR carriers (at least 32T32R 100Mhz bandwidth, 8DL Layers and 4UL Layers) + 6 FDD LTE carriers (4T4R 20Mhz bandwidth)	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 Bidder's test results.		x	
1.2.5	With solution (hardware and software, without licenses) proposed by Bidder: in Massive MIMO TDD NR + FDD NR+ FDD LTE Mode, the number of	20	50	In Massive MIMO TDD NR + FDD NR+ FDD LTE Mode: Max Number of NR TDD cells 100MHz, 8 DL layer/4 UL layer (X) :	- Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x

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	TDD NR carriers (at least 32T32R 100Mhz bandwidth, 8DL Layers and 4UL Layers) can be supported ≥ 3			+ X < 3: 0 points. + $3 \leq X < 9$: 20 points. + X ≥ 9 : 50 points.				
1.2.6	With solution (hardware and software, without licenses) proposed by Bidder: in Massive MIMO TDD NR + FDD NR+ FDD LTE Mode, the number of FDD NR carriers (4T4R 20Mhz bandwidth) can be supported ≥ 6	10	30	In NR TDD Massive MIMO+ + FDD NR+ FDD LTE Mode : Max Number of FDD NR 4T4R 20MHz) (X): + X < 6: 0 points. + $6 \leq X < 9$: 10 points. + X ≥ 9 : 30 points.	- Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x
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 4-mode: TDD NR Massive MIMO + TDD LTE 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 ≥ 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. + 5 points: $3000 \leq X < 6000$. + 10 points: X ≥ 6000 .	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x
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 ≥ 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 ≥ 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 ≥ 9000	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 < 9000.	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x

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				+ 5 points: $9000 \leq X < 50000$. + 10 points: $X \geq 50000$.				
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. Testing at bidder's Lab			x
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 + $X \geq 2$: 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 + Not support or lack of any port: 0 points	Refer to the bidder's description document. System check		x	
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	

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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					
2.1	The Bidder provides all accessories for the 5G site (including but not limited to: power cable, power connector, patch cord, SFP module, ground cable, label, clamp, C-tap, optical cables, jumper,...):	30	30	30 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement		x		
	1.BBU accessories: Bidder provide a full range of necessary accessories for the operation of the BBU equipment including: + Power cable (to connect from BBU to PDU) $\geq 2.5m/01$ BBU to ensure that Baseband work with maximum 100% load with maximum configuration. + Grounding Cable $\geq 2.5m/01$ BBU + Optical cable per gNodeB (to connect from gNodeB to the transmission equipment): $\geq 10m/01$ BBU + Number of SFP $\geq 10Gbps$ for backhaul interface $\geq 01/01$ BBU. + Providing solutions and equipment for connecting GPS synchronization signals from enodeB to gnodeB at the same location. + Other installation accessories for BBUs if any							
	2.AAU accessories: Bidder shall provide a full range of necessary accessories for the operation of the AAU equipment including: + The Power cable capable of withstanding 100% of the AAU load with maximum distance 80m, input voltage range (-36.0 V DC to -60.0 V DC). AAU power cable length $\geq 60m/01$ AAU + For each AAU, Bidder Provide number of optical fiber cables and SFP modules (for AAU and BBU) to run the Viettel configuration. The Optical fiber length: 100m. The SFP optical module must support at least 25 Gbps and supports distance at least 10km. Viettel requires optical fiber cables to be compatible with Bidder's AAU&BBU&SFP connectors. + Grounding Cable $\geq 6m/01$ AAU and copper C clamps. + AAU mounts: Material: Stainless steel or cast aluminum alloy or equivalent, rust-resistant, and corrosion-resistant; Allows mechanical tilt adjustment from 0°-20°, allowing the adjustment mechanism to be mounted at the top and/or bottom. The bracket can fit pipes with diameters from 60mm to 120mm, with a minimum load at least 50 kg.				Refer to the bidder's description document. Equipment check			
	3. Others: + Labels for optical fibers, power cables have index from 1, 2, 3,... for separate AAUs in one gNodeB. + 01 package of plastic cable tie (100 pieces, $\geq 30cm$, black). + Provide suitable clamps: Each clamp shall secure all optical fibers and							

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
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	power cables, with separate rows for optical fibers and power cables; clamp quantity ≥ 60 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, if the bidder does not provide the solution and equipment to connect the GPS synchronization signal from the eNodeB to the gNodeB at the same location. + 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: ≤ 3 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	269	400					
1	General							
1.1	The Bidder must offer product that supports Massive MIMO 32T32R.	50	50	50 points: Bidders must offer a massive MIMO product that supports at least 32T32R. 0 points: Bidders offering a massive MIMO product that supports less than 32T32R.	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 2496-2690MHz (B41 and N41). + 0 points: Does not support for frequency band 2496-2690MHz (B41 and N41).	Refer to the bidder's description document		x	
1.5	The AAU's Instantaneous Bandwidth ≥ 100 MHz	5	10	IBW: + IBW(MHz) < 100 : 0 points + $100 \leq$ 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 + $100 \leq$ 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.	Refer to the bidder's description document		x	

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				+ 0 points: Does not support 1 of 3 modes: LTE, NR, LTE+NR.				
1.9	The AAU's weight (excluding bracket) < 35 kg	30	50	The AAU with weight excluding bracket (X): + 0 points: $X \geq 35\text{kg}$. + 30 points: $20\text{kg} \leq X < 35\text{kg}$. + 50 points: $X < 20\text{kg}$.	Refer to the bidder's description documents. Equipment check	x		
1.10	The height of the AAU < 1500 mm	3	3	The height of the AAU (X): + 3 points: $X < 1500\text{ mm}$. + 0 points: $X \geq 1500\text{ mm}$.	Refer to the bidder's description documents. Equipment check	x		
1.11	The with of the AAU < 700 mm	2	2	The with of the AAU (X): + 2 points: $X < 700\text{ mm}$. + 0 points: $X \geq 700\text{ mm}$.	Refer to the bidder's description documents. Equipment check	x		
1.12	The depth of the AAU < 300 mm	2	2	The depth of the AAU (X): + 2 points: $X < 300\text{ mm}$. + 0 points: $X \geq 300\text{ mm}$.	Refer to the bidder's description documents. Equipment check	x		
1.13	Cooling system	NA	2	+ 2 points: Natural cooling + 0 points: Forced convection (fan)	Refer to the bidder's description documents. Equipment check	x		
1.14	Front Wind load at $150\text{ km/h} \leq 1100\text{ N}$	1	1	Front Wind load at 150 km/h (X): + 1 point: $X \leq 1100\text{ N}$. + 0 points: $X > 1100\text{ N}$.	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	
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): + $X \geq 2$: 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	5	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: $X < 1$.	Refer to the bidder's description document		x	

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						HOC	TAM	TAC
				+ 5 points.: $1 \leq X < 2$. + 10 points: $X \geq 2$				
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	
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) 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 with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. (any if)	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 < 1300 W	NA	20	Maximum Power consumption of AAU under the conditions of room temperature, no additional features with 100% load, 320W (X): + $X \geq 1300$ W: 0 points + $X < 1300$ W: 20 points.	Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB			x
3	Antenna							
3.1	Bidder must provide documents describing Broadcast and Traffic beams which include at least the following information: 1. Traffic beams + 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. 2. SSB beams + The maximum number of beams + Average vertical and horizontal 3dB beamwidth	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		

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
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	+ 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							
3.2	Bidder must provide: + 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: - Beam: beam traffic and beam broadcast that the AAU can run. - Output results: EIRP, gain, vertical beam width, horizontal beam width.	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 in Bidder's LAB			x
3.3	Number of Antenna Elements \geq 192	10	10	Number Antenna Element (X): + X < 192: 0 points. + X \geq 192: 10 points.	Refer to the bidder's description document	x		
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 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: -38V to -57V	5	5	Power Supply Range for AAU (X): + X from -38V to -57V: 5 points. + X out of -38V to -57V: 0 points	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 \neq -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 \geq 2	5	5	Number of eCPRI or CPRI with Line Rate 25Gbps/port (X): + X < 2: 0 points + X \geq 2: 5 points	Refer to the bidder's description documents. Equipment check	x		
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		

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
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	559	780					
1	Gernerall 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. RAN WG4: TS 38.113, TS 38.133, TS 38.171. SA WG2: TS23.501, TS23.502.	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	
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.	25	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. 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 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
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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. 0 points: the gNodeB does not support all NR Carrier BW : 60/80/100 MHz.	Refer to the bidder's description documents and Bidder's test results. Equipment test		x	
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 ≥ 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	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

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	scenario (1 NR 100MHz Massive MIMO 16 DL Layer): Peak DL user throughput must be ≥ 1.4 Gbps							
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 ≥ 180 Mbps	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							
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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
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	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
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 + EN-DC + Secondary RAT data usage report + User data Transfer: + Flow Control: Polling, discarding duplicated data, status indicator for retransmission,...	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	
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: Compliance with technical requirement 0 points: Not comply with 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.	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: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description document		x	
4.6	NR FDD cells support Extended Cell Range to 100 Km.	NA	5	5 points: Compliance with technical requirement 0 points: Not comply with 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	

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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	1 point: 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 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.	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	
4.15	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	
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: - 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.	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	
5.5	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	

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						HOC	TAM	TAC
5.6	<p>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:</p> <ul style="list-style-type: none"> + 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. <p>Support Carrier Aggregation/Dual Connectivity DL/UL with any combination band above in any senario following:</p> <ul style="list-style-type: none"> + Intra gNodeB CA. + Inter mode FDD and TDD. + Intra FR inter band CA. + 4G and 5G. <p>The Bidder provides all features and accompanying permanent licenses for gNodeB to operate:</p> <ul style="list-style-type: none"> + 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	<p>10 points: Full compliance with all requirements.</p> <p>0 points: Not comply at least 01 of technical requirement</p>	<p>- Refer to the bidder's description documents</p> <p>- Testing Bidder's Lab all following requirements:</p> <p>+Feaure: ENDC: 2CC LTE + 2 CC NR; CA DL: 2 CC, 3 CC, 4 CC; CA UL: 2CC (Intra gNodeB, Intra/Inter frequency band).</p> <p>+ Other: All expenses associated with this testing for the two Viettel engineers from Vietnam to Bidder's Lab Test.</p>			x
5.7	Support PDSCH Extension in SSB and TRS slots.	NA	5	<p>5 points: Compliance with technical requirement</p> <p>0 points: Not comply with technical requirement</p>	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	<p>1 point: 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	
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	<p>5 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	
5.10	BBU Hardware and Software support channel bandwidth for NR FDD Channel BW: 5MHz, 10 MHz ,15MHz and 20 MHz.	NA	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 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	<p>5 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 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	<p>1 point: 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	
5.13	Support DSS with RAN sharing (MORAN or MOCN).	NA	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	
5.14	NR Traffic Steering Feature: traffic steering to the UE based on coverage and UE capabilities for increasing UE downlink throughput.	NA	5	<p>5 points: Compliance with technical requirement</p> <p>0 points: Not comply with technical requirement</p>	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	<p>5 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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5.16	TDD PCell Support for DL Carrier Aggregation: Downlink carrier aggregation with a TDD cell as PCell and an FDD cell as Scell	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 lab test results. Testing in Viettel's LAB			x
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
5.19	NR DL Carrier Aggregation: The system shall support support inter-gNB Carrier Aggregation in existing eNodeB/gNodeB in provinces which belong to this bidding scope.	30	30	30 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 + Inter-Frequency Mobility with MeNB Coordination + Inter-Frequency Mobility without MeNB Coordination	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	
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	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
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: Compliance with technical requirement 0 points: Not comply with technical requirement	Refer to the bidder's description documents. System check		x	
6.7	5G service continuity in case of LTE Inter-MeNB mobility: To enable UEs to maintain service continuity in EN-DC if the LTE Cell coverage deteriorates. System shall support Inter-MeNB LTE handover without en-gNB change. This feature must be supported by eNodeB/gNodeB of the tender and it must run with existing eNodeB/gNodeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
6.8	NR Mobility: The system shall support enables gNodeBs to perform measurement-based handover, PSCell change, and redirection of UEs in both NSA and SA with existing eNodeB/gNodeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			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. + CSI-RS Beam Sweeping, Beam Maintenance, Beam Recovery. + PMI-based Beamforming và 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	
7.2	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	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
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 January 2026.	NA	2	2 points: 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: Compliance with technical requirement. 0 points: Not comply with technical requirement	Refer to the bidder's description documents. System check		x	
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, loadbalancing 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, Masked IMEI-SV, IMEI-TAC, IMEI-SVN, RedCap UE,...	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab			x
8.5	The Bidder provides all features and permanent licenses to support the functions below (including but not limited): + Network slicing Configuration. + Network slicing resource management	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 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	+ Network slicing QoS + Network slicing Mobility							
8.6	EN-DC RAN Slicing:The system shall support RAN slicing functionality for EN-DC traffic for customized QoS and resource partitioning in existing eNodeB/gNodeB in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
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	
9.2	Inter-gNodeB Multi-Target RRC Connection Re-establishment Support Handover failure:The system shall support multi-target RRC connection re-establishment with existing gNodeB neighbor in provinces which belong to this bidding scope. - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in NR RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another gNodeB (neighbors existing in Viettel's network) and they are connected with an Xn interface.. The RRC Connection Re-establishment feature (3GPP TS38.401) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Handover failure	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 and Bidder's test results. Testing at bidder's Lab			x
9.3	LTE-NR Dual Connectivity:The system shall support Inter-eNB handover for LTE-NR DC option 3x" and "Intra-eNB Handover for LTE-NR DC Option 3x" with the functionality of "Master Node Based Handover in EN-DC" with existing eNodeB/gNodeB in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
9.4	EN-DC-Triggered Handover during Connected Mode Mobility:The system shall facilitate the transfer of an EN-DC-capable UE in connected mode to a neighboring LTE cell that supports EN-DC, triggered by an incoming handover, using the existing eNodeB/gNodeB infrastructure in provinces covered by this tender	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 and Bidder's test results. Testing at bidder's Lab			x

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
9.5	LTE-NR Dual Connectivity:The system shall provide a traffic load distribution mechanism for EN-DC-capable UEs based on reprioritizing the NR carrier frequencies used for the following procedures: EN-DC setup Secondary Node Addition EN-DC-triggered handover. This feature must be supported by eNodeB/gNodeB of the tender and it must run with existing eNodeB/gNpdeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
9.6	LTE-NR Dual Connectivity:The system shall support EN-DC deployment, EN-DC BC coordination, switching of MCG and SCG Radio resources, LTE-NR aggregation, PDCP Flow Control , X2 Interface Management: Interface setup, reset, configurarion update. This feature must be supported by eNodeB/gNodeB of the tender and it must run with existing eNodeB/gNpdeB neighbor in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
9.7	LTE-NR Dual Connectivity:in EN-DC deployments,The system shall support to enable inter-frequency PSCell change to frequencies with higher priority in good radio conditions with existing eNodeB/gNodeB in provinces which belong to this 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 and Bidder's test results. Testing at bidder's Lab			x
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.	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 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	+ 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							
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.	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	
11.4	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	
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	

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						HOC	TAM	TAC
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	
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: Compliance with technical requirement 0 points: Not comply with 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: 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: 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 all requirements. 0 points: Not comply at least 01 of 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. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description documents. System check		x	
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	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
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	
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	
V	Other requirements	318	672					
1	Feature 4G	318	322					
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,	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	

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	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.							
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 + Bidder must state the calculation methods in the proposal to prove the proposed solutions (hardware and software) can support gNodeB (for 4G) profile	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	
1.4	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	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>outage time is minimizes in case lost connection and dropped telephony call are avoided.</p> <ul style="list-style-type: none"> - 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. 							
1.6	<p>Load control/ Admission control/ Congestion Control/ Radio resource management:</p> <ul style="list-style-type: none"> - 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 resource limitation. The pre-emption shall be activated according to service type, QCI, ARP. - 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. <p>Provide details of the Radio Admission Control and Congestion Control procedure implemented.</p> <ul style="list-style-type: none"> - 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 	2	2	<p>2 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	

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	Mobility Control, support multiple radio bearers per user, Admission triggered offload							
1.7	Coverage and Capacity Functionality: <ul style="list-style-type: none"> - The proposed systems shall dynamically allocate the radio resources (frequency, power) according to the radio characteristics and the quality of uplink/downlink in order to coordinate Intercell 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 	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		
1.8	Scheduler: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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. - 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 	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>parameter for one or more EPS bearers.</p> <ul style="list-style-type: none"> - 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, S1-MME, 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 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 	2	2	<p>2 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		

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	<p>Handover to UTRAN, GSM.</p> <ul style="list-style-type: none"> - 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. 							
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 interface. - 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), 	2	2	<p>2 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		

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	<p>Automatic record of the account usage information, Security certificate</p> <ul style="list-style-type: none"> - 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 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.	<p>Radio Network Functionality:</p> <ul style="list-style-type: none"> - 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 (ECGI) and Tracking Area Id (TAI). 	2	2	<p>2 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	

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	- 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/ S1-MME 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 Data Buffer Trigger for EN-DC MFB (Multi-Frequency Band Indicator) Support in 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	
1.18.	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	

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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	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	
1.21	ENDC optimization: + LTE Optimized EN-DC Band Combination Selection + UE MR-DC Capabilities-Based Handover + EN-DC Capability-Based Handover to Preferred Layer + 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	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	
1.22	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	
1.26	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Radio link failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope.	12	12	12 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 Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Radio link failure</p>							
1.27	Inter-eNodeB Carrier Aggregation:The system shall support inter-eNodeB Carrier Aggregation between eNodeB serving and eNodeB neighbor in provinces which belong this bidding scope. This feature enables downlink carrier aggregation between cells which are not belonged to the same eNodeB.	20	20	20 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.28	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Handover failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope. <ul style="list-style-type: none"> - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Handover failure</p>	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.29	The benefit of Inter-eNodeB Carrier Aggregation for throughput:The set of cells considered to be used as SCells is expanded across multiple eNodeBs. As a result, UEs can find a better set of cells with which to perform carrier aggregation, leading increased overall throughput.	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.30	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Mobility from E-UTRA failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope. <ul style="list-style-type: none"> - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. <p>The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it</p>	12	12	12 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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	possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Mobility from E-UTRA failure							
1.31	The benefit of Inter-eNodeB Carrier Aggregation for utilization of eNodeBs:Better utilization of eNodeBs in the network.(In the scope, planning area of the bidding package, device plugging in area of operated equipment, must support this features also)	12	12	12 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.32	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support Integrity check failure:The system shall support multi-target RRC connection re-establishment with existing eNodeB neighbor in provinces which belong to this bidding scope. - The Multi-Target RRC Connection Re-establishment feature supports RRC connection re-establishment with context established in LTE RAN. The feature initiates the secondary node release procedure during RRC connection re-establishment - The Multi-Target RRC Connection Re-establishment feature supports the re-establishment procedure in cells other than the serving cell. These include cells that belong to another eNodeB (neighbors existing in Viettel's network) and they are connected with an X2 interface.. The RRC Connection Re-establishment feature (3GPP TS 36.331) makes it possible to restore a UE context with a UE that lost connection to the serving cell. RRC connection re-establishment is initiated by the UE when it detects Integrity check failure	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	
1.33	Interworking Inter-eNodeB Carrier Aggregation requirement:This feature must be supported by eNodeB of tender and it must run with existing eNodeB neighbor in provinces which belong to this tender	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	
1.34	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about UE connection: During an ongoing voice call (VoLTE or PTT), the UE connection is improved, and the voice connection is sustained.	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	
1.35	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about the UE and bearer retainability:The KPIs related to the UE and bearer retainability are improved because the UE stays connected with no abnormal releases.	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	
1.36	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about signaling between CN and RAN: Reduced signaling between CN and RAN	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	
1.37	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about signaling between UE and RAN:Reduced signaling between UE and RAN	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	
1.38	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about abnormal UE releases between different eNodeBs:Less abnormal UE releases between different eNodeBs	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	
1.39	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about possibility for a UE to stay connected if re-establishment procedure:UE stay connected if re-establishment procedure is triggered between cells controlled by different eNodeBs.	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	

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
1.40	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about KPIs related to the UE or to the bearer retainability:KPIs related to the UE or to the bearer retainability are improved.	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	
1.41	Inter-eNodeB Multi-Target RRC Connection Re-establishment Support benefits about RRC connection re-establishment success rate: Improves RRC connection re-establishment success rate	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	
1.42	Load Balancing (LB) function:-The feature allows load ballancing in connected mode between serving eNodeB and eNodeB neighbor in provinces which belong to this bidding scope. When the 4G serving cell/site load is larger than a threshold, the serving 4G base stations can share the load to the surrounding 4G base stations	20	20	20 points: Full compliance with all requirements. 0 points: Not comply at least 01 of technical requirement	Refer to the bidder's description document		x	
1.43	Interworking Load Balancing (LB) :- This feature must be supported by eNodeB of the tender and it must run with existing eNodeB neighbor in provinces which belong to this bidding scope.	20	20	20 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. + 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). - The system shall support 5, 10, 15 and 20MHz carrier bandwidth. - 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. + 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. + The system shall support to provide the counter for received noise and interference powe per antenna branch to detect the external interference in uplink + LTE Massive MIMO: Support MU-MIMO 16 layers DL and 4 layers UL; - Support TM9; Dynamic Transmission Mode Switch for TM9. + EN-DC scheduling weight boost. + The system shall support 5, 10, 15MHz carrier bandwidth.	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	
2	Evolution technology	0	150					

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
2.1	<p>The Bidder provides documents to prove:</p> <ul style="list-style-type: none"> + 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. + The gNodeB manufacturer has a long-term roadmap (at least 2 years) to develop 5G Radio equipment according to Open RAN architecture. + The proposed AAU and BBU hardware are ready to support the Open RAN interface. 	NA	50	<p>50 points: The bidder provides documents to meet all the following requirements:</p> <ul style="list-style-type: none"> + 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 January 2026. + 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 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. <p>0 points: The bidder does not comply with at least 01 of the above requirements.</p>	Refer to the bidder's description document	x		
2.2	<p>The Bidder provides equipment from gNodeB manufacturer that:</p> <ul style="list-style-type: none"> + By the end of January 2026, 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	<p>50 points: The bidder provides documents to meet all the following requirements:</p> <ul style="list-style-type: none"> + 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 manufacturers. + Documents proving that: The manufacturer's Radio/BBU equipment can connect to BBU/Radio of at least 3 different manufacturers. <p>0 points: The bidder does not comply with at least 01 of the above requirements.</p>	<p>Refer to the bidder's description documents.</p> <p>Testing at Lab of manufacturer or visit operators who deployed ORAN using manufacturer' gNodeB</p>			x
2.3	<p>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.</p>	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	
3	Compatible with the existing 4G networks:							
3.1	<p>The gNodeB of manufacture is compatible and can run 5G NSA (ENDC: Downlink data is transmitted simultaneously to subscribers on both 4G and 5G) with current 4G stations in provinces within the scope of bidding package</p>	NA	200	<p>200 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	
B	Services	100	100					

No	Technical requirement for gNodeB M-MIMO 32T32R (2600MHz)_Type 1	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
1	Services: The Bidder offers all services in accordance with the requirements stated in Chapter IV of bidding document.	100	100	100 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. Technical requirement for AAU M-MIMO 32T32R (2600MHz)

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
	Total Technical requirement	400	500			20	26	0
I	General requirement	20	20					
I.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.	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 and commitment		x	
I.2	The Bidder must provide documents for the following items: + Documents describing device hardware, installation equipment of AAU + Documents describing the software roadmap of AAU + Documents describing the all features of AAU + Documents describing operation and maintainent AAU + Documents describing and guiding license management of AAU + Documents describing the 5G coverage planning and capacity dimensioning of AAU + Document describing all alarms, faults of AAU and solution to solve.	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	
II	Software license	60	60					
II.1	The Bidder must provide permanent licenses for all features/software in equipment according to the latest SW version for all equipment of bidding scope.	20	20	20 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	
II.2	For each AAU, the Bidder must provide solutions including hardware, software ("AAU, Baseband, OMC,...") and all related permanent licenses in order to run configuration 1 cell TDD NR100MHz 16DL/4UL 320W 32T32R.	20	20	20 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	
II.3	Viettel can transfer all licenses from a failure hardware to replacement hardware.	20	20	20 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	
III	Radio part	287	410					
1	MIMO and Operation Bandwidth							

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
1.1	The Bidder must offer product that supports Massive MIMO 32T32R.	50	50	50 points: Bidders must offer a massive MIMO product that supports at least 32T32R. 0 points: Bidders offering a massive MIMO product that supports less than 32T32R.	Refer to the bidder's description document. Equipment Check		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. Equipment Check		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 2496-2690MHz (B41 and N41). + 0 points: Does not support for frequency band 2496-2690MHz (B41 and N41).	Refer to the bidder's description document. Equipment Check		x	
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 documents and lab test results. Testing in Viettel's LAB		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 documents and lab test results. Testing in Viettel's LAB		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 documents and lab test results. Testing in Viettel's LAB		x	
2	Mechanical Properties							

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
2.1	The AAU's weight (excluding bracket) < 35 kg	30	50	The AAU with weight excluding bracket (X): + 0 points: $X \geq 35\text{kg}$. + 30 points: $20\text{kg} \leq X < 35\text{kg}$. + 50 points: $X < 20\text{kg}$.	Refer to the bidder's description documents. Equipment check	x		
2.2	The height of the AAU <1500 mm	3	3	The height of the AAU (X): +3 points: $X < 1500\text{ mm}$. + 0 points: $X \geq 1500\text{ mm}$.	Refer to the bidder's description documents. Equipment check	x		
2.3	The width of the AAU < 700 mm	2	2	The with of the AAU (X): + 2 points: $X < 700\text{ mm}$. + 0 points: $X \geq 700\text{ mm}$.	Refer to the bidder's description documents. Equipment check	x		
2.4	The depth of the AAU < 300 mm	2	2	The depth of the AAU (X): + 2 points: $X < 300\text{ mm}$. + 0 points: $X \geq 300\text{ mm}$.	Refer to the bidder's description documents. Equipment check	x		
2.5	Cooling system	0	2	+ 2 points: Natural cooling + 0 points: Forced convection (fan)	Refer to the bidder's description documents. Equipment check	x		
2.6	Front Wind load at 150 km/h $\leq 1100\text{ N}$	1	1	Front Wind load at 150 km/h(X): + 1 point: $X \leq 1100\text{ N}$. + 0 points: $X > 1100\text{ N}$.	Refer to the bidder's description document	x		
2.7	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		
2.8	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 and Bidder's test report	x		
2.9	Support mechanical tilt change	5	5	5 points: The AAU support mechanical tilt change 0 points: The AAU not support mechanical tilt change	Refer to the bidder's description document. Equipement check	x		
3	Capacity and Performance							

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
3.1	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	
3.2	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	
3.3	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	
3.4	Number of NR Uplink layers that the AAU (including both hardware and software) can support when working on NR only mode ≥ 4	5	10	The AAU with hardware and software that supports (X) Layer UL MIMO: + 0 points: X < 4. + 5 points: 4 \leq X < 8. + 10 points: X ≥ 8 .	Refer to the bidder's description documents and Bidder's test results. Testing at bidder's Lab		x	
3.5	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 documents and lab test results. Testing in Viettel's LAB		x	
3.6	The maximum number of LTE carriers per AAU when operating in 4G+5G mixed mode ≥ 2	10	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 documents and lab test results. Testing in Viettel's LAB		x	

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
3.7	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 lab test results. Testing in Viettel's LAB		x	
3.8	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 documents and lab test results. Testing in Viettel's LAB		x	
3.9	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 documents and lab test results. Testing in Viettel's LAB		x	
3.10.	Power Consumption Document: The Bidder must declare the power consumption of each AAU (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 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 with load (TU PRB DL) 100%, 70%, 50%, 30%, 0%. (any if)	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	
3.11	The Maximum power consumption of AAU Massive MIMO < 1300 W	0	20	Maximum Power consumption of AAU under the conditions of room temperature, no additional features with 100% load, 320W (X): + $X \geq 1300$ W: 0 points + $X < 1300$ W: 20 points.	Refer to the bidder's description documents and lab test results. Testing in Viettel's LAB		x	
4	Antenna							

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
4.1	<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		
4.2	<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: 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	
4.3	Number of Antenna Elements \geq 192	10	10	<p>Number Antenna Element (X):</p> <ul style="list-style-type: none"> + $X < 192$: 0 points. + $X \geq 192$: 10 points. 	Refer to the bidder's description document. Equipement check	x		
5	Interface							
5.1	Number of Input Power Port =1	5	5	<p>Number of Power Port per AAU (X):</p> <ul style="list-style-type: none"> + $X = 1$: 5 points. + $X > 1$: 0 points 	Refer to the bidder's description document. Equipment check	x		

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
5.2	Power Supply Range: -38V to -57V	5	5	Power Supply Range for AAU (X): + X from -38V to -57V: 5 points. + X out of -38V to -57V: 0 points	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		
5.5	Number of Fronthaul eCPRI or CPRI line required for one AAU for NR 100MHz, 16 Layer DL /4 Layer UL =1	0	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.	0	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		

No	Technical requirement for AAU 32T32R (2600MHz)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
						HOC	TAM	TAC
6	<p>AAU accessories: Bidder shall provide a full range of necessary accessories for the operation of the AAU equipment including: + The Power cable capable of withstanding 100% of the AAU load with maximum distance 80m, input voltage range (–36.0 V DC to –60.0 V DC). AAU power cable length ≥ 60m/01 AAU + For each AAU, Bidder Provide number of optical fiber cables and SFP modules (for AAU and BBU) to run the Viettel configuration. The Optical fiber length: 100m. The SFP optical module must support at least 25 Gbps and supports distance at least 10km. Viettel requires optical fiber cables to be compatible with Bidder's AAU&BBU&SFP connectors. + Grounding Cable ≥ 6m/01 AAU and copper C clamps. + AAU mounts: Material: Stainless steel or cast aluminum alloy or equivalent, rust-resistant, and corrosion-resistant; Separates structure that allows adjusting the mechanical tilt and azimuth without removing it from the boom mount; Allows mechanical tilt adjustment from 0°-20°, allowing the adjustment mechanism to be mounted at the top and/or bottom. The bracket can fit pipes with diameters from 60mm to 120mm, with a minimum load at least 50 kg.</p> <p>Others: + Labels for optical fibers, power cables have index from 1, 2, 3,... for separate AAUs in one gNodeB. + 01 package of plastic cable tie (100 pieces, ≥ 30cm, black). + Provide suitable clamps: Each clamp shall secure all optical fibers and power cables, with separate rows for optical fibers and power cables; clamp quantity ≥ 60 clamps/ 01 gNodeB. The clamp must be compatible with power cable and optical cable. + Other accessories attached if any</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. Equipment Check	x		
IV	<p>Compatible: The proposed AAU must be compatible with the 5G baseband equipment within the bidding scope</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	

1.4. Technical requirement for OMC

No	Technical requirement for Centralized management and monitoring system (OMC)	Basic detail/ Not basic detail (BS/NBS)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	Total Technical requirement and Services/Deploying Solutions		800	1000			0	17	75
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 shall provide new OMC hardware or reuse existing OMC hardware (within the scope of this package), ensuring that, after the addition of all nodes/cells under this package, the cumulative license utilization does not exceed 80% of the OMC hardware capacity.</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.</p>	BS	50	50	<p>Pass: Proposed product meets the requirements</p> <p>Fail: Proposed product does not meet the requirements.</p>	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.	BS	10	10	<p>Pass: Proposed product meets the requirements</p> <p>Fail: Proposed product does not meet the requirements.</p>	<p>Refer to the bidder's description documents and commitment</p> <p>Check list licenses/features</p>		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.	BS	10	10	<p>Pass: Proposed product meets the requirements</p> <p>Fail: Proposed product does not meet the requirements.</p>	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	BS	10	10	<p>Pass: Proposed product meets the requirements</p> <p>Fail: Proposed product does not meet the requirements.</p>	Refer to the bidder's description document and commitment		x	
1.2	System architecture		20	40					
1.2.1	OMCs can be deployed in any provinces or cities of Vietnam	BS	NA	10	<p>Pass: Proposed product meets the requirements</p> <p>Fail: Proposed product does not meet the requirements.</p>	Refer to the bidder's commitment		x	
1.2.2	<p>Software Architecture:</p> <p>- 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.</p>	BS	10	10	<p>Pass: Proposed product meets the requirements</p> <p>Fail: Proposed product does not</p>	Refer to the bidder's description documents and system check			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Basic detail/ Not basic detail (BS/NBS)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
	- The software must provide a dashboard interface for monitoring the overall system status (resources, services, databases, etc.).				meet the requirements.				
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	BS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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 (if any) which are the latest commercial ones	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Check the product in the BoQ, compare it with the document 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			x
1.3.2	Support new technologies: Virtualization (VMware, OpenStack, etc.), container (Docker), and microservices, etc.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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%	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description documents and system check			x

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1.5.2	<ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> + NBI Security Management + NBI Log Management (INE command log, OMC command log) + NBI FM (Alarm Monitor) + NBI Configuration Management + NBI Performance Management + NBI Inventory Management 	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description documents and system check			x
1.6	Surveillance, System Administration Ability		70	80					
1.6.1	- Hardware Monitoring and Alarms: <ul style="list-style-type: none"> + 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: <ul style="list-style-type: none"> + 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. 	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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: <ul style="list-style-type: none"> - Process status. - Database status (dead or alive) - Application high availability (HA) status (ensure switchover availability is indicated) 	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description documents and system check			x
1.6.5	Alert Data Retention Period: Alert data is stored in the OMC system for a minimum of 14 days.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed	Refer to the bidder's description documents and system check			x

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							HOC	TAM	TAC
					product does not meet the requirements.				
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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description documents and system check			x
1.8	Redundancy capabilities		30	30					
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description documents and system check			x

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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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
1.9.2	RAM Server Load: Maximum RAM usage should be below 80% on all servers.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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%.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x

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1.10.2	Self-healing Ability: - The system shall automatically detect downed modules and initiate recovery procedures, including alerting appropriate personnel.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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 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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description documents and system check			x
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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
1.12	Log Management		20	20					

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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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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 firewall or Access Control Lists (ACLs); Allow the installation of Viettel's information security monitoring agent (SRM/CyM agent)	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
1.14	Documentation standards		10	10					
1.14.1	The Bidder must provide document library: - 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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document		x	

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	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.								
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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	NBS	10	20	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not	Refer to the bidder's description document, commitment and system check			x

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							HOC	TAM	TAC
					meet the requirements.				
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not	Refer to the bidder's description document, commitment and system check			x

No	Technical requirement for Centralized management and monitoring system (OMC)	Basic detail/ Not basic detail (BS/NBS)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
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	- Allows building reusable KPI/counter templates for querying data. - Allows users to group KPI statistical results by Time, NE (Network Element), and Cells on different types of NEs.				meet the requirements.				
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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document and commitment		x	
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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not	Refer to the bidder's description document and commitment		x	

No	Technical requirement for Centralized management and monitoring system (OMC)	Basic detail/ Not basic detail (BS/NBS)	Min score required	Max score	Evaluation Rules	Evaluation method	Evaluation period		
							HOC	TAM	TAC
					meet the requirements.				
2.2.10	Counters synchronization between NE and OMC: Allows configuring automatic synchronization of counters (scheduled) or manual upon user request.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
2.3	Fault Management		50	80					
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not	Refer to the bidder's description document, commitment and system check			x

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							HOC	TAM	TAC
					meet the requirements.				
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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	10	10	Pass: Proposed product meets the requirements	Refer to the bidder's description document, commitment and system check			x

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	accounts on NEs. - Assign accounts to appropriate permission groups for each NE.				Fail: Proposed product does not meet the requirements.				
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	BS	10	10	Pass: Proposed product meets the requirements	Refer to the bidder's description document, commitment and system check			x

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					Fail: Proposed product does not meet the requirements.				
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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).	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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 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	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	10	10	Pass: Proposed product meets the	Refer to the bidder's description document, commitment and system check			x

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	(Operation and Maintenance Center) license information to a file, which is then stored on the OMC local partition for 30 days.				requirements Fail: Proposed product does not meet the requirements.				
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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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.	BS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	Refer to the bidder's description document, commitment and system check			x
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.	NBS	NA	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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 IV of bidding document.	BS	10	10	Pass: Proposed product meets the requirements Fail: Proposed product does not meet the requirements.	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	BS	NA	40	Pass: Proposed product meets the requirements Fail: Proposed product does not	Refer to the bidder's description document, commitment and system check		x	

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	in Vietnam, Viettel can integrate, activate/on-air, and monitor the gNodeBs/eNodeBs.				meet the requirements.				