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**REQUEST FOR INFORMATION - Network Disaggregation
(Datacentre Network / IP Backhaul Network / GPON Network)**

Document Release Date: 11th August 2020

Deadline for Receipt of Response: Noon (EAT Time), 28th August 2020

CONTENTS

- 1. INTRODUCTION 3
- 2. OBJECTIVES..... 3
- 3. DRIVERS 3
- 4. SCOPE 3
- 5. TECHNICAL REQUIREMENTS 4
 - 5.1. Domain Specific Requirements 4
 - 5.1.1. Datacenter Network..... 4
 - 5.1.2. IP Backhaul Network (Cell site gateways, Aggregation Routers) 4
 - 5.1.3. GPON Infrastructure (xPON Open Networking)..... 5
 - 5.2. Generic requirements (All Domains) 6
- 6. ADDITIONAL INFORMATION 8
- 7. NEXT STEPS 8
- 8. RESPONSES 8
- 9. NOTES TO SUPPLIERS: 8

1. INTRODUCTION

Safaricom PLC is the leading mobile services provider in Kenya and has a steadily growing subscriber base. Safaricom is continuously expanding and upgrading its systems and processes to meet the changing needs of its customers. To meet this objective Safaricom continuously seeks to partner with competent suppliers and service providers on various requirements.

Safaricom PLC now intends to engage the services of competent and reputable companies with deep expertise in disaggregated networks design, build and operations.

2. OBJECTIVES

The objective for this RFI is to investigate the breadth of the Disaggregated Networks Hardware & Software market. A key objective of this exercise is to evaluate if this market is sufficiently mature and broad enough to provide adequate solutions for the various network domains as captured in the scope below. At the end of the exercise a list of bidders will be prequalified who we can potentially work with in a POC that will later lead to an RFP process.

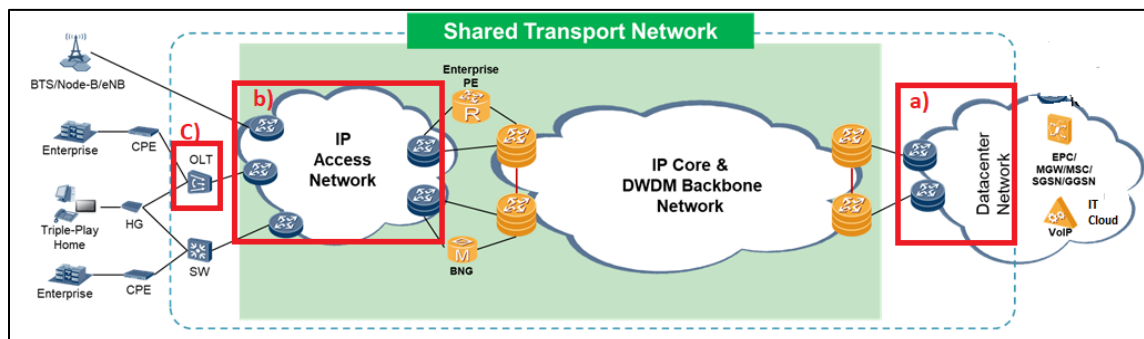
3. DRIVERS

- a. Scale: Support for network capacity growth in the various domains
- b. Openness: Decoupling of hardware and software lifecycle through ensuring cross vendor hardware / software compatibility and hence use of hardware and software from different providers and use open management interfaces and protocols
- c. Simplified management tools: use of common DEVOPS tools for network management.
- d. Evolution path to SDN.
- e. Efficiency: Platform performance vs Infrastructure cost, reduction in Space, power & cooling requirements.

4. SCOPE

Network Disaggregation has seen substantially growth in the ICT and telecommunications industry. Initially, providing solutions for the data center servers it has now found its way down to the network edge. Below are the network domains that we are interested at looking for these solutions.

- a) Datacenter Networks
- b) IP Backhaul Network
- c) GPON Infrastructure (xPON)



5. TECHNICAL REQUIREMENTS

5.1. Domain Specific Requirements

5.1.1. Datacenter Network

The datacenter network provides connectivity between compute elements within the datacenter (east-west traffic) as well as connectivity to external elements (north-south traffic). The deployment would be done in our main datacenters as well as the edge computing locations.

The supplier shall provide information in relation to the requirements below which are the key features & functionality that the Network needs to support.

- a) Leaf-spine architecture. The supplier shall show the recommended solution support for Leaf-spine architecture which is a two-layer network topology composed of leaf switches and spine switches.
- b) Virtual extensible Local Area Network (VXLAN) The solution should support Virtual extensible Local Area Network (VXLAN): A Framework for Overlaying Virtualized Layer 2 Networks over Layer 3 Networks as defined in the IETF standards RFC 7348 and the other related standards
- c) VXLAN BGP-EVPN The solution should support VXLAN BGP-EVPN solution based on MP-BGP, as described in RFC 4760
- d) The supplier shall describe the supported switch fabric and packet forwarding architecture and performance.
- e) Data rates supported. The supplier shall indicate maximum number of interface types supported on the proposed switch platform (1G, 10G, 40G, 100G, FCOE)
- f) Support for both IPv4 & IPv6
- g) The proposed CEs/Data Center Switches shall support OSPFv2 and OSPFv3 routing protocol as specified in the respective RFC
- h) The proposed CEs/Data Center Switches shall support BGP routing protocol as specified in the respective RFC
- i) The proposed CEs/Data Center Switches shall support MPLS L3VPN [IPv4 & IPv6] & L2VPN as specified in the respective RFC
- j) Multicast support

5.1.2. IP Backhaul Network (Cell site gateways, Aggregation Routers)

The objective of the target network is to implement an IP/MPLS network which will provide flexibility, resiliency and ease the implementation of existing and new services in the network. At

a high level, the IP/MPLS network equipment should support these features; L2VPN services, L3VPN services, Multicast, Synchronization, and Security.

The supplier shall provide information in relation to the requirements below which are the key features & functionality that the Network needs to support.

- a) The intra-domain routing within each of the MPLS domains (i.e. aggregation domains and core) SHOULD utilize standard IGP protocols like OSPF or ISIS. The intra-domain MPLS LSP setup and label distribution SHOULD utilize standard protocols like LDP or RSVP. Service routing should be based on BGP.
- b) Hierarchical design with Multi-Domain (and Multi-vendor) MPLS networks - that enables the seamless exchange of loopback addresses and MPLS label bindings for transport LSPs across the entire MPLS internetwork while at the same time preventing the flooding of unnecessary routing and label binding information into domains or parts of the network that do not need them.
- c) Segment routing (SR-MPLS TE/SRv6) support with demonstrated capability for interaction with LDP, RSVP and MPLS.
- d) Network should support the Seamless MPLS architecture (<https://tools.ietf.org/html/draft-ietf-mpls-seamless-mpls-07>)
- e) L3VPNs (IPv4 & IPv6)
- f) L2VPNs (P2P, VPLS, BGP-EVPN)
- g) Multicast support
- h) Data rates supported (1G, 10G, 40G, 100G)
- i) IP Network synchronization protocols support: Sync-E & PTP (8265 or 1588v2)

5.1.3. GPON Infrastructure (xPON Open Networking)

A key goal of Safaricom's envisioned strategy for FTTx is to be able to decouple xPON solution hardware and software roadmaps, in compliance with open networking initiatives thereby leading to more flexibility and open market opportunities with lower total cost of ownership. Safaricom would also like to benefit from the operational efficiencies that can be derived from SDN-capable OLTs.

The supplier shall provide information in relation to the requirements below on disaggregated OLT hardware and software. These are the key features & functionality that the OLT equipment needs to support.

- a) Compliance with leading open networking initiatives such as Virtual OLT Hardware Abstraction (VOLTHA), SDN Enabled Broadband Access (SEBA), R-CORD etc.
- b) Must have SDN & NFV capabilities.

- c) Standards compliance:
 - i. Must be compliant with ITU GPON, XGSPON and ONU Management & Control interface-related specifications.
 - ii. Should be compliant with IEEE Ethernet-related specifications and Metro Ethernet Forum specifications.
 - iii. Should be compliant with IETF IGMP & DHCP related standards.
- d) Interoperability: The OLT should be interoperable and certified to work with leading ONU vendors.
- e) Scalability. The OLT hardware must be highly flexible, modular, scalable and have a non-blocking architecture.
- f) OLT Hardware
 - i. Should support different form-factors with different port densities.
 - ii. Should support up to 1:256 split ratio on a PON.
 - iii. Chassis-based hardware should have the possibility to mix GPON, XGSPON, and NGPON2 in the same chassis.
 - iv. Should offer a smooth migration path from GPON to XGSPON to NGPON2 without the need for a complete forklift upgrade or rip and replace approach of the entire chassis.
 - v. Must support OLT software from multiple vendors.
 - vi. Data rates supported on uplinks (1G, 10G, 40G, 100G)
- g) OLT Software Must be supported on multiple Whitebox OLT hardware types from different OEMs.
- h) Security. Should provide security mitigations including: DDOS attack protection, anti-ICMP/IP attack, MAC & IP address anti-spoofing.
- i) Support for both IPv4 & IPv6

5.2. Generic requirements (All Domains)

The supplier shall provide information in relation to the requirements below applicable to all the domains.

- a) Software and hardware must be decoupled. Supplier should provide information on Hardware / software solutions compatibility with other supplier's hardware / software.
- b) Supplier should provide information on industry organization that they are a part of and those that have validated their solutions (e.g. OCP Open Compute Project, Linux Foundation, Open Networking Foundation, Telecom Infra Project)
- c) Software Defined Networks: the hardware and software platform should be SDN ready (RFC7426)
- d) Network QoS mechanisms supported

e) OSS & Management

- i. Network management using an upstream element management system which must provide fault, configuration, accounting, performance and security management.
- ii. Support for SNMPv3
- iii. Support for standard northbound open interfaces for integration with third party OSS/BSS systems via NETCONF/YANG, RESTCONF, documented REST APIs etc.
- iv. Configuration management using common tools e.g. Ansible/Chef/Puppet configuration templates.
- v. Network API inclusion on both hardware and software
- vi. Network programmability using common scripting languages e.g. Python
- vii. Network telemetry support aside from SNMP capability.

f) Environment & Power considerations

- i. Compliant with IEC and ETS and other environmental, power, acoustic and safety standards.

g) Services

- i. Professional services. Supplier to show case the services offered to enable the customer design and build disaggregated networks
- ii. Support frameworks and services Supplier to provide information on support frameworks that they use to ensure delivery of support services as per SLA.
- iii. Training & skills development. Supplier to showcase the programs available for upskilling of the teams that are required to design, build and support disaggregated networks.

6. ADDITIONAL INFORMATION

Interested firms must provide information to show their suitability for the high-level requirements

	Requirement	Comments & Attachments
1	Overall Company profile (if a company), clearly indicate the principal place of business.	
2	Provide case studies / customer references of deployments done within the last 3 years.	
3	For cases where the OEM is working through partners, provide details of this and the capabilities of the partners.	
4	Where a hardware provider is giving an E2E managed solution that includes software or vice versa, provide details of this partnership arrangement.	

7. NEXT STEPS

- a) Review of submitted responses
- b) Prequalification of shortlisted suppliers. Institutions that express interest to participate in the provision of the above-mentioned service, and meet our requirements, shall be prequalified for the provision of this networks in their area / domain(s) of expertise, subject to the provision of required documentation and demonstrated ability.

8. RESPONSES

All responses should be provided in electronic format only i.e. emailed to SNdubi@safaricom.co.ke , JKiremama@Safaricom.co.ke and lgachuhi@Safaricom.co.ke

9. NOTES TO SUPPLIERS:

- a) Only the suppliers who meet our minimum requirements will be considered for further discussions.
- b) Build a detailed response showcasing what firm's capacity and experience in offering disaggregated networks solutions in the fields described in this RFI document.
- c) Outline any industry best practices and trends that your organization may consider relevant for Safaricom's considerations.
- d) The RFI response must not include any pricing/commercial proposal.
- e) Safaricom reserves, at its sole discretion, the right to select or reject, either in totality or partially, any or all proposals made in the context of this RFI. Any such decisions made will be final and no correspondence will be engaged into, other than to informing the bidders of the outcome of the process.

- f) The receipt of a response shall not bind Safaricom into any contractual agreements with the bidder. Such arrangements shall only come into place once an award is issued and the bidder is successful as evaluated technically and commercially. Any costs associated with the preparation and submission of the response to the RFI shall be borne by the vendor.
- g) Safaricom and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the documents and information submitted in connection with this RFI.
- h) All responses should be provided in standard file formats i.e. PPTs, XLSs, DOC(X), PDF
- i) Suppliers who wish to provide bulk documents using share drives MUST use OneDrive. Documents submitted using public share drives will not be accepted.
- j) Any costs associated with the preparation and submission of the response to the RFI shall be borne by the vendor.
- k) State if you submit this RFI as a joint venture/consortium or any other joint format

Yours faithfully,

FOR: SAFARICOM PLC

Lydia Gachuhi

Senior Manager – Purchasing