



**MINISTRY OF FINANCE
MALE'
REPUBLIC OF MALDIVES**

Introduction

This document consists of 2 parts; part 1 defines the Technical Requirement for enhancing and upgrading of Network Infrastructure to the Maldives National Defence Force (MNDF). Part 2 defines Technical Requirement for the provision of Internet Service to the Maldives National Defence Force (MNDF). The Service Provider must meet the following Technical Requirements by MNDF SIGNALS.

This RFP is divided into 2 Parts/lots. Bidders may propose any one Part/lot (i.e., Partial bids) or 2 parts/lots together; however, each proposed part must entirely match the defined requirements. The Parts/lots are described as follows:

- a. Part/Lot 1: WAN Infrastructure Equipment's and Lease Lines (3 years)**
- b. Part/Lot 2: Internet Service (1 year)**

Bidders should provide technical details and prices separately for each Part/Lot.

1. PART 1 – WAN INFRASTRUCTURE

This part includes the requirement for the equipment's (SD-WAN Router) and the requirement for the point to point connection (Leased Lines). Details for the sites and the network overlay diagrams will be provided. Four different networks will be utilized, out of the 4 networks 3 networks will be used through SD-WAN Router using distinct VPN's (VPN 1, VPN 2 and VPN 3). And the fourth network is required separately. Service providers should provide two VLAN's. VLAN 1 will be utilized for the SD-WAN Router and the VLAN 2 will be used to send the Network 4. Following diagrams shows the details for the Network 1, Network 2, Network 3 and Network 4.

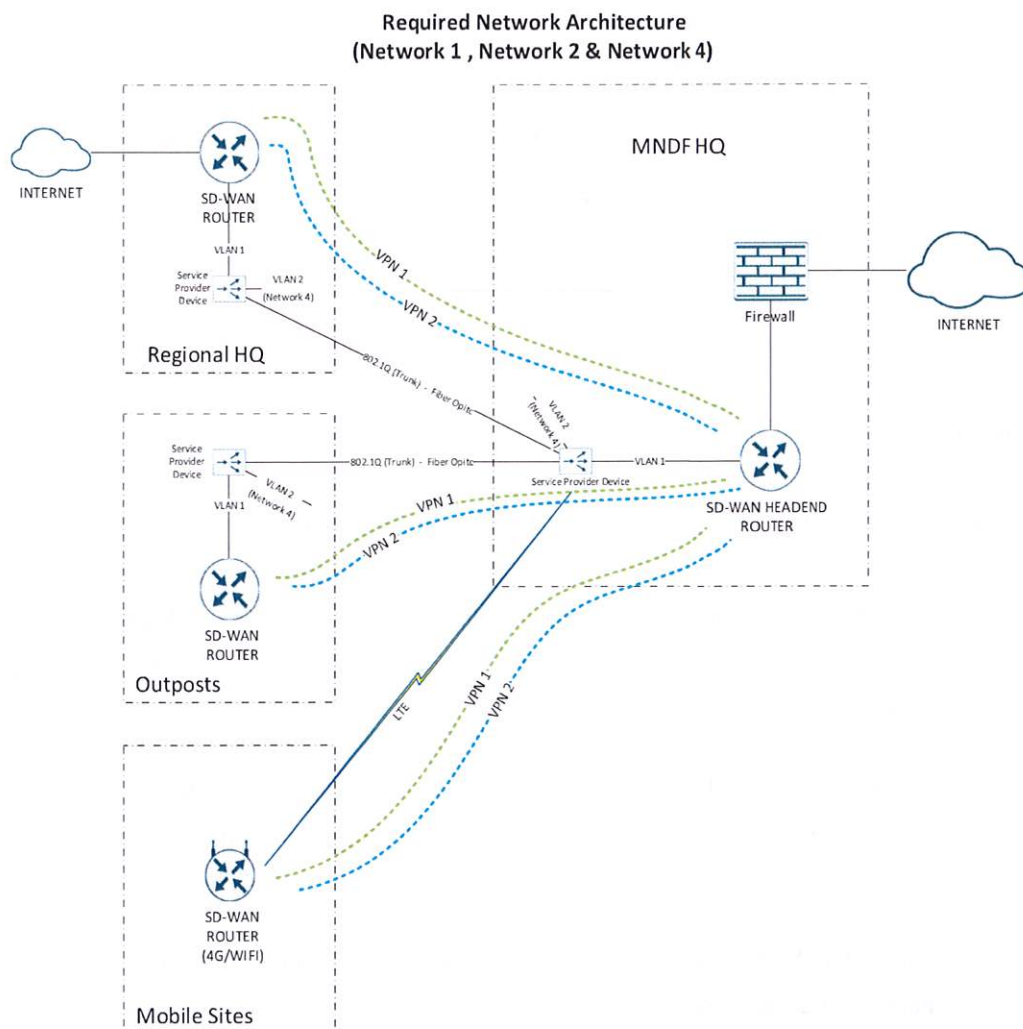


Figure 1

Figure 1 shows the required network architecture of Maldives National Defence Force.

1.1. Infrastructure Requirement – (Figure 1)

1. Figure 1 - Diagram shows two different networks sent through VPN 1 and VPN 2
2. Leased Line Service should be provided for Regional HQ's, Outposts and Mobile Sites.
3. If Regional HQ's internet service goes down, they should be able to get internet through MNDF HQ using VPN 2 Network
4. For VPN 1 and VPN 2 Network connectivity, Leased line should be used for the primary connection.
5. If Regional HQ's leased line service goes down, they should be able to get the Network service (VPN Tunnels should be connected using the internet service)
6. Provided leased lines should be 802.1Q trunks
7. Initially two different VLANS will be used.
8. VLAN 1 is used for the SD-WAN Routers
9. VLAN 2 (Network 4) should be created and accessible from MNDF HQ, Regional HQ's and Outposts (Layer 2 Network)
10. Regional HQ's, Outposts and Mobile Sites should have the ability to manage the bandwidth and captive portal should be provided. (for authentication and accounting MNDF HQ's Server will be utilized)
11. Captive portal should be configured for the VPN 2 Network (users should be fetched using LDAP)
12. NGFW Service is required for the sites with internet.
13. NGFW License and SD-WAN License should be provided for the HQ's
14. SD-WAN Licenses should be provided for the outposts and Mobile Sites
15. Wireless Leased line connectivity should be provided for the Mobile Sites.
16. Provider should configure the equipment's according to the MNDF Requirement and training should be provided for the MNDF appointed staffs.

Required Network Architecture (Network 3)

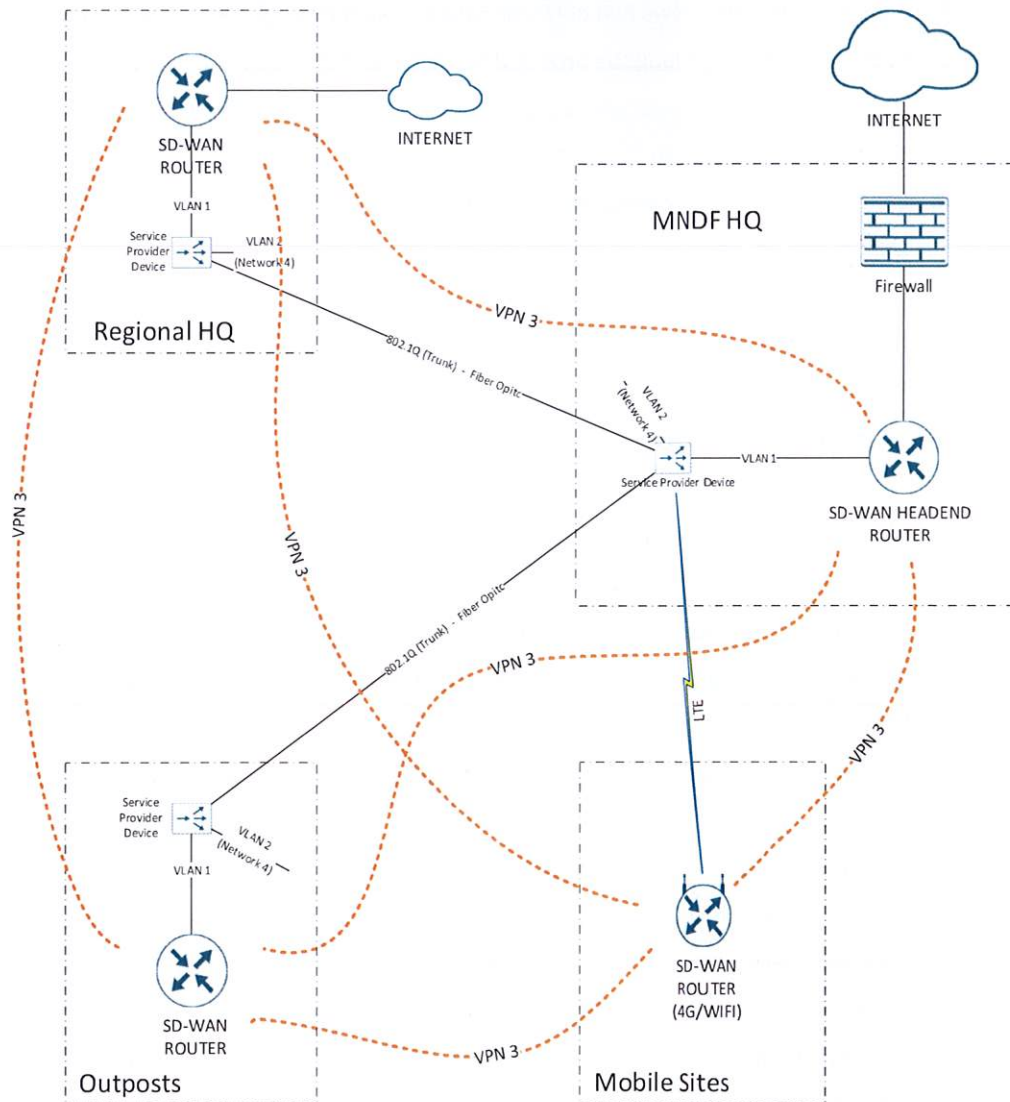


Figure 2

1.2. Infrastructure Requirement (Figure 2)

1. Figure 2 – Diagram shows VPN 3 Mesh Network (separate from VPN 1 Network and VPN2 Network)
2. All the sites must be connected to every other site
3. Multicast traffic should be able to flow to all the sites.
4. Leased line and internet failover should be configured for VPN 3
5. Leased Line should be the primary link for the VPN 3

1.3. Bandwidth requirements

The below table explains the bandwidth requirement between sites to site illustrated in *Table 1*

Table 1

#	Site	Network	Bandwidth	Service Type / Medium	Internet Access	Equipment
1	MNDF Uligam Post	Network 1	4 Mbps /	Leased Line	No	SD-WAN
		Network 2	Unlimited	Service / Fiber	Via HQ	Router
		Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
2	Hdh. Makunudhoo Radar Station	Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
3	MNDF Hanimaadhoo Post	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
4	Hanimaadhoo Ooredoo Tower (Mobile Site - Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
5	MNDF Kulhudhufushi Post	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
6	Kulhudhufushi Ooredoo Tower (Mobile Site - Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
7	Ga. Villingili Radar Station	Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
8	MNDF NA HQ, LH. Maafilaafushi	Network 1	6 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Locally	Router
9	LH Hinnavaru Ooredoo Tower (Mobile Site - Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or	No	SD-WAN Router

				Fiber		
10	K. Kaashidhoo Radar Station	Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
11	MNDF Maamigili Post	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
		Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
12	MNDF CA HQ – L. Kahdhoo	Network 1	6 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Locally	Router
		Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
13	L. Gan Ooredoo Tower (Mobile Site – Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
14	M. Mulee Radar Station	Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
15	MNDF Kudahuvadhoo Post	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
16	Kudahuvadhoo Ooredoo Tower (Mobile Site – Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
17	MNDF Gdh. Kaadehdhoo Post	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
18	Kaadehdhoo Ooredoo Tower (Mobile Site – Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
19	Gdh. Thinadhoo Fire Station	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router

20	MNDF Fuvahmulah Post	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
		Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
21	S.Hithadhoo Fire Station	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
22	MNDF SA HQ – S GAN	Network 1	8 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Locally	Router
		Network 4	2 Mbps / Unlimited	Leased Line Service / Fiber	No	Service Provider Device
23	S. Maradhoo Ooredoo Tower (Mobile Site – Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
24	Lh. Naifaru Fire Station	Network 1	4 Mbps	Leased Line	No	SD-WAN
		Network 2		Service / Fiber	Via HQ	Router
25	Hulhumale Ooredoo Tower (Mobile Site – Type 1)	Network 3	1Mbps / 10GB	Leased Line Service / Cellular or Fiber	No	SD-WAN Router
26	Mobile Sites – Type 2 QTY 10	Network 1	8 Mbps /	Leased Line	No	SD-WAN
		Network 2	Unlimited	Service / Cellular	Via HQ	Router
27	Mobile Sites – Type 1 QTY 05	Network 3	1Mbps / 10GB	Leased Line Service / Cellular	No	SD-WAN Router

1.4. Network equipment requirements

Table 2

#	Name	Qty	Location	Minimum Requirement	Remarks
1	SD-WAN Router	1	MNDF HQ Male'	NGFW Throughput: 1.6 Gbps	NGFW Feature and License Required. And, SD-WAN License
				Threat Protection Throughput: 1 Gbps	
				Firewall Throughput: 20 Gbps	
				GE RJ45 Ports: 12 (2 x WAN) and GE SFP Slots: 4	
				Internal Storage Required	
2	SD-WAN Router	3	MNDF HQ's	NGFW Throughput: 1 Gbps	NGFW Feature and License Required. And, SD-WAN License
				Threat Protection Throughput: 900 Mbps	
				Firewall Throughput: 10 Gbps	
				GE RJ45 Ports: 6 (2 x WAN) and GE SFP Slots: 2	
				Internal Storage Required	
3	SD-WAN Router	15	MNDF Outposts / Radar Stations / Fire Stations	NGFW Throughput: 250 Mbps	SD-WAN License Required
				Threat Protection Throughput: 200 Mbps	
				Firewall Throughput: 3 Gbps	
				GE RJ45 Ports: 6 (2 x WAN)	
				Single Radio (2.4GHz/5GHz), 802.11 a/b/g/n/ac	
				Internal Storage Required	
4	SD-WAN Router (Industrial Grade)	23	Mobile Sites Type 1 & Type 2	NGFW Throughput: 550 Mbps	SD-WAN License Required
				Threat Protection Throughput: 500 Mbps	
				Firewall Throughput: 6 Gbps	
				GE RJ45 Ports: 4 (2 x WAN) and GE SFP Slots: 2	
				Integrated 4G Modem	
				Single Radio (2.4GHz/5GHz), 802.11 a/b/g/n/ac ¹	
5	SD-WAN	10	Additional	NGFW Throughput: 250 Mbps	5 Device with
				Threat Protection Throughput:	

Router	Requirement	200 Mbps	NGFW Feature and License & 5 Device with SD-WAN License Required
		Firewall Throughput: 3 Gbps	
		GE RJ45 Ports: 6 (2 x WAN)	
		Single Radio (2.4GHz/5GHz),	
		802.11 a/b/g/n/ac	

Note: 1. For the Industrial Grade SD-WAN Router if inbuilt Wi-Fi is not available, separate Wi-Fi AP can be provided with the device. (Should be Compatible with the Device)

1.5. Technical requirements (Network Infrastructure)

1. Fiber Optic Cable should be used as last mile connectivity for the fixed locations (Not the Mobile Sites)
2. Links must be provided and met bandwidth requirement table (*Table 1*) accordingly.
3. Links must be in Layer 2 including links in the Mobile CPEs.
4. The service provider device must support VLAN trunk protocol (VTP 802.1 Q).
5. A backup link (redundant link and equipment's) must be provided and should be instantly activated on primary link failure. (MNDF HQ Male' Site Only)
6. Service provider must provide and setup the equipment mentioned above table (*Table 2*).
7. All the SD-WAN Routers should be registered under MNDF Ownership (for support and firmware downloading)
8. Technical focal point should be identified by the service provider to provide prompt technical assistance to MNDF when required.
9. Technical focal point should be identified by MNDF to provide prompt technical faults and keep in contact at times required to the Service Provider.
10. MNDF SIGNALS **must** be informed of any Major Technical works that is scheduled to be carried out OR any major Technical Faults occurred by the service provider which might lead to any Service Interruptions and **must** be informed as soon the work finished or fault is fixed and service(s) back running.
11. Installation, Support, Subscription, Training & Maintenance
 - a. Initial Installation & Configuration.
 - b. Three (3) year On-Site Support.
 - c. Implementation should be done by Certified Engineers.
12. SD-WAN Router should be provided for the MNDF HQ and the following requirements should be met
 - a. On-premise Centralized Management
 - b. Centralized provisioning and simplifies changes
 - c. Provides real time alerting and monitoring
 - d. Tunnel bandwidth aggregation

- e. VPN Segmentation
 - i. VPNs are isolated from each other
 - f. Application Awareness and Automated Path Intelligence
 - g. WAN path remediation
 - i. Forward Error Correction (FEC)
 - h. Secure Direct Internet Access
 - i. Automatic failover capabilities
 - i. Switching Between Best WAN Path
 - ii. Switch When Primary WAN is down
 - j. NGFW Security and Compliance
 - i. SSL/TLS inspection and threat protection
 - ii. Web filtering service
 - iii. Complete threat protection
 - iv. Highly scalable overlay VPN tunnels
 - k. Solution should provide transport independence and should allow to use any transport like MPLS, Internet, 3G/4G, Point to Point link
13. All the required licenses should be provided
14. The Proposed SD-WAN solution should be in the form of Hardware Appliance and must be Rack Mountable (Except Mobile Site Devices Mentioned in Table 2)
15. Proposed vendor must be placed in Leader/Challenger Quadrant in Gartner SD-WAN and NSS recommended vendor
16. The vendor must have back to back support from OEM through warranty and maintenance support period.

PART 2 – INTERNET SERVICE

This part of this RFP provides the technical requirement for the Internet service and its bandwidth to the Maldives National Defence Force. The Service Provider must meet the following Technical Requirements by MNDF SIGNALS.

2.1. Bandwidth Requirement (Internet Service)

#	Site	Speed	Fair Usage	Details
1	MNDF HQ Male'	40Mbps	Unlimited	Corporate Dedicated Internet Connection
2	MNDF NA HQ, LH. Maafilaafushi	10Mbps	Unlimited	Business shared Internet Connection
3	MNDF CA HQ – L. Kahdhoo	10Mbps	Unlimited	Business shared Internet Connection
4	MNDF SA HQ – S GAN	10Mbps	Unlimited	Business shared Internet Connection

2.2. Technical requirements (Internet Service)

2.2.1. General Requirements

1. Technical focal point should be identified by the service provider to provide prompt technical assistance to MNDF when required.
2. Technical focal point should be identified by MNDF to provide prompt technical faults and keep in contact at times required to the Service Provider.
3. MNDF SIGNALS **must** be informed of any Major Technical works that is scheduled to be carried out OR any major Technical Faults occurred by the service provider which might lead to any Service Interruptions and **must** be informed as soon the work finished or fault is fixed and service(s) back running.
4. Inbound and outbound communications **SHOULD NOT BE** logged on service provider's servers or any other equipment's for any reason.
5. Setup system(s) for Monitoring, logging Internet Service status and logging Service outage incidents.

2.2.2. MNDF HQ Male' Internet Requirement

1. Service should be provided 24/7 and the bandwidth provided to MNDF HQ must always be dedicated 40Mbps download and 40Mbps upload (symmetrical connection).
2. The bandwidth must not be shared with any other party (Distribution ratio must be 1:1)
3. Internet service provided to MNDF must be via a dedicated link with direct access to Internet (raw Internet) without a proxy or any other filtering mechanism.
4. Minimum 12 public IPs must be provided to MNDF HQ.
5. Service provider could choose to provide Internet via direct fiber optic link, or satellite link, by wireless or leased line.
6. A backup link (redundant link and equipment's) must be provided and should be instantly activated on primary link failure.

2.2.3. MNDF Regional HQ's Internet Requirement

1. Service should be provided 24/7 and the bandwidth provided to MNDF Regional HQ's must always be 10Mbps download and 10Mbps upload.
2. The bandwidth Distribution ratio must be 1:4