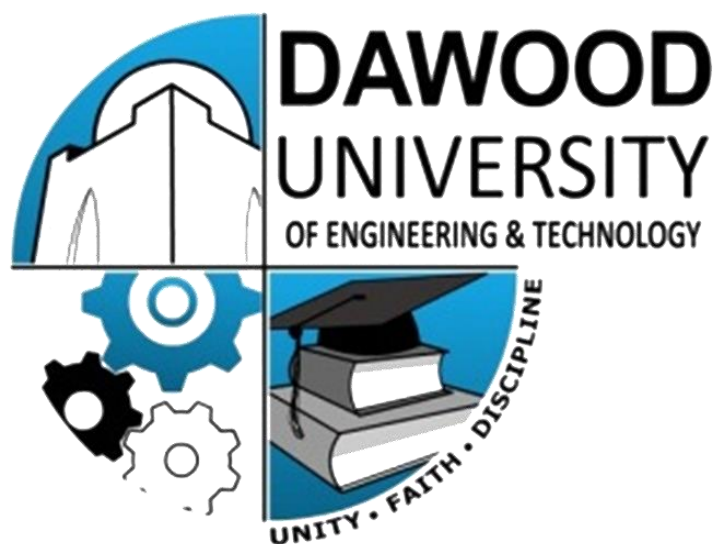


# **SCHEDULE OF REQUIREMENTS**

## **(ICT Infrastructure Upgrade)**

### **Part-1**

Dawood University of  
Engineering and Technology (DUET)



S #	Item Description	Specification	Quantity	Unit Price (Incl. Tax)	Total Price (Incl. Tax)	Delivery
1	Network Management System	<ul style="list-style-type: none"> <li>- Unified Network Management System supporting multi-vendor devices including but not limited to Cisco, HP, Juniper, supporting deployment on both Linux and Windows and supporting different databases including MySQL, MS SQL and Oracle. Capable to support two-node cluster for reliability and resiliency. NMS must support the following features: <ul style="list-style-type: none"> <li>✓ Topology management</li> <li>✓ Fault management</li> <li>✓ Performance management</li> <li>✓ Unified resource management including firewall, router, switches and WLAN controller and APs and server and storage</li> <li>✓ WLAN management including monitoring and fault diagnosis through smart phones.</li> <li>✓ Configuration management</li> <li>✓ Device software management</li> <li>✓ Network quality monitoring</li> <li>✓ Network traffic analysis</li> <li>✓ Security policy management including firewall manager and policy analyzer function</li> <li>✓ Report management function including traditional and business reporting function</li> </ul> </li> <li>- NMS must include 60 node licenses for</li> </ul>	1			45 Days

		<p>routers, switches, WLAN controller and firewall manager licenses for 3 nodes, 150 wireless AP licenses and 3 node rack mount servers' licenses.</p> <ul style="list-style-type: none"> <li>- NMS must include complete hardware and OS and database software licenses</li> <li>- NMS must include 3-year warranty and support services and software updates</li> </ul>				
2	Virtualization Platform	<ul style="list-style-type: none"> <li>- VMware Enterprise (or equivalent) for 4-CPU/20-cores including warranty support and services and software updates for 3 years</li> </ul>	1			45 Days
3	Rack Mount Server (HP/Dell/Lenovo or equivalent)	<ul style="list-style-type: none"> <li>- 2 x Intel® Xeon® Processors E5-2630 v4 or higher, RAM: 96GB (6 x 16GB DDR4-2400MHz), HDD: 2.5-inch 2x300G 10K RPM 12G SAS and 2.5-inch 6x900GB 10K RPM 12G SAS. Server must be equipped with 25 disk drive bays for local storage expansion, Dedicated Raid Controller Smart Array with 1G cache and super capacitance/battery backup supporting Raid 0/1/5/6/10/50/60, 2x10G SFP+ LOM with 2x10G LR SPF, 2xPCIe I/O slots, 2 x Hot Plug Platinum redundant 750W (at-least) Power Supply and fan modules and guide rail with cable management arm.</li> <li>- The proposed server must be equipped with all relevant management software and licenses and accessories without any additional cost.</li> <li>- The proposed server hardware must have 3 Years NBD warranty and support services</li> </ul>	2			45 Days
4	Next Generation	<b><u>General Specification</u></b>	2			45 Days

	<p>Firewall (Cisco or Palo Alto or equivalent)</p> <ul style="list-style-type: none"> <li>- The firewall must be able to mount in 19" Rack. Required rack-mount rail kit must be included.</li> <li>- Interface requirement: 8x100/1000BASE-T, 4x100/1000BASE-X ports, 1x USB 2.0 port</li> <li>- 4x1G single mode (10KM) SFP to be included</li> <li>- I/O expansion: 2 spare slots</li> <li>- Local storage: 300GB SAS disk or better</li> </ul> <p><b><u>Performance Requirement</u></b></p> <ul style="list-style-type: none"> <li>- Firewall throughput: 4G</li> <li>- IPS throughput: 2G</li> <li>- AV Throughput: 2G</li> <li>- URL filtering throughput: 1G</li> <li>- IPSec VPN throughput: 3G</li> <li>- Firewall policies: 15K or more</li> <li>- Concurrent sessions: 3.5M</li> <li>- New sessions per second: 60K</li> <li>- Virtual firewall: up to 50 (5VF license to be included in BOQ)</li> </ul> <p><b><u>VPN Support</u></b></p> <ul style="list-style-type: none"> <li>- P2P and P2MP IPSec VPNs</li> <li>- Remote access VPN</li> <li>- L2TP VPN</li> <li>- SSL VPN including SSL proxy/inspection</li> </ul>				
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		<p><b><u>L2/L3, QoS and Security Protocol Support</u></b></p> <ul style="list-style-type: none"> <li>- LACP</li> <li>- LLDP</li> <li>- DHCP server, relay and snooping</li> <li>- VRF-lite</li> <li>- GRE and Multi-point GRE support</li> <li>- IPv4 and IPv6 static and dynamic routing protocol supporting including RIP, OSPF, ISIS and BGP</li> <li>- IPv4 and IPv6 multicast routing protocol including PIM-SM and PIM-SSM</li> <li>- The firewall must support flexible flow classification (ACL, DSCP, IPv6 Traffic Class, 802.1p and a combination of these).</li> <li>- The firewall must support AAA including 802.1X, RADIUS and TACACS+.</li> <li>- The firewall must support DDoS attack protection including ICMP, TCP SYN and UDP flood attacks.</li> <li>- The firewall must support L2 and L3 (IPv4 and IPv6) ACLs including basic, enhanced and named ACL types.</li> <li>- The firewall must also support NAT, Policy based NAT and NAT64.</li> <li>- The firewall must support unicast, broadcast and multicast storm control.</li> <li>- The firewall must support NetFlow or sFlow or equivalent.</li> </ul> <p><b><u>Intrusion Prevention Support</u></b></p>				
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		<ul style="list-style-type: none"> <li>- The IPS engine must be able to provide over 5000+ signatures for attack identification.</li> <li>- The IPS engine must provide protocol identification to defend against abnormal protocol behaviors and should be able to take actions like: <ul style="list-style-type: none"> <li>✓ Detail Attack Logging</li> <li>✓ Full Packet - Flow dumping with payload for later forensic analysis</li> <li>✓ Generate NMS/SNMP traps</li> <li>✓ Send Emails or other notifications to concerned members</li> <li>✓ PERMIT/DROP packet/session</li> </ul> </li> <li>- The firewall must also support user-defined IPS signatures.</li> </ul> <p><b><u>Email Security, Application Visibility and Context Awareness</u></b></p> <ul style="list-style-type: none"> <li>- The firewall must support real time anti-spam to detect and filter out phishing emails.</li> <li>- The firewall must support white-list black-list, content filtering, keyword filtering and attachment filtering by type, size and quantity.</li> <li>- The firewall must support Virus scanning and notification for POP3, SMTP and IMAP email attachments.</li> <li>- The firewall must have application awareness with identification of 6000+ application and 5M viruses, Trojans and malware.</li> <li>- The firewall must provide identity based firewall services including local,</li> </ul>				
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		<p>RADIUS, TACACS, SecureID, Active Directory, LDAP and Certificate Authority.</p> <ul style="list-style-type: none"> <li>- The firewall must support URL filtering with URL category database of over 84+Million URLs in over 120+ categories.</li> <li>- The firewall must support defense against web application attacks such as cross site scripting and SQL injection attacks.</li> <li>- The firewall must also support HTTP/HTTPS/FTP based content awareness to defend against web viruses.</li> <li>- The firewall must support URL black and white list and keyword filtering.</li> <li>- The firewall must also support file reassembly, data filtering and blocking for over 25+ file formats.</li> <li>-</li> </ul> <p><b><u>Operations and Maintenance</u></b></p> <ul style="list-style-type: none"> <li>- The firewall must support NetFlow or sFlow or equivalent.</li> <li>- The firewall must provide visualized and multi-dimensional report display by user, application, content, time, traffic, threat, and URL.</li> <li>- The firewall must support object consolidation including address and services.</li> <li>- The firewall must support SNMP v1, v2c and v3. The supplier must detail all supported MIBs.</li> </ul>				
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		<ul style="list-style-type: none"><li>- The switch must support SYSLOG.</li><li>- The firewall must support management via CLI, Telnet, SSHv2 and HTTP/HTTPS.</li><li>- The firewall must be able to synchronize its clock via NTP v1/2/3.</li><li>- The firewall must support IP SLA or equivalent feature.</li></ul> <p><b><u>Logging and Reporting</u></b></p> <ul style="list-style-type: none"><li>- The firewall should have a reporting management system capable of generating reports on a manual, ad-hoc or schedule (hourly, daily, weekly, and monthly, etc.) basis without the need of any additional software subscription/licenses or hardware components.</li><li>- The firewall should be able to generate reports on individual user ID with (but not limited to) the following activities, Application Usage, accessed websites &amp; URL Categories, without the need for additional software subscription/licenses or hardware components</li><li>- The firewall must have feature to log exports using SCP or TFTP or FTP protocol</li><li>- The firewall must be able to produce the following reports (without the need for additional software subscription/licenses or hardware components):</li></ul> <ul style="list-style-type: none"><li>✓ Application Usage – Bytes and Sessions</li><li>✓ Threat Trends</li></ul>				
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		<ul style="list-style-type: none"> <li>✓ Correlated Reports – Application/Threats/URL</li> <li>✓ Individual user usage report – Application/Session/Time/URL</li> <li>✓ Botnet /Malware Detected Report</li> </ul> <p><b><u>Warranty and Security Subscriptions:</u></b></p> <ul style="list-style-type: none"> <li>- The proposed hardware must include three-year comprehensive warranty, support services and 9x5 next business day replacement</li> <li>- The firewall must be equipped with full Next Generation UTM feature licenses including Firewall, DPI, Content Filtering, IPS, AV and URL Filtering for three years</li> </ul>				
5	Layer-2 PoE+ Access Switch (Cisco or equivalent)	<p><b><u>General Requirement</u></b></p> <ul style="list-style-type: none"> <li>- The switch must be able to mount in 19" Rack. Required rack-mount kit must be included.</li> <li>- Switching capacity: 170Gbps</li> <li>- Packet forwarding performance: 50Mpps</li> <li>- Interface requirement: 24 x 10/100/1000BASE-T and 2x100/100BASE-X ports and 2x1G Combo ports</li> <li>- 1 x RJ45 Serial (console port)</li> <li>- Two 1G LR (10KM) SFP Gigabit should be included with each switch.</li> <li>- Switch must support stacking function and must include complete stacking accessories and/or licenses.</li> <li>- The switch must include Full layer-2 and basic layer-3 routing, FEX/Instant</li> </ul>	22			45 Days

		<p>Access leaf node and advance QoS feature license</p> <p><b><u>Fabric Virtualization</u></b></p> <ul style="list-style-type: none"> <li>- Supports Instant Access/FEX leaf or equivalent for network fabric virtualization and to ease network management functions</li> </ul> <p><b><u>L2 Protocol Support</u></b></p> <ul style="list-style-type: none"> <li>- Switch must support up to 16K MAC address table entries.</li> <li>- Supports IEEE 802.1Q (4K VLANs simultaneously or higher)</li> <li>- Support voice and data VLAN</li> <li>- Supports LLDP and LLDP-MED standard</li> <li>- DHCP server, relay, client and snooping</li> <li>- LACP standard for Link aggregation</li> <li>- GARP/GVRP standard support</li> <li>- Private VLAN or equivalent support</li> <li>- UDLD or equivalent</li> <li>- Flex Link or equivalent support</li> <li>- IEEE 802.3az standard support</li> <li>- IEEE 802.1w Rapid Convergence Spanning Tree Protocol</li> <li>- IEEE 802.1D Spanning Tree Protocol (STP) and RSTP</li> <li>- IEEE 802.1s Multiple Spanning Tree</li> <li>- IEEE EFM OAM (802.3ah) and CFM</li> </ul>				
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		<p>OAM (802.1ag)</p> <ul style="list-style-type: none"> <li>- Supports ITU-T G.8032 (ERPS) standard or equivalent</li> <li>- Port mirroring</li> <li>- IGMP v1/2/3 snooping and proxy and IGMP fast leave</li> <li>- MLD v1/2 snooping</li> <li>- Multicast VLANs</li> </ul> <p><b><u>L3 and QoS Protocol Support:</u></b></p> <ul style="list-style-type: none"> <li>- Supports RIP and OSPF routing protocol for L3 routing access</li> <li>- Supports 8 QoS queues</li> <li>- The switch must support flexible flow classification (ACL, DSCP, IPv6 Traffic Class, 802.1p and a combination of these)</li> <li>- Support WRR, DRR, PQ, WRR+PQ, and DRR+PQ queue scheduling algorithms</li> </ul> <p><b><u>Security and Management Features</u></b></p> <ul style="list-style-type: none"> <li>- Supports L2 and L3 ACLs (IPv4 and IPv6)</li> <li>- Support CPU control plane protection techniques</li> <li>- Supports AAA, 802.1X, RADIUS and TACACS</li> <li>- Supports sFlow or NetFlow or equivalent</li> <li>- Support NTP v1/2/3</li> <li>- SNMP v1, v2c, and v3</li> <li>- Supports Syslog, CLI, Telnet, SSHv2,</li> </ul>				
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		<p>HTTP, HTTPS</p> <p><b><u>Warranty and Support Services</u></b></p> <ul style="list-style-type: none"> <li>- The proposed hardware must include three year comprehensive warranty, support services and 9x5 next business day replacement</li> </ul>				
6	Layer-3 Modular Core Switch (Cisco or equivalent)	<p><b><u>General Requirement</u></b></p> <ul style="list-style-type: none"> <li>- The switch must be able to mount in 19" Rack. Required rack-mount kit or rail kit must be included.</li> <li>- Interface requirement: <ul style="list-style-type: none"> <li>✓ QTY=2 x 24-port 10GE SPF+ module with 4x10G LR, 70 x 1G LR optical transceivers</li> <li>✓ QTY=2 x 8-port 1GE SPF module with 4 x 1G GLC-T transceivers</li> </ul> </li> <li>- Switch must be equipped with redundant supervisor engines</li> <li>- Switch must support VSS or Clustering or equivalent function</li> <li>✓ Switch must be equipped completed hardware and software accessories required to do VSS/Clustering</li> <li>✓ VSS/Cluster interface requirement should be met exclusively, not from the base interface requirement</li> <li>- The switch must support Multi Chassis LAG (MC-LAG) with dual active control plane</li> <li>- Switch must be equipped with Redundant Fan modules and N+1 Power supplies</li> <li>- The switch should be capable to support VAS module including Next</li> </ul>	1			45 Days

		<p>Generation Firewall, IPS and WLAN Controller</p> <ul style="list-style-type: none"> <li>- The switch must include Full layer-2 and layer-3 routing, FEX/Instant Access (or equivalent) and advance QoS feature license</li> </ul> <p><b><u>Performance Specifications</u></b></p> <ul style="list-style-type: none"> <li>- Switch must be able to scale up to 3.4Tbps or higher</li> <li>- Forwarding performance: 2500Mpps or better</li> <li>- Per Slot switching capacity must be scalable up to 320Gbps or more</li> <li>- DRAM 4GB or higher</li> <li>- Compact flash 2GB or higher</li> <li>- 1 x USB port</li> <li>- 1 x OOB Ethernet port</li> <li>- Jumbo frame 10000 bytes or higher</li> </ul> <p><b><u>Fabric Virtualization</u></b></p> <ul style="list-style-type: none"> <li>- Supports Instant Access/FEX parent function or equivalent for network fabric virtualization and to ease network management functions</li> </ul> <p><b><u>WLC VAS Function</u></b></p> <ul style="list-style-type: none"> <li>- The switch must be equipped with WLAN Controller function and support at-least the following features:</li> <li>✓ IEEE 802.11a/b/n and IEEE 802.11ac wave-1 and wave-2 standard</li> <li>✓ 50G wireless services processing, 2K wireless access point and 12K users</li> <li>✓ AP access control, AP domain</li> </ul>				
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		<p>management, and AP configuration template management</p> <ul style="list-style-type: none"> <li>✓ Radio management, unified static configuration, and dynamic centralized management</li> <li>✓ Direct and Tunnel mode forwarding</li> <li>✓ Support L2 and L3 roaming</li> <li>✓ Supports roaming in direct forwarding mode</li> <li>✓ WLAN basic services, QoS, security, and user management</li> <li>✓ Supports WMM QoS function</li> <li>✓ CAPWAP, tag/terminal positioning, and spectrum analysis</li> <li>✓ Hot-spot 2.0 complaint</li> </ul> <p><b><u>L2 Protocol Support</u></b></p> <ul style="list-style-type: none"> <li>- Switch must support up to 256K (or more) MAC address table entries.</li> <li>- Supports IEEE 802.1Q (4K VLANs simultaneously or higher)</li> <li>- Support voice and data VLAN</li> <li>- Supports Port based, and MAC-based VLAN assignment</li> <li>- Supports GARP/GVRP standard</li> <li>- SPAN and RSPAN or equivalent</li> <li>- Supports LLDP and LLDP-MED standard</li> <li>- DHCP server, relay, client and snooping</li> </ul>				
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		<ul style="list-style-type: none"> <li>- LACP standard for Link aggregation</li> <li>- Private VLAN or equivalent support</li> <li>- UDLD or equivalent</li> <li>- Flex Link or equivalent support</li> <li>- IEEE 802.1ad Q-in-Q and Selective Q-in-Q standard support</li> <li>- IEEE 802.3az standard support</li> <li>- IEEE 802.1w Rapid Convergence Spanning Tree Protocol</li> <li>- IEEE 802.1D Spanning Tree Protocol (STP) and RSTP</li> <li>- IEEE 802.1s Multiple Spanning Tree</li> <li>- IEEE EFM OAM (802.3ah) and CFM OAM (802.1ag)</li> <li>- Supports ITU-T G.8032 (ERPS) standard</li> <li>- IGMP v1/2/3 snooping and proxy and IGMP fast leave</li> <li>- MLD v1/2 snooping</li> <li>- Multicast VLANs</li> </ul> <p><b><u>L3 and QoS Protocol Support</u></b></p> <ul style="list-style-type: none"> <li>- Switch must support BFD and IP FRR. BFD must be supported in ASIC</li> <li>- Switch must support IPv4 and IPv6 routing protocols including RIP, OSPF, ISIS, BGP and MP-BGP</li> <li>- Support must support VRRP for IPv4 and IPv6</li> <li>- Switch must support 500K (or more)</li> </ul>				
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		<p>route entries</p> <ul style="list-style-type: none"> <li>- Supports GRE Tunnel</li> <li>- Multicast routing protocol support including PIM-SM, PIM-SSM and MSDP for IPv4 and IPv6</li> <li>- Switch must support Multicast CAC function</li> <li>- The switch must support flexible flow classification (ACL, DSCP, IPv6 Traffic Class, 802.1p and a combination of these)</li> <li>- Supports 8 QoS queues</li> <li>- The switch must support queue scheduling algorithms including PQ, WRR, DRR, PQ+WRR, and PQ+DRR</li> <li>- The switch must support congestion avoidance mechanism including WRED</li> <li>- The switch must support Hierarchical QoS function</li> </ul> <p><b><u>Security and Management Features</u></b></p> <ul style="list-style-type: none"> <li>- Supports L2 and L3 ACLs (IPv4 and IPv6)</li> <li>- Support AAA, 802.1X, RADIUS and TACACS</li> <li>- Support Control Plane Protection techniques</li> <li>- Supports sFlow or NetFlow or equivalent</li> <li>- Support NTP v1/2/3</li> <li>- SNMP v1, v2c, and v3</li> <li>- Supports Syslog, CLI, Telnet, SSHv2,</li> </ul>				
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		<p>HTTP, HTTPS</p> <p><b><u>Warranty and Support Services and Licensing:</u></b></p> <ul style="list-style-type: none"> <li>- The proposed solution must include WLAN Controller function license and Wireless AP licenses as per BOQ</li> <li>- The proposed hardware must include three-year comprehensive warranty, support services, software updates and 9x5 next business day hardware replacement</li> </ul>				
7	Next Generation Firewall (Cisco or equivalent)	<p><b><u>General Specification</u></b></p> <ul style="list-style-type: none"> <li>- The firewall must be able to mount in 19" Rack. Required rack-mount rail kit must be included.</li> <li>- Interface requirement: 4x100/1000BASE-T, 2x100/1000BASE-X ports, 1x USB 2.0 port</li> <li>- I/O expansion: 2 spare slots</li> <li>- Local storage: 300GB SAS disk or better</li> </ul> <p><b><u>Performance Requirement</u></b></p> <ul style="list-style-type: none"> <li>- Firewall throughput: 2G</li> <li>- IPS throughput: 0.9G</li> <li>- AV Throughput: 0.9G</li> <li>- URL filtering throughput: 0.4G</li> <li>- IPSec VPN throughput: 0.8G</li> <li>- Firewall policies: 12K or more</li> <li>- Concurrent sessions: 2Million</li> <li>- New sessions per second: 30K</li> </ul>	1			45 Days

		<p><b><u>VPN Support</u></b></p> <ul style="list-style-type: none"> <li>- P2P and P2MP IPsec VPNs</li> <li>- Remote access VPN</li> <li>- L2TP VPN</li> <li>- SSL VPN including SSL proxy/inspection</li> </ul> <p><b><u>L2/L3, QoS and Security Protocol Support</u></b></p> <ul style="list-style-type: none"> <li>- LACP</li> <li>- LLDP</li> <li>- DHCP server, relay and snooping</li> <li>- VRF-lite</li> <li>- GRE and Multi-point GRE support</li> <li>- IPv4 and IPv6 static and dynamic routing protocol supporting including RIP, OSPF, ISIS and BGP</li> <li>- IPv4 and IPv6 multicast routing protocol including PIM-SM and PIM-SSM</li> <li>- The firewall must support flexible flow classification (ACL, DSCP, IPv6 Traffic Class, 802.1p and a combination of these).</li> <li>- The firewall must support AAA including 802.1X, RADIUS and TACACS+.</li> <li>- The firewall must support DDoS attack protection including ICMP, TCP SYN and UDP flood attacks.</li> <li>- The firewall must support L2 and L3 (IPv4 and IPv6) ACLs including basic, enhanced and named ACL types.</li> <li>- The firewall must also support NAT,</li> </ul>				
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		<p>Policy based NAT and NAT64.</p> <ul style="list-style-type: none"> <li>- The firewall must support unicast, broadcast and multicast storm control.</li> <li>- The firewall must support NetFlow or sFlow or equivalent.</li> </ul> <p><b><u>Intrusion Prevention Support</u></b></p> <ul style="list-style-type: none"> <li>- The IPS engine must be able to provide over 5000+ signatures for attack identification.</li> <li>- The IPS engine must provide protocol identification to defend against abnormal protocol behaviors and should be able to take actions like: <ul style="list-style-type: none"> <li>✓ Detail Attack Logging</li> <li>✓ Full Packet - Flow dumping with payload for later forensic analysis</li> <li>✓ Generate NMS/SNMP traps</li> <li>✓ Send Emails or other notifications to concerned members</li> <li>✓ PERMIT/DROP packet/session</li> </ul> </li> <li>- The firewall must also support user-defined IPS signatures.</li> </ul> <p><b><u>Email Security, Application Visibility and Context Awareness</u></b></p> <ul style="list-style-type: none"> <li>- The firewall must support real time anti-spam to detect and filter out phishing emails.</li> <li>- The firewall must support white-list black-list, content filtering, keyword filtering and attachment filtering by type, size and quantity.</li> <li>- The firewall must support Virus scanning and notification for POP3,</li> </ul>				
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		<p>SMTP and IMAP email attachments.</p> <ul style="list-style-type: none"> <li>- The firewall must have application awareness with identification of 6000+ application and 5M viruses, Trojans and malware.</li> <li>- The firewall must provide identity based firewall services including local, RADIUS, TACACS, SecureID, Active Directory, LDAP and Certificate Authority.</li> <li>- The firewall must support URL filtering with URL category database of over 84+Million URLs in over 120+ categories.</li> <li>- The firewall must support defense against web application attacks such as cross site scripting and SQL injection attacks.</li> <li>- The firewall must also support HTTP/HTTPS/FTP based content awareness to defend against web viruses.</li> <li>- The firewall must support URL black and white list and keyword filtering.</li> <li>- The firewall must also support file reassembly, data filtering and blocking for over 25+ file formats.</li> </ul> <p><b><u>Operations and Maintenance</u></b></p> <ul style="list-style-type: none"> <li>- The firewall must support NetFlow or sFlow or equivalent.</li> <li>- The firewall must provide visualized and multi-dimensional report display by user, application, content, time, traffic, threat, and URL.</li> <li>- The firewall must support object</li> </ul>				
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		<p>consolidation including address and services.</p> <ul style="list-style-type: none"> <li>- The firewall must support SNMP v1, v2c and v3. The supplier must detail all supported MIBs.</li> <li>- The switch must support SYSLOG.</li> <li>- The firewall must support management via CLI, Telnet, SSHv2 and HTTP/HTTPS.</li> <li>- The firewall must be able to synchronize its clock via NTP v1/2/3.</li> <li>- The firewall must support IP SLA or equivalent feature.</li> </ul> <p><b><u>Logging and Reporting</u></b></p> <ul style="list-style-type: none"> <li>- The firewall should have a reporting management system capable of generating reports on a manual, ad-hoc or schedule (hourly, daily, weekly, and monthly, etc.) basis without the need of any additional software subscription/licenses or hardware components.</li> <li>- The firewall should be able to generate reports on individual user ID with (but not limited to) the following activities, Application Usage, accessed websites &amp; URL Categories, without the need for additional software subscription/licenses or hardware components</li> <li>- The firewall must have feature to log exports using SCP or TFTP or FTP protocol</li> <li>- The firewall must be able to produce the following reports (without the need for additional software</li> </ul>				
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		<p>subscription/licenses or hardware components):</p> <ul style="list-style-type: none"> <li>✓ Application Usage – Bytes and Sessions</li> <li>✓ Threat Trends</li> <li>✓ Correlated Reports – Application/Threats/URL</li> <li>✓ Individual user usage report – Application/Session/Time/URL</li> <li>✓ Botnet /Malware Detected Report</li> </ul> <p><b><u>Warranty and Security Subscriptions:</u></b></p> <ul style="list-style-type: none"> <li>- The proposed hardware must include three-year comprehensive warranty, support services and 9x5 next business day replacement</li> <li>- The firewall must be equipped with full Next Generation UTM feature licenses including Firewall, DPI, Content Filtering, IPS, AV and URL Filtering for three years</li> </ul>				
8	Network and IT Rack (HP or equivalent)	<ul style="list-style-type: none"> <li>- 42U rack with 2-pair of PDU and complete accessories</li> <li>- 1 x KVM for server management with 17-inch screen and complete accessories</li> </ul>	3			45 Days
9	Network Device Serial Console Manager	8-port (RJ45) Serial Console Manager for router, firewall and switches management	2			45 Days
10	NOC LED TV Screen (Samsung or equivalent)	<ul style="list-style-type: none"> <li>- Branded 42-inch LED TV screen for NOC room</li> <li>- The proposed hardware must include three-year comprehensive warranty and support services</li> </ul>	1			45 Days

11	Desktop Computer (Dell or HP or equivalent)	<ul style="list-style-type: none"> <li>- Branded desktop computer with latest generation Intel Core-i5 processor, 16GB (2x8GB) RAM (expandable to 32GB or more). 1000 GB HDD, 2xUSB 3.0 ports, 2xUSB2.0 ports, 1xGE LAN port, 1xDual Band 802.11ac WLAN port, 24-inch LED screen, keyboard and mouse, Windows 10 Pro 64-bit</li> <li>- The proposed hardware and software must be including three-year comprehensive warranty and support services</li> </ul>	4			45 Days
12	Network Lab Equipment (Cisco or equivalent)	<ul style="list-style-type: none"> <li>- Cisco ISR 4321 series router (or equivalent) with 2xGE L3 ports, 8xGE L2 ports 2xSync/Async ports with V.35 DTE Cable, 4 x FXO and 1xFXS ports, including CME/BEST 5 user licenses, CT 5-session license, IVR 2-session license and Security/DMVPN or equivalent function license</li> <li>- The proposed hardware must include one year warranty</li> </ul>	2			45 Days
		<ul style="list-style-type: none"> <li>- Cisco ISR 4351 series router (or equivalent) with 3xGE L3 ports, 1xSync/Async ports with V.35 DTE Cable including Security/DMVPN and MPLS (or equivalent) function license</li> <li>- The proposed hardware must include one year warranty</li> </ul>	3			45 Days
		<ul style="list-style-type: none"> <li>- Cisco ISR 4351 series (or higher) router (or equivalent) with 7xGE L3 ports, 8xSync/Async ports with V.35 DCE Cable including Security/DMVPN and MPLS (or equivalent) function license</li> <li>- The proposed hardware must include one year warranty</li> </ul>	1			45 Days
		<ul style="list-style-type: none"> <li>- Cisco 6800 series switch with 24 x 1GE</li> </ul>	4			45 Days

		<p>RJ45 ports and 8x1GE SFP ports (or equivalent) with Full Layer-2, Layer-3, Advance QoS and MPLS function license</p> <ul style="list-style-type: none"> <li>- The proposed hardware must include one year warranty</li> </ul>				
		<ul style="list-style-type: none"> <li>- VIRL or equivalent Network Simulator software</li> </ul>	3			
13	UPS (APC or Huawei or equivalent)	<ul style="list-style-type: none"> <li>- Supply installation, commissioning and testing of rack mountable 6kV UPS with 15 minutes to 20 minutes back</li> <li>- UPS must include SNMP module and complete management function and licenses</li> <li>- The proposed hardware must include three-year comprehensive warranty, support services and 9x5 next business day replacement</li> <li>-</li> </ul>	2			45 Days
14	Server Room/Data Center and NOC Room Construction	<p>End to End Construction of Data Center/Server Room and NOC Room (in all aspects) including but not limited to the following baseline scope of work. Bidders are also advised to conduct comprehensive site survey.</p> <ul style="list-style-type: none"> <li>- Civil and Masonry work for data center/server room and NOC room</li> <li>- Supply and installation of 180 Feet 12-inch x 3-inch of cable tray (powder quoted)</li> <li>- Supply, installation, commission of 12mm Glass Window in Data Center/Server room</li> <li>- Supply, installation, commissioning and testing of Inter-rack optical fiber</li> </ul>	1 Job			45 Days



		<p>cabling (single mode, OS2 grade) and CAT6 cable (3M/Vivanco/Panduit or equivalent) within Data Center and between NOC center and Data Center (in all aspects).</p> <ul style="list-style-type: none"> <li>- Supply, installation, commissioning and testing of Dual 2-Ton A/C for Server Room with complete accessoriness including Gas &amp; Drain piping, Gas charging, Control cabling &amp; pressure testing</li> <li>- Supply installation, testing, commission of sequential A/C Control for AC's inside Data Center Room</li> <li>- Supply, installation, commissioning and testing of 1.5 Ton A/C for NOC Room with complete accessories including Gas &amp; Drain piping, Gas charging, Control cabling &amp; pressure testing</li> <li>- Supply, installation, commissioning and testing Electrical Distribution Box for Incoming Mains &amp; UPS with MCC Breaker 100M (ABB) , 1x Bus Bar, 3 Neon Lights 12-inch x 18-inch</li> <li>- Supply and Installation of Electrical Distribution Box for UPS Output Power Distribution with Breaker 2x32M (ABB) ,1xBus Bar, 3 Neon Lights 18-inch x 24-inch</li> <li>- Supply, installation, commissioning and testing of five Emergency Lights (Bazooka)</li> <li>- Supply, installation, commissioning and testing of 32/3 Amp Industrial Power Sockets (Single Phase) including 10mm 3-Core Flexible Cable (Pakistan</li> </ul>				
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		<p>Cable)</p> <ul style="list-style-type: none"> <li>- Supply, installation, commissioning and testing of LED Lights inside Data Center, NOC Room installed on Ceiling (Phillips)</li> <li>- Supply, installation, commissioning and testing of Electrical Cabling (Pakistan Cable) for AC Units, Lights, Access Control including</li> <li>- 50-Meter 6mm 4-core cable</li> <li>- 50-Meter 2.5mm 3-core cable</li> <li>- Supply, installation, commissioning and testing of Emergency Control/Shutdown Switch</li> <li>- Supply, installation, commissioning and testing of Access Control System for Server Room/Data Center</li> <li>- Supply, installation, commission and testing of Environment Monitoring System for Data Room with a built-in GSM module, Temperature and Humidity Sensors and Water Leakage sensors</li> <li>- Supply, installation, commission and testing of Fire suppression system</li> <li>- Supply, installation, commission and testing of Electrical Grounding/Earthing system (in all aspects) for data center/server room and NOC room and campus access switches</li> <li>- Supply, installation and commissioning of furniture (in all aspects) for NOC room</li> </ul>				
15		End to End supply, installation,	1 Job			45 Days

		<p>commissioning and testing of optical fiber cable (single mode, OS2 grade) and CAT6 cabling including but not limited to the following baseline scope of work:</p> <ul style="list-style-type: none"> <li>- Supply, installation, commissioning and testing of 17500 Feet Single Mode (1310nm) 24-core (duplex) Optical Fiber Cable along with Conduit. Cable grade must comply with ISO/IEC 24702 (OS2)</li> <li>- Supply, installation, commissioning and testing of 34000 Feet Single Mode (1310nm) 4-core (duplex) Optical Fiber Cable along with Conduit. Cable grade must comply with ISO/IEC 24702 (OS2)</li> <li>- Supply, installation, commissioning and testing of 48-port rack mountable ODF (completely loaded) with LC connectors, joint enclosure, cable manager and complete accessories</li> <li>- Supply, installation, commissioning and testing of 160 1-Meter single mode optical fiber patch cords (OS2 grade)</li> <li>- Supply, installation, commissioning and testing of 25000 Feet CAT6 Cable</li> <li>- Supply, installation, commissioning and testing of 250 CAT6 I/O connectors</li> <li>- Supply, installation, commissioning and testing of 250 CAT6 Dual shutter I/O face plate with PVC back</li> <li>- Supply, installation, commissioning and testing of 200 3-Meter CAT6 patch cords</li> <li>- Supply, installation, commissioning and testing of 200 1-Meter CAT6 patch</li> </ul>				
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		<p>cords</p> <ul style="list-style-type: none"><li>- Supply, installation, commissioning and testing of 20 9U Branded Rack Double Section (for Access Switches) with Cooling Fan, 4-port (duplex) optical fiber rack mount ODF (completely loaded) with LC connectors, 24-port CAT6 RJ45 Patch Panel and complete optical and CAT6 cable management accessories, 32/3 Amp Industrial Power Sockets (Single Phase) and rack mount PDU with at-least 6 C13 connectors.</li><li>- Optical Cabling installation, commissioning, labeling and testing (with OTDR)</li><li>- CAT6 Cabling installation, commissioning, labeling and testing (with Fluke)</li><li>- Supply, installation, commissioning, labeling and testing of Power Cable 4mm 3-core along with Conduit from Data Center/Server room to Access Switches Rack</li></ul>				
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