

Modular LAN Campus Core Switch			
ID	Primary Attribute	Secondary Attribute	Specification
1	Chassis	Type	Modular
		19 Inch Rack Mounting	Required
		Packet Processor Redundancy	Required (Online Insertion/Removal)
		Packet Processor	Layer-3 Switching: Non-Blocking Layer-2 Switching: Non-Blocking
		Control Plane Redundancy Support	Required
		Cooling Redundancy Support	Required
		Power Supply Redundancy Support (1:1)or (N+1)	Required
		Input Power Options	AC
		Online Insertion/Removal Hot-Pluggable	Required
		Multi-Chassis Link Aggregation	Required
2	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
		Layer 3 Protocols & Routing Features	<ul style="list-style-type: none"> - IPv4, IPv6, ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Routing Engine Fast failover - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
		OSPF Requirements	<ul style="list-style-type: none"> - IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
		BGPv4 Requirements	<ul style="list-style-type: none"> - Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities

		Required L2 Features	802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes
		Port Security	<ul style="list-style-type: none"> - 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port (Sticky MAC)
		QoS Features	<ul style="list-style-type: none"> - 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling - 15,000 source and 15,000 destination QoS ACL entries (processed in hardware)
		Access Control Lists	<ul style="list-style-type: none"> - Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN - 15,000 source and 15,000 destination ACL entries (processed in hardware)
		NTP Support	<ul style="list-style-type: none"> - Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
		Unidirectional Link failure Detection	Required

		<p>802.1d Required Spanning Tree Features</p>	<ul style="list-style-type: none"> - Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
		<p>Network Management</p>	<ul style="list-style-type: none"> - Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
		<p>SNMP Features</p>	<ul style="list-style-type: none"> - Support for, SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
		<p>Port Mirroring or similar</p>	<p>Required</p>
		<p>Remote Port Mirroring or similar</p>	<p>Required</p>
		<p>Configuration File Management</p>	<p>TFTP, FTP</p>
		<p>Software Image Management</p>	<p>TFTP, FTP</p>
		<p>VLAN Support</p>	<p>>= 1000 VLAN's</p>
		<p>Data Traffic Rate Limiting</p>	<ul style="list-style-type: none"> - Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
		<p>VOIP Features</p>	<p>Configurable Voice-VLAN</p>
		<p>Message Logging Buffer</p>	<ul style="list-style-type: none"> - Configurable log history size - Configurable logging severity - Configurable log message time stamps

3	Line-cards / Port Interfaces	Throughput to Backplane	Non-Blocking option available
		Port per ASIC (Oversubscription)	1:1 Option Available
		Interface Speed Options	- 10/100 Mbps Ethernet - 10/100/1000 Mbps Ethernet - 1 Gbps Ethernet - 10 Gbps Ethernet
		Media Flexibility Options	MMF >= 220m, SMF >= 10km, IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX, 1000BASE CX, 1000BASE-ZX, 100Base-TX (RJ45), 10GBASE-SR, 10BASE-LR, 10BASE-ER, 10BASE-LX4, 10BASE-CX4
		Configurable Egress Queues	>= 8 per port including Strict Priority
		Power over Ethernet Options	- 802.3af (full power on all ports) - 802.3at (full power on all ports) - Configurable Power levels per port - Visibility into PoE power use
		Online Insertion/Removal Support	Required

High Density Modular LAN Access Switch			
ID	Primary Attribute	Secondary Attribute	Specification
1	Chassis	Type	Modular
		19 Inch Rack Mounting	Required
		User Access Port Count	=> 144 copper or fiber
		System Throughput	Non-Blocking
		Packet Processor Redundancy	High Availability (critical areas): Required (Online Insertion/Removal) Non-Critical Areas: Not Required
		Packet Processor	Layer-3 Switching: Non-Blocking Layer-2 Switching: Non-Blocking
		Control Plane Redundancy Support	High Availability (critical areas): Required Non-Critical Areas: Not Required
		Cooling Redundancy Support	Required
		Power Supply Redundancy Support (1:1) or (N+1)	Required
		Input Power Options	AC
Online Insertion/Removal Hot-Pluggable	Required		
2	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
		Hot Swappable Insertion / Removal Support	Required
		Layer 3 Protocols & Routing Features	- IPv4, IPv6, ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRs, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps

		BGPv4 Requirements	<ul style="list-style-type: none"> - Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
		Required L2 Features	<p>802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes</p>
		Port Security	<ul style="list-style-type: none"> - 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port (Sticky MAC)
		QoS Features	<ul style="list-style-type: none"> - 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
		Access Control Lists	<ul style="list-style-type: none"> - Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
		NTP Support	<ul style="list-style-type: none"> - Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
		Unidirectional Link Failure Detection	Required

		<p>802.1d Required Spanning Tree Features</p>	<ul style="list-style-type: none"> - Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
		<p>Network Management</p>	<ul style="list-style-type: none"> - Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
		<p>SNMP Features</p>	<ul style="list-style-type: none"> - Support for, SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
		<p>Port Mirroring or Similar</p>	<p>Required</p>
		<p>Remote Port Mirroring or Similar</p>	<p>Required</p>
		<p>Configuration File Management</p>	<p>TFTP, FTP</p>
		<p>Software Image Management</p>	<p>TFTP, FTP</p>
		<p>VLAN Support</p>	<p>>= 1000 VLAN's</p>
		<p>Data Traffic Rate Limiting</p>	<ul style="list-style-type: none"> - Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
		<p>VOIP Features</p>	<p>Configurable Voice-VLAN</p>

		Message Logging Buffer	- Configurable log history size - Configurable logging severity - Configurable log message time stamps
3	Linecards / Port Interfaces	Throughput to Backplane	Non-Blocking option available
		Port per ASIC (Oversubscription)	1:1 Available option required
		Access Port Speed Options	- 10/100 Mbps Ethernet - 10/100/1000 Mbps Ethernet - 1 Gbps Ethernet (SFP)
		Uplink Port Speed Options	>= Qty 2 - 1 Gbps or 10 Gbps
		Media Flexibility Support	MMF >= 220m, SMF >= 10km, IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX, 1000BASE CX, 1000BASE-ZX, 100Base-TX (RJ45), 10GBASE-SR, 10BASE-LR, 10BASE-ER, 10BASE-LX4, 10BASE-CX4
		Configurable Egress Queues	>= 8 per port including Strict Priority
		Power over Ethernet Options	- 802.3af support (full power on all ports) - 802.3at support (full power on all ports) - Configurable Power levels per port - Visibility into PoE power use
		Online Insertion/Removal Support	Required

Stackable Network Access Switch			
ID	Primary Attribute	Secondary Attribute	Specification
1	Chassis	Type	Fixed Configuration
		19 Inch Rack Mounting	Required
		Stacking Support for Multiple Switches	<ul style="list-style-type: none"> - Backplane (no user or uplink ports used to stack) - Single control-plane - Single data-plane - Non-Blocking optional
		Power Input Options	AC
		Redundant Power Option (1:1)	Optional High Availability Option: Required Non-Critical Option: Not Required
2	Packet Processor	Layer 2 Switching	Non-Blocking
		Layer 3 Switching	Non-Blocking
		IGMP Snooping & IPv6 MLD v1 & v2	Switched in Hardware
		MAC Addresses Per Switch	>=12000
3	Port Interfaces	Access Port Options	<ul style="list-style-type: none"> - 10/100 Mbps - 10/100/1000 Mbps - 1 Gbps Ethernet (SFP)
		Uplink Port Options	=> Qty 2 - 1 Gbps or 2 - 10 Gbps copper or fiber
		Per Switch Port Count Options	<ul style="list-style-type: none"> - 12 Port Option - 24 Port Option - 48 Port Option
		SFP Media Flexibility Options	IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX/LH, 1000BASE-ZX, 1000BASE-T (RJ45), 100Base-T(RJ45), 10GBASE-SR, 10BASE-LR, 10BASE-ER, 10BASE-LX4, 10BASE-CX4
		Power over Ethernet Options	<ul style="list-style-type: none"> - 802.3af support (24 port & 48 port options, capable of supplying power to all ports) - 802.3at support (24 port & 48 port options) - Configurable power levels per port - Visibility into PoE power use
		Configurable Egress Queues	=> 8 per port including Strict Priority
4	Operating System	Layer 3 Protocols & Features	<ul style="list-style-type: none"> - IPv4, IPv6, ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2

		<p>OSPF Requirements</p>	<ul style="list-style-type: none"> - IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRs, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
		<p>BGPv4 Requirements</p>	<ul style="list-style-type: none"> - Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
		<p>Required L2 Features</p>	<p>802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes</p>
		<p>Port Security</p>	<ul style="list-style-type: none"> - 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port (Sticky MAC)
		<p>QoS Features</p>	<ul style="list-style-type: none"> - 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling

	Access Control Lists	<ul style="list-style-type: none"> - Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	NTP Support	<ul style="list-style-type: none"> - Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
	Unidirectional Link failure detection	Required
	802.1d Required Spanning Tree Features	<ul style="list-style-type: none"> - Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
	Network Management	<ul style="list-style-type: none"> - Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
	Multi-chassis Management Interface Aggregation	Required

		Cross-Stack Link Aggregation	Required: must be capable to support defining link aggregation across multiple switches within a stack
		SNMP Features	<ul style="list-style-type: none"> - Support for SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. - Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
		Port Mirroring or similar	Required
		Remote Port Mirroring or similar	Required
		Software Image Management	TFTP, FTP
		Configuration File Management	TFTP, FTP
		VLAN Support	<ul style="list-style-type: none"> >= 255 VLAN's >= 1000 VLAN ID's
		Data Traffic Rate Limiting	<ul style="list-style-type: none"> - Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
		VOIP Features	Configurable Voice-VLAN
		Message Logging Buffer	<ul style="list-style-type: none"> - Configurable log history size - Configurable logging severity - Configurable log message time stamps

Configuration Item Addendum

Modular LAN Campus Core Switch - Configuration			
ID	Primary Attribute	Secondary Attribute	Specification
1	Chassis	Type	Modular
		19 Inch Rack Mounting	Required
		Redundant Switch Packet Processor	Required (Online Insertion/Removal)
		Packet Processor	Required
		Control Plane Redundancy Support	Required
		Cooling Redundancy Support	Required
		Power Supply Redundancy Support (1:1)or (N+1)	Required
		Input Power Options	AC Required
		Online Insertion/Removal Hot-Swappable	Required
		Multi-Chassis Link Aggregation Support	Required
2	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
		Layer 3 Protocols & Routing Features	<ul style="list-style-type: none"> - IPv4, IPv6, ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Routing Engine Fast failover - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
		OSPF Requirements	<ul style="list-style-type: none"> - IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRs, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
		BGPv4 Requirements	<ul style="list-style-type: none"> - Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities

Configuration Item Addendum

		Required L2 Features	802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes
		Port Security Requirements	<ul style="list-style-type: none"> - 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port (Sticky MAC)
		QoS Features	<ul style="list-style-type: none"> - 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
		Access Control Lists	<ul style="list-style-type: none"> - Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
		NTP Support	<ul style="list-style-type: none"> - Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
		Unidirectional Link failure Detection	Required

Configuration Item Addendum

		802.1d Required Spanning Tree Features	<ul style="list-style-type: none"> - Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
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		SNMP	<ul style="list-style-type: none"> - Support for, SNMPV2C, & SNMPV3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
		Port Mirroring or similar	Required
		Remote Port Mirroring or similar	Required
		Configuration File Management	TFTP, FTP
		Software Image Management	TFTP, FTP
3	Line-cards / Port Interfaces	Online Insertion/Removal Support	Required
		Connection to Switch Fabric	=< 2:1 oversubscription
		Configurable Egress Queues	>= 8 per port including Strict Priority
		1 GbE Fiber port count	Minimum 144 count 1 GbE Fiber Ports (100 SX Optics) (44 LX/LH Optics)
		100/1000 port count	Minimum (48) 100/1000 Copper RJ45 ports

Configuration Item Addendum

	10 GigE Port count	Minimum (2) 10 GigE Ports
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		System Throughput	Non-Blocking
		Packet Processor Redundancy	Required
		Packet Processor	Layer-3 Switching: Non-Blocking Layer-2 Switching: Non-Blocking
		Cooling Redundancy Support	Required
		Power Supply Redundancy Support (1:1)or (N+1)	Required
		Input Power Options	AC
		Online Insertion/Removal Hot-Pluggable Slot	Required
2	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
		Hot Swappable Insertion/Removal Support	Required
		Layer 3 Protocols & Routing Features	- IPv4, IPv6, ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
		Port Security	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port (Sticky MAC)
		Unidirectional Link failure Detection	Required

Configuration Item Addendum

	<p>OSPF Requirements</p>	<ul style="list-style-type: none"> - IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRs, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
	<p>BGPv4 Requirements</p>	<ul style="list-style-type: none"> - Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	<p>Required L2 Protocols & Features</p>	<ul style="list-style-type: none"> - 802.1q - Per-port broadcast, multicast, and unicast storm control - 802.3ad (LACP) - Link-Layer Discover Protocol - Jumbo Ethernet Frames with MTU up to 9000 bytes
	<p>802.1d Spanning Tree Features Required</p>	<ul style="list-style-type: none"> - Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
	<p>VOIP Features</p>	<p>Configurable Voice-VLAN</p>

Configuration Item Addendum

		<p>Network Management</p>	<ul style="list-style-type: none"> - Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or Similar - ability to disable telnet, ftp,HTTP, HTTPS - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port-optional - DNS support for resolution of user-defined device names
		<p>SNMP</p>	<ul style="list-style-type: none"> - Support for SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. - Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
		<p>Message Logging Buffer</p>	<ul style="list-style-type: none"> - Configurable log history size - Configurable logging severity - Configurable log message time stamps
		<p>Port Mirroring</p>	<p>Required</p>
		<p>Remote Port Mirroring</p>	<p>Required</p>
		<p>Software Image Management</p>	<p>TFTP, FTP</p>
		<p>Configuration file Backup and Management</p>	<p>TFTP, FTP</p>
		<p>NTP Support</p>	<ul style="list-style-type: none"> - Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
<p>3</p>	<p>Linecards / Port Interfaces</p>	<p>Online Insertion/Removal</p>	<p>Required</p>
		<p>Connection to Switch Fabric</p>	<p>=< 2:1 oversubscription</p>
		<p>Configurable Egress Queues</p>	<p>>= 8 per port including Strict Priority</p>
		<p>Power over Ethernet Requirement</p>	<ul style="list-style-type: none"> - 802.3af support (full power on all ports) - 802.3at support (full power on all ports) - Configurable Power levels per port - Visibility into PoE power use

Configuration Item Addendum

		User Access Port Count	Minimum (240) ports of 100/1000 Copper RJ45
		Uplink Ports Required	Minimum (4) 1 GbE Fiber (LX/LH Optics)

Configuration Item Addendum

Stackable Network Access Switch - Configuration			
ID	Primary Attribute	Secondary Attribute	Specification
1	Chassis	Type	Fixed Configuration
		19 Inch Rack Mounting	Required
		Stacking Support for Multiple Switches	- Backplane (no user or uplink ports used to stack) - Single control-plane - Single data-plane - Non-Blocking optional
		Power Supply Redundancy (1:1 or n+1)	Required
		Power Input Options	AC
2	Packet Processor	Layer 2 Switching Throughput (pps)	Non-Blocking
		Layer 3 Switching Throughput (pps)	Non-Blocking
		IGMP Snooping & IPv6 MLD v1 & v2 in Hardware	Required
3	Port Interfaces	User Access Port Count	(48) Port 100/1000 RJ45 Copper
		Uplink Ports	(4) GbE Fiber ports (LX/LH Optics)
		Power over Ethernet Options	- 802.3af support (all 48 ports) - 802.3at support (all 48 ports) - Configurable power levels per port - Visibility into PoE power use
		Configurable Egress Queues	=> 8 per port including Strict Priority
4	Operating System	Layer 3 Protocols & Features	- Option for L3 Switching: IPv4, IPv6, ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRs, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps

Configuration Item Addendum

	BGPv4 Requirements	<ul style="list-style-type: none"> - Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	Layer 2 Protocols & Features	<ul style="list-style-type: none"> - 802.1q - Per-port broadcast, multicast, and unicast storm control - 802.3ad (LACP) - Link-Layer Discover Protocol - Jumbo Ethernet Frames with MTU up to 9000 bytes
	Port Security	<ul style="list-style-type: none"> - 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port (Sticky MAC)
	Software Image Update Options	TFTP, FTP
	Configuration File Backup and Management	TFTP, FTP
	QoS Features	<ul style="list-style-type: none"> - 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
	Access Control Lists	<ul style="list-style-type: none"> - Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	NTP Support	<ul style="list-style-type: none"> - Version 3 or greater: Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface

Configuration Item Addendum

		Cross-Stack Link Aggregation	Required: must be capable to support defining link aggregation across multiple switches within a stack.
		Unidirectional Link failure detection	Required
		Port Mirroring or similar	Required
		Remote Port Mirroring or similar	Required
		Multi-chassis Management Interface Aggregation	Required
		Network Management	<ul style="list-style-type: none"> - Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management port-optional - DNS support for resolution of user-defined device names
		Message Logging Buffer	<ul style="list-style-type: none"> - Configurable log history size - Configurable logging severity - Configurable log message time stamps
		Data Traffic Rate Limiting	<ul style="list-style-type: none"> - Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
		VOIP Features	Configurable Voice-VLAN
		SNMP	<ul style="list-style-type: none"> - Support for SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. - Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles

Configuration Item Addendum

		<p>Required 802.1d Spanning Tree Features</p>	<ul style="list-style-type: none"> - Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
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