**Příloha č.1 - Úplná specifikace předmětu plnění**

**HPE 1920 24G PoE+ (180W) Switch**

**Přehled**
- Management: Smart managed
- Routing/Switching: Layer 3 Lite
- 24x PoE+100/1000 RJ45 portů + 4x SFP 1000 Mbps porty
- PoE+ budget 180 W PoE+
- L3 statické směrování s 32 trasami
- Access Control List, IEEE 802.1x and VLANs guard
- Montáž do 19“ racku

**Technická specifikace**
**Diferenciátor**
24-port gigabit advanced smart managed switch with 4 GbE SFP ports
**Porty**
24 RJ-45 auto-negotiating 10/100/1000 PoE+ ports
4 SFP 1000 Mbps ports
Supports a maximum of 24 autosensing 10/100/1000 ports plus 4 1000BASE-X SFP ports, or a combination
Included
**Paměť a procesor**
MIPS @ 500 MHz
32 MB flash
packet buffer size: 4.1 Mb
128 MB SDRAM
**Čekací doba**
100 Mb Latency: < 5 µs
1000 Mb Latency: < 5 µs
**Datový tok**
41.7 Mpps
**Kapacita směrování/přepínání**
56 Gbps
**Funkce správy**
IMC - Intelligent Management Center
limited command-line interface
Web browser
SNMP Manager
IEEE 802.3 Ethernet MIB
**Spotřeba energie**
235 W

**HPE 1920 48G PoE+ (370W) Switch**

**Přehled**
- Management: Smart managed
- Routing/Switching: Layer 3 Lite
- 48x PoE+100/1000 RJ45 portů + 4x SFP 1000 Mbps porty
- PoE+ budget 370 W PoE+
- L3 statické směrování s 32 trasami
- Access Control List, IEEE 802.1x and VLANs guard
- Montáž do 19“ racku

**Technická specifikace**
**Diferenciátor**
48-port gigabit advanced smart managed switch with 4 GbE SFP ports
**Porty**
48 RJ-45 auto-negotiating 10/100/1000 PoE+ ports
4 SFP 1000 Mbps ports
Supports a maximum of 48 autosensing 10/100/1000 ports plus 4 1000BASE-X SFP ports, or a combination
Included
**Paměť a procesor**
MIPS @ 500 MHz
32 MB flash
packet buffer size: 4.1 Mb
128 MB SDRAM
**Čekací doba**
100 Mb Latency: < 5 µs
1000 Mb Latency: < 5 µs
**Datový tok**
77,4 Mpps
**Kapacita směrování/přepínání**
104 Gbps
**Funkce správy**
IMC - Intelligent Management Center
limited command-line interface
Web browser
SNMP Manager
IEEE 802.3 Ethernet MIB

**Aruba 2920 24G Switch**

**Přehled**
- Switch s managementem
- Routing/Switching: Layer 3 Dynamic
- 20x + 100/1000 RJ45 portů + 4x Combo porty + 2x modulové sloty + 1x Stohovací slot + 1x Dual-personality (RJ-45 nebo USB micro-B) serial console port
- Stohovací modul: Podporuje stohování až 4 switchů.
- Flexibilní 10 Gb konektivita (SFP+ and/or 10GBASE-T): až 4x 10 Gb porty
- IPv4/IPv6 host support
- Šetří více energie: 802.3az a Idle port (Nižší spotřeba při neaktivitě portu)
- Montáž do 19“ racku
- Doživotní záruka: Oprava výměnou následující pracovní den!

**Charakteristika řady 2920**
**Quality of Service (QoS)**
Traffic prioritization (IEEE 802.1p); Layer 4 prioritization; Class of Service (CoS); Rate limiting; Large buffers
**Connectivity**
Flexible 10 Gbps Ethernet connectivity; Two-port stacking module with up to 40 Gbps/port; Auto-MDIX; Dual-personality functionality; IEEE 802.3at Power over Ethernet (PoE+); Pre-standard PoE support; IPv6; IPv6 host; Dual stack (IPv4/IPv6); MLD snooping;
**Performance**
Energy-efficient design; High-efficiency power supplies; Energy-efficient Ethernet (EEE) support; HP ProVision ASIC architecture; Selectable queue configurations;
**Convergence**
IP multicast snooping and data-driven IGMP; LLDP-MED (Media Endpoint Discovery); IEEE 802.1AB Link Layer Discovery Protocol (LLDP); PoE and PoE+ allocations;
**Resiliency and high availability**
IEEE 802.1s Multiple Spanning Tree; IEEE 802.3ad Link Aggregation Control Protocol (LACP) and HP port trunking; Ring and chain stacking topology
**Management**
SNMPv1, v2, and v3; Out-of-band Ethernet management port
**Manageability**
Dual flash images; Friendly port names; Find-Fix-Inform; Multiple configuration files; Software updates; RMON, XRMON, and sFlow; Troubleshooting; Uni-Directional Link Detection (UDLD)
**Layer 2 switching**
VLAN support and tagging; GARP VLAN Registration Protocol; Jumbo packet support; IEEE 802.1v protocol VLANs
**Layer 3 routing**
Static IP routing; Routing Information Protocol (RIP); 256 static and 2,048 RIP routes;
**Security**
Multiple user authentication methods; IEEE 802.1X; Web-based authentication; MAC-based authentication; Authentication flexibility; Multiple IEEE 802.1X users per port; Concurrent IEEE 802.1X, Web, and MAC authentication schemes per port; Access control lists (ACLs); Source-port filtering; RADIUS/TACACS+; IEEE 802.1X, MAC or Web authentication; Secure shell; Secure Sockets Layer (SSL); Port security; MAC address lockout; Secure FTP; Switch management logon security; Custom banner; STP BPDU port protection; DHCP protection; Dynamic ARP protection; STP Root Guard; Identity-driven ACL; Per-port broadcast throttling
**Monitor and diagnostics**
Digital optical monitoring of SFP+ and 1000BASE-T transceivers
**Warranty and support**
Lifetime warranty; Electronic and telephone support; Software releases

**Technická specifikace**
**Porty**
20 RJ-45 autosensing 10/100/1000 ports(IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T), Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only; 4 RJ-45 dual-personality 10/100/1000 ports(IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T); 2 module slots; 1 Stacking module slot; 1 Dual-personality (RJ-45 or USB micro-B); 1 USB 1.1; 1 RJ-45 out-of-band management port
**Paměť a procesor**
: Tri Core ARM1176 @ 625 MHz, 512 MB SDRAM, packet buffer size: 11.25 MB (6.75MB Dynamic Egress + 4.5MB Ingress), 1 GB flash MB
**Čekací doba**
< 3.3 µs (FIFO 64-byte packets)
**Datový tok**
95.2 million pps
**Velikost směrovací tabulky**
2048 entries
**Funkce správy**
HP PCM+; IMC - Intelligent Management Center; command-line interface; Web browser; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; Out-of-band management (serial RS-232C or MicroUSB)
**Přepínací kapacita**
128 Gbps
**Ochrana proti útoku Denial of service**
CPU DoS Protection
**Obecné protokoly**
IEEE 802.1AX-2008 Link Aggregation; IEEE 802.1D MAC Bridges; IEEE 802.1p Priority; IEEE 802.1Q VLANs; IEEE 802.1s Multiple Spanning Trees; IEEE 802.1v VLAN classification by Protocol and Port; IEEE 802.1w Rapid Reconfiguration of Spanning Tree; IEEE 802.3ab 1000BASE-T; IEEE 802.3ad Link Aggregation Control Protocol (LACP); IEEE 802.3af Power over Ethernet; IEEE 802.3at PoE+; IEEE 802.3az Energy Efficient Ethernet; IEEE 802.3x Flow Control; RFC 768 UDP; RFC 783 TFTP Protocol (revision 2); RFC 792 ICMP; RFC 793 TCP; RFC 826 ARP; RFC 854 TELNET; RFC 868 Time Protocol; RFC 951 BOOTP; RFC 1058 RIPv1; RFC 1256 ICMP Router Discovery Protocol (IRDP); RFC 1350 TFTP Protocol (revision 2); RFC 1519 CIDR; RFC 1542 BOOTP Extensions; RFC 2030 Simple Network Time Protocol (SNTP) v4; RFC 2131 DHCP; RFC 2236 IGMP Snooping; RFC 2453 RIPv2; RFC 2865 Remote Authentication Dial In User Service (RADIUS); RFC 2866 RADIUS Accounting; RFC 3046 DHCP Relay Agent Information Option; RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks; RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP); RFC 3413 Simple Network Management Protocol (SNMP) Applications; RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3); RFC 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP); RFC 3416 Protocol Operations for SNMP; RFC 3417 Transport Mappings for the Simple Network Management Protocol (SNMP); RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP); RFC 3576 Ext to RADIUS (CoA only); RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches; RFC 4675 RADIUS VLAN & Priority; RFC 4861 Neighbor Discovery for IP version 6 (IPv6); RFC 4862 IPv6 Stateless Address Autoconfiguration; UDLD (Uni-directional Link Detection)
**Správa sítě**
IEEE 802.1AB Link Layer Discovery Protocol (LLDP); RFC 1155 Structure of Management Information; RFC 1157 SNMPv1; RFC 2021 Remote Network Monitoring Management Information Base Version 2 using SMIv2 ; RFC 2576 Coexistence between SNMP versions; RFC 2578 Structure of Management Information Version 2 (SMIv2); RFC 2579 Textual Conventions for SMIv2; RFC 2580 Conformance Statements for SMIv2; RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events); RFC 2819 Remote Network Monitoring Management Information Base; RFC 2856 Textual Conventions for Additional High Capacity Data Types; RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations ; RFC 3164 BSD syslog Protocol; RFC 3176 sFlow; RFC 3411 SNMP Management Frameworks; RFC 3412 SNMPv3 Message Processing; RFC 3414 SNMPv3 User-based Security Model (USM); RFC 3415 SNMPv3 View-based Access Control Model VACM); ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED); SNMPv1/v2c/v3; XRMON
**Spotřeba energie**
58 W (maximum)

**Aruba 2920 48G Switch**

**Přehled**
- Switch s managementem
- Routing/Switching: Layer 3 Dynamic
- 44x + 100/1000 RJ45 portů + 4x Combo porty + 2x modulové sloty + 1x Stohovací slot + 1x Dual-personality (RJ-45 nebo USB micro-B) serial console port
- Stohovací modul: Podporuje stohování až 4 switchů.
- Flexibilní 10 Gb konektivita (SFP+ and/or 10GBASE-T): až 4x 10 Gb porty
- IPv4/IPv6 host support
- Šetří více energie: 802.3az a Idle port (Nižší spotřeba při neaktivitě portu)
- Montáž do 19“ racku
- Doživotní záruka: Oprava výměnou následující pracovní den!

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**Performance**
Energy-efficient design; High-efficiency power supplies; Energy-efficient Ethernet (EEE) support; HP ProVision ASIC architecture; Selectable queue configurations;
**Convergence**
IP multicast snooping and data-driven IGMP; LLDP-MED (Media Endpoint Discovery); IEEE 802.1AB Link Layer Discovery Protocol (LLDP); PoE and PoE+ allocations;
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IEEE 802.1s Multiple Spanning Tree; IEEE 802.3ad Link Aggregation Control Protocol (LACP) and HP port trunking; Ring and chain stacking topology
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SNMPv1, v2, and v3; Out-of-band Ethernet management port
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Static IP routing; Routing Information Protocol (RIP); 256 static and 2,048 RIP routes;
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Multiple user authentication methods; IEEE 802.1X; Web-based authentication; MAC-based authentication; Authentication flexibility; Multiple IEEE 802.1X users per port; Concurrent IEEE 802.1X, Web, and MAC authentication schemes per port; Access control lists (ACLs); Source-port filtering; RADIUS/TACACS+; IEEE 802.1X, MAC or Web authentication; Secure shell; Secure Sockets Layer (SSL); Port security; MAC address lockout; Secure FTP; Switch management logon security; Custom banner; STP BPDU port protection; DHCP protection; Dynamic ARP protection; STP Root Guard; Identity-driven ACL; Per-port broadcast throttling
**Monitor and diagnostics**
Digital optical monitoring of SFP+ and 1000BASE-T transceivers
**Warranty and support**
Lifetime warranty; Electronic and telephone support; Software releases

**Technická specifikace**
**Porty**
44 RJ-45 autosensing 10/100/1000 ports(IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T), Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only; 4 RJ-45 dual-personality 10/100/1000 ports(IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T); 2 module slots; 1 Stacking module slot; 1 Dual-personality (RJ-45 or USB micro-B); 1 USB 1.1; 1 RJ-45 out-of-band management port
**Paměť a procesor**
:Tri Core ARM1176 @ 625 MHz, 512 MB SDRAM, packet buffer size: 11.25 MB (6.75MB Dynamic Egress + 4.5MB Ingress), 1 GB flash
**Čekací doba**
< 3.2 µs (FIFO 64-byte packets)
**Datový tok**
130.9 million pps
**Velikost směrovací tabulky**
2048 entries
**Funkce správy**
HP PCM+; IMC - Intelligent Management Center; command-line interface; Web browser; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; Out-of-band management (serial RS-232C or MicroUSB)
**Přepínací kapacita**
176 Gbps
**Ochrana proti útoku Denial of service**
CPU DoS Protection
**Obecné protokoly**
IEEE 802.1AX-2008 Link Aggregation; IEEE 802.1D MAC Bridges; IEEE 802.1p Priority; IEEE 802.1Q VLANs; IEEE 802.1s Multiple Spanning Trees; IEEE 802.1v VLAN classification by Protocol and Port; IEEE 802.1w Rapid Reconfiguration of Spanning Tree; IEEE 802.3ab 1000BASE-T; IEEE 802.3ad Link Aggregation Control Protocol (LACP); IEEE 802.3af Power over Ethernet; IEEE 802.3at PoE+; IEEE 802.3az Energy Efficient Ethernet; IEEE 802.3x Flow Control; RFC 768 UDP; RFC 783 TFTP Protocol (revision 2); RFC 792 ICMP; RFC 793 TCP; RFC 826 ARP; RFC 854 TELNET; RFC 868 Time Protocol; RFC 951 BOOTP; RFC 1058 RIPv1; RFC 1256 ICMP Router Discovery Protocol (IRDP); RFC 1350 TFTP Protocol (revision 2); RFC 1519 CIDR; RFC 1542 BOOTP Extensions; RFC 2030 Simple Network Time Protocol (SNTP) v4; RFC 2131 DHCP; RFC 2236 IGMP Snooping; RFC 2453 RIPv2; RFC 2865 Remote Authentication Dial In User Service (RADIUS); RFC 2866 RADIUS Accounting; RFC 3046 DHCP Relay Agent Information Option; RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks; RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP); RFC 3413 Simple Network Management Protocol (SNMP) Applications; RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3); RFC 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP); RFC 3416 Protocol Operations for SNMP; RFC 3417 Transport Mappings for the Simple Network Management Protocol (SNMP); RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP); RFC 3576 Ext to RADIUS (CoA only); RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches; RFC 4675 RADIUS VLAN & Priority; RFC 4861 Neighbor Discovery for IP version 6 (IPv6); RFC 4862 IPv6 Stateless Address Autoconfiguration; UDLD (Uni-directional Link Detection)
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**Spotřeba energie**
70 W (maximum)

**OEM 1G SFP LC LX Transceiver**

A small form-factor pluggable (SFP) Gigabit LX transceiver that provides a full-duplex Gigabit solution up to 10 km (single-mode) or 550 m (multimode).

**Ports:**
1 LC 1000BASE-LX port (IEEE 802.3z Type 1000BASE-LX)
Duplex: full only

**Cable type:**
Either single mode or multimode
62.5/125 µm or 50/125 µm (core/cladding) diameter, graded-index, low metal content, multimode fiber optic, complying with ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a, respectively
Low metal content, single-mode fiber-optic, complying with ITU-T G.652 and ISO/IEC 793-2 Type B1

**Maximum distance:**
2-550 m (multimode 62.5 µm core diameter, 500 MHz\*km bandwidth)
2-550 m (multimode 50 µm core diameter, 400 MHz\*km bandwidth)
2-550 m (multimode 50 µm core diameter, 500 MHz\*km bandwidth)
2-10,000 m (single-mode fiber)
A mode conditioning patch cord may be needed in some multimode fiber installations.

**Wavelength:** 1550/1310nm

**Power Consumption:**< 500mW Typical

**OEM 1G SFP LC LX Transceiver**

A small form-factor pluggable (SFP) Gigabit LX transceiver that provides a full-duplex Gigabit solution up to 10 km (single-mode) or 550 m (multimode).

**Ports:**
1 LC 1000BASE-LX port (IEEE 802.3z Type 1000BASE-LX)
Duplex: full only

**Cable type:**
Either single mode or multimode
62.5/125 µm or 50/125 µm (core/cladding) diameter, graded-index, low metal content, multimode fiber optic, complying with ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a, respectively
Low metal content, single-mode fiber-optic, complying with ITU-T G.652 and ISO/IEC 793-2 Type B1

**Maximum distance:**
2-550 m (multimode 62.5 µm core diameter, 500 MHz\*km bandwidth)
2-550 m (multimode 50 µm core diameter, 400 MHz\*km bandwidth)
2-550 m (multimode 50 µm core diameter, 500 MHz\*km bandwidth)
2-10,000 m (single-mode fiber)
A mode conditioning patch cord may be needed in some multimode fiber installations.

**Wavelength:** 1310/1550nm

**Power Consumption:**< 500mW Typical