

# AGENT-3 S5RN(P)

## Hardened Advanced Layer 2/3/4 Gigabit Ethernet Switch with PoE options



The integrity of the Electric Utility Systems is highly reliant on the adequate operation of the Protection and Control elements present in a network. The associated Telecommunication infrastructure must fulfil a series of strict requirements with regard to robustness, availability and security.

PULLNET Technology's AGENT-3 S5RN Series is a compact solution specifically designed to meet the strict requirements of Protection and Control networks in the Electricity Sector.

Its high performance Layer 2/3/4 switching functionality combined with its robustness guarantees the reliability and optimization of network resources when is most needed.

Service availability, together with QoS and security guaranties, are essential musts for appropriate delivery of the diverse types of real-time services that need to be transmitted in mission-critical networks.

AGENT-3 S5RN includes an advanced set of attributes and standard protocols that guarantee the implementation of highly available secure networks able to integrate multiple real-time services in their operative.

The AGENT-3 S4R with a total process capacity of 104 Gbit/s and its 4 (two optional) 10 GB ports meets the actual and close future demands for the Utilities networks

## BENEFITS

**Robustness.** AGENT-3 S5RN systems have been specially devised to operate in highly inductive environments for a long time. It's fan-less design, also, contributes to its reliability.

**Service Availability.** The use of the AGENT-3 S5RN permits to reduce the number of technologies and the complexity of the stack of protocols needed to implement a Broadband Network, which results in enhanced MTBF.

**Flexibility.** The AGENT-3 S5RN can be directly integrated with the OMTP optical multiservice high-performance platform; allowing also direct connections to the optical fibre or to other Ethernet networks through IPv4 as well as IPv6.

**Quality of Service.** 8 priority levels of traffic per port (IEEE 802.1p CoS) in the AGENT-3 S5RN, DSCP/IP Precedence, and TCP/UDP identifiers allow to minimising latencies for critical services. AGENT-3 S4RN's support to up to 4000 simultaneous VLAN's; its IEEE 802.1ad Q-in-Q functionality; and *DiffServ* through customised QoS policies are assets that expand the possibilities of configuration.

**Security.** The AGENT-3 S5RN Series includes a comprehensive set of advanced security features as IEEE 802.1x Authentication; RADIUS; TACACS+ ciphering;

SSH and HTTPS; Web and Telnet services with data encryption; Access Control Lists (ACL's); and SNMPv3.

**Fault tolerance.** In addition to power supply redundancy, the system incorporates, between others, the following protocols:

- IEEE 802.1w/s/d RSTP/MSTP/STP Spanning Tree Protocols
- IEEE 802.1ad LACP. Link Aggregation Control Protocol
- RFC 3376 IGMP. Internet Group Management Protocol
- RFC 3768 VRRP. Virtual Router Redundancy Protocol.
- ITU-t G.8032 Ring recovery of 50 ms

**Cost-efficiency.** Basic compact system. Advanced Management Tools based upon IETF/SNMP standards, modularity and low maintenance costs. The PoE version, AGENT-3 S5RNP also contributes to the efficiency simplifying the network layout

**Compatibility.** Integration of classical with last generation equipment and services. CWDM and DWDM compatible.

# Protocols and Standards [Release 2.10.2]

## LAYER 2 FORWARDING AND PROTOCOLS SUPPORTED

- Jumbo frames
- Flow control & PFC
  - IEEE 802.3x for full-duplex mode
  - Back-pressure flow control in half duplex mode
- Broadcast, unicast, and multicast storm protection
- IGMP (v1/v2) snooping
- IGMP snooping query per-VLAN
- VLAN support
  - IEEE 802.1Q VLAN
  - 4,094 VLANs
  - Port-based VLANs
  - Port-based VLANs
- Spanning Tree
  - IEEE 802.1D STP
  - IEEE 802.1w RSTP
  - IEEE 802.1s MSTP
  - PVST (Per VLAN Spanning Tree)
- BPDU/LACP tunneling
- UDLD
- IEEE 802.3ad Link aggregation
  - Up to 128 trunk groups depending on model
  - Up to 8 ports per trunk group
- Port mirroring (many-to-one)
- Port security
- LLDP – Link Layer Device Discovery Protocol /LLDP-MED
- Q-in-Q
- Multi-chassis Link Aggregation (MLAG)
- MLAG with Spanning Tree support
- VXLAN Tunnel Endpoint (VTEP) support
- 802.1p in Layer 2 forwarding
- 802.1X support
- PTP E2E Mode

## LAYER 3 ROUTING FEATURES

- Dual stacked IPv4 and IPv6 addressing
- IPv4 and IPv6 static route configuration
- ECMP: 32 next hops
- ECMP resilient hashing (depends on ASIC support)
- RIPv2
- OSPFv2 (IPv4)
- BFD (Bidirectional Forwarding Detection)
- MP-BGP (IPv4, IPv6)
  - Static MPLS LSP
  - Labeled BGP (RFC3107)
- VRRP
- DHCP-relay including DHCP option-82
- IGMPv1/v2/v3
- PIM-SM and PIM-SSM
- VXLAN Tunnel Endpoint (VTEP)
- VxLAN over mLAG
- GRE tunneling over LAG interfaces

## IPv6 LAYER 3 ROUTING FEATURES

- OSPFv3
- MP-BGP for IPv6 NLR

## QUALITY OF SERVICE

- IEEE 802.1p-based CoS
- 8 priority queues per port

- TOS or DSCP-based CoS
- ACL classification, metering, and remarking
- SP, WRR, WFQ scheduling
- Tail drop
- WRED congestion control
- Policy-based DiffServ
- Map Traffic to Different Queues
- Voice VLAN
- Buffer management

## SECURITY

- User/password protected system management
- L2/L3/L4 ACLs
- TACACS+ AAA
- SSHv1/v2
- SSLv3/TLS v1
- DoS attack protection
- COPPP – Control Plane Policing & Statistics
- Dynamic ARP Inspection
- Enable/disable USB port for USB memory
- Dynamic ARP inspection

## CROSSFLOW

- \*Network Address Translation (NAT) (depending on ASIC support)
- Drop counters statistics on ASIC
- QoS (1R2C/2R3C, WRR, WRED)
- Support for User-defined-flows (UDF) with L2/L3/L4 offset for inner headers matching
- Map Traffic to Different Queues
- ECN (Explicit Congestion Notification) on UC (unicast) and MC (multicast) queues
- \*SCTP (Stream Control Transmission Protocol) traffic filtering
- VLAN push/pop operation in L2 MPLS
- Based on Open-vSwitch (OVS) 2.3
- Compatible with OpenFlow 1.5 specification
- TCAM Flow Optimization for better scalability and performance
- Interoperable with Open Daylight, ONOS, HPE's VAN, NEC's ProgrammableFlow Controller, and RYU
- OpenFlow encapsulation: L2oGRE, L3oGRE, NVGRE, PBB, VXLAN, MPLS (depending on ASIC support)

## Network Management

- Command line interface (CLI)
- Telnet and SSH remote login
- Centralized control plane policing and filtering
- SNMPv1/v2c/v3
- AAA RADIUS support
- IPFIX (NetFlow)/sFlow

## Operational Programming Tools

- Automate PICOS installation via ONIE
- Auto provisioning with scripting capacity (Zero Touch Provisioning)
- Debian 7.0 Linux distribution
- Modular PICOS: Service daemon for L2/L3 Mode and OVS Mode • Standard Debian

- Based package upgrade (apt-get)
- Extensible CLI with Scripts and APIs
- Configuration Commit / Check / Rollback
- C/C++, Ruby, Python, Perl
- Configuration Management: Puppet, Chef, CFEngine (user-installed), Ansible, Salt
- NETCONF/YANG model support for L2/L3 mode.

## IEEE Standards Compliance

- 802.1D Bridging and Spanning Tree Protocol
- 802.1s Multiple Spanning Tree Protocol
- 802.1w Rapid Spanning Tree Protocol
- 802.1p QOS/CoS
- 802.1Q VLAN Tagging
- 802.1X Port-based Network Access Control (PNAC)
- 802.1ah PBB (MAC in MAC)
- 802.3ad Link Aggregation with LACP
- 802.3ab 1000BASE-T
- 802.3z Gigabit Ethernet
- 802.3ae 10 Gigabit Ethernet
- 802.3by 25/50 Gigabit Ethernet
- 802.3ba 40 Gigabit Ethernet
- 802.3ba 100 Gigabit Ethernet

## RFC – SPECIFIED MIBS

- RFC 1157 SNMPv1
- RFC 1212 Concise MIB definition
- RFC 1213 MIB II
- RFC 1215 SNMP traps
- RFC 1256 ICMP router discovery
- RFC 1493 Bridge MIB
- RFC 1573 Interface Evolution MIB
- RFC 1643 Ether-like MIB
- RFC 1901 Community based SNMPv2
- RFC 1905 Protocol Operations for SNMPv2
- RFC 1906 Transport Mappings for SNMPv2
- RFC 1907 Management Information Base for SNMPv2
- RFC 1908 Coexistence between SNMPv1 and SNMPv2
- RFC 1997 BGP Communities Attribute
- RFC 2021 RMON2 probes
- RFC 2096 IP Forwarding table MIB
- RFC 2233 The Interface Group MIB using SNMPv2
- RFC 2439 BGP Route Flap Damping
- RFC 2545 Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
- RFC 2665 Ethernet-like Interfaces
- RFC 2796 BGP Route Reflection – An Alternative to Full Mesh IBGP
- RFC 3065 Autonomous System Confederations for BGP
- RFC 3392 Capabilities Advertisement with BGP-4
- RFC 4893 BGP Support for Four-octet AS Number Space
- RFC3107 - Labeled BGP
- RFC4607 - PIM SSM
- RFC3376 - IGMPv3
- RFC6241 NETConf
- Pica8 Private MIB
- UCD-SNMP-MIB



## Physical Interfaces

- 24x Ethernet 10/100/1000 Base-T RJ45 ports
- 4x Ethernet 1/10GB SFP+ Uplink ports
- 2x Ethernet 20 GB QSFP+ Stacking ports
- Option PoE AGENT-3 S5RNP:
  - 24x IEEE 802.3af (15W) / IEEE 802.3at (30W)
  - 8x UPoE (60W)
  - Total PoE Power Budget: 960W
- 1x Micro USB Serial Console
- 1x Ethernet 100/1000 Base-T RJ45 Management Port
- 1x USB type A Storage Port

## Performance

- Wire Speed forwarding L2 and L3
- Switching Capacity: 104 GBit/s
- Forwarding Rate: 95 Mpps
- MAC Address Table Size: 96K
- Jumbo Frame: 12KByte
- VLAN IDs: 4K
- L3 Entry IPv4: 96K Unicast, 48K Multicast
- L3 Entry IPv6: 49K Unicast, 24K Multicast
- Packet Buffer size: 4 MB shared buffer pool



## Power Supply

### Standard version (AG-3 S5RN)

- 2 Redundant load-sharing, hot swappable internal PSUs
- Input voltage: 88 to 300 Vdc and 85 to 264 Vac Universal PSU
- Maximum consumption at full Load: 100W
- PSU equipped with controlled speed fan

### PoE version (AG-3 S5RNP)

- 2 Redundant load-sharing, hot swappable internal PSUs
- Input voltage: 88 to 300 Vdc and 85 to 264 Vac Universal PSU
- Maximum consumption at full Load: 100W + PoE
- PSU equipped with controlled speed fan



## Mechanical Dimensions:

- 440x350x45 mm, suitable for 19" Rack and 1 RU
- 17.3x16.1x1.7 ", suitable for 19" Rack and 1 RU

## Weight:

- AG-3 S5RN: 5.15 kg (11.37 lb)
- AG-3 S5RNP: 6.02 kg (13.27 lb)

## Environmental Specifications, EMI & EMC

- Working temperature: -20°C a +45°C, IEC 68-2-14
- Shock: IEC 68-2-29
- Vibration: IEC68-2-36, IEC 68-2-6
- Drop: ISTA 2A
- EN55022, Class A
- CISPR22 Class A
- FCC Part 15 Class A
- CCC GB9254-2008
- CSA 22.2
- UL 60950-1
- RoHS-6 Compliant
- European CE Mark
- Mexico NOM approval



**Warranty:** 5 Years