

ASR 6000 GTTH SWITCH

Layer 3 Gigabit Ethernet access switch



Full service flexibility for the network edge

The ASR 6000 is a Layer 3 Gigabit Ethernet Access switch with IPv4/IPv6 routing features designed for data, voice and video service control in broadband networks.

Using an onboard Network Processor, the ASR 6000 delivers enhanced service functionality such as per client bandwidth ingress and egress shaping, weighted fair queuing scheduling with 2000 queues per client, quality measurement of MPEG TV and RADIUS controlled service templates.

The ASR 6000 is used by service providers, network operators and city networks for FTTH broadband service delivery in the access, as a Gigabit Ethernet aggregation switch and mini-BNG.

BENEFITS

- Network processor enabled access switch and mini-BNG for IPoE/PPPoE
- Easy network operation - extensive troubleshooting functions
- Superior rate-limiting and QoS features
- All connectors via the front panel
- Simplified Gigabit transition with multi-rate SFP support and combo-ports

Product overview

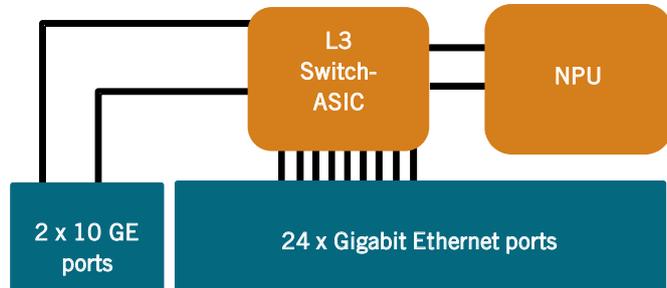
The ASR 6000 is a Layer 3 access switch designed for FTTx access service control, network aggregation and high-performance IPv4 and IPv6 routing. The ASR 6000 provides network operators, service providers and city networks, with a versatile tool for their routing and switching needs.

The ASR 6000 is filled with features to deliver voice, video and data services and builds on the experience of over 1,300,000 deployed fibre-to-the-home ports of previous generation ASRs.

ASR 6000 hybrid architecture

A hybrid switch-ASIC and NPU architecture makes it possible for the ASR 6000 to deliver unique per-client services, as well as quality and troubleshooting functions such as Realtime Protocol Monitoring of TV multicast traffic.

Just like BNGs, the ASR 6000 can be controlled by the RADIUS protocol, allowing a high degree of automation for control of services.



The ASR 6000 CLI contains many functions and detailed information about the traffic to simplify for the network team and provide a deep insight into the network to facilitate troubleshooting and everyday operations.

The ASR 6000 is available in two models; either with 24 RJ-45 copper (ASR 6326) or 24 SFP (ASR 6226) Gigabit Ethernet ports. The SFP ports support both 100 Mbps and 1 Gbps speeds, which means that upgrading access to a fibre network is easy. Customer gateways at the edge can continue to operate at 100Mbps. When customer equipment is upgraded, a simple configuration change in the ASR instantly upgrades the downlink to 1 Gbps. SFP+ ports also provide multi-rate speeds, both 1 Gbps and 10 Gbps.



Benefits

RADIUS control

Customized and automated service control can be implemented using the RADIUS protocol. Service conditions and behavior can be adapted to fit any type of existing service deployment structure used by operators. Existing RADIUS based mechanisms, used for xDSL, can be reused by the ASR 6000 which reduces investment costs in the OSS system for service providers when new services are deployed in the network.

PPPoE or DHCP messages from the client triggers the RADIUS authentication process in the ASR 6000.

The RADIUS server response controls service parameters such as rate-limiting, access-lists or other functions to apply to the traffic related to the specific client. The RADIUS response can assign a service template to the client, allowing a variety of different functions to be applied on the traffic.

Accounting updates are provided to the RADIUS-server to allow track of traffic volume.

Change of Authorization is supported to allow portal login, or dynamic adjustment of service parameters in active sessions.

Flexible, script-based, integration allows customization to fit the specific RADIUS-server or needs of the network. This unique capability means that the RADIUS-integration takes very little time.

Per-client bandwidth control with advanced scheduling

The ASR 6000 has extensive classification rules to perform traffic management of individual clients. For local clients (connected on the Gigabit Ethernet ports), the NPU can provide further granularity and functionality.

The NPU has a large memory pool for packet buffers and other purposes. This enables proper queuing and traffic shaping with no packet loss which, in turn, gives better link- and network utilization of bandwidth for a smooth end-user experience – this is how end-users expect Internet services to work.

The NPU applies flow-based forwarding with thousands of virtual queues for proper weighted fair queuing and scheduling of traffic for connected clients. This makes it possible to create advanced, highly granular traffic management and QoS rules, even considering the application in use when deciding to queue, drop or forward traffic.

VPN Services

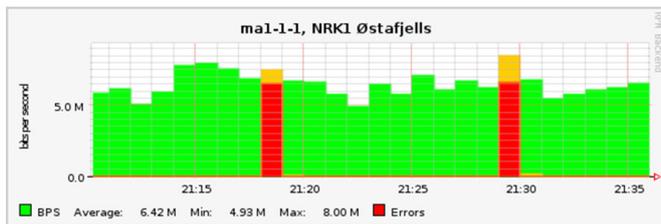
FTTx networks not only carry residential services. The infrastructure is also well suited to handle business VPN services. The ASR 6000 has several features to allow L2 VPN networks to overlay the layer 3 network, or to work in parallel. This allows the single infrastructure to service both residential and business customer needs.

Quality improvements and inspection of TV

In networks using multicast technology for TV distribution the ASR 6000 can improve the overall quality if the TV playout generates a bursty media stream. The ASR 6000 is able to shape bursty multicast traffic which will prevent packet drops due to buffer exhaustion. This reduces quality issues experienced by the end-users.

The ASR 6000 can also inspect multicast MPEG transport streams, supporting MPEG over RTP as well as UDP. The ASR 6000 collects and analyzes metrics at RTP level, Transport Stream level and Packetized Elementary Stream level. This supports both SD-TV and HD-TV channels.

RPM Graph zoom



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Multicast quality software

The errors detected include:

- sequence-errors
- jitter
- missing-sync-byte
- misaligned

Any detected errors can be logged, read using SNMP, or shown by the ASR CLI. Each ASR becomes a probe, capable of monitoring up to 50 TV channels at the same time.

If an end-user reports a problem with the TV service, the RPM data provides immediate notification when a problem is seen in the network, and also if it affects the entire network, or just a part of the network.

This data may even help network engineers to pinpoint the location of the problem in seconds, instead of the usual hours, or even days, of manual troubleshooting.

Environmental touch

The ASR 6000 series has been adapted to meet Swedish legislation to reduce certain hazardous materials commonly used in electronics. The ASR 6000 contains less bromide, phosphorus and chlorine compounds than comparable products which reduces the health risks associated with electronics.

In addition, the ASR 6000 supports Waystreams super low power SFPs that can reduce carbon emission and the electricity bill by 20-25% on average for FTTx equipment.



Efficient use of IPv4 address space

In Layer 3 mode, each port or virtual-port on the ASR 6000 can connect to a different end-user. Layer 3 ports towards a large population normally require heavy IPv4 sub-netting which rapidly consumes the shrinking IPv4 address pool.

The ASR 6000 contains a set of features that allows an IPv4 subnet to be shared among end-user clients connected on different Layer 3 ports – even across multiple ASRs. Clients share a larger subnet and any traffic between clients within the subnet is routed through, and between, the ASRs. The result is a secure Layer 3 separation between end-users, a routed topology for easy network management, and maximum use of available IPv4 address space.

Support for dual stack services

The exhaustion of IPv4 addresses means that IPv6 deployment is now becoming mandatory in many networks. ASR 6000 supports IPv6 unicast forwarding. Policies for traffic management and QoS also support IPv6 which means that an IP client can use either IPv4 and IPv6, or both.



Order Items

The following table describe the main order items in the ASR 6000 family.

Article	Description
ASR6226-AC	ASR 6226, 2 1/10 GE (SFP+) + 24 port 100/1000BASE-X (SFP) with four combo RJ-45, AC power, iBOS included.
ASR6326-AC	ASR 6326, 2 1/10 GE (SFP+) + 24 port 10/100/1000BASE-X with four combo 1000BASE-X SFP, AC power, iBOS included.
SW-ASR6K-REMOTE24	Add on iBOS license for 24 remote vid aggregation interfaces.
WAY-CONSOLE	Serial console-cable (RJ-45 to DB9)

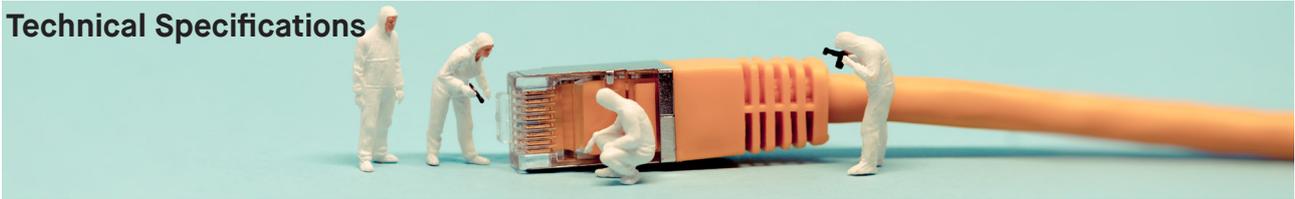
Accessories

ASR 6000 accessories include various types of SFP and SFP+ optical modules and console cable.

Waystream also offers a set of super low power SFPs that consume up to 70% less power compared to standard products. For more information refer to the Waystream datasheet for SFP products.



Technical Specifications



Physical		
	ASR 6226-AC	ASR 6326-AC
10 GE ports	Multi-rate 1 Gbps SFP or 10 Gbps SFP+	Multi-rate 1 Gbps SFP or 10 Gbps SFP+
GE ports	24 SFP multi-rate 100/1000 Mbps Gigabit Ethernet ports	24 10/100/1000 Mbps Gigabit Ethernet ports
Combo ports	4 RJ-45 10/100/1000 Gigabit Ethernet ports	4 1000BASE-X SFP Gigabit Ethernet multi-rate ports
Dimensions	43x441x240 mm (H x W x D)	43x441x240 mm (H x W x D)
Weight	4 kg	4 kg
Indicators	Interface LED indicator for link and speed Power LED indicator System LED indicator Managed LED indicator	
Acoustic	Max 50dBA noise level	
Cooling	Redundant fan. The ASR 6000 has sufficient cooling capacity when two of the three fans are working.	
Environmental		
Operating temperature	0 to 45°C	
Operating humidity	10% to 90%, non-condensing	
Storage temperature	-10 to 70°C, 14 to 158°F	
Storage humidity	5% to 95%, non-condensing	
Rack mounting	Standard 19" rack mountable	
Heat dissipation	See power consumption	
Power and Safety		
Power connector	One IEC 60320-1 C14, located on the front panel	
Power	Single power input 100-240V, 50-60 Hz	
Power consumption	ASR 6226 AC: 50 W ASR 6326 AC: 50 W	
Regulatory compliance	EN 55022 Class A, EN 55024, EN 300386 IEC/EN 60950-1, IEC/EN 60825-1 CE mark CB RoHS directive 2002/95/EC WEEE directive 2002/96/EC	

Performance

Switch ASIC performance	Forwarding rate: 65 Mbps Forwarding bandwidth: 88 Gbps
NPU Performance	800Mhz NPU with 4 cores, providing up to 10 Gbps throughput
MAC table	16K entries
VLAN table	4K entries
Multicast S,G entries	4K entries
IP routing entries	13K entries IPv4 / 3K entries IPv6
Classification	Layer 2-4 packet classification with filtering and remarking Per service packets and bytes accounting Access-list entry hit logging and packet counting
Packet queuing	Weighted round robin (WRR) Weighted fair queuing (WFQ)
Policing	4095 single/dual Token Bucket Policer with packet drop or recolor (64kbps-1000Mbit/s)
Shaping	4095 shapers with packet drop or recolor (64kbps – 1000Mbit/s)



Layer2 and Forwarding

IEEE standards	IEEE 802.3u – Fast Ethernet IEEE 802.3z – Gigabit Ethernet IEEE 802.1p and 802.1Q with full VLAN range including selective Q-in-Q IEEE 802.1 D Spanning-tree IEEE 802.1w Rapid spanning-tree IEEE 802.1x Port authentication with RADIUS VLAN/Service template assignment
Link aggregation	Up to 16 groups, 4 interfaces per group

Virtual Private Networking

L3 tunnels	L2TPv3 with Transparent Ethernet bridging and port forwarding GRE Up to 200 tunnel interfaces
L2CP	Layer2 Control Protocol Tunneling over VLANs
GRE	IP over GRE



IP Routing and Forwarding

Interfaces	600 Layer3 interfaces
ECMP	Up to 4 paths
Multicast	4096 S,G IPv4 multicast forwarding entries Per port and per VLAN replication PIM SM / SSM IGMP v2, IGMPv3
Unicast	OSPFv2, OSPFv3, BGPv4, IS-IS, policy-routing

Other features

Management	Industry standard CLI with debugging, configuration and management RS232 serial console to access the CLI Telnet SNMP PFDP – PacketFront Device Protocol SNMP v1, v2c and v3 Syslog NTP LLDP
System boot	BOOTP client for address assignment
Flow export	Netflow version 9
DHCP	DHCP relay agent DHCPv6 relay agent IP spoofing protection Wirespeed IP fragment inspection Per layer 3-interface packet shaper for packets destined to the control plane
Security	Restricted multicast access with IGMP join-filter UNI isolated ports MAC Forced Forwarding for IPv4 including automatic gateway and server snooping DHCPv4 snooping for anti-spoofing Lawful Interception X1 and X3 interface
Mirroring	Interface mirroring to local interface Interface mirroring over GRE to remote Wireshark or other packet capture tool
RADIUS	Radius based service control (BNG)
PPPoE Server	PPPoE server operation for 576 users with PAP/CHAP authentication

Service and Support

Waystream provides several different support options with a defined Service Level Agreement (SLA) to give you the mix of technical support and hardware replacement services that best suits your needs. We are committed to help you protect your investment and our Technical Assistance Center team, or approved Partners, are ready to handle all your support issues.

Through our support web site, we provide software updates and upgrades, and has an extensive Knowledge Base for both general network topics and product specific questions. You will also find documentation, release notes, product specifications and other useful information to help you achieve the best results with our products.

Training

Waystream offers on-site and online training programs to enhance the skill and knowledge of your network engineering teams. For further details, please contact sales@waystream.com.

Purchase your ASR 6000

To find out how you can join the growing number of networks using the ASR 6000, please contact your local partner or sales@waystream.com.



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Smart network solutions because end users matter.

ABOUT WAYSTREAM

Waystream develops and sells high-quality and advanced digital infrastructure, such as routers and switches. With our products and expertise, we make it possible for telecom operators, service providers and city networks to offer reliable and user-centric network services with the best features. Our products are smart, simple to configure and maintain, and are designed to create the best end user experience.

Waystream AB Färögatan 33 SE-164 51 Kista Sweden
waystream.com

