

ASR6000 GTTH switch

Full service flexibility for the network edge

The ASR 6000 is a Layer 3 Gigabit Ethernet access switch with wire speed switching and IPv4/IPv6 routing performance designed for data, voice and video service control. Using an onboard Network Processor, the ASR6000 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 ASR6000 is used by service providers, network operators and city networks for FTTH broadband service delivery, as a Gigabit Ethernet aggregation switch and office router.

- ✓ Reduced costs for operations
- ✓ Improved quality on services
- ✓ Easy access to all connectors via the front panel
- ✓ Simplified Gigabit transition with multi-rate SFP support and combo-ports
- ✓ Wire-speed routing and switching for both IPv4 and IPv6

Product Overview

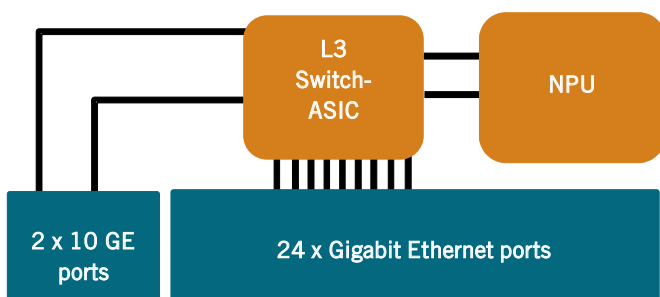
The ASR6000 is a Layer 3 access switch designed for network edge service control, network aggregation and high-performance IPv4 and IPv6 routing.

The ASR6000 provides network operators, service providers, city networks, as well as small and medium sized companies, with a versatile tool for their routing and switching needs.

The ASR6000 is filled with features to deliver voice, video and data services and builds on the experience of over 1,000,000 deployed fibre-to-the-home ports of previous generation ASRs.

ASR6000 hybrid architecture

A hybrid switch-ASIC and NPU architecture makes it possible for the ASR6000 to deliver wire speed L2- and L3 switching with per-client service enforcement, as well as NPU-enabled features; such as Realtime Protocol Monitoring of TV multicasts, and the programmable script motor that offers customized service control with autonomous self-configuration.



ASR6000 hybrid architecture

The AS6000 can activate services on-demand in accordance with policy decisions made either autonomously by the ASR or by an external server, for example a RADIUS or DHCP server.

The ASR6000 is available in two models; either with 24 RJ-45 copper (ASR6126) or 24 SFP (ASR6026) 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

Script motor

The programmable script motor allows customized and autonomous service control. 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 ASR6000 which reduces investment costs in the OSS system for service providers when new services are deployed in the network.

802.1x or DHCP messages activate a script in the ASR6000. The script uses programming logic to determine what actions to take.

Examples of script actions are:

- An authentication request may be sent to a RADIUS server, which can respond with attributes that the script converts into configuration parameters, such as bandwidth control.
- Content of DHCP server responses can be analysed – for example if an IPv6 prefix delegation option is present, a static route for the prefix can be installed by the script.

Service Templates

The ASR6000 supports the concept of service templates. A service template consists of the configuration commands to activate a particular service. When a trigger packet is received, the ASR6000 can interact with a central server to determine which service to activate for a client and then perform self-activation of configuration commands. This allows per-client defined service parameters, such as bandwidth and QoS.

Per-client bandwidth control with advanced scheduling

The ASR6000 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 can use upto one Gigabyte of memory 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.

Quality improvements to TV

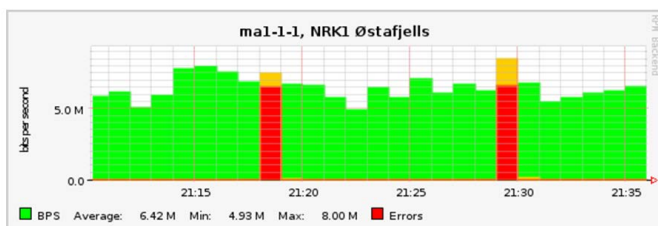
Particularly in Fibre-To-The-Home networks, TV distribution using IP multicast is commonplace. Networks are deploying hundreds of TV channels, yet the average high-speed access switch has modest packet buffers. If the multicast source (TV playout) generates a bursty media stream, then the combined load of unicast- and multicast traffic can cause buffer exhaustion and packet drop. This is then experienced by the end-user as a frozen picture, or even as a loss of the video service.

The ASR6000 is able to shape bursty multicast traffic using the NPU which will benefit any switch-based access network downstream of the ASR because the traffic pattern of the multicast stream is evenly distributed.

Quality inspection of TV

The ASR6000 can also inspect multicast MPEG transport streams, supporting MPEG over RTP as well as UDP. The ASR6000 collects and analyzes metrics at RTP level, Transport Stream level and Packetized Elementary Stream level.

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.

Efficient use of IPv4 address space

In Layer 3 mode, each port on the ASR6000 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 ASR6000 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 scarce IPv4 address space.

Support for dual stack services

The exhaustion of IPv4 addresses means that IPv6 deployment is now becoming mandatory in many networks. ASR6000 supports IPv6 unicast forwarding. Policies for traffic management and QoS also support IPv6 which means that a client can use either IPv4 and IPv6, or both.

Order items

The following table describe the main order items in the ASR6000 family.

Order items	
Article	Description
ASR6026-AC	ASR 6026, 2 1/10 GE (SFP+) + 24 port 100/1000BASE-X (SFP) with four combo RJ-45, AC power, iBOS included
ASR6126-AC	ASR 6126, 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

Accessories

ASR6000 accessories include various types of SFP and SFP+ optical modules.



Features

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 / 6K entries IPv6
Classification	Layer 2-4 packet classification with filtering
	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 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 GRE Up to 200 tunnel interfaces
L2TPv3	Transparent Ethernet bridging over L2TPv3 Port forwarding over L2TPv3
GRE	IP over GRE



IP Routing and Forwarding

Interfaces	300 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

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
System boot	BOOTP client for address assignment
Flow export	Netflow version 9
DHCP	DHCP relay agent
	DHCPv6 relay agent
Security	IP spoofing protection
	Wirespeed IP fragment inspection
	Per layer 3-interface packet shaper for packets destined to the control plane
	Restricted multicast access with IGMP join-filter
	UNI isolated ports
	MAC Forced Forwarding
	DHCPv4 snooping for anti-spoofing
Mirroring	Interface mirroring to local interface
	Interface mirroring over GRE to remote Wireshark or other packet capture tool

Physical		
	ASR6026-AC	ASR6126-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 ASR6000 has sufficient cooling capacity when two of the three fans are working.	

Environmental	
Operating temperature	0 to 40°C, 32 to 104°F
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 6026 AC: 50 W ASR 6126 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

Service and support

Waystream provides several different support packages with a clearly 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.



Purchase your ASR6000

With over 10 years' experience in the FTTH industry, Waystream offers individual pricing and purchasing terms. Our experienced sales team will assist you in making the best buy possible, based on your specific needs and current situation.

To find out how you can join the growing number of Gigabit To The Home networks using the ASR6000 switch, contact sales@waystream.com.