

# AlgoMatch™

## Inside

### **Arista AlgoMatch**

A unique Arista innovation combining software and hardware, enabling more flexible and scalable solutions for access control, telemetry and enforcement based networking for modern datacenters evolving to hybrid cloud.

AlgoMatch is a superior architecture that delivers an efficient packet-matching algorithm and takes advantage of the flexibility and programmability available in today's advanced merchant silicon.

AlgoMatch allows for:

- "User Defined Filters" where packet classification is based on offsets for custom actions
- Advanced counters for accounting and security auditing
- Richer network policy that would exhaust resources in a TCAM solution

Organizations large and small are embracing cloud-based approaches in their datacenter to achieve greater levels of agility and operational efficiency, enable them to respond to ever increasing data volumes and balance both capital and operational expenses.

Greater network scale, dense virtualization, containers, big data and analytics have changed the requirements around network and application security, protecting critical data and addressing the requirements for business continuity. Legacy network architectures are struggling to keep up with these requirements, while providing improved application visibility and a flexible network security policy at scale. This is leading network architects to rethink their datacenter architectures.

### Traditional Legacy Approach

Apply enforcement at the Core and Aggregation tier

Provision Static Traffic Matching

IPv4 Optimized policy

Follows a rigid architecture

Opaque resource utilization, prone to unpredictable overloading

Enforces silo approach to application policy

### Cloud Requirement

Deploy policy flexibly at leaf and spine layers

Highly dynamic policies

Scale both IPv4 and IPv6 equally

Programmable and reusable

Highly deterministic resource usage

Built to scale with applications

### The Legacy Approach is Status Quo

Existing options for implementing network policies rely on the use of technology that has not evolved for over 20 years. The workload and workflow flexibility requirements in today's highly dynamic cloud networks require the underlying infrastructure to be free of the limitations of rigid approaches to network policy control mechanisms.

Ternary Content Addressable Memory (or TCAMs) have been the primary technology for packet classification for multiple generations of networking products, but typical TCAM-based solutions aren't optimal for today's flexible cloud networks:

- Power inefficiency and a fundamentally expensive technology make it hard to achieve both scale and precise classification at the same time. For instance, IPv6 is especially challenging in many TCAM-based designs because of the larger size of the IPv6 addresses that requires two entries, halving capacity.
- Limited flexibility for application-specific matching, L4 filtering and deep packet matching lead to an expansion of rules consuming multiple TCAM entries and reducing capacity.
- Complex internet facing policies with thousands of entries and ranges require a more programmable solution as they hit the TCAM scale limits of many standard systems.
- TCAMs use a lot of power and have high heat dissipation which limits the use of larger capacity as it forces lower system performance.
- TCAMs are expensive so system designers use as little as possible, either on chip or external.
- TCAM is dedicated to a single fixed function and is inflexible.
- TCAM is used for policy and QoS functionality meaning a trade off is required in implementing both features.

These challenges with expensive and power-hungry TCAM based policy in turn lead to the creation of dedicated application silos, with security policy being enforced using expensive core routers at the aggregation and core tier where the resources are deployed. This lack of flexibility imposes sub-optimal hierarchical design choices and artificially restricts traffic flows in two tier leaf and spine designs.

A new solution is needed that combines more programmable enforcement mechanisms for the latest high performance leaf and spine switches and addresses the limitations of TCAMs.

## Introducing Arista AlgoMatch

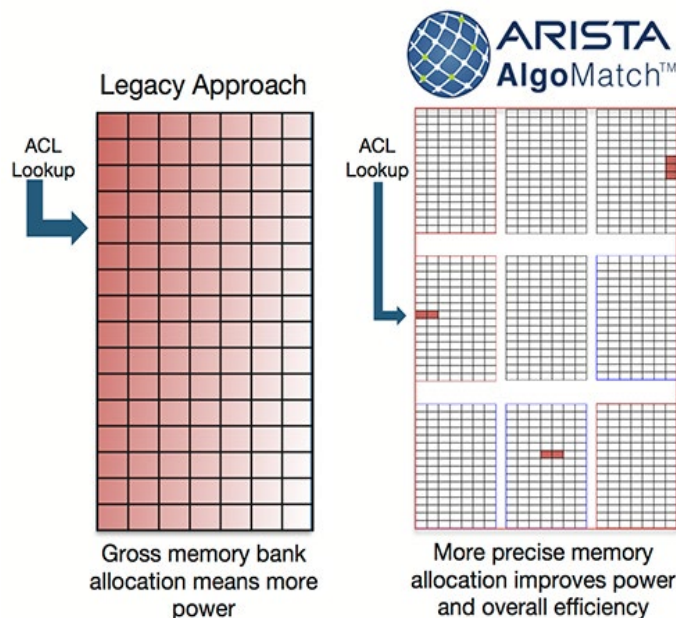
Driven by the requirements of cloud customers, Arista AlgoMatch technology is a unique Arista innovation combining software and hardware. It enables more flexible and scalable solutions for access control, telemetry and enforcement networking whether the requirements are an on-premises or hybrid cloud model.

By combining power-efficient and low-cost general purpose memory technology with Arista advanced software algorithms, AlgoMatch provides greater scale, performance and efficiency compared to common standard implementations with merchant silicon systems and TCAM. The scale of AlgoMatch is 2-6x greater without losing system density or increasing power.

In a typical TCAM solution, as additional lookup capacity is added, the power increases inline with the scale. AlgoMatch utilizes power-efficient searching, only checking locations needed, and as a result lowers power draw by as much as 50% compared to TCAMs.

AlgoMatch utilizes a flexible and efficient packet matching algorithm with variable lookup sizes, rather than a fixed size lookup with TCAM. This enables full flow matching against source and destination criteria, or parts of the mask, and allows for multiple actions to be performed on a single packet or flow, with user defined filters for packet classification and custom actions in a single pass.

AlgoMatch does not expand L4 rules to deliver flexible matching for complex L4 rules. To identify a specific pattern, users can define custom application filters that look deeper into the header of encapsulated frames. A policy with multiple actions is not typically possible with a TCAM solution without using recirculation of chained lookups. However, with AlgoMatch, multiple actions can be applied in a single pass (i.e. Access Control, Telemetry and Counters) without losing either features or performance.



There are several use-cases for AlgoMatch that leverage the increased scale, v6 optimization, L4 efficiency, and more powerful filter logic. With approximately 2-4X more capacity and support for IPv6 addresses at the same capacity as IPv4, AlgoMatch is effective for both the datacenter edge and complex routing use cases. Custom application filters and deep packet matching using a consistent set of semantics allow precise matching. Complex internet and intranet policies can be accommodated with AlgoMatch due to the flexible design and lower resource utilization. Application level matching and range filtering with Layer 4 (TCP and UDP) rules are enabled without a compromise of the rule precision.

### Summary

Every organization shifting from legacy architectures to cloud based models (public, private or hybrid) is facing the triple challenge of access control, telemetry and policy enforcement. To cater to these new models, network architects have to look at new designs for greater flexibility, scale, agile network policy implementation around dynamic application workloads and virtualized services at cloud scale.

The Arista AlgoMatch solution delivered on a range of market leading high-density 10G/25G/40G/100GbE fixed and modular switches enables organizations large and small to leverage new cost effective and efficient methods to meet these requirements and modernize their networks.

The solution is built on Arista EOS, the world's most robust and extensible switch operating system, with powerful capabilities for network automation, network visibility and rich telemetry, in combination with EOS CloudVision®, all backed up by a world-class support organization.

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