



I28 TECHNOLOGY

QUALITY OF SERVICE

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INTRODUCTION

Internet Protocol (IP) as typically configured and deployed provides a best effort service. There are no guarantees or priorities for any application traffic. During congestion packets are dropped randomly as no differentiation is possible among the thousands of traffic flows in the IP network. Current offerings for network devices slice and dice networks by creating overlays and tunnels. During congestion, these offerings rely on bits in the packet headers to decide which packets to selectively drop without any real understanding of application needs.

Software defined WAN (SD-WAN) offerings aim to address the need to use multiple forms of connectivity. They rely on packet markings without really understanding application needs. Some SD-WAN solutions claim intelligent quality delivery by providing the ability to mark packets based on pattern matching within packet payload. With flows increasingly being encrypted and applications gaming the system by masquerading packet markings, these techniques no longer work.

Nearly all communications between endpoints in a network involve bidirectional, end-to-end packet exchanges constituting a session. But

conventional routers have no notion of end-to-end sessions. Conventional routers are independent devices that forward individual packets, indiscriminately, without knowledge of applications or sessions. They are unable to prescriptively adjust the network to satisfy the unique performance requirements of a specific application.

128 Technology believes networking can be more simple, elegant and intuitive while providing advanced security, reliability, and performance capabilities. Our vision is rooted in five basic principles:

1. IP networks should be natively session-aware
2. Security and load balancing are not standalone functions
3. Routing must evolve to be application and service-centric
4. Overlay networks are not the answer
5. Zero-trust security must be omnipresent

With these guiding principles in mind, 128 Technology created Secure Vector Routing to meet the stringent security, agility, and performance demands of contemporary networks. By associating end user applications to these bidirectional sessions, 128T is able to provide quality guarantees far superior than any other solution in the marketplace today.

Quality is remembered long after price is forgotten

-Aldo Gucci

QUALITY OF SERVICE

The 128T solution delivers guaranteed and differentiated services on any IP network. Context awareness is achieved by having end to end session visibility for all traffic in the network. This awareness affords centralized management, granular control, infused security, and dynamic traffic management, while also enabling the ability to provide unsurpassed quality of service offerings.

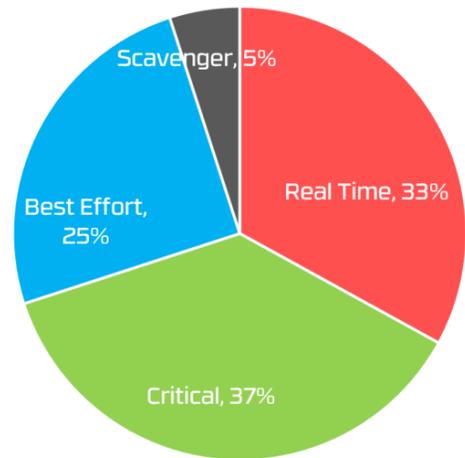
Within a 128T router, the Quality of Service (QoS) toolset will offer many functions. The 128T router will be able to offer differentiated services based on a class model. Combined with intelligent path selection, fast failover, prioritization, shaping, duplication, and error correction across the network, this QoS toolset will bring best in class quality of experience to end-user applications.

TRAFFIC CLASSES

The 128T solution supports a 4 class model. An enterprise can map traffic within their network according to application types (as shown in figure on the left) or a SD-WAN service provider can choose to provide traffic classes based on customer's needs.

The solution enables granular control of bandwidth and priorities associated with each traffic class. In the event of network congestion, these parameters ensure that application requirements for different SLAs are honored. Collectively, this ensures a superior end-user experience.

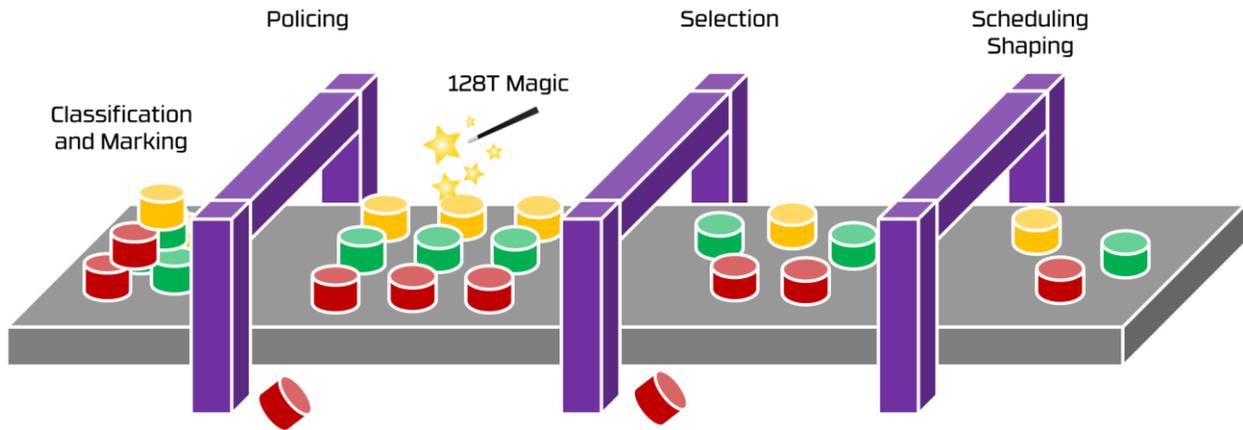
The 128T router can be operated in different trust modes to ensure that the administrator is in complete control of the overall service offering and can curb any flow trying to game the system. Intelligent session identification ensures superior experience to the end user.



TOOLS

The 128T router will support the following offerings:

- Classification and Marking
- Policing
- Selection
- Scheduling and Shaping



Classification and Marking

The 128T solution classifies traffic in order to receive a different level of treatment from other traffic classes.

Classification

The 128T router will be able to classify packets by any combination of the following options:

Layer 3	Layer 4	128T Constructs
DSCP Markings	Protocol (TCP/UDP)	Services
Source/Destination Addresses	Source/Destination Ports	

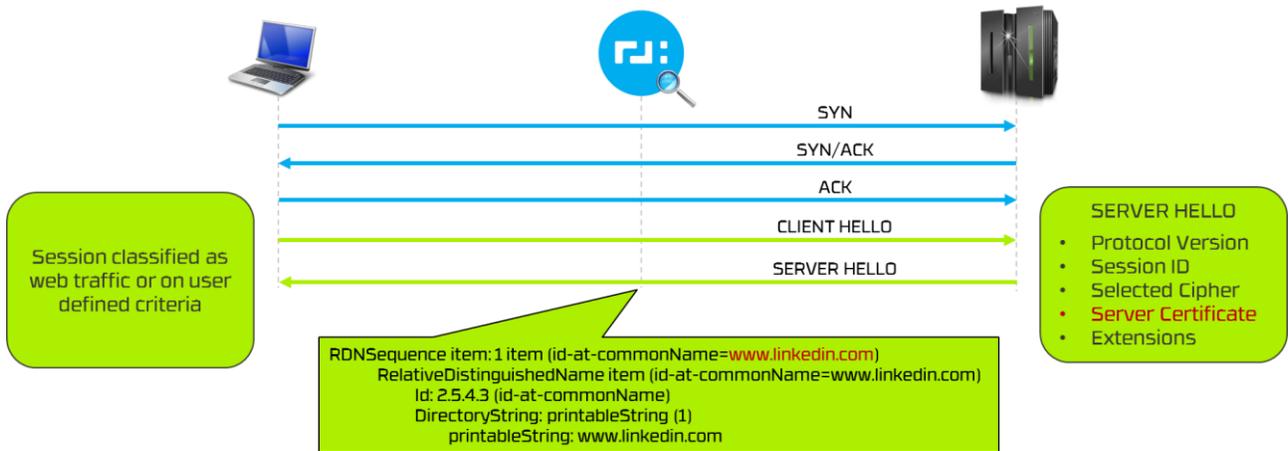
The 128T router can also perform application identification and classify packets based on the application associated with the session.

Intelligent Application Detection

With the use of WebRTC and HTTPS, some of the SD-WAN functionality such as WAN optimization and application specific enhancements like media resiliency and optimization is rendered VOID. As the traffic is already encrypted, double encryption wastes resources and increases delay. It also negates any pattern matching or DPI analysis to identify the application associated with the flow. The sessions can still benefit from dynamic path selection, error mitigation techniques, and traffic optimization offered by the 128T solution. This requires intelligent application detection. The 128T solution can offer two techniques for application detection:

SSL/TLS (HTTPS) Identification

The 128T router can identify applications that use HTTP over SSL/TLS or HTTPS. The 128T router examines the X.509 digital certificate received from the server and inspects the common name field in the SSL Handshake Protocol. This enables the 128T router to accurately identify the application associated with the session.



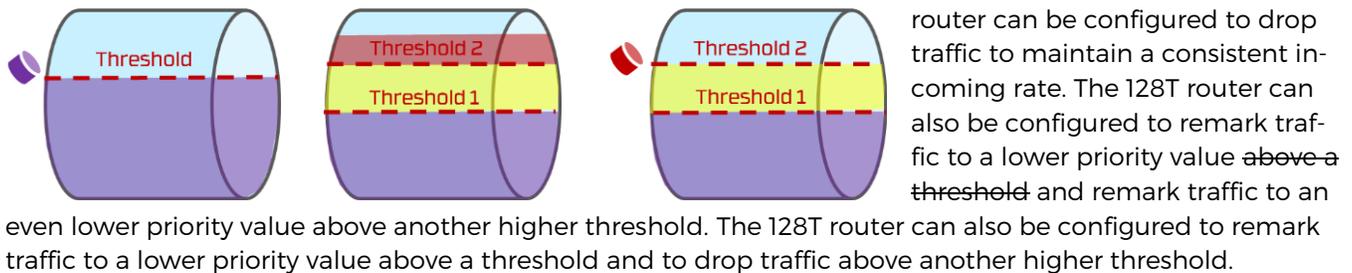
Remarking

The 128T router provides the ability to remark priority bits in packets. This will enable the administrator to define a class map for priorities from received values to required values.

These classification and remarking tools along with application identification, allow for precision QoS treatment, provides quality guarantees that business expect with next generation routing..

Policing

The 128T router can drop or markdown unwanted traffic as desired. The 128T router can be configured in three different modes to drop, remark, and drop/remark based on an interface or service class. The 128T



router can be configured to drop traffic to maintain a consistent incoming rate. The 128T router can also be configured to remark traffic to a lower priority value above a threshold and remark traffic to an even lower priority value above another higher threshold. The 128T router can also be configured to remark traffic to a lower priority value above a threshold and to drop traffic above another higher threshold.

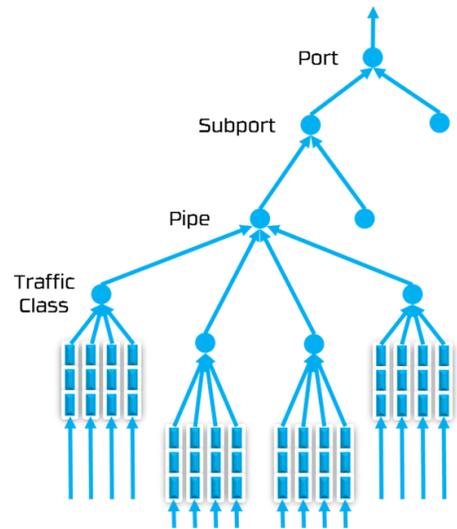
Queuing

The 128T router enables a method to provide service guarantees by enabling queuing to avoid congestion. Queuing includes scheduling and shaping. Excess traffic is dropped based on priorities to ensure that traffic from high value applications do not suffer due to applications that can tolerate loss.

An administrator can specify, by way of percentage, the allocation of weight/priority to each traffic class.

Each traffic class has four different queues. The administrator will be allowed to specify how traffic is mapped to these traffic classes. These are serviced using byte-level WRR (i.e. [WFQ](#)).

The 128T platform will drop packets to avoid congestion when exit queues are filling up. The 128T platform supports [Weighted RED \(WRED\)](#) congestion avoidance mechanism.



SUMMARY

Legacy networks are too costly, complex and inflexible for the world of on-demand applications and elastic services. The new world of IT networks requires a new network designed from the ground up with virtualization, multitenancy, and cloud-based services in mind.

Secure Vector Routing was specifically conceived to satisfy the stringent performance, agility, and reliability demands of contemporary IT networks. This new approach to networking slashes expense and complexity by eliminating inefficient tunneling protocols, overlay schemes and middle boxes, and by radically simplifying operations and control. A deterministic, session-oriented routing paradigm brings contextual awareness to routing, enabling end-to-end security and service quality while streamlining network administration. With Secure Vector Routing, obscure access control lists, firewall rules, and packet marking schemes are replaced by granular name based service control. Intelligent application detection, superior QoS capabilities with an innovative 4x4 class model, and advanced QoS techniques ensure a superior user experience.



The 128T QoS toolset provide the tools to deliver tailored services, support mission critical applications, and efficient use of network resources. The 128T QoS toolset is a must-have for delivering superior services!



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