Strategic Capabilities: Reduce the complexity, risk, and cost of supporting the new applications and services your business needs, while making SD-WAN, Virtual Edge, NaaS, and WAN/VPN refresh easier than ever.

Executive Overview
To improve efficiency, visibility, performance, and innovation, organizations are looking for new ways to bring applications and networks closer together. But most of today’s networks are still architected on the legacy belief that intelligence should reside within hosts and applications, not the network. This makes it difficult for networks to adapt to the needs of the mission-critical operations that drive business forward. It may also be leading to a number of poor networking practices that Gartner highlighted in a classic article, such as becoming overly risk averse, limiting team collaboration, using outdated WAN architectures, and making network changes manually. Left unchecked, these practices can stifle innovation and get in the way of business.

The 128T Session Smart™ Router provides a modernized, service-centric, session-oriented, and security-infused routing model for building context-aware networks. It replaces complex out-of-band routing protocols, tunnel-based network overlays, and cumbersome provisioning systems with centralized control, intelligent service routes, and in-band (metadata) signaling. At the heart of the 128T Router is Secure Vector Routing (SVR), which is a session-oriented approach that enables the network to differentiate the way it delivers applications and services with unmatched simplicity, security, and scalability. It’s also fully compatible and interoperable with existing network protocols and architectures.

Challenges
Nearly all communication between network endpoints involve packet exchanges that create a session. Both legacy and current routers treat these sessions in isolation. They forward packets independently without the intelligence to recognize that some packets are working together to form one piece of communication, and they are unaware of context.

Context-aware communications require network devices and systems to automatically adapt to the end-user’s situational information. To do this, today’s solutions require complex out-of-band routing protocols, filtering using cumbersome access control lists (ACLs), tunnel-based network overlays, and numerous provisioning systems. This leads to middlebox sprawl, routing inefficiencies, tremendous overhead, troubleshooting nightmares, and skyrocketing costs.

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Advanced software-defined networking (SDN) approaches deliver agility and cost savings primarily through centralized control, automation, and orchestration. Meanwhile, the networking architectures—whether they’re underlay or overlay—are built on a legacy model that is mired in complexity. It results in outdated security and a fragmented view of the end-to-end networking infrastructure. These shortcomings in the network can impact the business in a number of ways:

- Neglecting to make changes that would improve the network, potentially hindering application performance.
- Making manual changes to the network that require significant investments in orchestration tools and major integration efforts.
- Limiting collaboration between network, security, and IT teams and increasing costs as a result.
- Accruing technical debt over time that causes poor network performance and outages.

- Using outdated architectures not suited for modern day applications, which causes waste and requires the purchase of high-performance routers to handle traffic.
- Limiting visibility and control over the network, resulting in outages and downtime that jeopardize customer loyalty, revenue, and brand image.
- Relying on old perimeter security that allows new threats to become data breaches and cyberattacks.

128T Solution
The 128T solution, using Session Smart technology, brings contextual awareness to the network by associating transient sessions with the applications and services they support. It enables centralized management, granular control, individualized flows, integrated functions, infused security, and dynamic traffic management. These inherent benefits help the network deliver unsurpassed quality, reliability, and scale to the applications and services that help the business win.
In the process, the 128T solution eliminates the need for overlays and tunnels, and centralizes services, tenancy, and policy information. This removes the need for automation tools, minimizes complexity, improves visibility, and maximizes savings. The context-aware network can better support the business and help fuel its success. The 128T solution delivers on that strategy with the following:

- **Session Centric IP Routing** creates symmetrical bi-flows that enable packets to be intelligently routed, sessions to be controlled, and traffic to be analyzed. The solution can monitor network and session performance proactively to route traffic along paths that meet the SLA requirements for the application.

- **Highly Programmable solution** makes it possible to stretch and slice networks end-to-end, providing a single routing scheme that can be used for any combination of private and public networks.

The 128T solution operates as a distributed virtual router, inherently sharing tenancy and service information for dynamic workload elasticity. Location-independent routing ensures integrated load balancing and workload/device mobility.

- **Private-Public-Private Internetworking** offers end-to-end segmentation without tunnels and overlays. This eliminates complicated stitching operations and the requirement for orchestration as a mask for complexity.

- **Zero Trust Security** ensures each flow is encrypted and authenticated based on associated security policies. That way enterprises can offer secure micro-segmented connections or individualized VPNs to different lines of business within a large organization.

- **Dynamic Session and Application Awareness** provides load balancing and traffic steering based on session policies and the status of the network.

Session Smart technology can help businesses break free of legacy routing infrastructures and enable network innovation.

**Technical Use Cases**

The 128T solution is suited for numerous use cases. Here is an outline of a few:

**SD-WAN:** Existing SD-WAN solutions repackage legacy technologies with abstraction, segmentation, analytics, and orchestration. While this simplifies deployment and yields some level of savings, it doesn’t solve the issues associated with underlying networks. All SD-WAN solutions use two or more WAN transport networks by building an overlay network with encapsulation such as GRE, VxLAN, IPSec, DMVPN, or a proprietary tunneling technology. Overlays and tunnels attempt to offset network weaknesses and inflexibility by introducing wrappers. However, that method tends to increase complexity and costs, while impeding end-to-end networking.

- The 128T solution enables intelligent session-based tunnel-free interconnections across heterogeneous networks.

**Virtual Edge:** The network edge aggregates customer and Internet connections. That makes the edge a choke point for all traffic.

- The 128T solution enables full session-based redundancy and high availability. Session migration, duplication, and maximization ensure that traffic is delivered intelligently. Load balancing, L2-L4 firewall, SFC, and other integrated functions make the 128T Session Smart Router a one-stop solution for the Virtual Edge.

**NAAS:** enables infrastructure owners to offer network services to a third-party. Doing so requires the ability to easily enable virtualization.

- The 128T solution provides hypersegmentation and routing with words so networks can be segregated. Global service and tenant models ensure that entire networks can be easily used to support services with a simple click of a button.

**VPN/WAN Refresh:** Many enterprises are frustrated by high VPN/WAN costs and are seeking to refresh these services. By transforming their networks at the same time, businesses can fully realize the benefits of WAN updates.

- The 128T solution enables a low-cost, pay-as-you-use approach, with rich features such as load balancing, failsafe delivery, and application identification to ensure superior WAN functionality.
Key Features

The 128T Session Smart Router enables the network to maintain the following strategic capabilities:

Secure Vector Routing (SVR): 128T Routers participating in a flow maintain transient session state while that session is active. Routes are managed as vectors with inherent directionality, security, hypersegmentation, and dynamic traffic steering capabilities. The SVR architecture enables:

- Directionality: Location and session initiation
- IP address independence
- Device and workload mobility
- Guaranteed bi-flow symmetry
- Integrated stateful load balancing

SVR utilizes innovative first packet processing with metadata to recognize IP packets as IP sessions. Each IP session has directionality with a distinct starting point and end point once it’s initiated. IP sessions also consist of two flows, one in the forward direction and one in the reverse direction. After a session is established, subsequent packets in the session travel via one of two unidirectional flows, depending on their direction.

Session Smart Routing: The 128T solution enables intent-based networking by routing sessions towards services instead of IP addresses, which also supports location independence. In-band signaling ensures that sessions are established without any complex external protocols. As services move from one location to another (e.g., virtual machine mobility), the sessions can be redirected without any interruption.

Service-centric routing also provides the ability to support the same service in different locations, since the network decides where to send the traffic in real-time. This provides load and path balancing as required.

Because sessions can have unique flows, hyper-segmentation can be used to individually encrypt and authenticate them during transmission.

Service-centric Fabric: SVR adopts a Zero Trust Security (ZTS) model that guarantees that only authorized flows travel through the network. Unlike traditional routing solutions that forward packets by default using ACLs to block flows, the 128T Session Smart Router denies traffic flows by default. Sessions are only established when there is a valid service to which the tenant has access, defined explicitly by policy. These policies can be generic or granular depending on the context. This ensures a ZTS model where no unauthorized packets are ever sent across the network. As this functionality is enforced on all 128T Routers, it enables security everywhere rather than only at the perimeter of the network.

To simplify network operations, the 128T solution supports Private-Public-Private Internetworking, offering end-to-end segmentation without complicated tunnels, overlays, or stitching operations.

A session can be switched over from one path to another in less than a second, ensuring application continuity. Sessions can also be recreated to their original form when they go through dynamic NATs or when network failovers occur.

The 128T Conductor enables central administration, provisioning, monitoring, and analytics. The Conductor provides a single platform for managing multiple, geographically-dispersed routers across an authority. It can also serve as the northbound interface to an OSS/BSS.

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Summary

The 128T solution enables centralized control, simplifies deployment of context-aware networks, introduces intelligent service routing with in-band signaling, provides fine grained micro-segmentation, and infuses security based on a zero trust model.

The 128T solution goes above and beyond traditional router offerings by solving underlying network issues. The result is a context-aware network that can easily, dynamically, and securely stretch across boundaries, so organizations can build application-friendly infrastructures that support business requirements and deliver unparalleled experiences.