

Meet Stringent 5G Wireline Transport Network Performance, Scalability and Reliability Demands: Create an Adaptable, Session-Aware Network Fabric and Complexity

Executive Overview

Mobile network operators across the globe are looking to 5G to drive the next wave of business growth. The GSMA projects the number of global 5G connections to reach 1.8 billion by 2025. And industry analysts expect worldwide 5G service revenues to exceed \$354 billion by 2027.

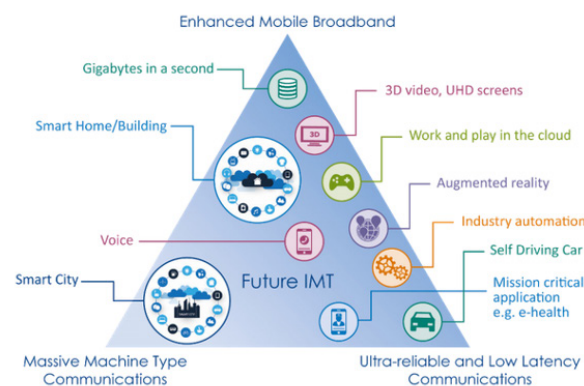
5G networks will transport an unparalleled volume, velocity and variety of data, creating unprecedented architectural challenges for MNO network planners. Legacy 4G wireline transport networks, designed to support best-effort 1 Gbps mobile broadband services can't meet the increased performance, scalability and resiliency demands of the 5G era. Most rely on high-overhead, tunnel-based network architectures that are inherently inefficient and expensive. MNOs must rearchitect their underlying transport infrastructure to fully monetize their 5G investments.

The 128T Session Smart Networking solution is an advanced, service-aware networking solution that eliminates the inherent inefficiencies and cost constraints of traditional networking products and legacy SD-WAN solutions. The 128 Technology solution provides an adaptable, tunnel-free fabric that meets stringent 5G wireline transport network scalability, performance and availability requirements. Ideal for deployment at remote unstaffed RAN sites, the software-based solution runs on low-cost COTS servers and supports zero-touch provisioning and single-pane-of-glass, centralized management for simple installation, administration and maintenance.

Challenges

Mobile network operators across the world are turning to 5G to expand markets and grow revenues. By boosting data rates, reducing latency and increasing endpoint densities, 5G networks lay the foundation for a myriad of new applications from smart IoT systems, to virtual and augmented reality apps, to self-driving cars.

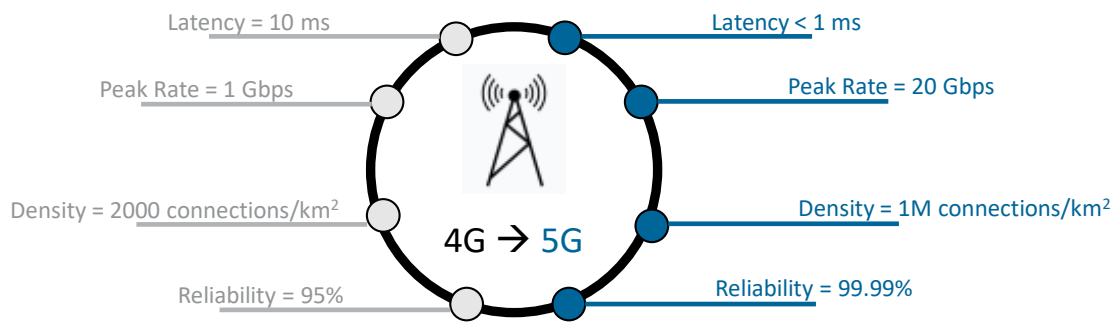
Industry analysts project global 5G service revenues to exceed \$354 billion by 2027



¹ [The Mobile Economy 2020](#), GSM Association, 2020.

² 5G Services Market Estimates & Trend Analysis to 2027, Grandview Research, 2019

5G networks will help MNOs improve differentiation and move up the value chain, but they pose difficult challenges for network planners. 5G wireline transport networks will carry an extraordinary variety, volume and velocity of application data and machine-to-machine (M2M) traffic, introducing unprecedented scalability, performance and reliability requirements.



5G Poses Unprecedented Scalability, Performance and Reliability Challenges

Massive Scalability and Density Requirements

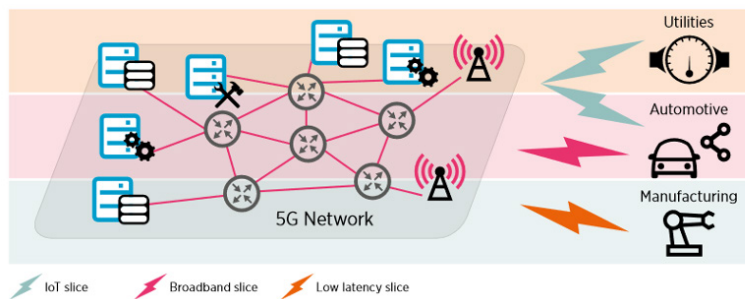
5G networks must support vast numbers of connected endpoints. The 5G specification supports up to 1 million devices per square kilometer compared to around 2000 devices per square kilometer with 4G!

Unparalleled Performance Requirements

5G networks must support ultra-high-speed data rates (up to 20 Gbps) for bandwidth-intensive applications like UHD video, as well as ultra-low latency (<1 ms) communications for delay-sensitive applications like self-driving cars.

Strict SLA Requirements

5G networks must support diverse applications with distinct characteristics and QoS requirements. Some application data like autonomous vehicle and industrial control data is latency-sensitive. Other dataflows like 4K and 3D video streams are bandwidth-intensive. 5G introduces the notion of network slicing—subdividing the network into multiple virtual networks that provide different service assurances for different types of applications.



Network Slicing Carves the Network into Multiple Virtual Networks with Distinct SLAs

Stringent Reliability and Availability Requirements

5G data services will often be used in mission-critical applications where network disruptions can hinder productivity or impair business performance. They will also be used in public safety applications (emergency services, healthcare, video surveillance) where network interruptions can lead to property damage, injury or loss of life. 5G wireline transport networks must provide persistent connectivity in the event of equipment problems or link failures.

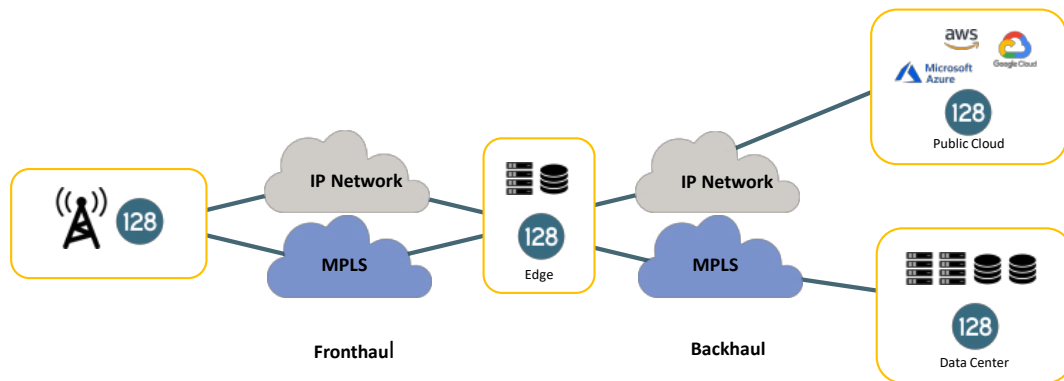
4G Transport Network Architectures Aren't Well Suited for 5G

Conventional branch office networking products and legacy SD-WAN solutions are inherently expensive and complicated, and can't meet the increased price-performance and agility demands of the digital era.

- **Performance constraints.** In most 4G architectures, RAN traffic is tunneled across the transport network and 'hair-pinned' to the core, which can add latency, degrade application performance and impair service quality.
- **No service assurances for 5G network slices.** Most 4G networks overlay all dataflows into a single tunnel, which inhibits traffic classification and management. Since all flows are treated identically, there is no way to provide different service assurances for different classes of applications.
- **No visibility into sessions or application data.** Because all dataflows are encapsulated into a single overlay tunnel, network administrators cannot monitor or troubleshoot individual applications or sessions.
- **Poor bandwidth utilization.** High-overhead VPN tunneling protocols like IPsec squander bandwidth, impairing data throughput and application performance.
- **Costly, inefficient redundancy mechanisms.** Most 4G transport networks rely on hot-standby tunnels for failover. Backup tunnels are always nailed up, but rarely used—an expensive and wasteful approach.

128T Session Smart Networking Meets Stringent 5G Scalability, Performance and Resiliency Demands

The 128T Session Smart Networking solution is an advanced, service-centric networking solution that takes software-defined routing to a new level. The solution eliminates the inherent inefficiencies and cost constraints of traditional routing products and legacy SD-WAN solutions, providing an adaptable, service-aware fabric that meets stringent 5G transport network scalability, performance and resiliency requirements.



128T Session Smart Networking Unleashes Performance and Scalability

Performance and Scalability

128T Session Smart Networking supports a variety of session optimization and intelligent routing features to ensure high performance and service quality for diverse dataflows. The solution supports up to four times the hardware performance of alternative solutions. Tunnel-free bandwidth savings improves throughput by 40%. Fine-grained QoS controls efficiently shape and prioritize traffic to enforce different SLAs for different network slices. Innovative application-aware routing intelligently steers traffic based on administratively defined policies and real-time network conditions, automatically selecting the right network path for the right application at the right time. Unique lossless application delivery capabilities optimize bandwidth utilization, helping improve data throughput over high-latency or lossy connections. And load-balancing features distribute traffic across diverse paths to optimize application performance and availability.

Dynamic Edge Service Discovery

The 128 Technology solution automatically discovers MEC nodes and dynamically detects where services are located, using an innovative Service and Topology Exchange Protocol (STEP) that maintains global service, tenancy and policy information. STEP automatically propagates topology and service changes, obviating the need to manually update routers when MEC nodes are added, removed or reconfigured.

Reliability and Availability

128T Session Smart Networking is designed to provide high availability and continuous connectivity. Active-active router configurations provide stateful failover in the event of equipment problems. And multipath session migration features ensure persistent connectivity in the event of link failures or network outages.

Ultra-Fast, Persistent Mobility

128T Routers use a unique location-independent, waypoint-based routing approach that enables ultra-fast, persistent mobility. Waypoint addresses are independent of and distinct from UE IP addresses (which can change as users change locations). When a UE moves off one gNB/eNodeB and sends packets from another gNB/eNodeB, the receiving 128T Router automatically detects the UE and preserves the session. The 128 Technology approach avoids hair-pinning or complex signaling protocols, providing session continuity and high-speed mobility. (5G supports mobility speeds of 500 km/h, compared to 350 km/h for 4G.)

Security

The 128 Technology solution protects 5G wireline transport networks against data leakage and malicious attacks. Integral security capabilities include deny-all (zero trust) routing, Layer 3/4 DoS/DDoS protection, payload encryption, and NAT and VPN functionality. 128 Technology's pioneering Secure Vector Routing provides strong data security without the overhead of traditional encryption protocols like IPsec. The tunnel-free architecture also gives MNOs full visibility into individual dataflows, so they can efficiently monitor end-to-end sessions, track KPIs and troubleshoot problems.

100% Software-Based Solution Eliminates Cost and Complexity

128 Technology's solution is fully software-based for ultimate flexibility and economics. The software runs on any commercial off-the-shelf or white box server platform, including ruggedized platforms for harsh environments. 128T Session Smart Networking slashes cost and complexity, eliminating the middlebox and VNF sprawl that plague traditional networking solutions and legacy SD-WAN solutions. Unlike with a traditional service function chaining approach, the 128 Technology solution performs multiple logical network functions (e.g. MEC service chain instances) in a single VNF, significantly reducing CPU and memory requirements. As a result the 128 Technology software can run on far less expensive servers than legacy SD-WAN solutions. Better still, the 128T Session Smart Networking solution supports zero-touch provisioning and single-pane-of-glass, remote management for simple deployment, administration and maintenance.

128T Session Smart Networking Outperforms Traditional Solutions

128T Session Smart Networking provides high performance, security and resiliency for 5G wireline transport networks while avoiding the cost and complexity of traditional routing products and legacy SD-WAN solutions. The table below summarizes some of the important advantages 128 Technology offers over alternative solutions for key 5G requirements.

Requirement	Traditional WAN and Legacy SD-WAN	128T Session Smart Networking
Ensure high scalability and performance	High-overhead tunneling protocols squander bandwidth and impair the performance of delay-sensitive applications.	Secure Vector Routing minimizes protocol overhead. Lossless application delivery optimizes bandwidth utilization and boosts application performance.
Enable network slicing	Tunnel overlays inhibit traffic management and prevent application-specific SLAs.	Fine-grained traffic management and application-aware routing enable application-specific, policy-based SLAs.
Protect data privacy	Tunnel overlays safeguard data privacy, but limit visibility and control.	Secure Vector Routing protects data privacy, while enabling granular traffic management and visibility.
Ensure continuous connectivity	Idle hot-standby tunnels are costly and inefficient.	Multi-path session migration provides cost-effective protection against link failures and network outages. Active-active router configurations provide high availability.
Simple and affordable deployment	Special-purpose middleboxes or dedicated VNFs add cost and complexity.	128 Technology consolidates all network functions onto a single VNF for ultimate simplicity and economics.

³ [128 Technology 128T Session Smart Routers Scale & Performance](#). Tolly Report #220100, December 2019

⁴ [Tunnel-Based versus Tunnel-Free SD-WAN](#), 2020

SUMMARY

5G introduces unprecedented scalability, performance and reliability challenges for MNO network architects. Extraordinary numbers of endpoints will generate massive volumes of diverse data that must be transported in an efficient, reliable and secure manner. Legacy 4G networks, engineered to deliver best-effort data services, aren't well suited for 5G deployments.

128T Session Smart Networking takes software-defined, distributed routing to the next level, satisfying demanding 5G performance, scalability and resiliency requirements. A tunnel-free architecture, combined with intelligent service-based routing provides granular control over individual sessions, supporting network slicing with ultimate efficiency and economics.

The 128 Technology solution ensures highly secure and reliable connectivity without the performance tax or cost overhead of traditional VPN tunneling schemes. Integral bandwidth optimization capabilities boost data throughput over high-latency or lossy connections. And persistent multi-path routing and high availability router configurations ensure continuous connectivity in the event of link, network or equipment failures.

To learn how the 128T Session Smart Networking solution can help your business meet stringent 5G performance, scalability and availability demands contact 128 Technology today.

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ABOUT 128 TECHNOLOGY

At 128 Technology we help our customers radically reinvent their digital futures based on a new model for virtual networking called Session Smart™. Session-smart networking enables enterprise customers and service providers to create a service-centric fabric that's more simple, agile, and secure, delivering better performance at a lower cost. Whether your enterprise is moving your business to the cloud, modernizing the WAN edge, seeking more reliable unified communications or pursuing an industrial internet of things (IIoT) initiative, session smart networking re-aligns networks with digital transformation initiatives.