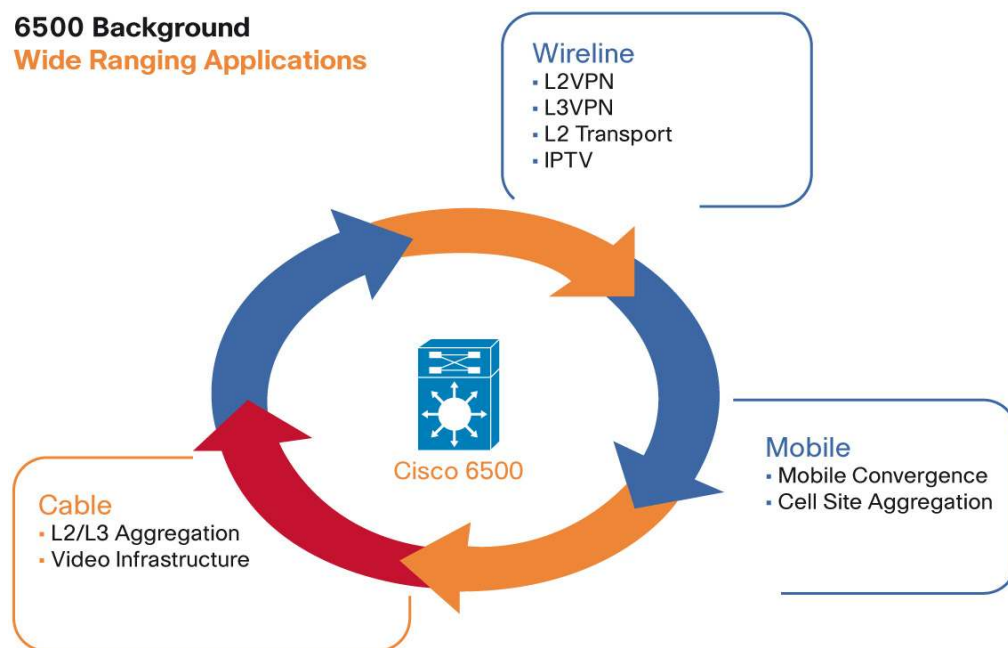


## Enabling Service Provider deployment with the Catalyst 6500 Supervisor Engine 2 Terabit (2T)

The increase in demand for video and e-business application services requires service providers to offer both increased bandwidth and enhanced network services. The next-generation Cisco® Catalyst® 6500 Supervisor Engine 2 Terabit (2T) provides enhanced scalability and enables additional services natively without requiring WAN (SPA Interface Processor [SIP-400/SIP-600] or ES+) cards for service provider Multiprotocol Label Switching (MPLS) features.

Cisco Catalyst 6500 with Supervisor Engine 2T supports a wide range of applications, and it cannot be deployed in different service provider environments. (See Figure 1.)

**Figure 1.** 6500 Deployment in Service Provider Space.



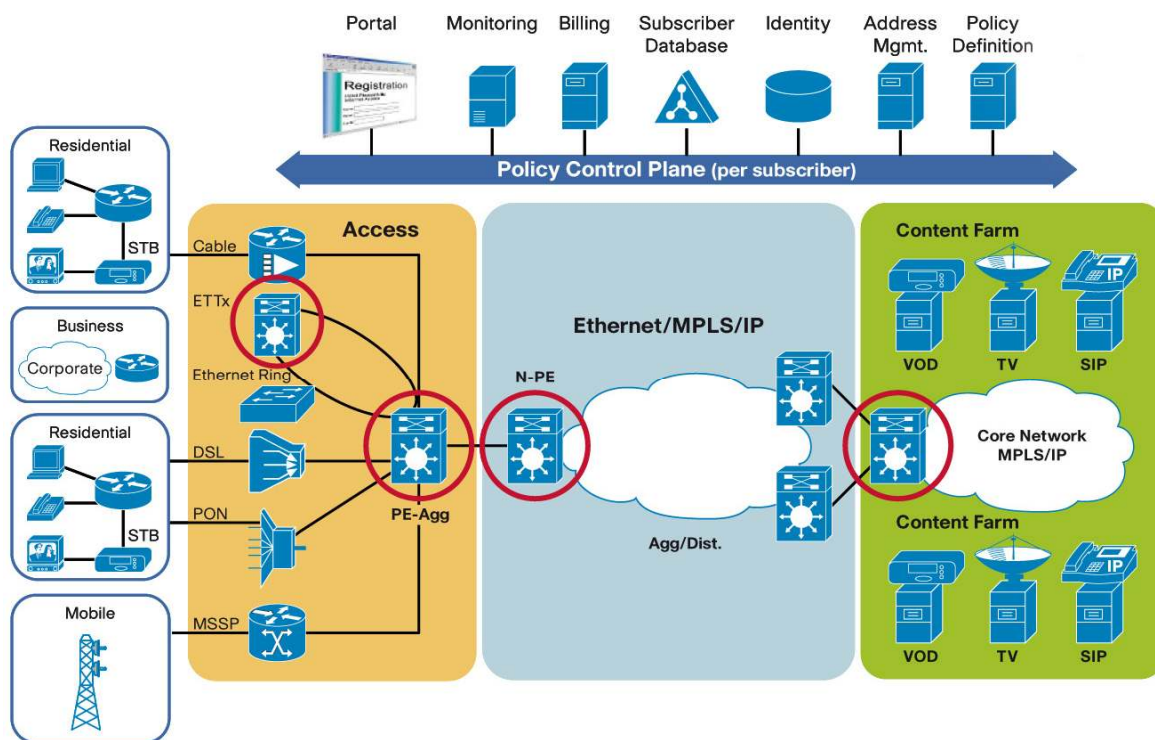
### Service Provider Requirements

The evolving services and network convergence of service providers require a network infrastructure able to fulfill the following requirements:

- **Scalability:** Offer high switching performance and bandwidth availability to support bandwidth-intensive applications and enable new services without operational effects.
- **Flexibility:** Offer flexibility of port densities, and various connector types with long-reach optics. Offer the ability to integrate “triple play” and TLS services based on Layer 2, IP, and MPLS technologies.
- **Feature richness:** Offer differentiators to enable metropolitan services, such as MPLS, IPv6, and multicast.
- **Security:** Protect service provider resources and guarantee subscribers’ traffic isolation and authentication.

- **High availability:** Maximize service uptime and reduce mean time to recovery (MTTR) and mean time between failure (MTBF).
- **QoS:** Enable voice, video, and data on the same platform, with jitter, latency, and packet loss guarantees.
- **Manageability:** Ease service provisioning, improve operational efficiency, and reduce OpEx costs.

**Figure 2.** Cisco Catalyst 6500 SUP 2T Service Provider Architecture.



### Cisco Catalyst 6500 Series: The Foundation

The Cisco Catalyst 6500 Series is the premier Cisco switching platform for the access, aggregation, and core edge of the service provider network with the following primary advantages:

- 2-Tbps integrated switch fabric capacity with Cisco Catalyst 6500 Series Supervisor Engine 2T
- Ability to scale from 60- to over 720-Mpps switching performance with distributed forwarding
- High-density Gigabit and 10-Gigabit Ethernet support and support for 40-Gigabit Ethernet
- End-to-end architecture and features consistency with Cisco ME 6524, Cisco Catalyst 6500 Supervisor Engine 32, Supervisor Engine 720, and Supervisor Engine 2T
- High-performance CPU for Layer 2 protocol convergence and stability
- Optimized switching capabilities with centralized and distributed MAC learning in hardware
- Optimized performance with jumbo frame support, deep packet buffers to handle bursty traffic, and low latency to minimize response times of real-time applications
- Innovative mechanism to scale the number of service instances and MACs in a Layer 2 network
- Support for a broad range of connectivity options by offering 10/100, 100BASE-X SFP, 10/100/1000, Gigabit Ethernet SFP, and 10-Gigabit Ethernet line cards
- Enhanced service richness in the same platform by supporting Layer 2 service enablers such as access and 802.1Q trunk ports, hardware-enabled 802.1Q tunnels, VLAN translation, EVC, and Layer 2 Protocol Tunneling

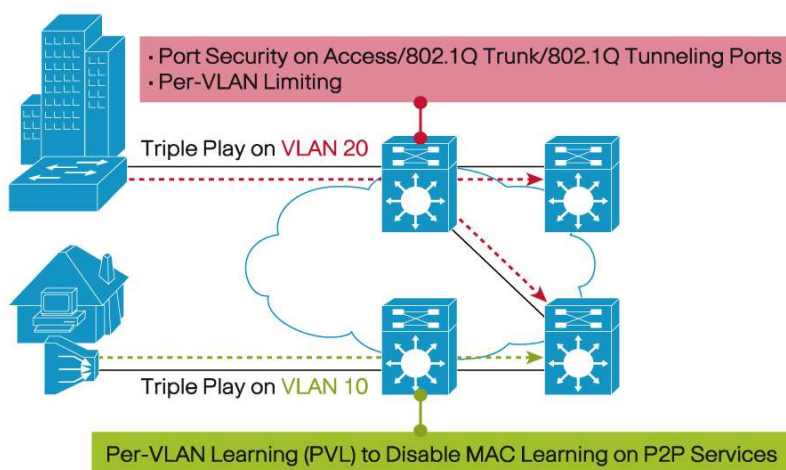
- Full IEEE compliancy and third-party interoperability through IEEE 802.3ad, 802.1w, and 802.1s
- Support for next-generation Layer 2 networks through standard IEEE 802.1ad implementation

For more information please refer to the [SUP2T Architecture](#) Whitepaper.

## Security

- Memory protection, fault containment, and improved scalability through dedicated TCAMs for ACLs, security, and QoS deployments
- Protection of the service provider's network against DoS attacks, enabling Control Plane Policing and hardware rate limiters
- Flexible mechanisms to safeguard service provider's MAC table and optimize MAC learning

**Figure 3.** Security Mechanisms to Protect Service Provider MAC Table



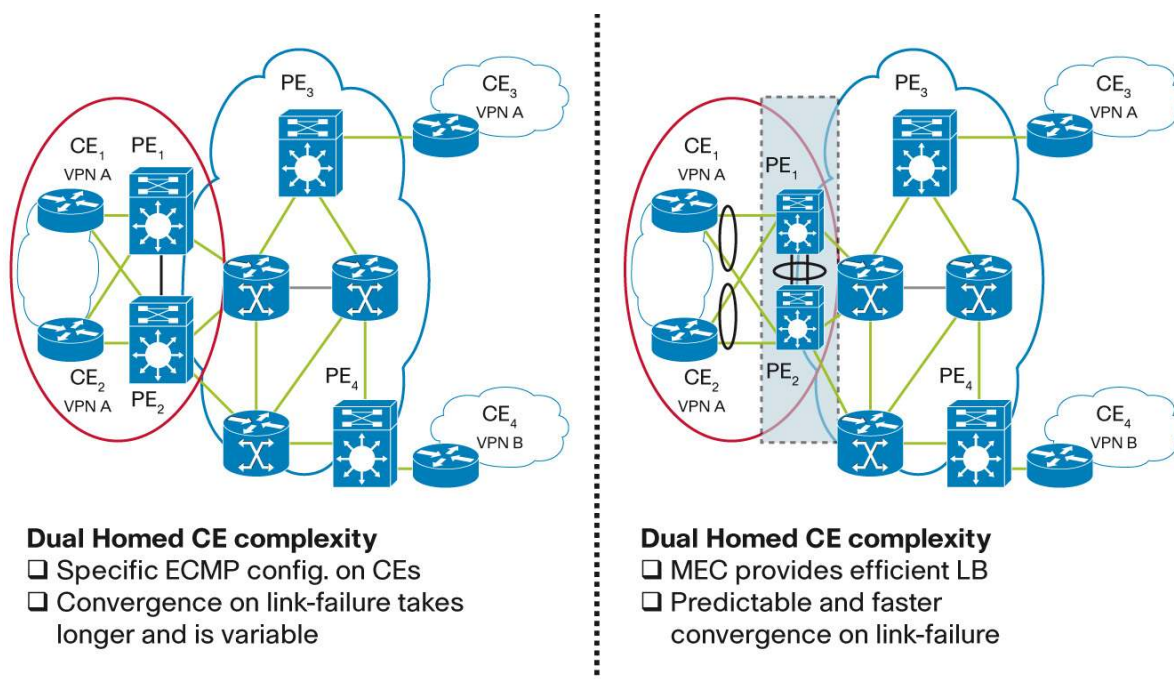
- Protection of service provider's CPU through port-, VLAN-, and MAC-based ACLs enabled in hardware
- Protection from unauthorized end users through 802.1x, DHCP snooping, and dynamic ARP inspection
- Subscribers' protection and traffic isolation through private VLANs and private hosts
- Link security with 802.1AE-based encryption

For more information refer to the [CoPP](#) and [802.1AE](#) guides on SUP2T.

## High Availability

- Hardware redundancy for fans, power supplies, fabrics, and clocks for nonstop operation
- Complete separation of control and data planes for enhanced resiliency
- Optimized Layer 2 fast convergence by enabling IEEE 802.1w (RSTP) and IEEE 802.1s (MSTP) improved Layer 2 fast convergence over hub-and-spoke topologies by enabling Flexlink to obviate the need for Spanning Tree
- Leadership in high availability and service uptime; stateful switchover (SSO) to help ensure minimal traffic loss and subsecond recovery in Layer 2 networks upon primary supervisor failure
- Multihoming and PE redundancy with support for Layer 3 and Layer 2 MPLS VPNs in VSS mode

**Figure 4.** Leveraging VSS for N-PE Redundancy in SP networks.

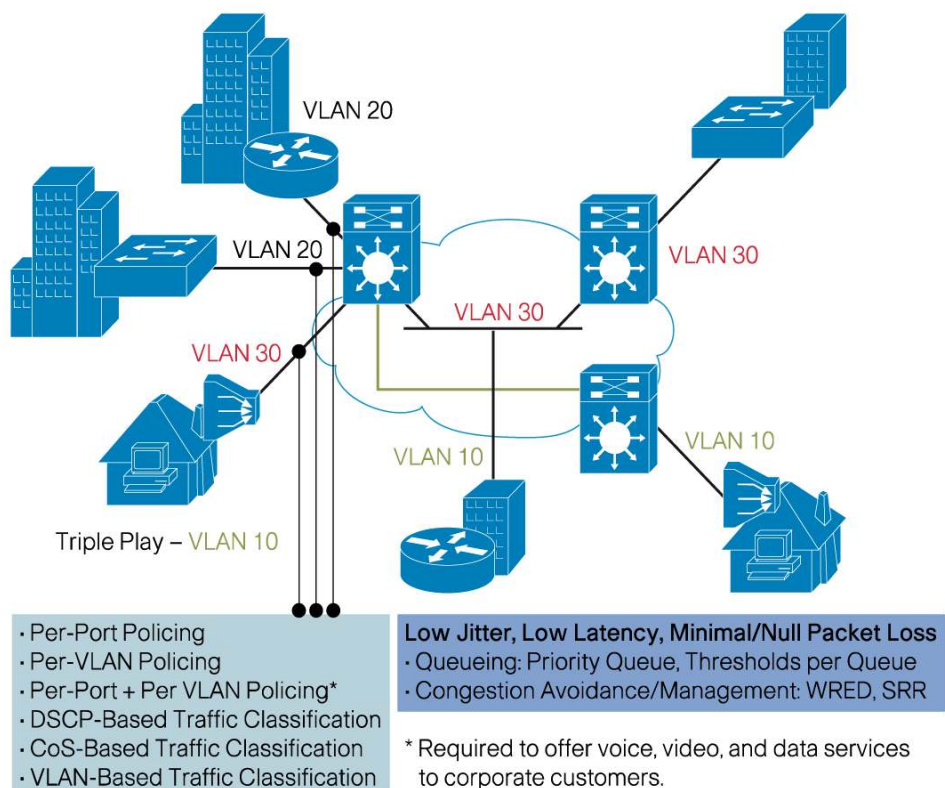


- Cisco IOS<sup>®</sup> Software modularity to deliver fault containment, memory protection, process restartability, and In-Service Software Upgrade (ISSU) for patch fixes

For more information refer to the [SUP2T](#) and [VSS](#) Architecture white paper on SUP2T.

### QoS and Multicast

- Advanced quality-of-service mechanism to enable triple play and TLS services on the same infrastructure (Figure 5)

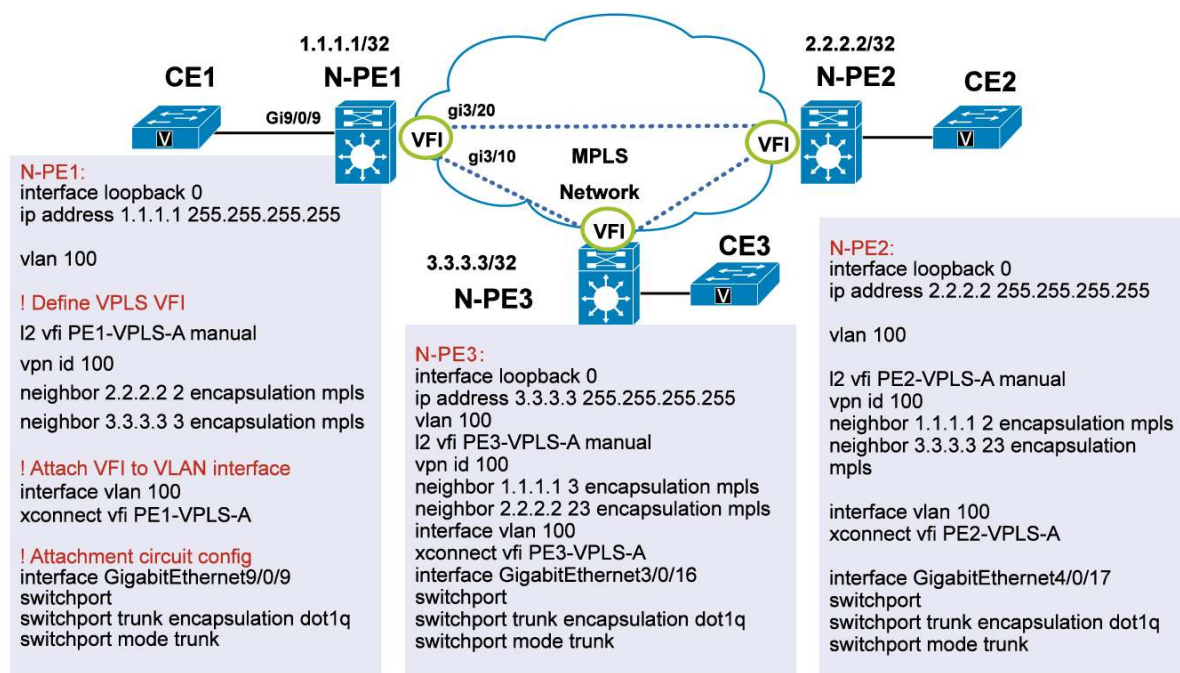
**Figure 5.** Flexible QoS Mechanism to Enable Voice, Video, and Data

- Triple play services support by enabling Cisco innovative technologies, such as hardware-enabled PIM-SM and PIM-SSM and IGMP snooping, and hardware-based Layer 2 multicast

For more information refer to the [QoS](#) and [Multicast](#) white papers on SUP2T.

### MPLS and EVC

- Support for MPLS features: L3VPNs, traffic engineering, EoMPLS, VPLS, VPLSoGRE, and H-VPLS natively without regular Ethernet cards supported on the Supervisor Engine 2T

**Figure 6.** VPLS Deployment with Catalyst 6500 SUP2T.

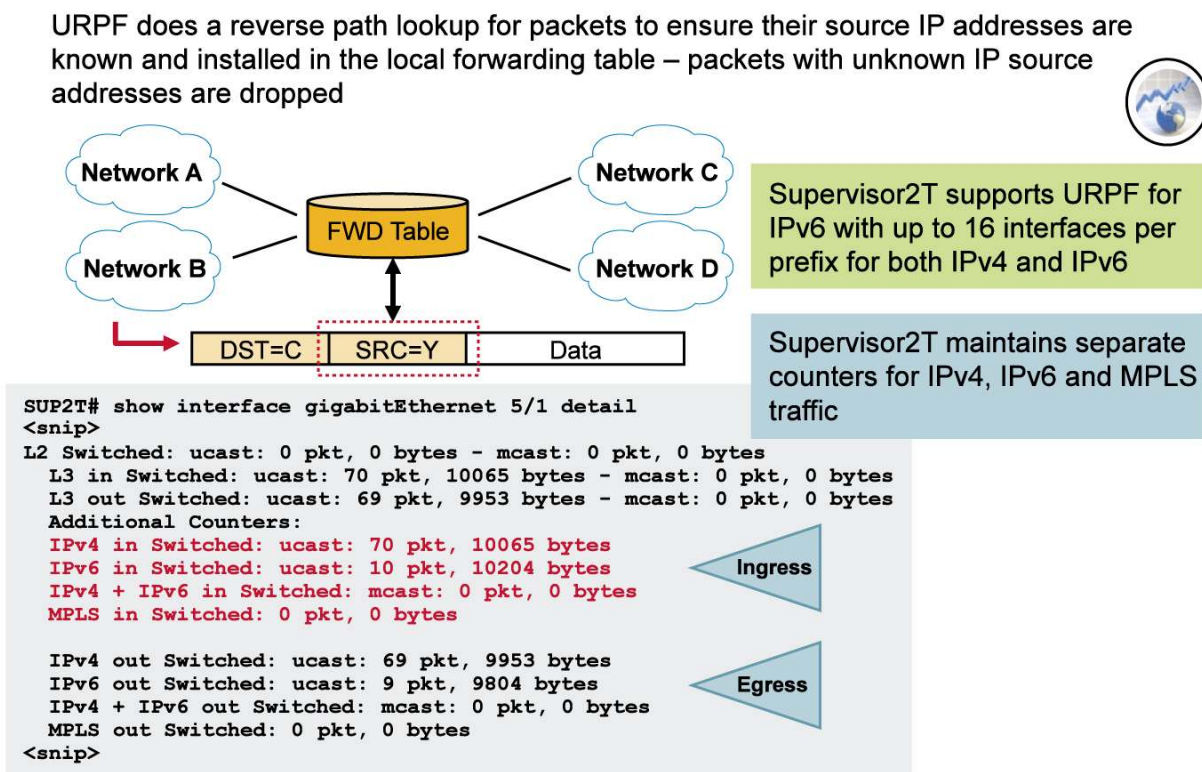
- Native support for EVC to scale VLANs (L2VPN mapping to EVC not supported)

For more information refer to the [Virtualization](#) and [VPLS](#) white papers on SUP2T.

## IPv6

- Additional control and forwarding scale scalability with Supervisor Engine 2T
- Full IPv6 in IPv4 tunneling support, IPv6 and IPv4 in IPv6 GRE tunneling support, and MPLS encapsulation without recirculation

Figure 7. Catalyst 6500 SUP2T IPv6 Enhancements.



For more information refer to the [IPv6 White paper](#) on sup2T.

### Manageability

- Increased end-to-end service operational efficiency through management and monitoring features such as E-OAM protocols
- The Supervisor Engine 2T with Policy Feature Card 4 (PFC4) supports a wide variety of NetFlow enhancements to support the needs of Cisco customers including Flexible Netflow
- Flexible and comprehensive network monitoring capabilities through SNMP MIBs for interface management, traffic monitoring, switching protocol management, and features management

For more information refer to the [Netflow White paper](#) on SUP2T.

### Conclusion

Cisco Catalyst 6500 Supervisor Engine 2T provides scale and ideal feature set for specific SP deployments. This new supervisor engine will not require WAN cards such as SIP-400, SIP-600, or ES+ cards to turn on MPLS features, thus providing advanced MPLS features on every supported line card.



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