Ethernet Private Network Service Types

Objectives

Audio Narration

Welcome to Lesson 1, Introduction to Ethernet Private Networks or EPNs. In this lesson you will learn to:

- Describe the fundamentals of an EPN.
- Identify the 3 EPN Services.
- Describe a scenario for each EPN service.

Screen Mockup

1 Describe the fundamentals of an EPN

2 Identify the 3 EPN Services

3 Describe a scenario for each EPN service

Programming Notes

Display each objective aligned with audio.

What is an EPN

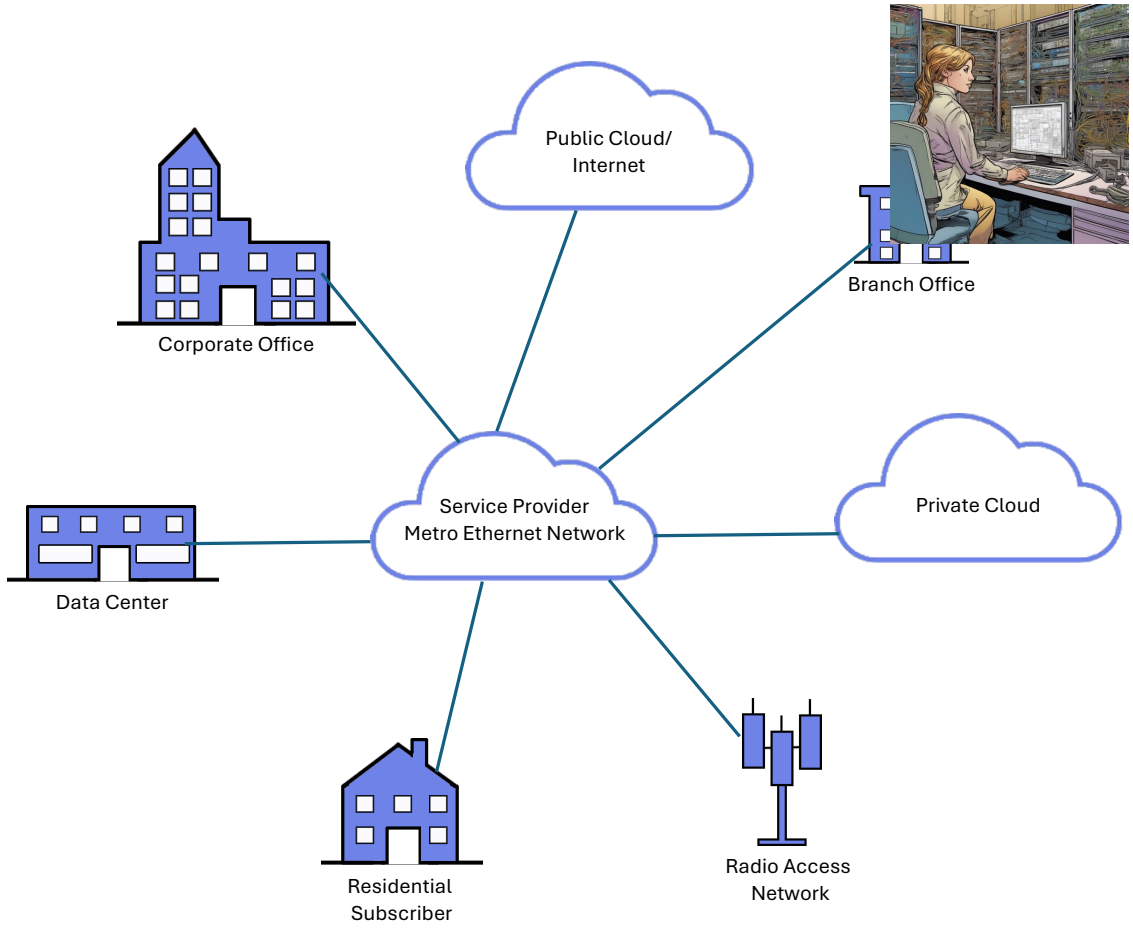
Audio Narration

An **Ethernet Private Network (EPN)** is a carrier-provided service that delivers **Layer 2 Ethernet connectivity** across a service provider's network. Instead of relying on traditional leased lines or Layer 3 VPNs, EPNs allow organizations to extend their own Ethernet segments over a provider's optical backbone while preserving native Ethernet frame structure, including MAC addresses and VLAN tags. This transparency enables businesses to manage their networks as if all sites were directly connected to the same switch, regardless of geographic distance.

Programming Notes

Diagram of Data center connected to Ethernet network. Include office building, residential, cel tower, branch office and private and public clouds.

Screen Mockup



EPN at Layer 2

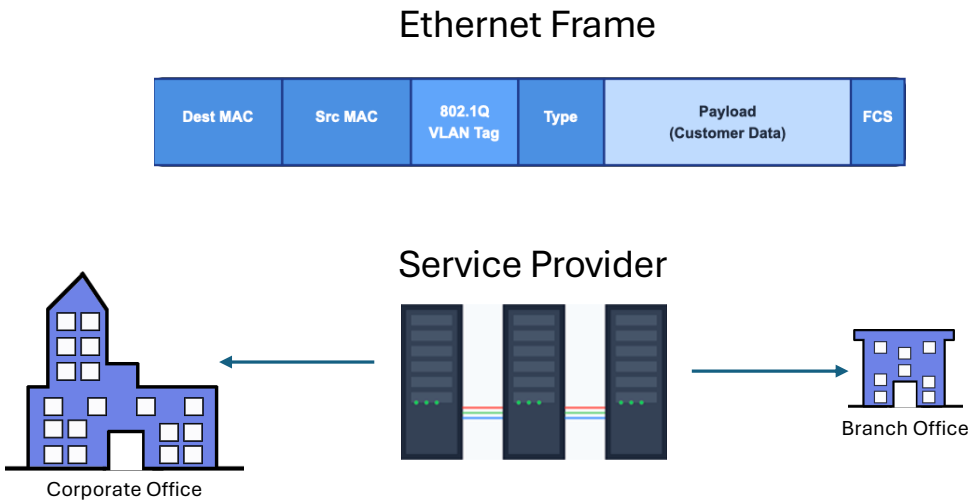
Audio Narration

EPNs operate at the **data link layer (Layer 2)**. This means they transport Ethernet frames transparently between customer sites without requiring IP routing or protocol conversion.
From the customer's perspective, remote sites appear to be on the same LAN segment, preserving the original Ethernet headers, VLAN tags, and MAC addresses end-to-end.

Programming Notes

Screen Mockup

Layer 2: the Data Link Layer in the OSI model, responsible for transmitting data frames between devices on the same network segment.



How it Works in an Optical Network

Audio Narration

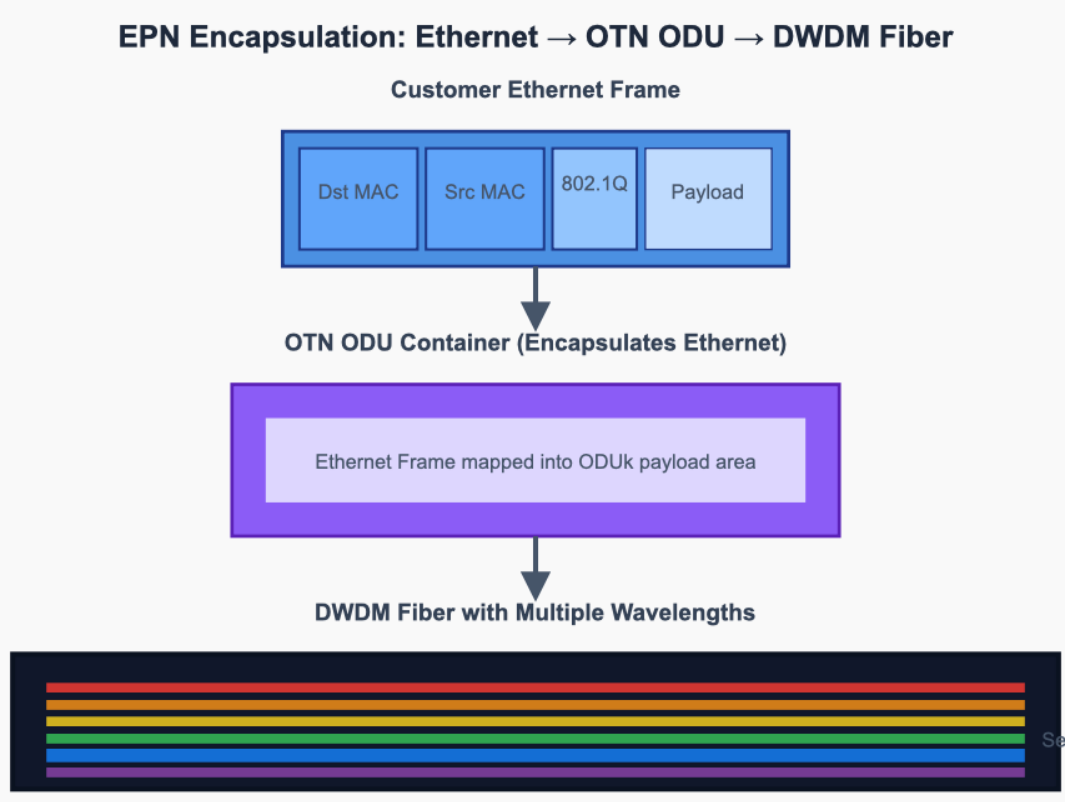
How does this work?

The service provider uses high-capacity **fiber optic infrastructure** — often based on **Dense Wavelength Division Multiplexing (DWDM)** or **Optical Transport Network (OTN)** systems.

These technologies allocate dedicated wavelengths or bandwidth slices for each customer's EPN service. Customer Ethernet traffic is mapped into **optical containers** (such as ODU frames in OTN) and transported across the optical backbone with guaranteed performance.

Programming Notes

Screen Mockup



EPN Service Types

Audio Narration

Ethernet Private Networks come in **three main service types**, defined by the Metro Ethernet Forum (MEF):

E-Line – point-to-point connectivity between two sites. Variants include **Ethernet Private Line (EPL)** and **Ethernet Virtual Private Line (EVPL)**.

E-LAN – multipoint-to-multipoint connectivity, allowing any site to talk to any other site.

E-Tree – rooted multipoint connectivity, where a central hub communicates with many branch sites, but the branches cannot talk directly to each other.

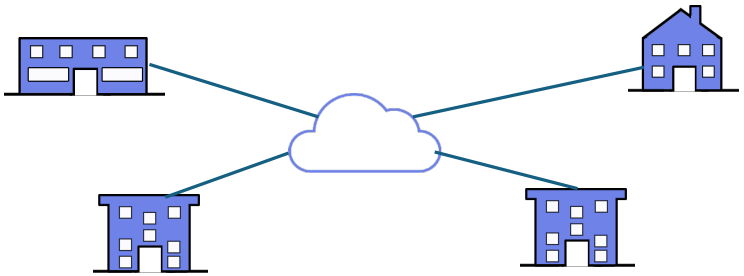
Click the buttons to learn more about each service type.

Programming Notes

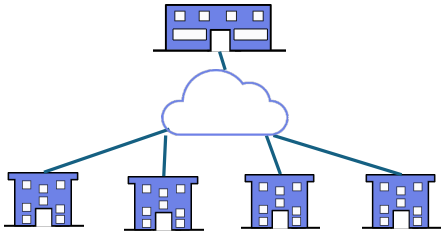
Screen Mockup

E-Line – point-to-point connectivity

E-LAN – multipoint-to-multipoint connectivity



E-Tree – hub and spoke model



E-Line

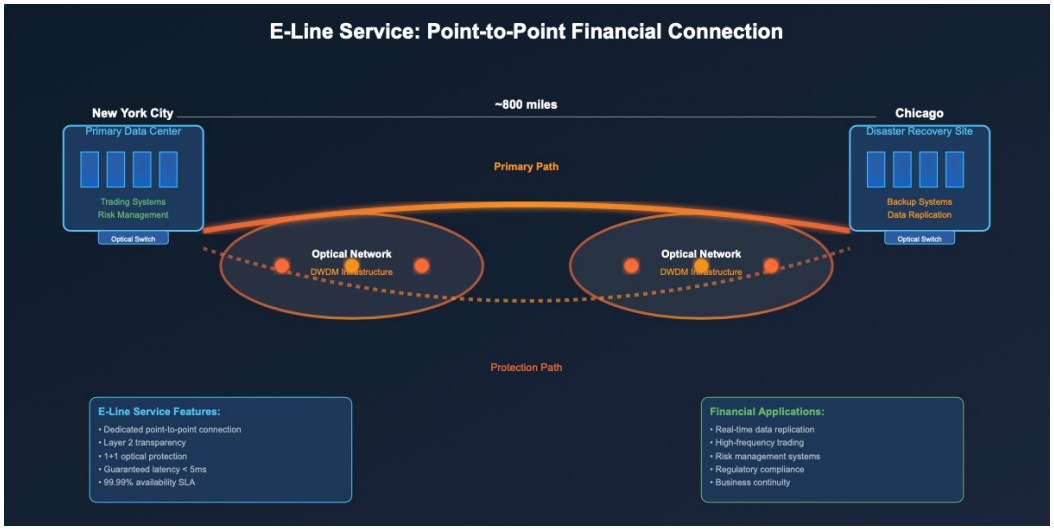
Audio Narration

Let’s take a look at an E-Line scenario. A large financial services company needs to connect their primary data center in New York City with their disaster recovery facility in Chicago. They require a dedicated, high-bandwidth connection to replicate critical trading data in real-time, with guaranteed latency and availability commitments to support their regulatory compliance requirements.

The E-Line service provides this customer with a dedicated point-to-point Ethernet connection that behaves exactly like a private wire between their two locations, despite spanning nearly 800 miles of optical network infrastructure. From the customer's perspective, their Chicago facility appears to be directly connected to their New York data center via a single Ethernet link, allowing them to extend their Layer 2 network seamlessly across the continent. The service preserves all Ethernet frame characteristics, including VLAN tags and MAC addresses, enabling the customer to run spanning tree protocols and other Layer 2 applications as if both sites were in the same building.

Programming Notes

Screen Mockup



E-Line Implementation

Audio Narration

Our optical network creates this illusion by establishing a dedicated wavelength path through our DWDM infrastructure, with the customer's Ethernet frames being transparently mapped into OTN containers for transport. The service includes 1+1 optical protection, meaning identical signals travel over geographically diverse fiber routes, ensuring that even a complete fiber cut won't interrupt their data replication. Performance monitoring at both endpoints continuously measures latency, packet loss, and availability, with automated alerts if any parameter approaches the SLA thresholds. The customer pays a premium for this dedicated bandwidth, but gains the certainty that their connection will always be available with predictable performance characteristics, which is essential for their regulatory compliance and business continuity requirements.

Programming Notes

Display in popup text box.

Screen Mockup

E-LAN

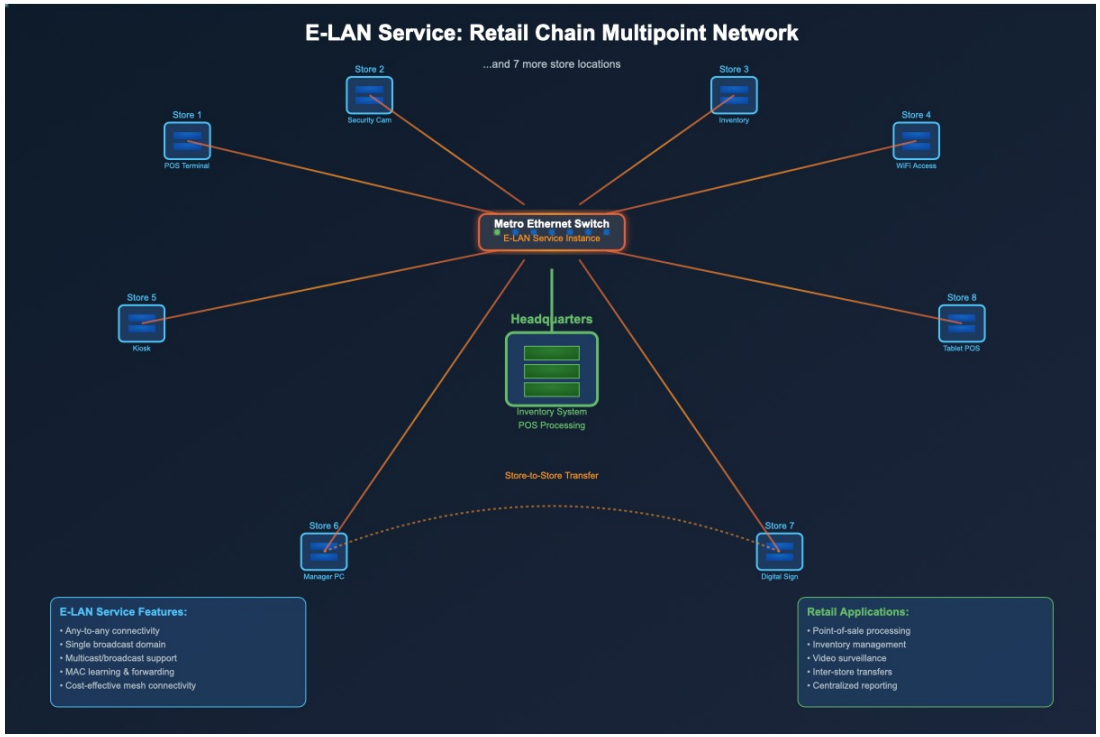
Audio Narration

Let’s take a look at an E-LAN scenario. A retail chain with 15 stores across the metropolitan area needs to connect all locations to their central headquarters for inventory management, point-of-sale processing, and video surveillance. Each store needs to communicate with headquarters and potentially with other stores for inventory transfers, creating a requirement for any-to-any connectivity.

The E-LAN service creates a virtual Local Area Network that spans all 16 locations, making them appear as if they're all connected to the same Ethernet switch despite being distributed across the city. Unlike traditional point-to-point circuits that would require 120 individual connections to achieve full mesh connectivity between 16 sites, the E-LAN service provides this any-to-any communication capability through a single service instance. Each store can communicate directly with headquarters and with any other store location simply by sending Ethernet frames with the appropriate destination MAC addresses, just as they would on a local network.

Programming Notes

Screen Mockup



E-LAN Implementation

Audio Narration

The optical network implements this service using a combination of MPLS-based pseudowires and Ethernet switching functionality at key aggregation points throughout the metropolitan area. Customer traffic from each retail location is collected at nearby optical nodes and transported over our fiber infrastructure to a central Ethernet switch that provides the multipoint forwarding behavior. Advanced flooding control and MAC learning ensure that broadcast traffic is managed efficiently, preventing any single location from overwhelming the shared infrastructure. The service includes bandwidth management to ensure that the video surveillance traffic from all stores doesn't impact the real-time point-of-sale transactions, with different traffic classes receiving appropriate priority treatment. This architecture allows the retailer to manage their entire network as a single broadcast domain while benefiting from the reliability and performance guarantees of carrier-grade optical transport.

Programming Notes

Display in popup text box.

Screen Mockup

E-Tree

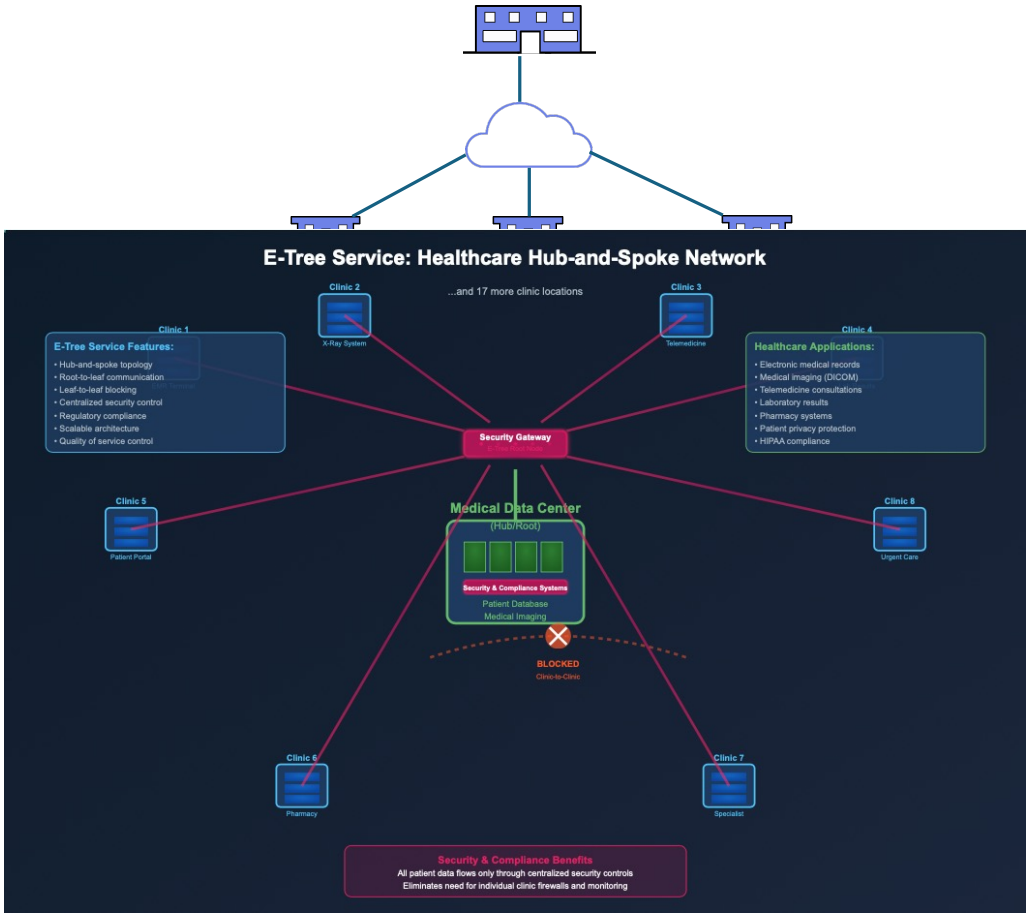
Audio Narration

A healthcare organization operates a central medical records data center that serves 25 remote clinics throughout the region. The clinics need high-speed access to the central patient database and imaging systems, but regulatory requirements prohibit direct communication between clinic locations to maintain patient privacy and data security compliance.

The E-Tree service establishes a hub-and-spoke connectivity model where the central data center (the "root" of the tree) can communicate with all 25 clinic locations (the "leaves"), but the clinic locations cannot communicate directly with each other. This architecture perfectly matches the healthcare organization's operational requirements and regulatory constraints, ensuring that patient data flows only between each clinic and the central facility where proper security controls and audit logging are implemented. The service maintains the transparency and performance benefits of Ethernet while enforcing the communication restrictions at the network level.

Programming Notes

Screen Mockup



E-Tree Implementation

Audio Narration

The optical network implements E-Tree functionality through sophisticated traffic filtering and VLAN manipulation at the provider edge routers. Each clinic's traffic is tagged with specific VLAN identifiers that determine forwarding behavior - frames destined for the hub location are forwarded normally, while frames that would travel between leaf sites are automatically dropped by the network infrastructure. This enforcement happens transparently to the customer's equipment, which sees only standard Ethernet interfaces at each location. The hub site receives aggregated traffic from all clinic locations and can broadcast information such as software updates or policy changes to all sites simultaneously.

The service includes differentiated bandwidth allocation, with each clinic receiving guaranteed bandwidth for their database queries and imaging transfers, while the hub site has higher bandwidth capacity to serve all locations concurrently. Quality of service policies ensure that real-time applications like telemedicine consultations receive priority over batch data transfers, maintaining consistent performance for patient care activities. The centralized traffic flow pattern also simplifies the healthcare organization's security architecture, as they only need to implement firewalls, intrusion detection, and compliance monitoring at the central hub rather than at each individual clinic location.

Programming Notes

Display in popup text box.

Screen Mockup

Summary

Audio Narration	Screen Mockup
Ethernet Private Network (EPN) services provide: Protocol transparency (Layer 2 frames preserved end-to-end) Bandwidth scalability from Mbps to multi-Gbps Low latency and high availability through optical transport SLA-backed performance guarantees Customers retain full control of their Layer 3 routing and above, while the service provider manages the underlying optical transport.	

Programming Notes

Objectives

Audio Narration	Screen Mockup
In this lesson, you learned to: Describe the fundamentals of an Ethernet Private Network. Identify the three EPN service types: **E-Line, E-LAN, and E-Tree**. Explain real-world scenarios for each service type.	1 Describe the fundamentals of an Ethernet Private Network 2 Identify the 3 EPN Services 3 Describe a scenario for each service

Programming Notes

On-screen text:

Layer 2 private connectivity over a provider network

Three service types: E-Line, E-LAN, E-Tree

Flexible for multiple deployment scenarios

Display each objective aligned with audio.