

# Chapter 6 (10 Marks)

Differentiate between the internet, intranet and extranet on the basis of benefits and drawbacks. How does CMS help in intranet system development? [5+4]

Define the terms internet, intranet and extranet and explain the role each plays in e-business. [8]

Differentiate between the internet and intranet on the basis of benefits and drawbacks. Explain about the VPN methods. Why CMS is important in intranet system development?[3+3+2]

How internet should evolve to support better multimedia? Explain different classes of multimedia application with suitable example? [4+6]

What is intranet implementation? Explain the procedure to follow for intranet implementation. Write the concept of Virtual Private Network (VPN). [2+4+4]

Compare intranet and internet in terms of benefits and drawbacks. Discuss in detail about firewall and content filtering. [4+6]

Compare Intranet, Internet and Extranet with their benefits and drawbacks. Discuss the necessary resources required to design medium size intranet system. [5+5]

What do you mean by Content Management System (CMS)? An organization has more than six departments each of which has more than fifty internet users. Present your guideline for its internet and intranet system development with respect to the resources required. [2+8]

## Internet

### Benefits:

1. **Global Connectivity:** Connects users worldwide, providing access to vast amounts of information and resources.
2. **E-commerce and Business:** Facilitates online shopping, digital marketing, and global business operations.
3. **Communication:** Enables various forms of communication, including email, social media, and video conferencing.
4. **Entertainment:** Offers access to a wide range of entertainment options such as streaming services, online games, and social media.

### Drawbacks:

1. **Security Risks:** Vulnerable to cyber-attacks, phishing, malware, and other security threats.
2. **Information Overload:** The vast amount of information can be overwhelming and sometimes misleading or inaccurate.
3. **Privacy Concerns:** User data can be collected, tracked, and misused by various entities.
4. **Distraction:** Can lead to procrastination and reduced productivity due to the abundance of entertainment and social media.

## Intranet

### Benefits:

1. **Security:** More secure than the internet as access is restricted to internal users, reducing the risk of external threats.
2. **Efficiency:** Streamlines internal communication and collaboration within an organization.
3. **Resource Sharing:** Facilitates easy sharing of resources, documents, and information among employees.

4. **Cost-Effective:** Reduces the need for printed materials and can lower communication costs.

#### **Drawbacks:**

1. **Limited Access:** Only accessible to authorized users within the organization, limiting its reach.
2. **Maintenance:** Requires regular maintenance and updates to ensure security and efficiency.
3. **Initial Setup Costs:** Can be expensive to set up and implement initially.
4. **User Training:** Employees may need training to use the intranet effectively.

## **Extranet**

#### **Benefits:**

1. **Extended Collaboration:** Enables collaboration between an organization and its external partners, suppliers, and customers.
2. **Controlled Access:** Provides secure and controlled access to specific external users.
3. **Efficiency:** Enhances efficiency in business processes like supply chain management and customer relationship management.
4. **Resource Sharing:** Allows sharing of resources and information with external stakeholders, improving coordination.

#### **Drawbacks:**

1. **Security Risks:** Although more secure than the internet, it still poses some security risks from external users.
2. **Complexity:** More complex to set up and manage compared to an intranet.
3. **Cost:** Can be costly to implement and maintain, especially with the need for secure connections and user management.
4. **Dependence on Technology:** Relies heavily on technology, which can be a disadvantage if there are technical issues or failures.

## **Summary**

- **Internet** is best for global connectivity and access to vast information but comes with significant security and privacy risks.

- **Intranet** is ideal for secure, internal communication and resource sharing within an organization but has limited reach and requires maintenance.
- **Extranet** bridges the gap between internal and external stakeholders, enhancing collaboration and efficiency, though it involves higher costs and complexity.

Feature	Internet	Intranet	Extranet
<b>Definition</b>	Global network accessible to the public.	Private network accessible only within an organization.	Private network accessible to specific external entities.
<b>Benefits</b>	- Wide accessibility and reach.	- Secure and controlled environment.	- Facilitates secure collaboration with external parties.
	- Easy information dissemination.	- Improved internal communication and collaboration.	- Extends internal resources to partners/customers.
	- Cost-effective for broad information sharing.	- Customizable to meet specific organizational needs.	- Enhances business relationships and processes.
	- Supports a wide range of applications and services.	- Reduces operational costs with streamlined processes.	- Secure data sharing with access controls.
<b>Drawbacks</b>	- Security risks and vulnerabilities.	- Limited access to internal users only.	- Complexity in managing access for external users.
	- Information overload and low-quality content risks.	- High initial setup and maintenance costs.	- Potential security risks if not properly managed.
	- Potential for misuse or harmful content.	- Requires ongoing administration and support.	- Requires careful coordination with external entities.

# Network Infrastructure

Network infrastructure refers to the underlying framework that enables communication and connectivity between devices and systems within a network. It consists of both hardware and software components and is essential for supporting various applications and services. Here are the key components:

## 1. Hardware Components:

- **Routers:** Direct traffic between different networks and manage data flow.
- **Switches:** Connect devices within a single network and facilitate communication by forwarding data to the correct device.
- **Firewalls:** Provide security by monitoring and controlling incoming and outgoing network traffic based on predetermined security rules.
- **Access Points:** Allow wireless devices to connect to a wired network, extending the network's reach.
- **Cabling:** Physical cables (e.g., Ethernet cables) that connect devices within the network.

## 2. Software Components:

- **Operating Systems:** Network operating systems (like Windows Server, Linux) manage network resources and services.
- **Network Management Software:** Tools for monitoring and managing network performance, configurations, and security.
- **Protocols:** Standards for data transmission (e.g., TCP/IP, HTTP, FTP) that ensure devices can communicate effectively.

## 3. Network Types:

- **Local Area Network (LAN):** A network covering a small geographical area, like a home or office.
- **Wide Area Network (WAN):** A network that spans a large geographical area, often connecting multiple LANs.
- **Metropolitan Area Network (MAN):** A network that covers a city or a large campus.

- **Virtual Private Network (VPN):** A secure connection over the internet that encrypts data and allows remote access to a private network.

#### 4. Architecture:

- **Client-Server Model:** A network architecture where multiple clients (users) connect to a central server that provides resources and services.
- **Peer-to-Peer (P2P):** A decentralized network where each device (peer) can act as both a client and a server.

#### 5. Network Security:

- Measures and technologies used to protect the integrity, confidentiality, and availability of the network, including encryption, authentication, and intrusion detection systems.

#### 6. Scalability and Redundancy:

- **Scalability:** The ability to grow and expand the network to accommodate more devices or users without significant performance loss.
- **Redundancy:** Implementing backup components or paths to ensure network reliability and minimize downtime in case of a failure.

#### 7. Cloud Infrastructure:

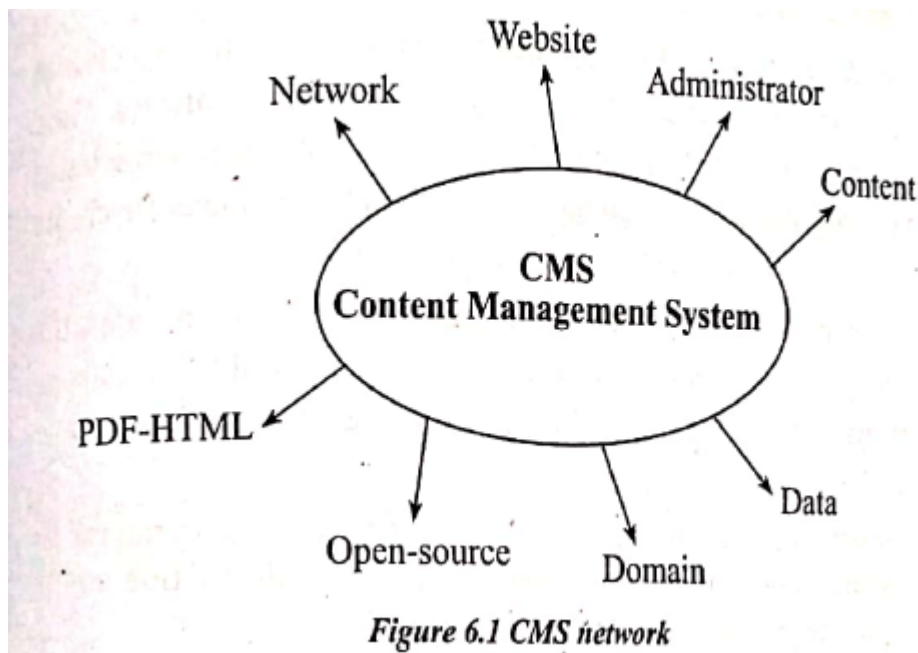
- Many organizations are now integrating cloud services, which allow for flexible resource management and scalability through external service providers.

Understanding these components and how they interact is crucial for designing, implementing, and maintaining effective network infrastructures.

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### Content Management System (CMS)

A Content Management System (CMS) is a software application that enables users to create, manage, and modify content on a website without the need for specialized technical knowledge.



## What is a CMS?

A CMS is designed to simplify the process of publishing content on the web by providing an easy-to-use interface for content creators, editors, and administrators. It separates the content of a website from its design and functionality, allowing non-technical users to manage content without having to write code.

## Key Features of a CMS

1. **User-friendly Interface:** Provides a graphical user interface (GUI) that makes it easy to create and edit content.
2. **Content Editing Tools:** Includes a rich text editor (WYSIWYG - What You See Is What You Get) for formatting text, adding images, and embedding media.
3. **Templates and Themes:** Allows the use of pre-designed templates and themes to control the look and feel of the website.
4. **Content Management:** Organizes content into categories, tags, and folders, making it easier to manage and retrieve.
5. **User Management:** Supports multiple user roles and permissions, enabling collaborative content creation and management.
6. **SEO Tools:** Provides tools for optimizing content for search engines.

7. **Plugins and Extensions:** Supports additional features and functionalities through plugins and extensions.

## How a CMS Works

### 1. Installation and Setup:

- **Web Hosting:** A CMS is typically installed on a web server. This can be a dedicated server, a virtual private server (VPS), or shared hosting.
- **Database Configuration:** The CMS connects to a database (e.g., MySQL, PostgreSQL) where it stores content, user data, and other information.
- **Template Setup:** You can install themes or templates to define the website's layout and design.

### 2. Content Creation and Management:

- **Dashboard:** Users log into an administrative dashboard where they can create, edit, and manage content.
- **Content Editor:** The WYSIWYG editor allows users to write and format text, add images, and embed videos without knowing HTML or CSS.
- **Media Management:** Users can upload and manage media files like images, videos, and documents.

### 3. Publishing:

- **Drafts and Scheduling:** Users can save content as drafts and schedule it to be published at a specific time.
- **Publishing:** Once ready, content can be published with a single click, making it live on the website.

### 4. Website Management:

- **Menus and Navigation:** Users can create and manage navigation menus.
- **Plugins and Extensions:** Additional functionalities can be added through plugins (e.g., contact forms, e-commerce capabilities).
- **Updates:** The CMS software, along with its plugins and themes, needs regular updates to ensure security and performance.

### 5. Security and Backup:



- **User Roles and Permissions:** Different levels of access can be granted to different users to ensure security.
- **Backups:** Regular backups of the database and website files are essential to prevent data loss.

## Popular CMS Platforms

1. **WordPress**
2. **Joomla**
3. **Drupal**
4. **Magento**
5. **Shopify**

## Benefits of Using a CMS

- **Ease of Use:** Non-technical users can easily manage website content.
- **Efficiency:** Streamlines the content creation and publishing process.
- **Collaboration:** Facilitates teamwork with multiple user roles and permissions.
- **Scalability:** Suitable for small blogs to large enterprise websites.
- **SEO Friendly:** Helps in optimizing content for search engines.

In summary, a CMS is an invaluable tool for anyone looking to manage a website efficiently and effectively, offering a range of features that cater to both beginners and advanced users.

## Web CMS

A

**Web Content Management System (Web CMS)** is a software application that allows users to create, manage, and modify digital content on a website without needing specialized technical knowledge. It provides a user-friendly interface for managing website content, often supporting multiple users in a collaborative environment.

Key features typically include:

1. **Content Creation:** Tools for creating and formatting content, often using a WYSIWYG (What You See Is What You Get) editor.
2. **Content Storage:** A repository for storing content in a structured manner.
3. **Content Management:** Features for organizing and managing the workflow of content, including version control, approval processes, and publishing schedules.
4. **Content Presentation:** Templates and themes to ensure consistent presentation of content across the website.
5. **User Management:** Roles and permissions to control access to different parts of the system and content.

Popular examples of Web CMS include WordPress, Joomla, and Drupal.

## Enterprise Content Management (ECM)

**Enterprise Content Management (ECM)** refers to the strategies, methods, and tools used to capture, manage, store, preserve, and deliver content and documents related to organizational processes. ECM is designed to manage the entire lifecycle of information within an organization, with a focus on large-scale content and data management.

## WordPress

WordPress is an open-source content management system (CMS) that is widely used for creating websites and blogs. It is known for its user-friendly interface, extensive plugin ecosystem, and customizable themes. WordPress powers over 40% of all websites on the internet, making it the most popular CMS globally. It is highly versatile, suitable for both small personal blogs and large corporate websites.

## Key Features of WordPress

1. **User-Friendly Interface**
  - **Dashboard:** Intuitive admin dashboard that allows users to easily manage their content.

- **WYSIWYG Editor:** What You See Is What You Get (WYSIWYG) editor makes content creation and editing straightforward.

## 2. Themes

- **Customization:** Thousands of free and premium themes available for customizing the look and feel of a website.
- **Responsive Design:** Many themes are designed to be mobile-friendly and responsive.

## 3. Plugins

- **Extensibility:** Over 50,000 plugins available to extend functionality, including SEO tools, social media integration, e-commerce capabilities, security enhancements, and more.
- **Ease of Installation:** Plugins can be installed directly from the WordPress dashboard with a few clicks.

## 4. SEO-Friendly

- **SEO Plugins:** Plugins like Yoast SEO and All in One SEO Pack help optimize content for search engines.
- **Clean Code:** WordPress is built with clean code that follows best practices, making it easier for search engines to index sites.

## 5. Media Management

- **Media Library:** Easily upload, organize, and manage images, videos, and other media files.
- **Editing Tools:** Basic image editing tools available directly in the media library.

## 6. Content Management

- **Posts and Pages:** Create and manage blog posts and static pages.
- **Categories and Tags:** Organize content using categories and tags for better structure and navigation.

## 7. Security

- **Regular Updates:** Frequent updates to core software to patch security vulnerabilities and improve functionality.

## 8. Performance

- **Caching Plugins:** Plugins like W3 Total Cache and WP Super Cache help improve site speed and performance.
- **CDN Integration:** Easily integrate with Content Delivery Networks (CDNs) to improve load times.

## 9. E-commerce

- **WooCommerce:** A powerful e-commerce plugin that transforms WordPress into a fully functional online store.
- **Payment Gateways:** Support for multiple payment gateways and shipping options.

## 10. Community and Support

- **Large Community:** Active community of developers, designers, and users contributing to the platform.
- **Documentation and Tutorials:** Extensive documentation, tutorials, forums, and support channels available.

## 11. API and Integrations

- **REST API:** RESTful API allows for integration with other applications and services.
- **Third-Party Integrations:** Easily integrate with various third-party services and platforms.

WordPress's flexibility and extensive range of features make it suitable for a wide variety of websites, from personal blogs to large e-commerce sites and corporate portals.

## DRUPAL

Drupal is a robust and flexible open-source content management system designed for developers and more complex websites. It offers advanced features for customization and scalability, making it ideal for large enterprises, government sites, and educational institutions. Drupal has a steep learning curve compared to other CMS platforms, but it provides powerful tools for creating highly customized and secure websites.

## Key Features of Drupal

1. **Modular System:** Drupal's architecture allows for the easy addition of modules to extend functionality.
2. **Custom Content Types and Views:** Create different types of content and display them in various ways.
3. **User Management:** Advanced user management and permission settings.
4. **SEO Friendly:** Built-in tools for search engine optimization.
5. **Responsive Design:** Themes that adapt to different devices and screen sizes.
6. **Community Support:** A large community of developers and users contributing to its development and support.

## Pros of Drupal

1. **Highly Customizable:** With thousands of modules and themes, Drupal is highly flexible and customizable to meet various needs.
2. **Strong Community:** A robust community of developers and users ensures ongoing improvements and support.
3. **Scalability:** Suitable for small websites to large enterprises, Drupal scales well with increasing content and traffic.
4. **Security:** Strong focus on security with regular updates and a dedicated security team.
5. **Content Workflow:** Advanced content workflow capabilities, including content staging and moderation.
6. **Multilingual Support:** Built-in support for multiple languages, making it ideal for global websites.
7. **API-First Architecture:** Emphasis on APIs, making it easier to integrate with other systems and services.

## Cons of Drupal

1. **Steep Learning Curve:** Drupal can be complex and may require a significant investment of time to learn, especially for non-technical users.
2. **Resource Intensive:** It can be resource-heavy, requiring robust hosting solutions for optimal performance.

3. **Complex Upgrades:** Major version upgrades can be complex and may require professional assistance.
4. **Limited Themes and Modules:** Compared to some other CMS platforms like WordPress, the selection of themes and modules can be more limited.
5. **Development Costs:** Custom development and maintenance can be more expensive due to the complexity and need for skilled developers.
6. **Overhead:** The extensive feature set may introduce overhead, making it more than what is needed for simple websites.

## Use Cases

1. **Enterprise Websites**
2. **Government Websites**
3. **Educational Institution**
4. **Non-Profits**
5. **E-commerce**

## Joomla

Joomla is a free and open-source content management system (CMS) for publishing web content, developed by Open Source Matters, Inc. It is built on a model-view-controller web application framework that can be used independently of the CMS. Joomla is an open-source content management system that balances user-friendliness and flexibility. It is known for its strong community support and extensive library of extensions and templates. Joomla is suitable for a wide range of website types, from small business sites to large e-commerce platforms. It offers a good balance between ease of use and customization capabilities, making it a popular choice for users with intermediate technical skills.

## Key Features of Joomla

1. **User Management:** Joomla provides a comprehensive user management system, allowing administrators to manage user information and permissions.

2. **Content Management:** Flexible content management options, including easy-to-use editor, media management, and article categorization.
3. **Templates:** Joomla uses templates to control the look and feel of the site. Users can install and switch between templates easily.
4. **Extensions:** Thousands of extensions (modules, plugins, components, and templates) are available to extend Joomla's functionality.
5. **Multilingual Support:** Built-in support for multiple languages.
6. **SEO Friendly:** SEO-friendly features are included, such as metadata management and search engine-friendly URLs.
7. **Customizable and Extensible:** Highly customizable through templates and extensible with plugins and modules.

## Pros of Joomla

1. **User-Friendly Interface:** Joomla's interface is generally considered user-friendly and easier to navigate, especially for non-technical users.
2. **Flexible and Extensible:** With a wide range of extensions, templates, and modules, Joomla is highly flexible and can be tailored to a variety of needs.
3. **Strong Community Support:** A large, active community provides extensive support and documentation.
4. **Multilingual Support:** Built-in multilingual support allows for the creation of websites in multiple languages without the need for additional extensions.
5. **Access Control Levels:** Advanced access control and user management, allowing for the creation of different user roles with specific permissions.
6. **Integrated Help System:** Joomla includes an integrated help system and extensive documentation.
7. **Robust Built-in Features:** Many robust features come out-of-the-box, reducing the need for additional plugins for common functionalities.

## Cons of Joomla

1. **Learning Curve:** While easier than some other CMSs, Joomla still has a learning curve, particularly for users unfamiliar with web development.
2. **Extension Compatibility:** Not all extensions are always compatible with each other or with newer versions of Joomla, which can cause issues.

3. **Complexity for Simple Sites:** Joomla may be more complex than necessary for simple websites or blogs, making platforms like WordPress more suitable in such cases.
4. **Update Process:** Updating Joomla and its extensions can sometimes be complicated and may require careful planning to avoid conflicts.
5. **Resource Intensive:** Similar to other robust CMSs, Joomla can be resource-intensive, requiring good hosting solutions for optimal performance.
6. **Less Popular than WordPress:** With fewer users compared to WordPress, the selection of third-party themes and plugins is more limited.

## Use Cases

1. **Corporate Websites**
2. **E-commerce Sites**
3. **Government Applications**
4. **Small Business Websites**
5. **Community Portals**

## Comparison

- **Ease of Use:** WordPress is generally considered the easiest to use, making it a popular choice for beginners. Joomla offers a balance of ease of use and extensibility, while Drupal is the most complex but also the most powerful and flexible.
- **Customization:** Drupal offers the highest level of customization, suitable for complex and large-scale websites. Joomla also provides significant customization options, while WordPress is highly customizable but typically used for simpler projects.
- **Community and Support:** All three CMSs have large and active communities that provide support, but WordPress has the largest community, followed by Joomla and Drupal.
- **Security:** Drupal is known for its robust security features, making it a preferred choice for government and enterprise websites. Joomla and



WordPress also offer strong security, but Drupal is often considered the most secure.

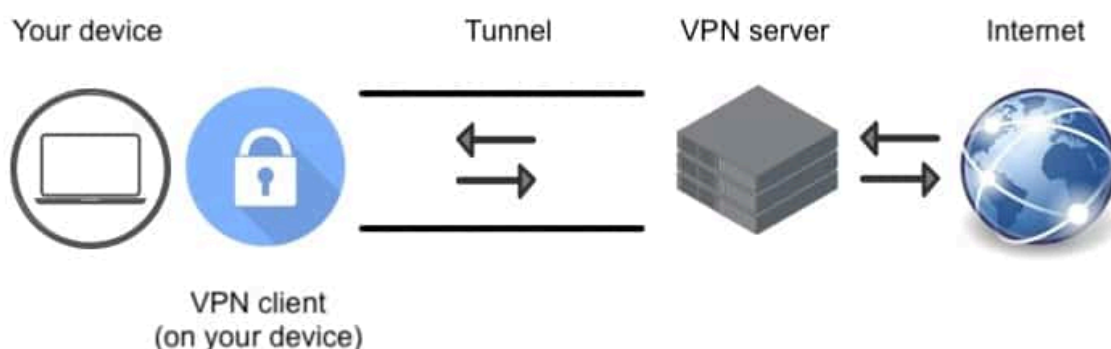
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## Tunneling protocol

A tunneling protocol is a technology that encapsulates one network protocol within another network protocol. Tunneling protocols are primarily used to transport data securely and efficiently across an untrusted network, such as the internet.

## VPN

How a VPN tunnel works



A VPN (Virtual Private Network) is a technology that creates a secure, encrypted connection over a less secure network, such as the internet. It allows users to send and receive data as if their devices were directly connected to a private network, enhancing security and privacy.

### How a VPN Works (Based on the Diagram)

1. **Your Device:** This is the user's computer, smartphone, or other internet-connected device.

2. **VPN Client:** A software application on the user's device that establishes and manages the VPN connection.
3. **Tunnel:** The secure, encrypted connection created by the VPN client between the user's device and the VPN server. Data transmitted through this tunnel is protected from eavesdroppers.
4. **VPN Server:** A remote server that the user's device connects to via the VPN tunnel. It acts as an intermediary between the user's device and the internet.
5. **Internet:** The VPN server sends and receives data from the internet on behalf of the user's device.

## Benefits of a VPN

1. **Security:** Encrypts data, protecting it from hackers and other cyber threats.
2. **Privacy:** Hides your IP address and online activities, preventing tracking and surveillance.
3. **Access Control:** Allows access to restricted content by bypassing geo-blocks and censorship.
4. **Remote Access:** Enables secure connection to a private network from remote locations, useful for remote work.
5. **Anonymity:** Helps maintain anonymity by masking the user's true IP address and location.

## Uses of a VPN

1. **Secure Browsing:** Protects personal information when using public Wi-Fi.
2. **Bypass Geo-Restrictions:** Access region-restricted services like streaming platforms.
3. **Enhanced Privacy:** Prevents ISPs and advertisers from tracking online activities.
4. **Remote Work:** Securely connects to corporate networks for remote work.
5. **Safe Communication:** Ensures secure communication for sensitive conversations and data transfers.

# Types

## 1. Site-to-Site VPN (Gateway-to-Gateway VPN)

This type connects entire networks to each other. It is used to connect two or more geographically separated offices of a company.

### Characteristics:

- Utilizes VPN gateways (routers or firewalls) at each site.
- Transparent to end users.
- Often uses IPSec for secure tunneling.

### Use Case Example:

- A company with offices in New York and London can connect their local area networks (LANs) to operate as a single network.

## 2. Remote Access VPN (Host-to-Gateway VPN)

This type allows individual users to connect to a remote network securely over the internet. It is typically used by remote workers or travelers who need access to their company's network.

### Characteristics:

- Users connect using VPN client software installed on their devices.
- Requires user authentication.
- Can use protocols like SSL/TLS, IPSec, or L2TP.

### Use Case Example:

- An employee working from home can securely connect to the corporate network to access files and applications as if they were physically present in the office.

## Key Differences:

- **Scope:** Site-to-Site VPNs connect entire networks, while Remote Access VPNs connect individual devices to a network.
- **User Experience:** Site-to-Site VPNs are transparent to users, while Remote Access VPNs require users to actively connect via client software.

- **Common Protocols:** Both may use IPSec, but Remote Access VPNs often use SSL/TLS as well.

Both types of VPNs provide secure communication channels but cater to different needs and scenarios.

## Tunneling Protocols for VPN

### IPSec (Internet Protocol Security)

1. **Secures Internet Data:** IPSec encrypts and authenticates each IP packet, making internet communications secure.
2. **Two Modes:** It has Transport mode (encrypts data only) and Tunnel mode (encrypts entire packets), commonly used for VPNs.
3. **Robust Security:** Offers strong data integrity, origin authentication, and confidentiality.

### L2TP (Layer 2 Tunneling Protocol)

1. **Tunnels Data:** L2TP creates a tunnel for data to travel securely between two points over a public network.
2. **Needs Encryption Partner:** Typically paired with IPSec for encryption, as L2TP alone doesn't encrypt data.
3. **User and Network Initiation:** Can be started by the user or automatically by the network.
4. **Combines Strengths:** L2TP/IPSec combo ensures data integrity, confidentiality, and authentication.
5. **Versatile Use:** Suitable for both remote access and connecting two networks (site-to-site VPN).

### PPTP (Point-to-Point Tunneling Protocol)

1. **Old but Simple:** Developed by Microsoft, PPTP is easy to set up and configure.
2. **Basic Security:** Uses minimal encryption, making it less secure by today's standards.

3. **Data Transfer:** Creates a VPN by encapsulating PPP packets within TCP/IP.
4. **Speed Over Security:** Faster setup but not ideal for sensitive data due to weaker security.
5. **Compatibility:** Works well with many devices and operating systems but is outdated.

## SSTP (Secure Socket Tunneling Protocol)

1. **Microsoft's Protocol:** Developed by Microsoft, it integrates well with Windows.
2. **Uses HTTPS:** Establishes connections using HTTPS, making it effective at bypassing firewalls.
3. **Strong Security:** Leverages SSL/TLS for encryption, ensuring data integrity and confidentiality.
4. **Easy Setup on Windows:** Built-in support in Windows makes configuration straightforward.
5. **Limited to Windows:** Not widely available on non-Windows platforms.

## OpenVPN

1. **Highly Secure:** Uses custom security protocols based on SSL/TLS, supporting strong encryption.
  2. **Flexible Operation:** Can use UDP (for performance) or TCP (for reliability).
  3. **Open-Source:** Community-driven development enhances security and reliability.
  4. **Firewall-Friendly:** Can bypass firewalls by using port 443, similar to HTTPS traffic.
  5. **Versatile:** Suitable for various applications, though it can be complex to set up. Works on multiple platforms.
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