

Section 1.1.5 Computer Networks Fundamentals

Email

{Electronic Mail}

Cracking OSCP: Your Roadmap to Ethical Hacking Success

Socials: [HackProKP](#)

Github: <https://github.com/at0m-b0mb/Cracking-OSCP-Your-Roadmap-to-Ethical-Hacking-Success>

Complete Youtube Playlist:

<https://www.youtube.com/watch?v=MvkNbn8i2so&list=PLyrv3TPH3ejYNZipa0OIUvkdjHeUTRJ3J&index=1&t=0s>

Email Components:

1. **Sender:** The person or entity sending the email.
2. **Recipient:** The person or entity to whom the email is addressed.
3. **Subject Line:** A summary of the email's content, usually displayed prominently to the recipient.
4. **Body:** The main content of the email, which can include text, images, links, and attachments.
5. **Attachments:** Files that are included with the email, such as documents, images, or videos.

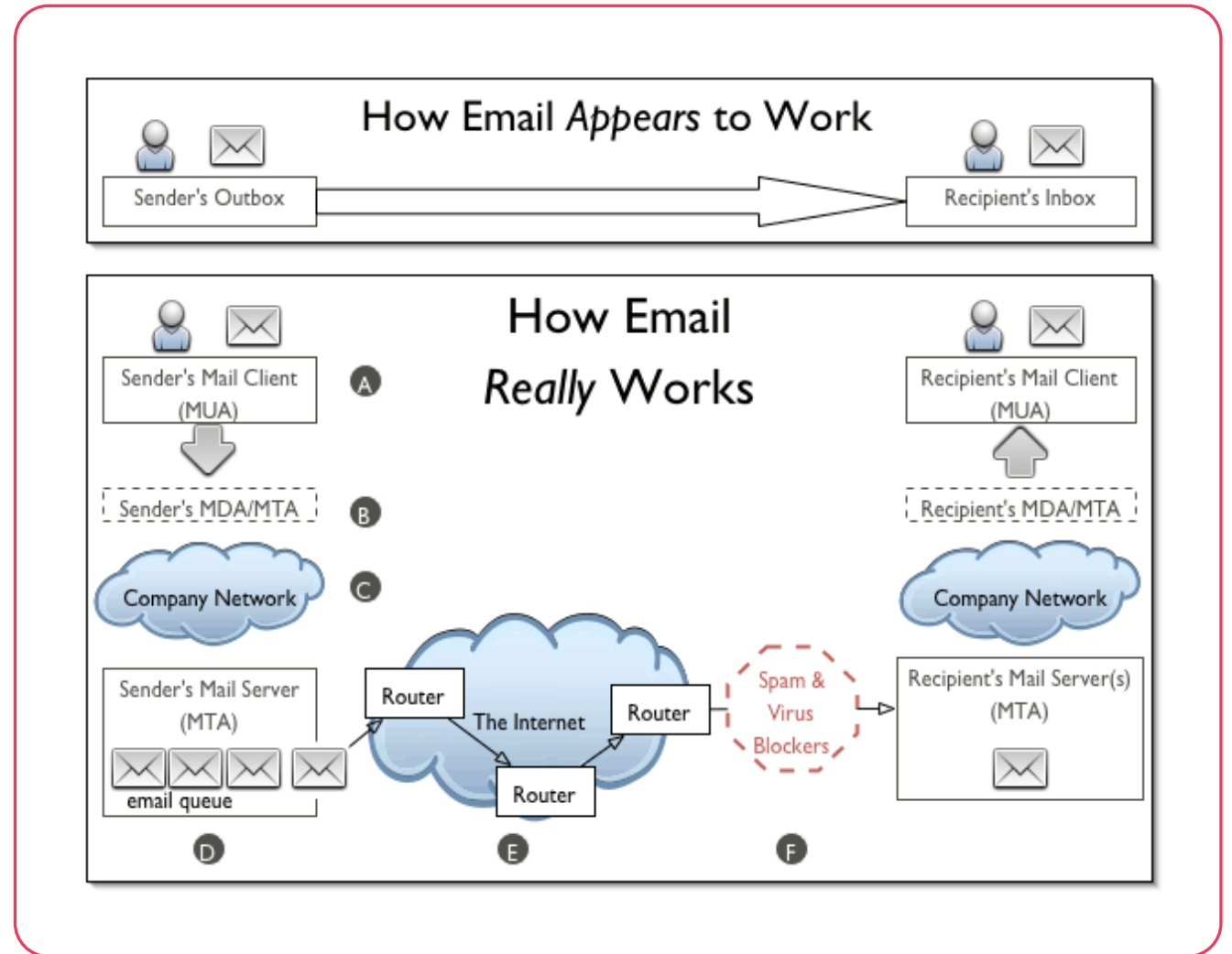
Email Components:

- 6. CC (Carbon Copy):** Additional recipients who receive a copy of the email. Their addresses are visible to all other recipients.
- 7. BCC (Blind Carbon Copy):** Similar to CC, but the addresses of BCC recipients are hidden from other recipients.
- 8. Signature:** Optional information (e.g., name, job title, contact information) automatically added to the end of an email.

Email Protocols:

- **SMTP (Simple Mail Transfer Protocol):** Used for sending emails.
- **IMAP (Internet Message Access Protocol):** Retrieves emails from a mail server.
- **POP3 (Post Office Protocol 3):** Retrieves emails but typically downloads them to the device, removing them from the server.

- Step A: Sender creates and sends an email
- Step B: Sender's MDA/MTA routes the email
- Step C: Network Cloud
- Step D: Email Queue
- Step E: MTA to MTA Transfer
- Step F: Firewalls, Spam and Virus Filters
- Final Step: Delivery



Step A: Sender creates and sends an email

- **Creation:** The sender uses an email client (like Outlook or Gmail) to compose an email, including the recipient's address, subject, and message content.
- **Sending:** Once the email is ready, the sender clicks "Send," initiating the process of delivering the email to the recipient.

Step B: Sender's MDA/MTA routes the email

- **Mail Delivery Agent (MDA):** This is a software component responsible for accepting emails from the sender's email client.
- **Mail Transfer Agent (MTA):** The MTA may handle tasks of both MDA and MTA, and it routes the email within the sender's network. It can forward emails to other MTAs if necessary.

Step C: Network Cloud

- Network Cloud: This refers to the complex network infrastructure, including servers, routers, and other devices, through which emails travel. It can be within a company's network or the broader Internet.
- Issues: The network cloud can face various issues like delays due to heavy loads, maintenance downtime, or misconfigurations. Firewalls, spam filters, and malware detectors also operate within this cloud.

Step D: Email Queue

- **Queue:** Outgoing emails may enter a queue if there's a high volume of email traffic. The MTA processes emails in the queue in order, which may cause delays.

Step E: MTA to MTA Transfer

- The MTA processes emails in the queue in order, which may cause delays.
- **Transfer:** The email is transferred from the sender's MTA to the recipient's MTA, possibly passing through multiple MTAs along the way.
- **DNS Lookup:** Each MTA consults the Domain Name System (DNS) to determine the recipient's mail server (MX server) based on the recipient's domain name.
- **MX Servers:** MX servers are responsible for receiving emails for a specific domain. The sending MTA contacts the MX servers in order of priority until it finds the correct one for the recipient's domain.

Step F: Firewalls, Spam and Virus Filters

- **Firewalls:** These are security barriers that control the flow of network traffic. They may inspect emails for security threats.
- **Spam and Virus Filters:** These filters analyze emails for spam content and malware. They may quarantine or delete suspicious emails.

Final Step: Delivery

- **Acceptance:** If the email passes through all checks and filters, it is accepted for delivery by the recipient's MTA.
- **Delivery to Mailbox:** The recipient's MDA delivers the email to the recipient's mailbox, where it awaits retrieval by the recipient's email client.

Client-Server Architecture

- Email operates on a **client-server** model.
- Email clients (e.g., Gmail, Outlook) on user devices interact with email servers (**SMTP, IMAP** Protocol) to send, receive, and store messages.
- Email Clients use **POP3** to download the Emails from the Servers.

SMTP (Simple Mail Transfer Protocol):

- Responsible for sending emails from the sender's email client to the recipient's email server.
- Works in conjunction with other protocols like IMAP or POP3.
- Uses port 25 for unencrypted communication and port 587 for encrypted communication (SMTP with **STARTTLS**).

IMAP (Internet Message Access Protocol):

- Allows users to access their emails stored on a mail server.
- Emails are kept on the server, and changes (read, delete, etc.) are synchronized across devices.
- Uses port 143 for unencrypted communication and port 993 for encrypted communication (**IMAPS**).

POP3 (Post Office Protocol 3):

- Downloads emails from the mail server to the user's device.
- Typically deletes emails from the server after downloading, making it less suitable for multiple device access.
- Uses port 110 for unencrypted communication and port 995 for encrypted communication (POP3S).

Email Addresses:

Each user has a unique email address, typically in the format,

- **Format:** username@domain.com
- **Components:** Username (local part), @ symbol, Domain (server part).
 - **Username (Local Part):**
 - Often the name or an alias of the user.
 - May include special characters like dots (.), underscores (_), or numbers.
 - **Domain (Server Part):**
 - Represents the mail server associated with the email address.
 - Usually, the name of the email service provider or the organization's domain.

MX Record (Mail Exchange Record)

- MX records are **DNS (Domain Name System)** records that specify the mail server responsible for receiving email on behalf of a domain.
- When someone sends an email to an address like "username@example.com," the sender's email server looks up the MX records for the domain "example.com" to determine where to deliver the message.

MX Record Format:

- An MX record consists of three main components:
 - **Priority:** An integer value indicating the priority of the mail server.
 - **Mail Server:** The domain name of the mail server responsible for receiving email.
 - **TTL (Time-to-Live):** The time duration for which the MX record should be cached by DNS servers, specified in seconds.

Email Clients:

- **Web-based:** Gmail, Yahoo Mail, Outlook.com.
- **Desktop:** Microsoft Outlook, Mozilla Thunderbird, Apple Mail.
- **Mobile:** Email apps on smartphones.

Web-based Clients:

- **Gmail:** Offers powerful search capabilities, integration with Google services, and categorization through labels.
- **Outlook.com:** Provides a clean interface, integration with Microsoft services, and a focused inbox feature.
- **Yahoo Mail:** Offers customizable themes, 1TB of storage, and spam filters.

Desktop Clients:

- **Microsoft Outlook:** Known for its robust features, calendar integration, and seamless integration with Microsoft Office.
- **Mozilla Thunderbird:** An open-source, cross-platform email client with features like add-ons and smart folders.
- **Apple Mail:** Native to macOS and iOS devices, it provides integration with other Apple applications.

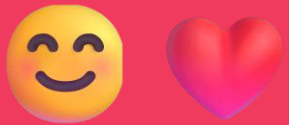
Sending and Receiving Email:

- **Outgoing Server (SMTP):** Sends emails to the recipient's server.
- **Incoming Server (IMAP/POP3):** Retrieves emails from the sender's server.
- **Authentication:** Login credentials (username and password) verify the user's identity.

Email Security:

- **Encryption:** Protects email content during transmission (SSL/TLS).
- **Spam Filtering:** Filters out unwanted emails.
- **Two-Factor Authentication (2FA):** Enhances account security.

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