CCNA: Introduction to Network

**Module 3 – 3.1: The Rules**

*I. Devices in a Buddle:*

- **Protocols (Giao thức) as the foundation of network communication:** Protocols define the rules and procedures that devices must follow to communicate with each other.

- **The role of standards organizations:** Organizations like the Internet Engineering Task Force (IETF), International Organization for Standardization (ISO), and Institute of Electrical and Electronics Engineers (IEEE) 1 play a crucial role in developing and maintaining standards for network protocols.

- **Protocol suites:** A collection of protocols that work together to enable end-to-end communication.

- **The OSI and TCP/IP reference models:** These models provide a framework for understanding how network communication is structured and how data is transferred between devices.

*II. Communications Fundamentals*

- **Networks** range from simple (two computers) to complex (internet).

- **Communication** needs more than just a physical connection; devices must know "how" to communicate.

- **All communication** involves:

+ **Message source / sender (Nguồn tin nhắn / Người gửi):** Message sources are people, or electronic devices, that need to send a message to other individuals or devices.

+ **Message Destination / receiver (Điểm đến tin nhắn / Người nhận)**: The destination receives the message and interprets it.

+ **Channel (Kênh):** This consists of the media that provides the pathway over which the message travels from source to destination

*III. Communications Protocols*

- Communication, whether face-to-face or over a network, relies on **protocols** – specific rules for each method. Just like you wouldn't use the same rules for a phone call as you would for a letter, different network communication methods have their own protocols.

**- Key Takeaways:**

+ Protocols are essential for all communication.

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Description automatically generated + Different communication methods have different protocols.

A purple rectangular sign with black text

Description automatically generated

- Protocols must account for the following requirements to successfully deliver a message that is understood by the receiver:

+ An identified sender and receiver

+ Common language and grammar

+ Speed and timing of delivery

+ Confirmation or acknowledgment requirements

*IV. Network Portocol Requirements*

**- Network protocols** not only identify the source and destination but also **dictate the specific rules and procedures for how messages are transmitted across the network**.

- Common computer protocols include the following requirements:

+ Message encoding (Mã hoá thông điệp)

+ Message formatting and encapsulation (Định dạng và Đóng gói)

+ Message size (Kích thước thông điệp)

+ Message timing (Thời gian thông điệp)

+ Message delivery options (Tuỳ chọn phân phối thông điệp)/

*V. The Communication Process*

Medium

Encoding

Message

Think

Sender

Feedback

Decoding

Receiver

*VII. Message Encoding:*

**- Encoding:** Turning information into a form that can be sent.

**- Decoding:** Turning the sent information back into its original form so it can be understood.

**- Analogy:**

Imagine you're telling a friend about a beautiful sunset. You:

1. **Encode:** Translate your thoughts into words and speak them using sounds and tones.
2. **Transmit:** Send the sounds through the air.
3. **Decode:** Your friend hears the sounds and translates them back into understanding the description of the sunset.

**- Network Example:**

* **Encoding:** A computer converts text, images, or videos into a series of 1s and 0s (binary code) for transmission over the network.
* **Decoding:** The receiving computer converts the binary code back into the original text, image, or video.

*VIII. Message Formating and Encapsulation (Đóng gói)*

**- Message Formatting:** Messages need a specific structure or format to be understood. It's like having a set way to write a letter with specific sections (address, salutation, body, closing).

**- Encapsulation:** Placing one message format (like the letter) inside another (like the envelope).

**- Analogy:**

Sending a letter:

1. **Formatting:** The letter has a specific structure: sender's address, recipient's address, salutation, body, closing.
2. **Encapsulation:** The letter is placed inside an envelope. The envelope also has its own format with spaces for addresses, stamps, etc.

**- Network Example:**

* **Formatting:** Data is divided into smaller pieces called packets. Each packet has a header with information like the source and destination addresses.
* **Encapsulation:** Several layers of information (like headers for different network protocols) are added to the data, much like placing the letter inside an envelope.

*IX. Message Size:*

- When people communicate with each other, the messages that they send are usually broken into smaller parts or sentences. These sentences are limited in size to what the receiving person can process at one time, as shown in the figure. It also makes it easier for the receiver to read and comprehend.

- When sending a long message over a network, it's like sending a long package through the mail.

* **Breaking it down:** The message is divided into smaller "packets" (like smaller boxes).
* **Size limits:** These packets have size restrictions. They can't be too big or too small.
* **Addressing:** Each packet has its own address to ensure it reaches the correct destination.
* **Reassembling:** The receiving device reassembles the packets back into the original message.

This analogy helps to visualize how message size restrictions work in network communication.

*X. Message Timing*

Message timing is also very important in network communications. Message timing includes the following:

+ **Flow Control (Kiểm soát luồng):** This is like managing the speed of a conversation. It ensures both sides can send and receive information at a pace that everyone can handle.

+ **Response Timeout (Thời gian chờ phản hồi):** If you ask a question and don't get an answer within a reasonable time, you might assume the other person didn't hear you and try again. Network devices also have time limits for waiting for responses.

+ **Access Method (Phương thức truy cập):** This is like taking turns in a conversation. It determines when each device can send data on the network to avoid conflicts.

*XI. Message Delivery Options*

**- Unicast:** Sending a message to one specific person or device.

**- Multicast:** Sending a message to a selected group of people or devices.

**- Broadcast:** Sending a message to everyone in a particular area or network.

**- Analogy:**

**+ Unicast:** Sending a personal letter to a friend.

**+ Multicast:** Sending a group email to your book club.

**+ Broadcast:** Making an announcement over a loudspeaker to everyone in a building.

**- Network Example:**

**+ Unicast:** Sending an email to a single person.

**+ Multicast:** Sending a software update to a group of computers on a network.

**+ Broadcast:** Sending a network configuration message to all devices on a local network.