

Wireshark Experiment – 01

Ethernet Protocol

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Ethernet Protocol

The Ethernet protocol is a widely used standard for local area networking (LAN). It defines the rules and processes for devices to communicate within a network using wired connections. Ethernet is standardized by the IEEE as 802.3, and its primary purpose is to enable reliable data exchange between devices on the same network segment.

Key Features of Ethernet Protocol

1. Ethernet frames carry data packets between devices.
2. Frames include the source and destination MAC addresses, making communication specific to particular devices.
3. Ethernet uses Carrier Sense Multiple Access with Collision Detection (CSMA/CD) for managing data transmission.
4. Ethernet supports various physical media, including twisted-pair cables.
5. Devices are identified by a **MAC address** (Media Access Control address), a unique identifier assigned to each Ethernet interface.

Ethernet Frame Structure

An Ethernet frame is the basic unit of data transmission and has the following components:

1. Preamble (7 bytes) and Start Frame Delimiter (SFD) (1 byte):
 - Used to synchronize communication between devices.
2. Destination MAC Address (6 bytes):
 - Identifies the recipient device.
3. Source MAC Address (6 bytes):
 - Identifies the sending device.
4. EtherType/Length (2 bytes):
 - Specifies the protocol type or frame length.
5. Payload (46–1500 bytes):
 - Contains the actual data being transmitted.
6. Frame Check Sequence (FCS) (4 bytes):
 - Ensures data integrity by detecting transmission errors.

Advantages of Ethernet

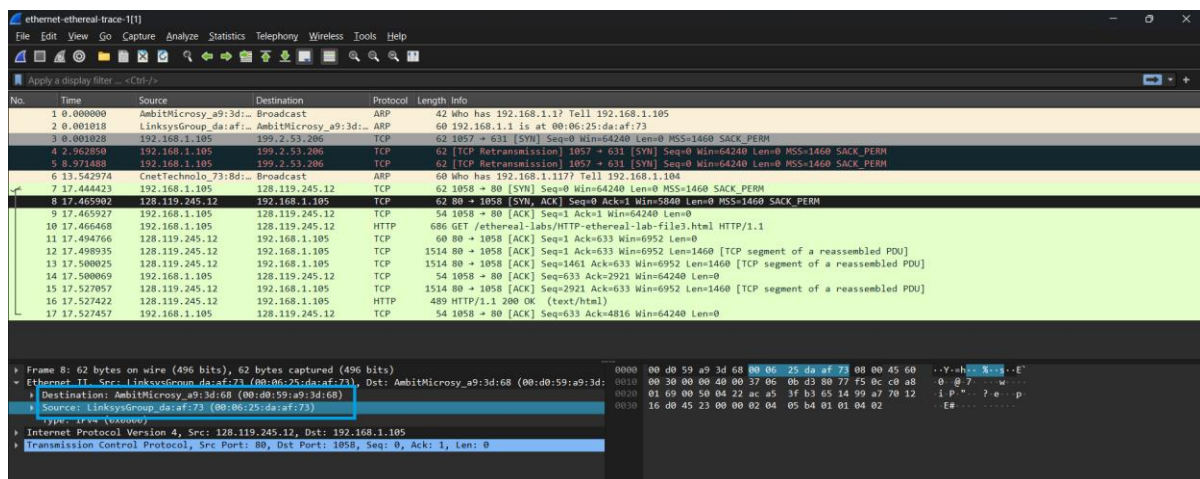
- **Speed:** Ethernet supports high-speed data transmission, suitable for most modern networks.
- **Reliability:** CSMA/CD and advanced switching mechanisms ensure efficient communication.
- **Scalability:** Can be used in small home networks or large enterprise networks.
- **Cost-Effective:** Widely available and affordable hardware and cables.

Applications

- Local Area Networks (LANs).
- Home and Office Networking.
- Data Centers and High-Speed Backbone Networks.
- IoT and Industrial Automation.

1.What is the 48-bit Ethernet address of your computer?

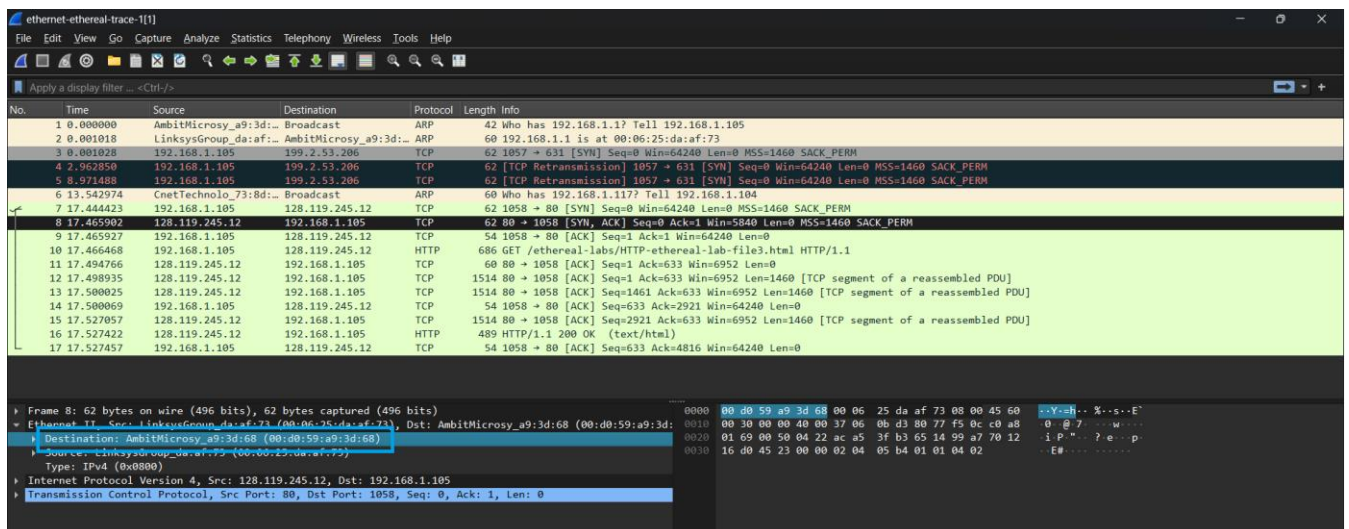
ANS: 48 it Ethernet address of my computer: 00:06:25:da:af:73



2.What is the 48-bit destination address in the Ethernet frame? Is this the Ethernet address of gaia.cs.umass.edu? (Hint: the answer is no). What device has this as its Ethernet address?

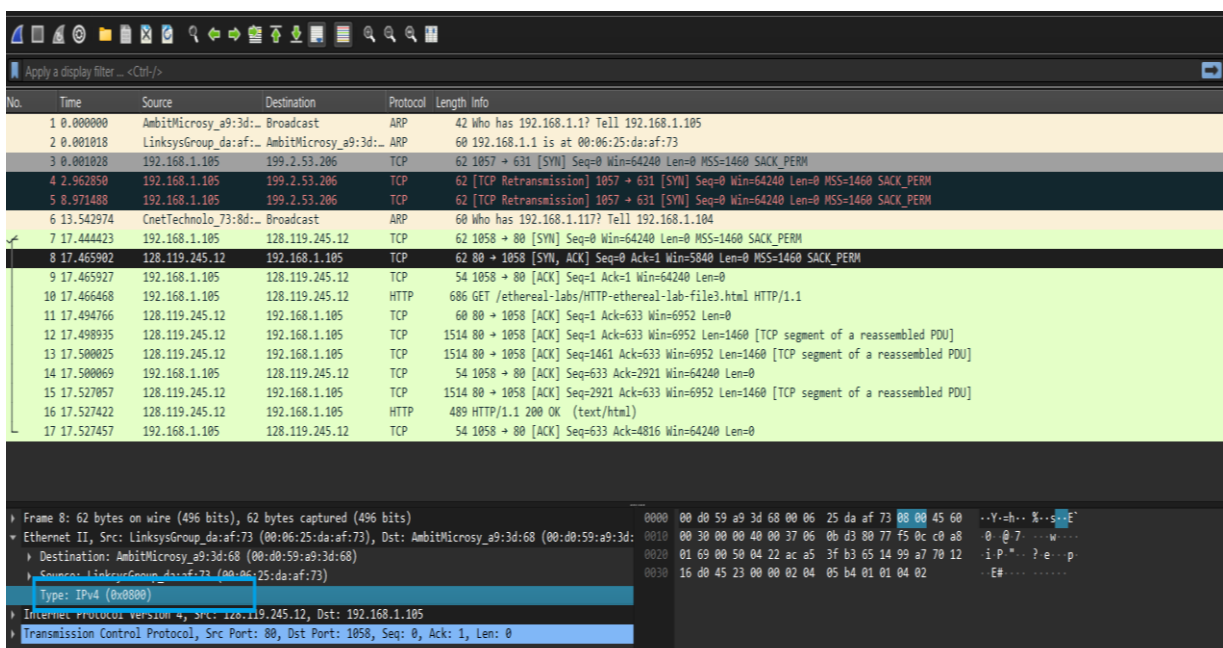
ANS: 48-bit destination address in the Ethernet frame: 00:d0:59:a9:3d:68.

No this address is not the address of the ethernet frame, The Router has this as its destination address.



3. Give the hexadecimal value for the two-byte Frame type field. What do the bit(s) whose value is 1 mean within the flag field?

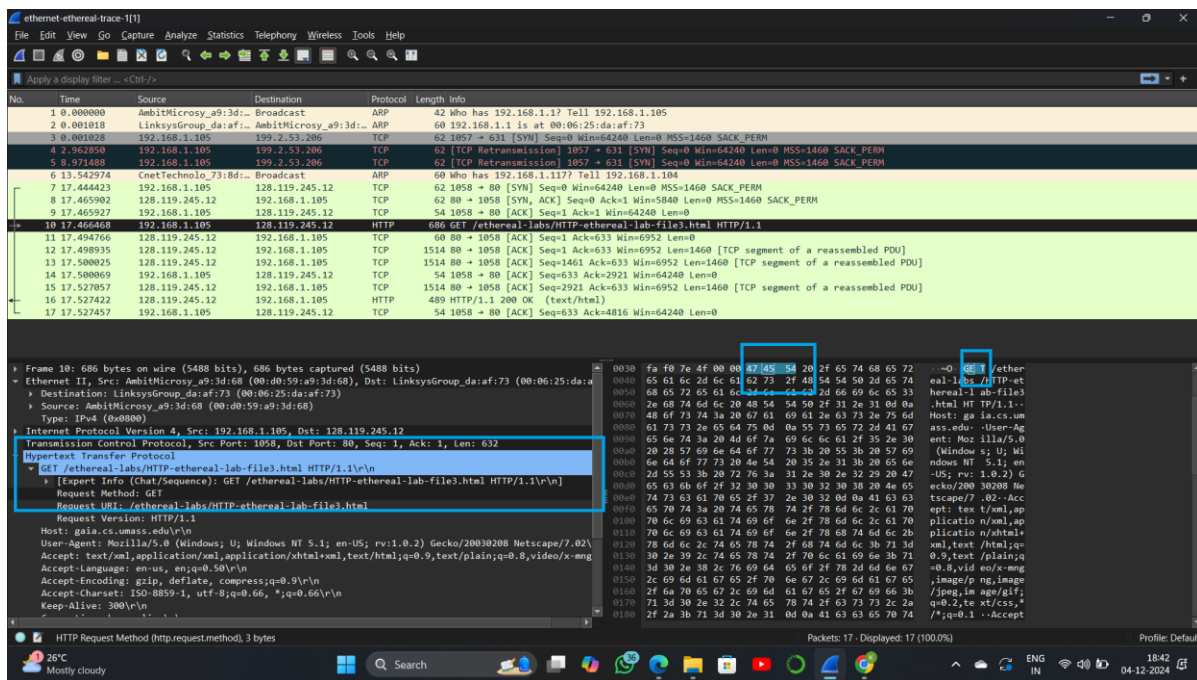
ANS:



The hex value for the Frame type field is 0x0800. This corresponds to the IP protocol (the frame type field indicates that the next layer above IP – the layer to which the payload of this Ethernet frame will be passed – is IP).

4. How many bytes from the very start of the Ethernet frame does the ASCII “G” in “GET” appear in the Ethernet frame?

ANS: The ASCII “G” appears 47 bytes from the start of the Ethernet frame. There are 14 B Ethernet frame, and then 20 bytes of IP header followed by 20 bytes of TCP header before the HTTP data is encountered.

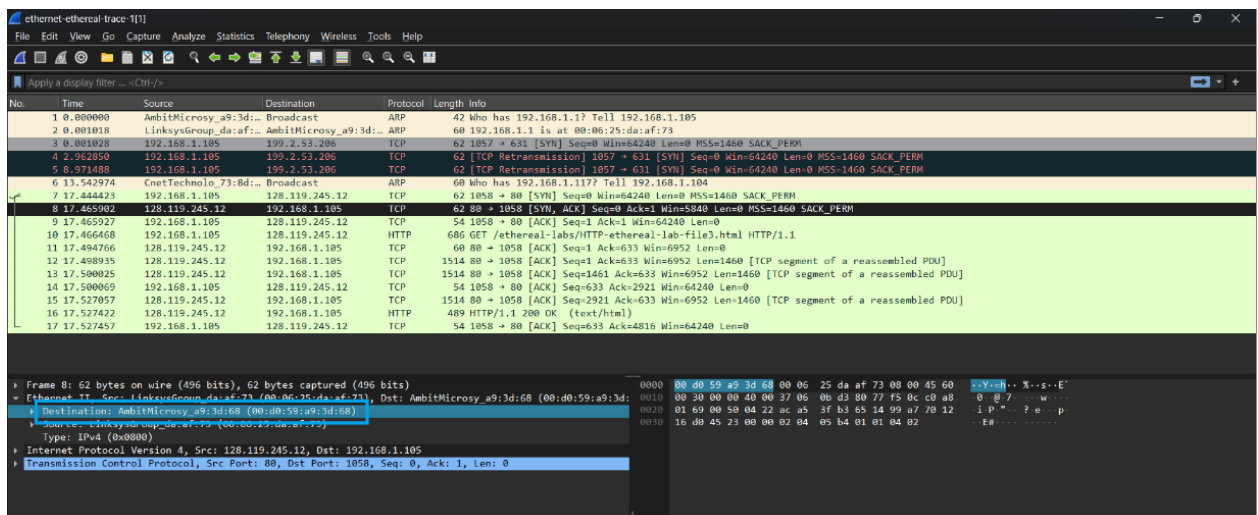


5. What is the value of the Ethernet source address? Is this the address of your computer, or of gaia.cs.umass.edu (Hint: the answer is no). What device has this as its Ethernet address.

ANS: The source address 00:06:25:da:af:73 is neither the Ethernet address of gaia.cs.umass.edu nor the address of my computer. It is the address of my Linksys router, which is the link used to get onto my subnet.

6. What is the destination address in the Ethernet frame? Is this the Ethernet address of your computer?

The destination address : 00:d0:59:a9:3d:68 is the address of my computer.



7. Give the hexadecimal value for the two-byte Frame type field. What do the bit(s) whose value is 1 mean within the flag field?

ANS: The hex value for the Frame type field is 0x0800. This value corresponds to the IP protocol

8.How many bytes from the very start of the Ethernet frame does the ASCII “O” in “OK”

Wireshark packet capture showing an HTTP response. The packet list shows a GET request and a 200 OK response. The packet details pane for the selected packet (No. 17) shows the Ethernet II, Internet Protocol Version 4, and Transmission Control Protocol layers. The packet bytes pane shows the raw data of the frame, with the ASCII 'O' in 'OK' highlighted at offset 47.

(i.e., the HTTP response code) appear in the Ethernet frame?

ANS:

Wireshark packet capture showing an HTTP response. The packet list shows a GET request and a 200 OK response. The packet details pane for the selected packet (No. 17) shows the Ethernet II, Internet Protocol Version 4, and Transmission Control Protocol layers. The packet bytes pane shows the raw data of the frame, with the ASCII 'O' in 'OK' highlighted at offset 47.

The ASCII “O” appears 47 bytes from the start of the Ethernet frame