CSS2C08

COMPUTER NETWORKS

MODULE 4

1. LINK LAYER SERVICES
2. ERROR DETECTION AND CORRECTION
3. MULTIPLE ACCESS PROTOCOLS
4. LAN ADDRESS
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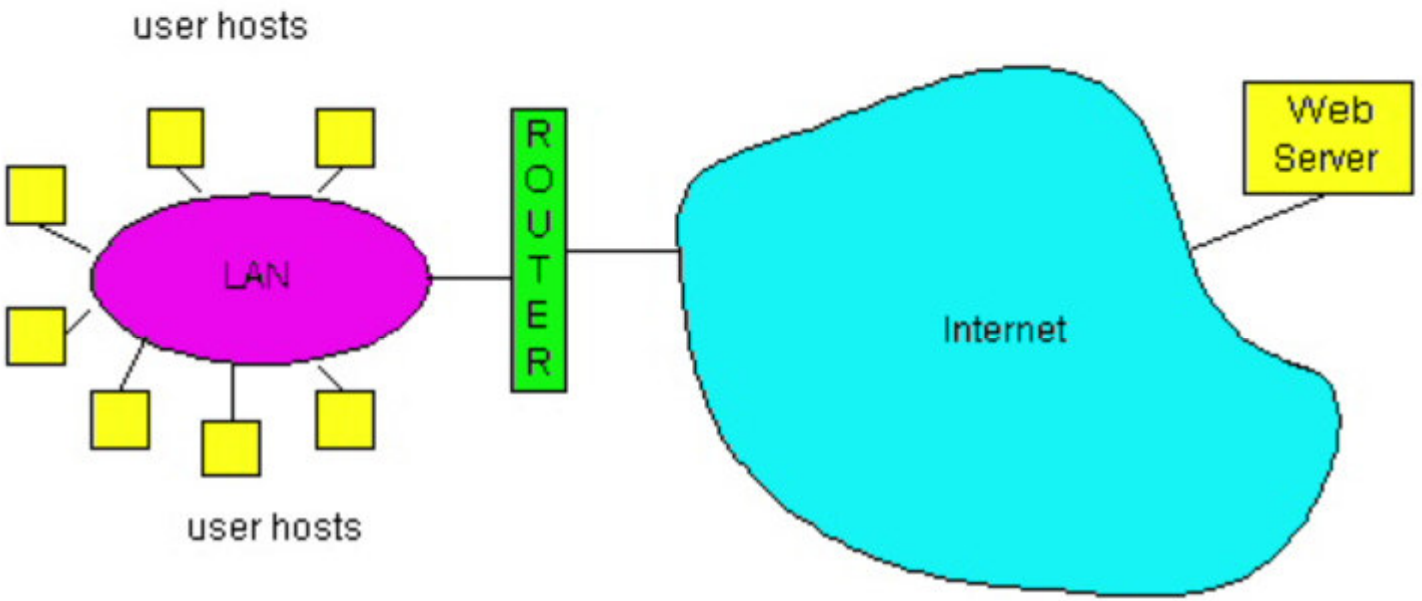
LAN

- A LAN is a computer network that is concentrated in a geographical area, such as in a building or on a university campus.
- When a user accesses the Internet from a university or corporate campus, the access is almost always by way of a LAN. For this type of Internet access, the user's host is a node on the LAN, and the LAN provides access to the Internet through a router.

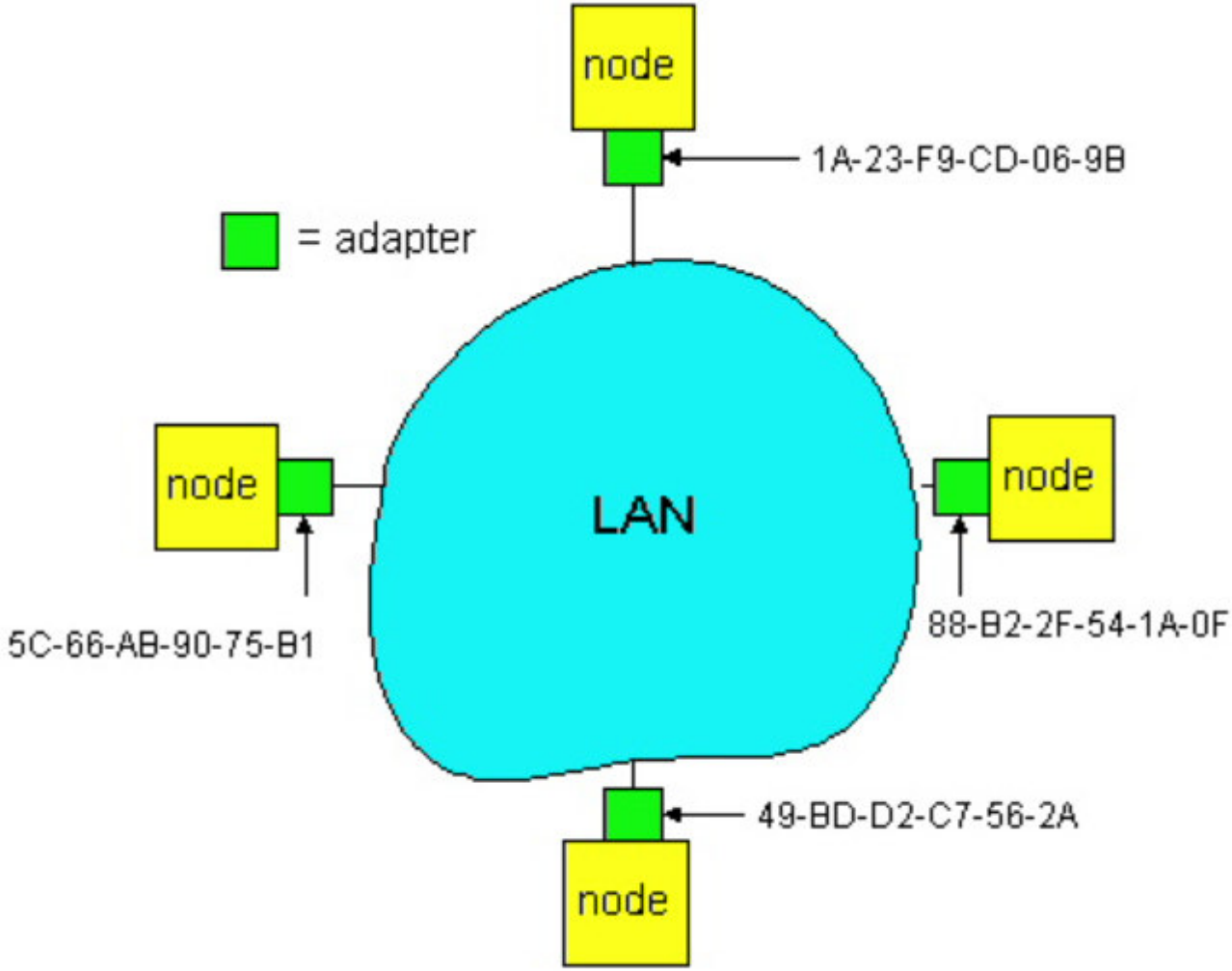

user hosts
LAN
ROUTER
Internet
Web
Server
user hosts

- The LAN is a single "link" between each user host and the router; it therefore uses a link-layer protocol, which incorporates a multiple access protocol.
- The two classes of LAN technologies were popular in the workplace.
  - The first class consists of the Ethernet LANs (also known as 802.3 LANs),which are random-access based.
  - The second class of LAN technologies are token-passing technologies, including *token ring* (also known as IEEE 802.5)and *FDDI* (also known as Fiber Distributed Data).

- Nodes in LANs send frames to each other over a broadcast channel. This means that when a node in a LAN transmits a frame, every other node connected to the LAN receives the frame. But usually, a node in the LAN doesn't want to send a frame to all of the other LAN nodes but instead wants to send to some particular LAN node. To provide this functionality, the nodes on the LAN need to be able to address each other when sending frames, i.e., the nodes need LAN addresses and the frame needs a field for a destination LAN address.

LAN ADDRESS

- A LAN address is also variously called a physical address, an Ethernet address, or a MAC (media access control) address.
- For most LANs (including Ethernet and token-passing LANs), the LAN address is six-bytes long, giving 2^{48} possible LAN addresses. These six-byte addresses are typically expressed in hexadecimal notation, with each byte of the address expressed by a pair of hexadecimal numbers.
- An adapter's LAN address is permanent – when an adapter is manufactured, a LAN address is burned into the adapter's ROM.



Each adapter connected to a LAN has a unique LAN address.

- The property of LAN addresses is that no two adapters have the same address.
- An adapter's LAN address has a flat structure (as opposed to a hierarchical structure), and doesn't change no matter where the adapter goes. A portable computer with an Ethernet card always has the same LAN address, no matter where the portable goes.
- An adapter's LAN address is analogous to a person's social security number, which also has a flat addressing structure and which also doesn't change no matter where the person goes.

- When an adapter wants to send a frame to some destination adapter on the same LAN, the sending adapter inserts the destination LAN address into the frame.
- When the destination adapter receives the frame, it extracts the enclosed datagram and passes the datagram up the protocol stack.
- All the other adapters on the LAN also receive the frame; but these other adapters discard the frame without passing the network-layer datagram up the protocol stack.

- Thus, these other adapters do not have to interrupt their hosts when they receive datagrams destined to other hosts.
- Having said this, sometimes a sending adapter *does* want all the other adapters on the LAN to receive and *process* the frame it is about to send. In this case, the sending adapter inserts a special **LAN broadcast address** into the destination address field of the frame.
- For LANs that use the six-byte addresses (such as Ethernet and token-passing LANs), the broadcast address is a string of 48 consecutive 1s (i.e., FF-FF-FF-FF-FF-FF in hexadecimal notation).