Channel Allocations

- Channel allocation is a process in which a single channel is divided and allotted to multiple users in order to carry user specific tasks.
- There are user's quantity may vary every time the process takes place. If there are N number of users and channel is divided into N equal-sized sub channels, Each user is assigned one portion.
- If the number of users are small and don't vary at times, then Frequency Division Multiplexing can be used as it is a simple and efficient channel bandwidth allocating technique.
- Channel allocation problem can be solved by two schemes: Static Channel Allocation in LANs and MANs, and Dynamic Channel Allocation.

Channel Allocations

- **Static Channel Allocation in LANs and MANs:**
- It is the classical or traditional approach of allocating a single channel among multiple competing users Frequency Division Multiplexing (FDM).
- if there are N users, the bandwidth is divided into N equal sized portions each user being assigned one portion.
- since each user has a private frequency band, there is no interface between users.

Channel Allocations

- **Dynamic channel allocation scheme :**
- In dynamic channel allocation scheme, frequency bands are not permanently assigned to the users. Instead channels are allotted to users dynamically as needed, from a central pool. The allocation is done considering a number of parameters so that transmission interference is minimized.
- With a dynamic approach the allocation of the channel changes based on the traffic generated by the users.
- When a User makes a call request then Base Station (BS) send that request to the Mobile Station Center (MSC) for the allocation of channels or voice channels.

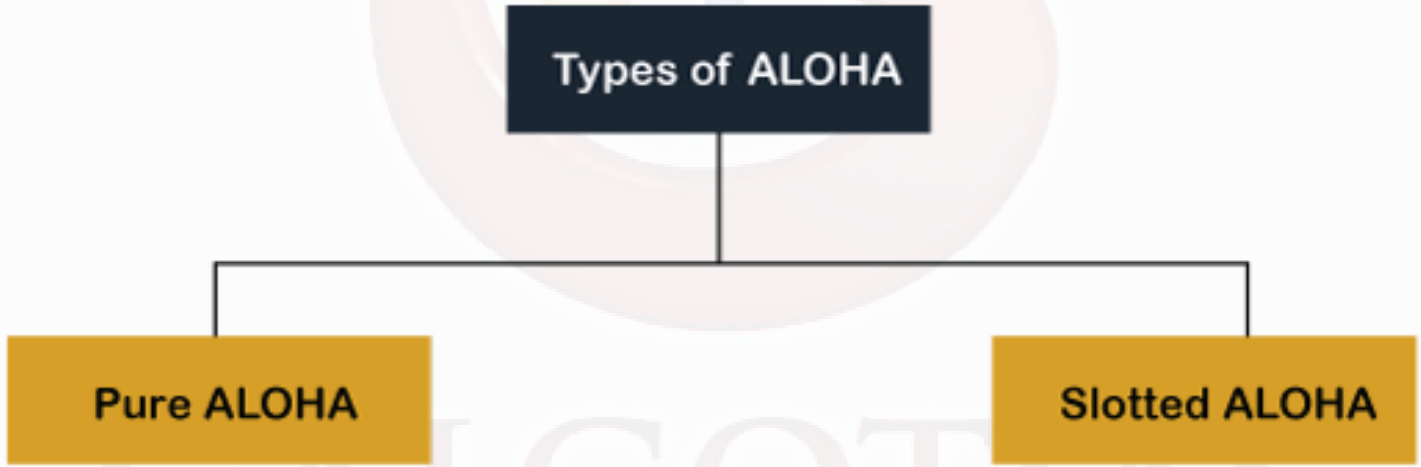
ALOHA protocols

- ALOHA is **a multiple access protocol for transmission of data via a shared network channel**. It operates in the medium access control sublayer (MAC sublayer) of the open systems interconnection (OSI) model.
- It is designed for wireless LAN (Local Area Network) but can also be used in a shared medium to transmit data. Using this method, any station can transmit data across a network simultaneously when a data frameset is available for transmission.

ALOHA protocols

- In ALOHA, each node or station transmits a frame without trying to detect whether the transmission channel is idle or busy. If the channel is idle, then the frames will be successfully transmitted.
- If two frames attempt to occupy the channel simultaneously, collision of frames will occur and the frames will be discarded.
- These stations may choose to retransmit the corrupted frames repeatedly until successful transmission occurs.

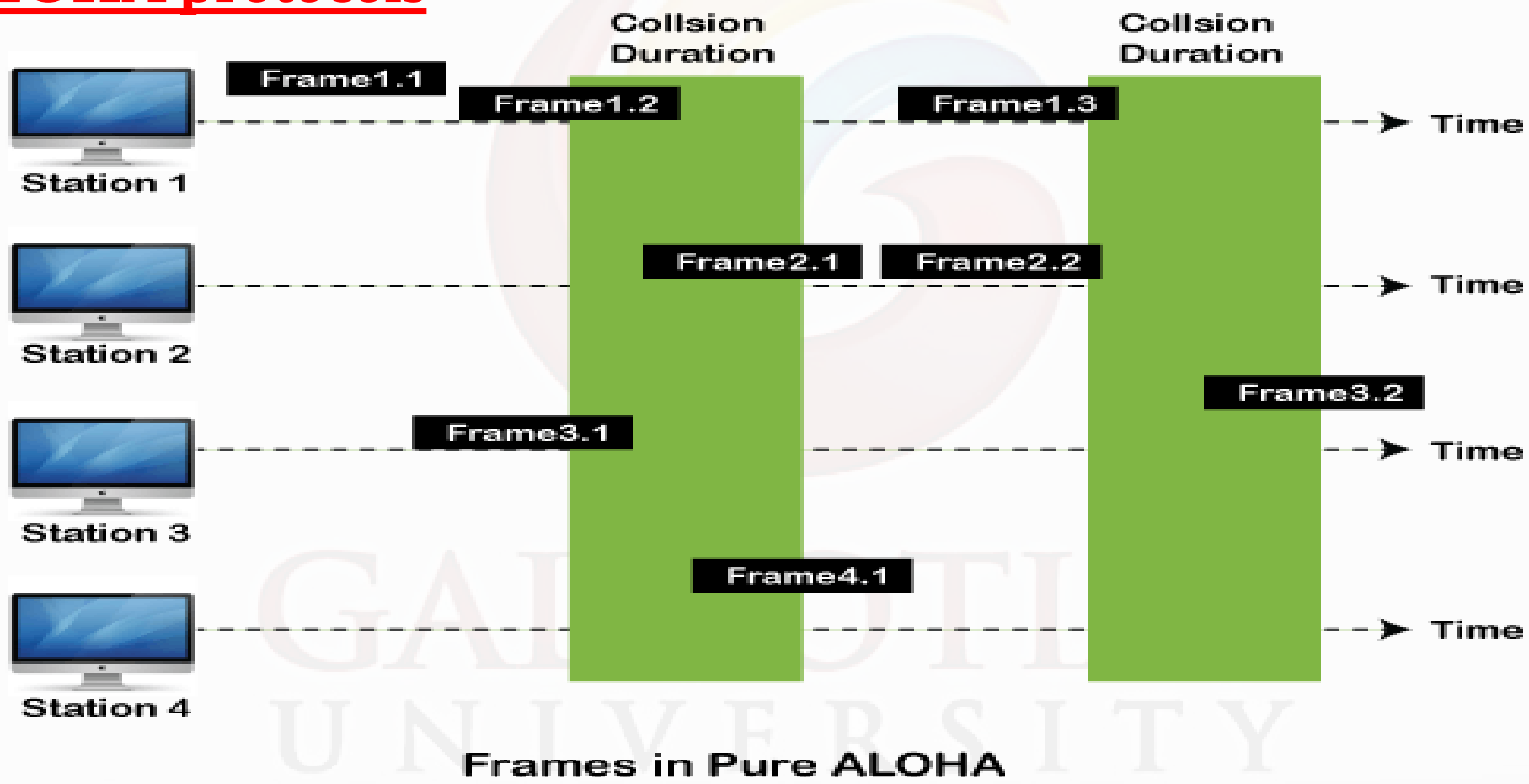
ALOHA protocols



Pure ALOHA protocols

- Whenever data is available for sending over a channel at stations, we use Pure Aloha. In pure Aloha, when each station transmits data to a channel without checking whether the channel is idle or not, the chances of collision may occur, and the data frame can be lost.
- When any station transmits the data frame to a channel, the pure Aloha waits for the receiver's acknowledgment. If it does not acknowledge the receiver end within the specified time, the station waits for a random amount of time, called the backoff time (Tb). And the station may assume the frame has been lost or destroyed. Therefore, it retransmits the frame until all the data are successfully transmitted to the receiver.

Pure ALOHA protocols

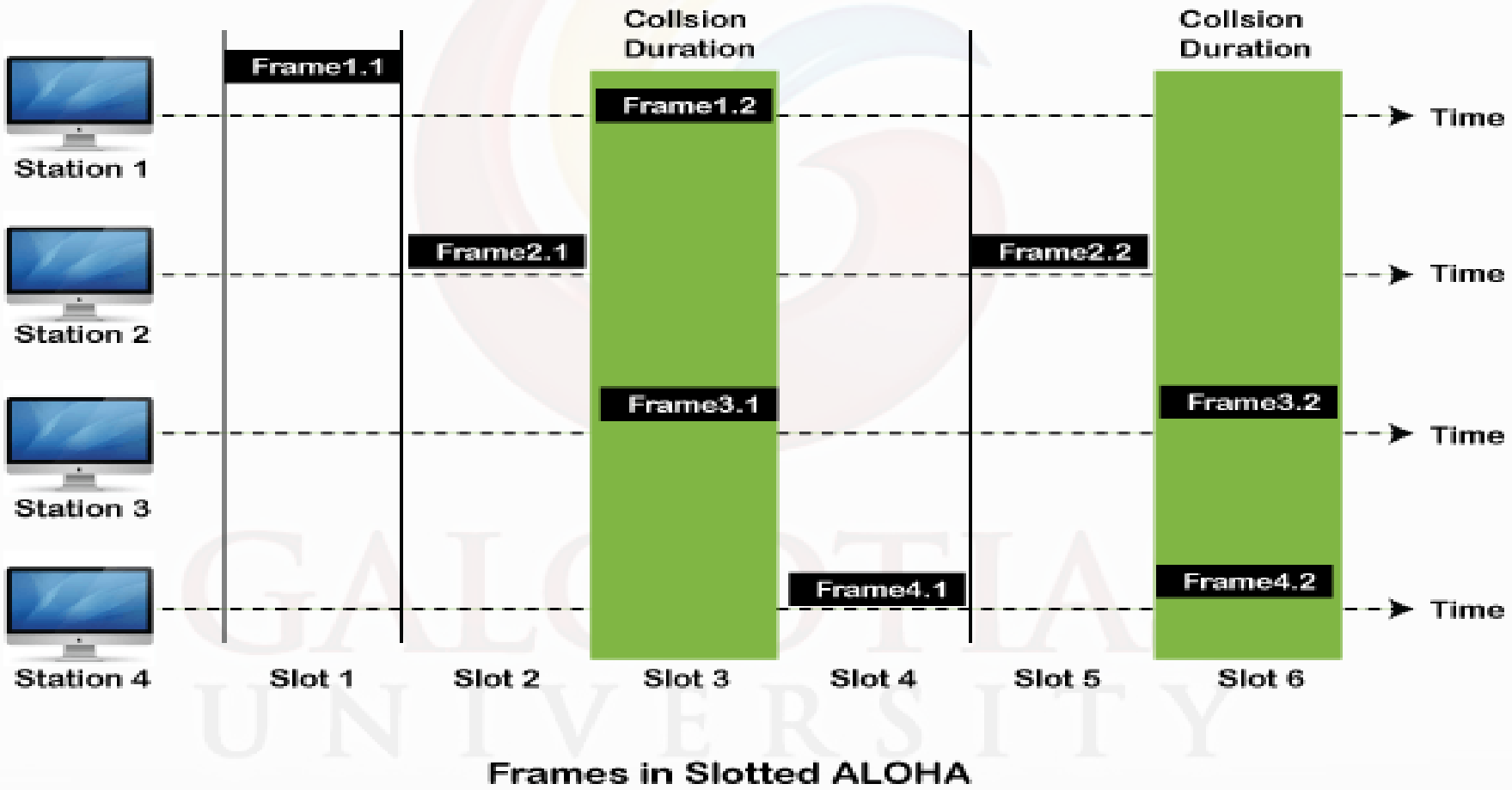


Frames in Pure ALOHA

Slotted ALOHA protocols

- The slotted Aloha is designed to overcome the pure Aloha's efficiency because pure Aloha has a very high possibility of frame hitting. In slotted Aloha, the shared channel is divided into a fixed time interval called slots.
- So that, if a station wants to send a frame to a shared channel, the frame can only be sent at the beginning of the slot, and only one frame is allowed to be sent to each slot. And if the stations are unable to send data to the beginning of the slot, the station will have to wait until the beginning of the slot for the next time.
- However, the possibility of a collision remains when trying to send a frame at the beginning of two or more station time slot.

Slotted ALOHA protocols



Frames in Slotted ALOHA

Medium Access Control (MAC)

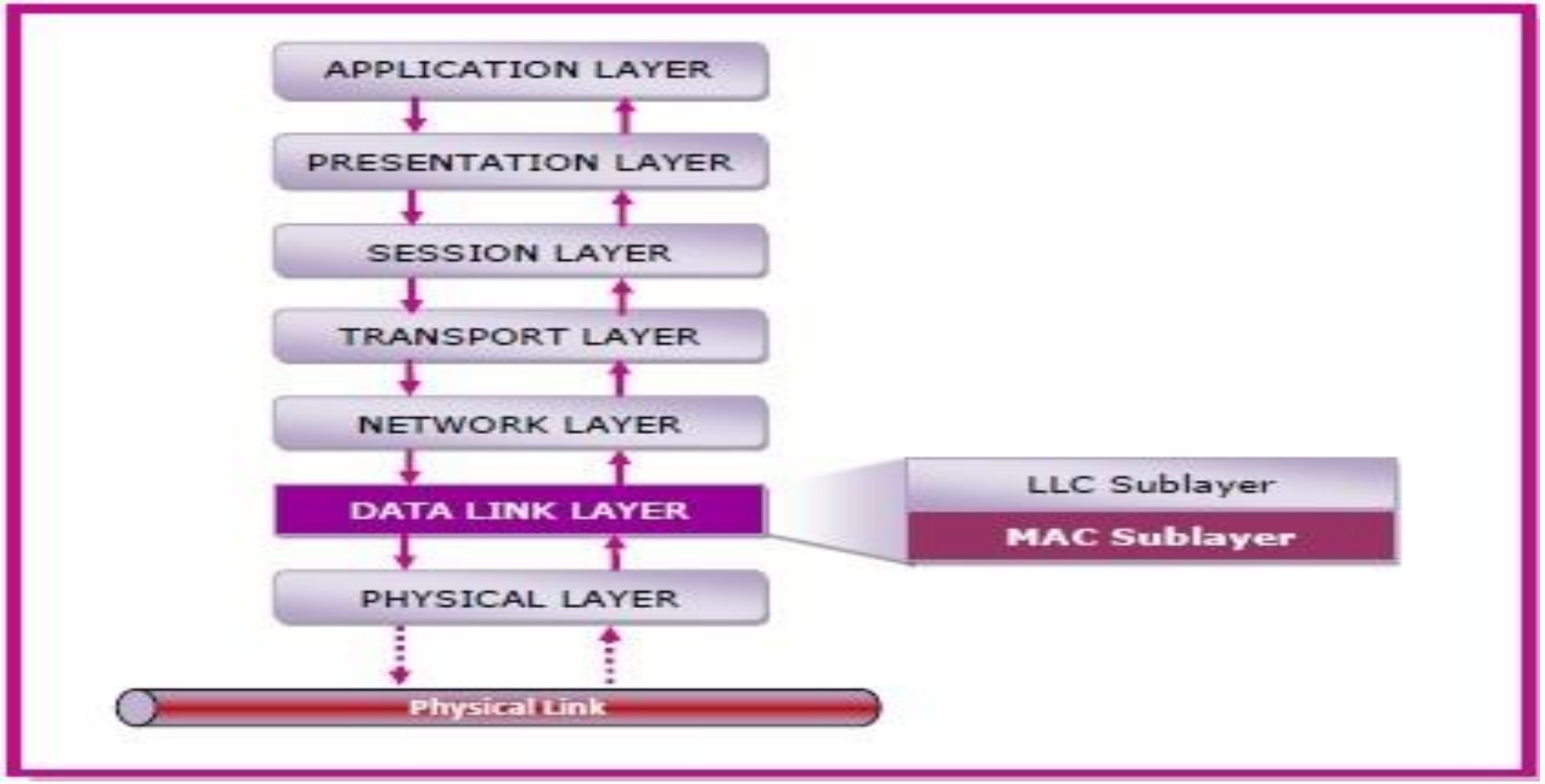
- medium access control (MAC) is a sublayer of the data link layer of the open system interconnections (OSI) reference model for data transmission.
- It is responsible for flow control and multiplexing for transmission medium. It controls the transmission of data packets via remotely shared channels.
- It sends data over the network interface card.

Medium Access Control (MAC)

- MAC Layer in the OSI Model
- The Open System Interconnections (OSI) model is a layered networking framework that conceptualizes how communications should be done between heterogeneous systems. The data link layer is the second lowest layer. It is divided into two sublayers –

- The logical link control (LLC) sublayer
- The medium access control (MAC) sublayer

Medium Access Control (MAC)



Functions of MAC Layer

- It provides an abstraction of the physical layer to the LLC and upper layers of the OSI network.
- It is responsible for encapsulating frames so that they are suitable for transmission via the physical medium.
- It resolves the addressing of source station as well as the destination station, or groups of destination stations.

Functions of MAC Layer

- It performs multiple access resolutions when more than one data frame is to be transmitted. It determines the channel access methods for transmission.
- It also performs collision resolution and initiating retransmission in case of collisions.
- It generates the frame check sequences and thus contributes to protection against transmission errors.

MAC Addresses

- It p MAC address or media access control address is a unique identifier allotted to a network interface controller (NIC) of a device. It is used as a network address for data transmission within a network segment like Ethernet, Wi-Fi, and Bluetooth.
- MAC address is assigned to a network adapter at the time of manufacturing. It is hardwired or hard-coded in the network interface card (NIC). A MAC address comprises of six groups of two hexadecimal digits, separated by hyphens, colons, or no separators. An example of a MAC address is 00:0A:89:5B:F0:11.

Thank You