

Chapter 1

Introduction

Multimedia



Multimedia

- The word multi and media are combined to form the word multimedia. The word “multi” signifies “many.”
- Multimedia is a type of medium that allows information to be easily transferred from one location to another.
- Multimedia is the presentation of text, pictures, audio, and video with links and tools that allow the user to navigate, engage, create, and communicate using a computer.
- Multimedia refers to the computer-assisted integration of text, drawings, still and moving images(videos) graphics, audio, animation, and any other media in which any type of information can be expressed, stored, communicated, and processed digitally.

Multimedia

- Digital information represented through audio, video, and animation in addition to traditional media like text, graphics, images.
- Integration of text, graphics, images, audio, video, animation.
- Stored, transmitted, processed digitally



Non-Linear Multimedia

- Interactive.
- Users have control over content.
- Stored, transmitted, processed digitally
- For eg: games, interactive video



Types of multimedia

LINEAR MULTIMEDIA

Linear active content progresses without any navigational control for the viewer.

Cinema presentation is an example of linear multimedia.

NON-LINEAR MULTIMEDIA

Non-linear content offers user interactivity to control progress as used with a computer game .

Hypermedia is an example of non-linear multimedia.

Multimedia

- Digital information represented through audio, video, and animation in addition to traditional media like text, graphics, images.
- Integration of text, graphics, images, audio, video, animation.
- Stored, transmitted, processed digitally



Hypermedia and Hypertext

- Hypertext is meant to read non linearly by following links
- Hypermedia: links are not constraint on text can include other media like graphics, images, sound, video
www is best example
- Stored, transmitted, processed digitally



HYPERTEXT VERSUS HYPERMEDIA

HYPERTEXT

Text which links to other blocks of text within the same document or a different document

Represents text elements

Allows the users to navigate through text in a non-linear way

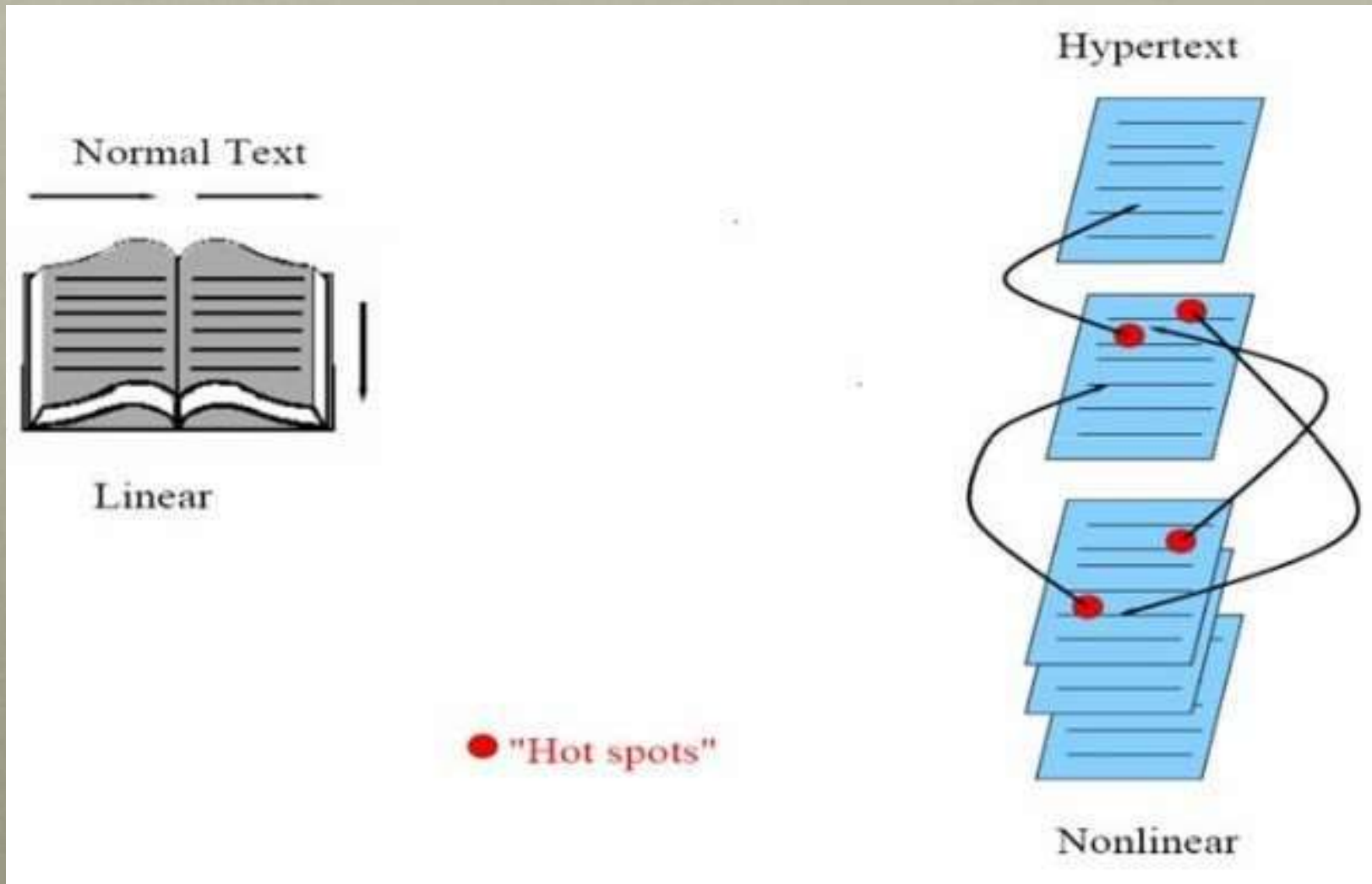
HYPERMEDIA

Extension of hypertext but not limited to text elements

Represents different media such as text, audio, image, video and still or moving graphics

Includes multimedia elements to improve the multimedia experience

Linear Vs Non-linear



Multimedia Applications

- Digital Video editing
- Electronic newspaper
- World wide web
- Games, encyclopedia
- Home shopping
- Interactive TV



Video conferencing

- Video on Demand

Multimedia System

- system that involves in generation, representation, storage, transmission, search retrieval of multimedia information.
- It also involves in processing and analysis including compression.
- Includes multimedia hardware, software, network etc



Four Basic Characteristics of Multimedia system

- Must be computer controlled
- Are integrated
- Represented digitally
- Final presentation of multimedia is usually interactive



Computer Controlled

- Producing content of information using image editor, sound and video editor
- Storing large and shared multimedia information
- Transmit through network
- Present the information through display, speakers, projector



Integrated

- Multimedia components like text, audio, video, pictures, graphics, animation must be integrated
- Multimedia devices like camera, microphone must be connected and controlled by a single computer
- Digital storage is used for all media types.
- Multimedia information is shown in computer screen.



Interactive

- Information delivery must interactive like selecting the time, order, speed of the presentation
- Users can modify the content of information



Digitally represented

- Must be able to transform an analog signal to digital signal.
- Digital signals can be processed very effectively.



Challenges of Multimedia computing

- Continuous media like video need a lot of space to store and very high bandwidth to transmit
- Synchronization, Sequencing, Distributed Network, Inter-media Scheduling
- Automatic analyzing, indexing of audio, image and video is much harder than text.
- Algorithms for manipulations of multimedia are more complex and still not efficient.
- Multimedia should be stored and transmitted through distributed networks.



Desirable Features

- Very High Processing Power for large data processing and real time delivery
- Multimedia file system for audio and video streaming
- Special hardware like RAID
- Compression and Decompression in real time
- High and efficient I/O for real time recording as well as playback



Desirable Features

- Large storage in the order of Tb and memory in the order of Gb and large caches high speed buses
- Network support for client-server or distributed systems
- Software tools to handle media, deliver media



Components of Multimedia System

- Capture devices
video camera, video recorder, Microphone, keyboards, 3D input devices, VR devices, Digitizing Hardware
- Storage devices:
Hard disk, SSD, DVD, blu-ray
- Communication networks
gbits Ethernet, intranets, internet



Computer system: desktop computer, processor, ram, sound card, display card

Components of Multimedia System

- Display Device:
High resolution monitor, speakers, projector



Global Structure

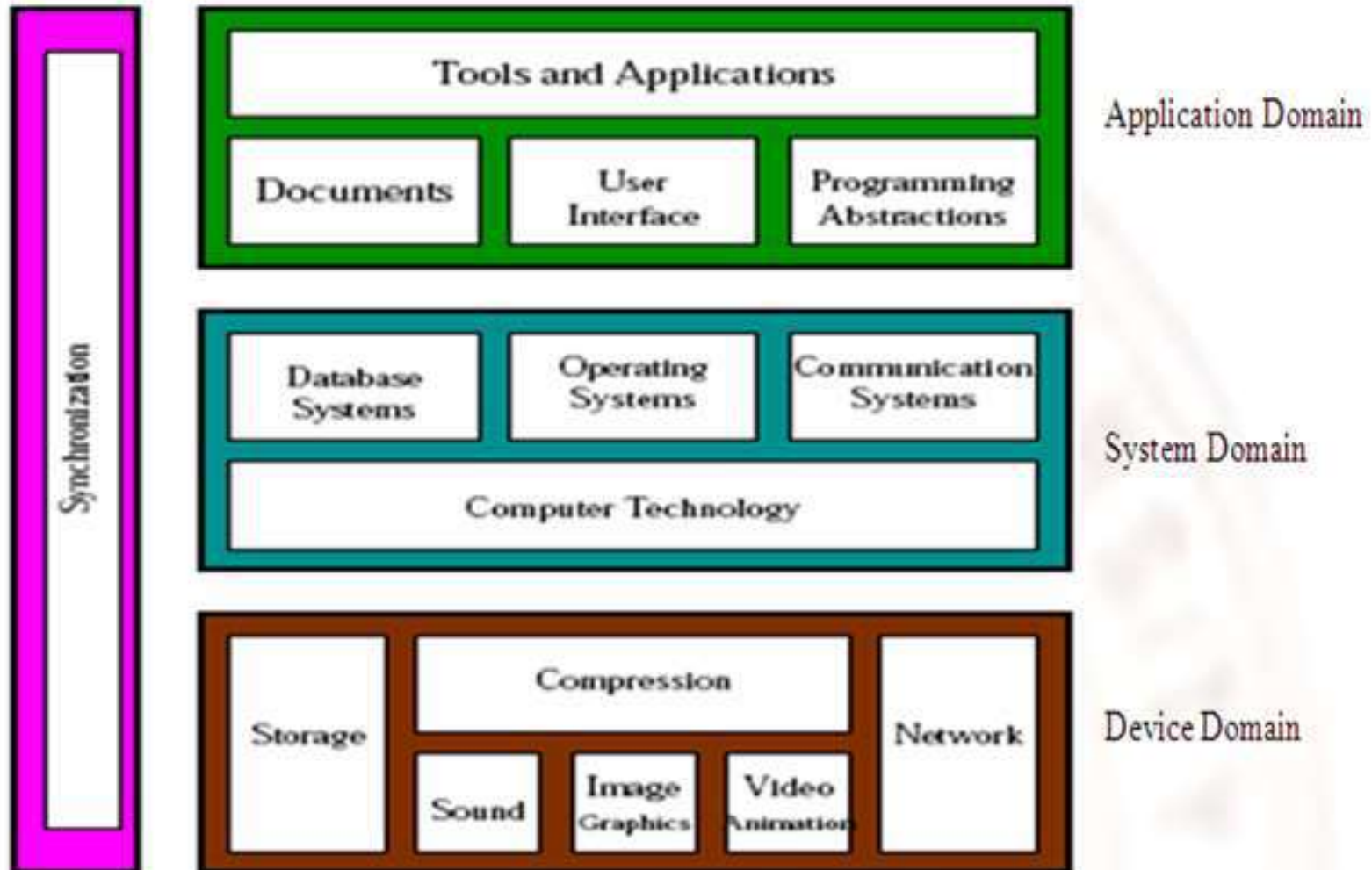


Figure: Global Structure

Global Structure

- Device Domain
- System Domain
- Application Domain



Device Domain

- Processing of digital signals, image, graphics, animation, audio, video comes under this domain
- It also includes compression and transmission through network.
- Large multimedia information should be compressed so that it can be transmitted on available network with given data rate.



System Domain

- Computer technology interfaces device domain and system domain.
- System services utilize the device domain.
- Operating system provides programming and computational environment.
- OS provides services like processor, main memory, input output devices and network.
- Manages large databases and allows structured access to db.



Application Domain

- Services of system domain are provided to application domain through programming abstraction.
- Document handling consists of generating different media, recording it at the time of presentation.
- Document handling and other applications are accessed through user interface



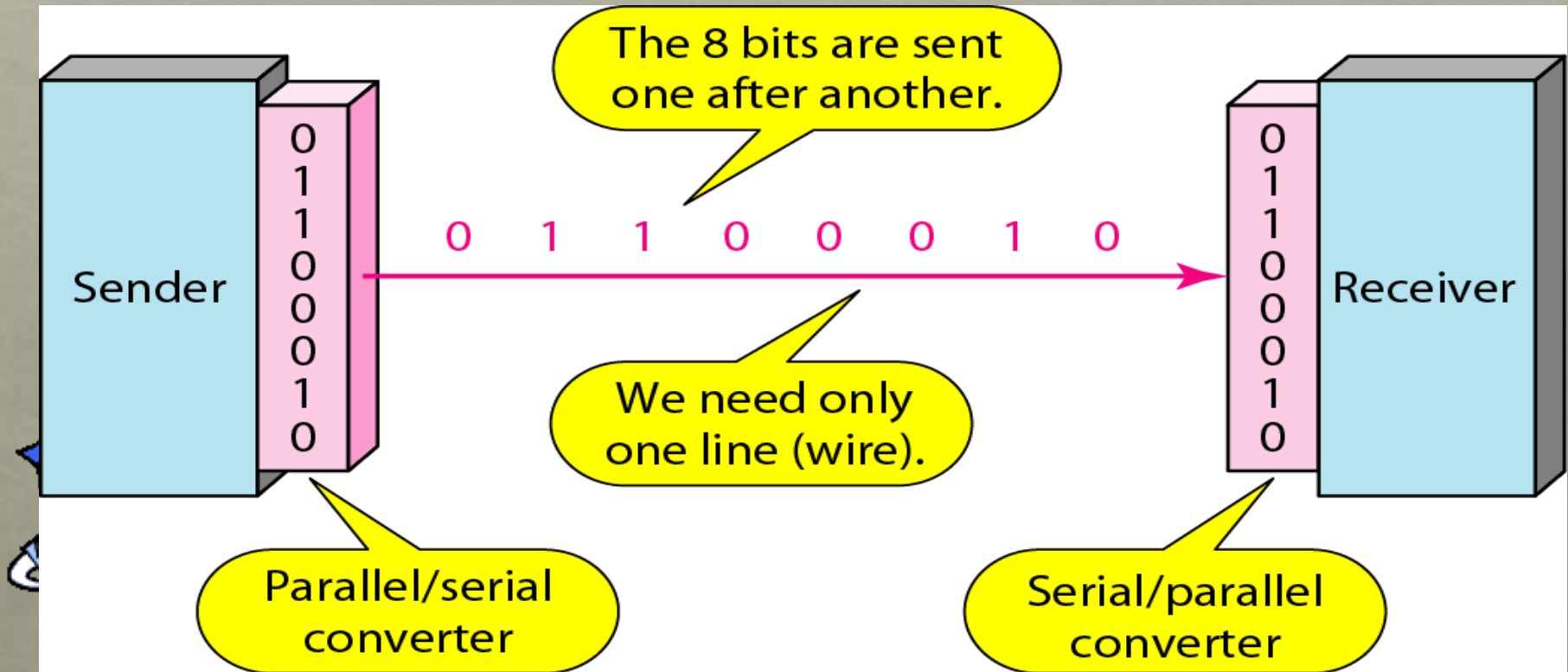
Cross Domain

- Tries to handle the temporal relationship among various media across all domains
- Synchronization among different media at different domain is maintained



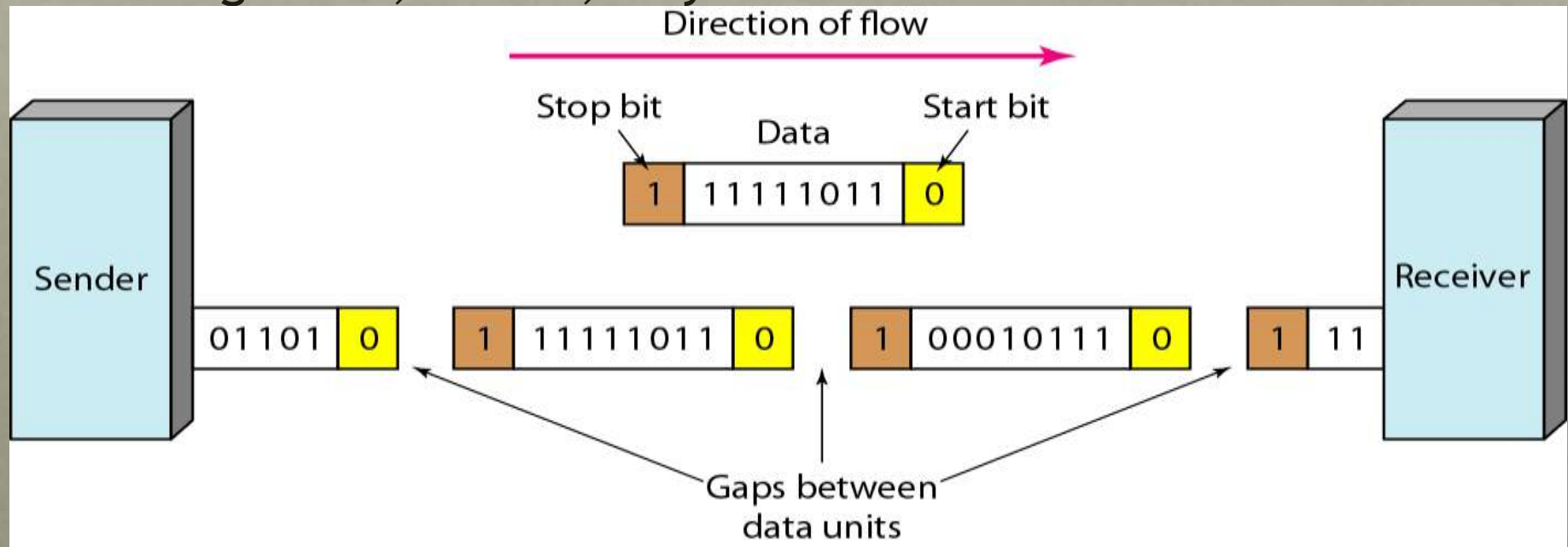
Multimedia Communication

- Generally transmitted serially
- One bit at a time



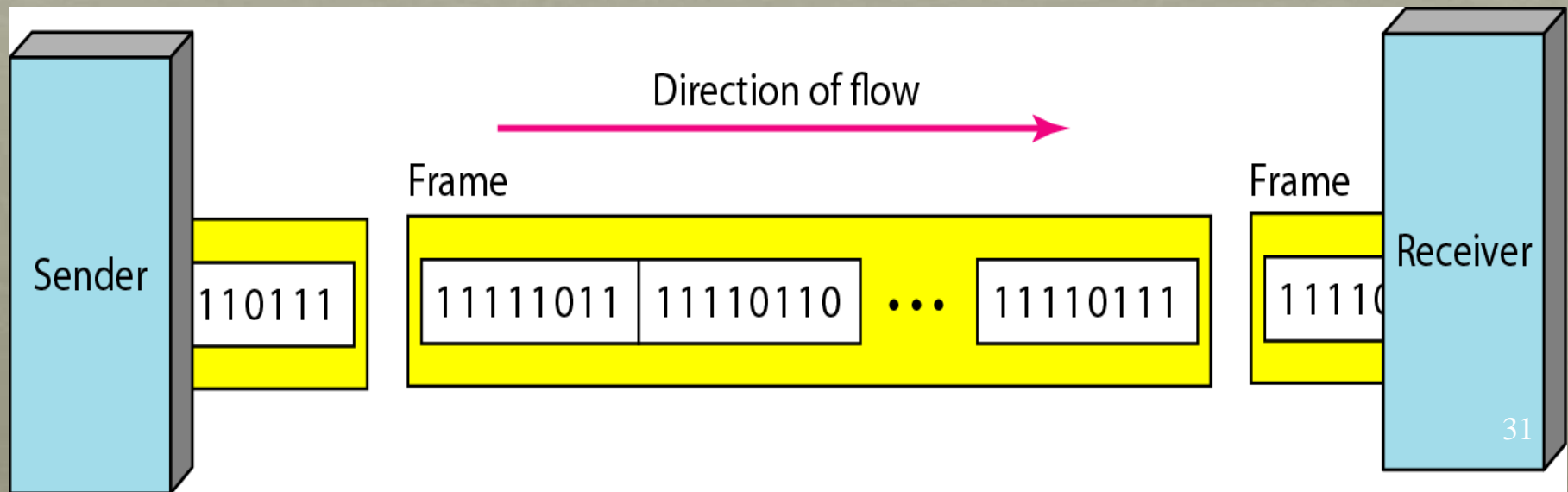
Asynchronous Transmission

- Synchronization at the byte level
- There may be gap between bytes, good for random communication
- Eg www, email, keyboard



Synchronous

- No start and stop bit
- Sender and receiver must be synchronized
- Synchronized with clocks



Isochronous

- Data is transferred at fixed rate.
- Best for multimedia communication
- Delivers data at steady rate.



Classification of medium

- Perception medium
- Representation medium
- Presentation medium
- Storage medium
- Transmission medium
- Information exchange medium



Perception Medium

- Perception media are sensed by human
- Done through seeing or hearing the information
- Visual media such as text, image and video are sensed with eyes.
- Perception of auditory media such as music, noise are done with ears.



Representation medium

- Representation media are defined by internal computer representation of information.
- The central question is how the computer information is coded?
- The answer is that various format is used to represent media information in computer.



Presentation Medium

- Presentation media such as paper, screen, speaker are used to deliver information where as keyboard, microphone, camera are used to input data.



Storage Medium

- Are data carrier that enables storage of information
- For eg: floppy disk, hard disk, ssd



Transmission Medium

- Used to transmit multimedia data.
- For eg: fiber optics, coaxial cable



Information Exchange

- It includes both storage media and transmission media
- Information can be exchanged by transporting storage medium to the destination
- Or through computer networks like email

