

**NAME: TANKISO MASOEBE**

**DATA COMMUNICATION WK 2**

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### **1.TRANSMISSION COMPARISON**

Synchronous and asynchronous transmission are two fundamental methods of data communication. In synchronous transmission, data is sent in a continuous stream, synchronized by a shared clock between the sender and receiver. This allows for fast, efficient transfer of large amounts of data because bits are transmitted without gaps, making it ideal for real-time communication. For example, video streaming uses synchronous transmission to deliver smooth, uninterrupted playback by keeping sender and receiver in constant alignment. asynchronous transmission sends data one character or byte at a time, with start and stop bits marking each unit. This makes it slower but more flexible, since it does not require

### **2.ENCODING RESEARCH**

Manchester encoding is a self-clocking line code that combines clock and data into a single signal by encoding each bit as a mid-bit transition, rather than as a static voltage level . This ensures no long runs of constant levels, facilitating reliable clock recovery and avoiding DC offset. Though it requires double the bandwidth compared to non-encoded signals, its robustness makes it ideal where synchronization is critical. Notably, it has been used in early Ethernet, RFID, infrared consumer remotes, and even to upload commands to the Voyager spacecraft.

### **3.SCENARIO ANALYSIS**

When downloading a file from a server, the communication process follows a structured approach. The transmission mode is serial, since bits are transmitted one after another across the network path. This is more efficient and reliable for long-distance communication compared to parallel transmission, which is usually limited to short connections. The transfer is synchronous, meaning the sender and receiver are synchronized, and data packets flow in a continuous, orderly stream without unnecessary delays For direction, the process can be viewed as simplex during the actual file transfer phase, since data flows in one direction—

from the server to the client—without simultaneous upstream data. Finally, the encoding method often used in such data transfers is Phase Shift Keying (PSK) or related techniques like Quadrature Amplitude Modulation (QAM), which convert digital bits into modulated signals over the network. This ensures efficient and accurate transmission of the file to the user's device.

#### **4. TRANSMISSION CALCULATION**

**File size = 5 MB**

**Convert to megabits:**

**$5 \text{ MB} \times 8 = 40 \text{ Mb}$**

**Bandwidth = 10 Mbps**

**$\text{Time} = \text{SIZE} / \text{BANDWIDTH} = 40 \text{ Mb} / 10 \text{ Mb/s} = 4 \text{ s}$**

**Answer: 4 seconds.**

