WHAT IS SYNCHRONOUS TRANSMISSION AND ASYNCHRONOUS TRANSMISSION?

>> WHAT IS SYNCHRONOUS TRANSMISSION?

The term *synchronous* is used to describe a continuous and consistent timed transfer of data blocks.
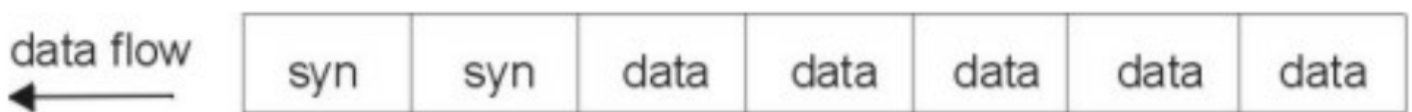
Synchronous data transmission is a data transfer method in which a continuous stream of data signals is accompanied by timing signals (generated by an electronic clock) to ensure that the transmitter and the receiver are in step (synchronized) with one another. The data is sent in blocks (called frames or packets) spaced by fixed time intervals.

Synchronous transmission modes are used when large amounts of data must be transferred very quickly from one location to the other. The speed of the synchronous connection is attained by transferring data in large blocks instead of individual characters.

Synchronous transmission synchronizes transmission speeds at both the receiving and sending end of the transmission using clock signals built into each component. A continual stream of data is then sent between the two nodes.

The data blocks are grouped and spaced in regular intervals and are preceded by special characters called syn or synchronous idle characters. See the following illustration.

Figure 1. Synchronous transmission

| data flow | syn | syn | data | data | data | data | data |

After the syn characters are received by the remote device, they are decoded and used to synchronize the connection. After the connection is correctly synchronized, data transmission may begin.

Due to there being no start and stop bits the data transfer rate is quicker although more errors will occur, as the clocks will eventually get out of sync, and the receiving device would have the wrong time that had been agreed in the protocol for sending/receiving data, so some bytes could become corrupted (by losing bits).

Ways to get around this problem include re-synchronization of the clocks and use of check digits to ensure the bytes is correctly interpreted and received.
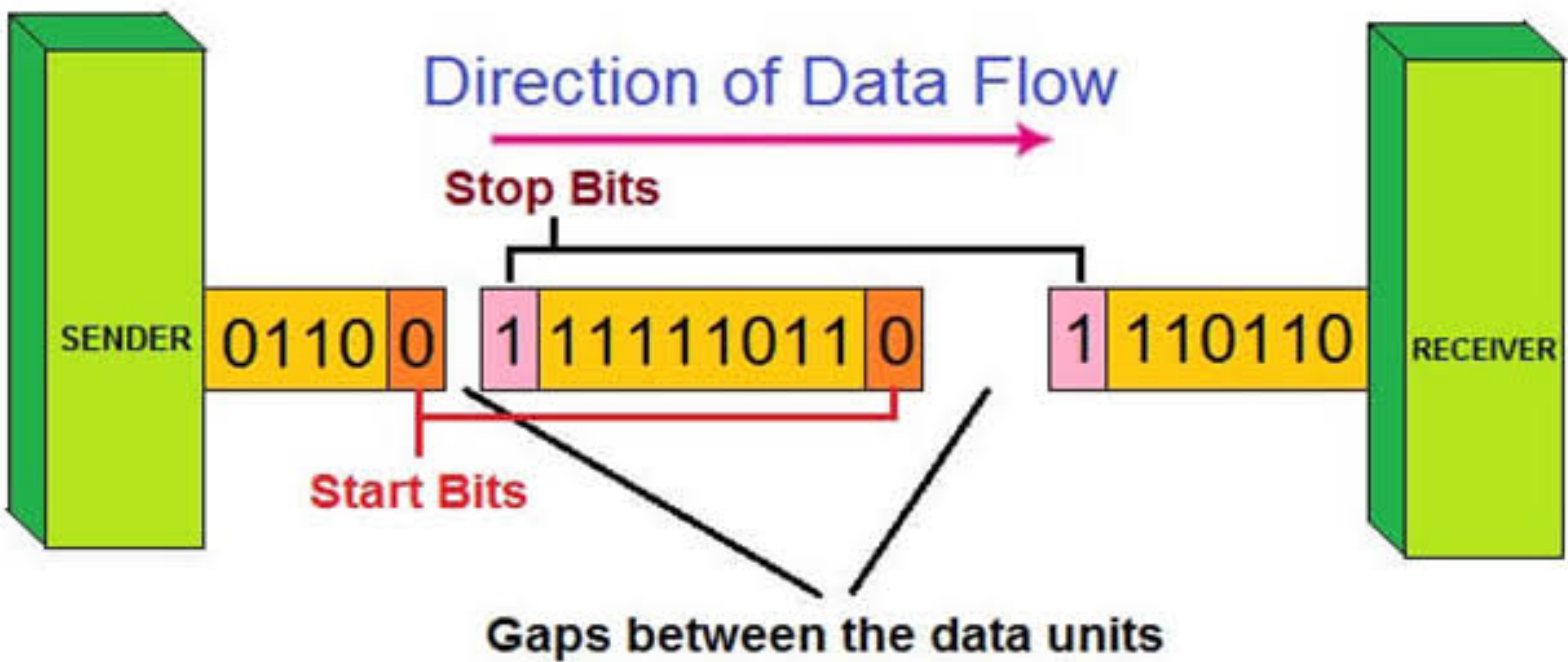
>> WHAT IS ASYNCHRONOUS TRANSMISSION

In contrast, asynchronous transmission works in spurts and must insert a start bit before each data character and a stop bit at its termination to inform the receiver where it begins and ends.

The term *asynchronous* is used to describe the process where transmitted data is encoded with start and stop bits, specifying the beginning and end of each character.

An example of synchronous transmission is shown in the following figure.

Asynchronous Communication

Direction of Data Flow

Stop Bits

SENDER 0110 0 1 11111011 0 1 110110 RECEIVER

Start Bits

Gaps between the data units

These additional bits provide the timing or synchronization for the connection by indicating when a complete character has been sent or received; thus, timing for each character begins with the start bit and ends with the stop bit.

When gaps appear between character transmissions, the asynchronous line is said to be in a mark state. A mark is a binary 1 (or negative voltage) that is sent during periods of inactivity on the line as shown in the following figure.

When the mark state is interrupted by a positive voltage (a binary 0), the receiving system knows that data characters are going to follow. It is for this reason that the start bit, which precedes the data character, is always a space bit (binary 0) and that the stop bit, which signals the end of a character, is always a mark bit (binary 1).

Examples of Synchronous Transmission

- Chatrooms
- Video conferencing
- Telephonic conversations
- Face-to-face interactions

Examples of Asynchronous Transmission

- Emails
- Forums
- Letters
- Radios
- Televisions