

How do computers store & send data? - Reading for Meaning

Data is all around us. Common types of data are sound, text and images. We continually work with data, send data across networks including the internet, and store data on our smartphones and other digital devices.

For a digital device, all data is sent, processed and stored as binary data.

Binary is a base 2 number system which only includes the numbers 1 and 0. These represent the tiny switches in a computer called transistors. A transistor can only exist in 2 states – either on or off. There are other methods of representing binary in a computer system. Magnets, where North and South represent the 1s and 0s, are used to store data on magnetic hard drives. Light is used to transmit data at the speed of, well, light. Light transmits data along fibre optic cables and is where we get the term fibre broadband. Pulses of light can be used to represent the 1s and 0s.

The smallest unit of storage is called a bit. 1 bit represents either a 1 or a 0. Eight bits make one byte and with one byte 256 different pieces of data can be represented and stored. For example, any number between 0 and 255 can be shown with 8 bits. Each number has a different 8-bit binary pattern.

Text is converted to binary using standard codes. There are two standard character sets: ASCII which uses 8 bits and Unicode which uses 16 bits. Unicode is used when languages other than English need to be represented.

Images are also stored and sent as binary data. A digital image is made of pixels. The number of pixels in an image can be calculated and these numbers converted into binary. Each pixel has a colour. The colour is made only from a shade of red, green and blue. 24 bits is usually used for a digital photograph with 256 different shades being available for red, 256 for green and 256 for blue.

The binary behind the image is interpreted by specialist software, like graphics software or a Picture Viewer. This converts the binary back into coloured pixels which display on screen as an image.

Colour filters, such as are used on Instagram, work by altering the amount of red, green and blue in each pixel to create a different effect.