RS422 serial information

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Introduction to RS422

Serial communication methods to transfer information between equipment have been defined by standards for nearly half a century. The oldest and best known standard is RS232, a standard which defines the communication between **DTE**, *data terminal equipment*, and **DCE**, *data communication equipment*. The relatively short distances and low speed the **RS232** serial interface can handle demanded for newer standards like **RS422**, RS423 and RS485. In this document, I will focus on the **RS422** interface for serial balanced differential communications.

Differential balanced signals with RS422

Serial, *balanced* and *differential* are the keywords for the **RS422** interface standard. *Serial* means, that the information is sent bit by bit on a single transmission line, just like with **RS232**. *Balanced differential* is what makes **RS422** different from **RS232**. On **RS232** interfaces, the signals are send on lines which share a common zero. With **RS422**, each signal line consists of two wires, preferably twisted to reduce noise. The voltage-*difference* between the two lines is an indication of the signal value, rather than the voltage-*level*. Looking at voltage differences with **RS422** rather than levels eliminates a lot of noice induced by external sources and allows for higher data rates and cable lengths compated to **RS232**. You can see the differences in speed and cable length between **RS422** and other commonly used serial interface standards like **RS232**, **RS423** and **RS485** in the interface comparison table.

Twisting the lines helps to reduce the noise. The noise currents induced by an external source are reversed in every twist. Instead of amplifying each other as in a straight line, the reversed noice currents reduce each others influence. The figure explains this in more detail.

Noise in straight and twisted pair cables

Noise in straight and twisted pair cables

Network topology with RS422

There are more differences between **RS422** and **RS232** than the maximum data speed and cable length. RS232 was specifically defined as an interface between computers, printers and terminals with modems. The modem would translate the communication signals to protocol usable for long distance communication, where *long distance* could also mean a device on the other side of the control room or building. **RS422** allows the direct connection of intelligent devices, without the need of modems. Furthermore, where the **RS232** linedriver is only designed to serve one receiver, a **RS422** linedriver can serve upto ten receivers in parallel. This allows one central control unit to send commands in parallel to upto ten slave devices. Unfortunately, those slave devices cannot send information back over a shared interface line. **RS422** allows a multi-drop network topology, rather than a multi-point network where all nodes are considered equal and every node has send and receive capabilities over the same line. If you need to build a multi-point communication network rather than multi-drop, **RS485** is the right choice with a maximum of **32** parallel send and **32** receive units parallel on one communication channel.

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