

# 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 noise induced by external sources and allows for higher data rates and cable lengths compared 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 noise 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.

# EIA-422

## From Wikipedia, the free encyclopedia

(Redirected from [RS-422](#))

American national standard **ANSI/TIA/EIA-422-B** (formerly **RS-422**) and its international equivalent **ITU-T Recommendation V.11** (also known as **X.27**), are technical standards that specify the "electrical characteristics of the balanced voltage digital interface circuit"<sup>[1]</sup>. It provides for data transmission, using balanced or differential signaling, with unidirectional/non-reversible, terminated or non-terminated transmission lines, point to point, or multi-drop. In contrast to [RS-485](#) (which is multi-point instead of multi-drop) EIA-422/V.11 does not allow multiple drivers but only multiple receivers.

The current title of the ANSI standard is *TIA-422 Electrical Characteristics of Balanced Voltage Differential Interface Circuits* and is now in revision B, published in May [1994](#), and was reaffirmed by the [Telecommunications Industry Association](#) in [2005](#).

Several key advantages offered by this standard include the differential receiver, a differential driver and data rates as high as [10 megabaud](#) at [12 metres \(40 ft\)](#). The specification itself does not set an upper limit on data rate, but rather shows how signal rate degrades with cable length. The figure plotting this stops at [10 Mbit/s](#).

EIA-422 only specifies the electrical signaling characteristics of a single balanced signal. Protocols and pin assignments are defined in other specifications. The mechanical connections for this interface are specified by [EIA-530](#) ([DB-25](#) connector) or [EIA-449](#) ([DC-37](#) connector), however devices exist which have 4 screw-posts to implement the transmit and receive pair only. The maximum cable length is [1200 m](#). Maximum data rates are [10 Mbit/s](#) at [12 m](#) or [100 kbit/s](#) at [1200 m](#). EIA-422 cannot implement a truly multi-point communications network (such as with [EIA-485](#)), however one driver can be connected to up to ten receivers.

A common use of EIA-422 is for RS-232 extenders. In video editing studios it is used to link control signals for all video and audio players/recorders to a central control board. Also, an RS-232-compatible variant of RS-422 using a mini-DIN-8 connector was widely used on Macintosh hardware until it was replaced by Intel's Universal Serial Bus on the iMac in 1998.

EIA-422 can interoperate with interfaces designed to MIL-STD-188-114B, but they are not identical. EIA-422 uses a nominal 0 to 5 Volt signal while MIL-STD-188-114B uses a signal symmetric about 0 V. However the tolerance for common mode voltage in both specifications allows them to interoperate. Care must be taken with the termination network.

EIA-423 is a similar specification for unbalanced signaling.

When used in relation to communications wiring, RS-422 wiring refers to cable made of 2 sets of twisted pair, often with each pair being shielded, and a ground wire. While a double pair cable may be practical for many RS-422 applications, the RS-422 specification only defines one signal path and does not assign any function to it. Any complete cable assembly (i.e. with connectors) should be labeled with the specification that defined the signal function and mechanical layout of the connector, such as RS-449.



Wikibooks has a book on the topic of  
***Programming:Serial Data Communications***

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## External links

- The Telecommunications Industry Association

## References

- <sup>^</sup> *TIA/EIA STANDARD, Electrical Characteristics of Balanced Voltage Digital Interface Circuits, TIA/EIA-422-B*, May 1994

## See also

- B&B Electronics "RS-422 and RS-485 Application Note" B&B Electronics Manufacturing Company, retrieved from [\[1\]](#)
- National Semiconductor Application Note AN-1031 "TIA/EIA-422-B Overview", January 2000, National Semiconductor Inc., retrieved from [\[2\]](#)
- National Semiconductor Application Note AN-759 "Comparing EIA-485 and EIA-422-A Line Drivers and Receivers in Multipoint Applications", February 1991, National Semiconductor Inc., retrieved from [\[3\]](#)
- National Semiconductor Application Note AN-214 "Transmission Line Drivers and Receivers or TIA/EIA Standards RS-422 and RS-423" August 1993, National Semiconductor Inc., retrieved from [\[4\]](#)
- Maxim IC Application Note 723 "Selecting and Using RS-232, RS-422, and RS-485 Serial Data Standards" Dec 2000,

Maxim Integrated Products, Inc., retrieved from [\[5\]](#)

- Texas Instruments Application Report "422 and 485 Standards Overview and System Configurations" June 2002, Texas Instruments, retrieved from [\[6\]](#)
- Texas Instruments Application Report "Comparing Bus Solutions" February 2004, Texas Instruments, retrieved from [\[7\]](#)

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Categories: [Serial buses](#)

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