

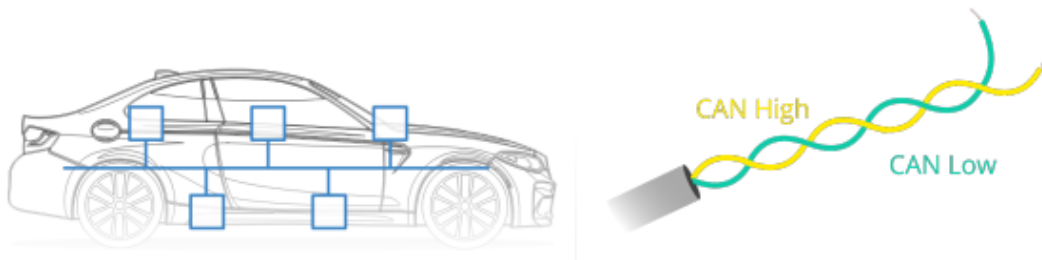
CAN bus

What is CAN bus?

Your car is like a human body:

The [Controller Area Network](#) (CAN bus) is the nervous system, enabling communication.

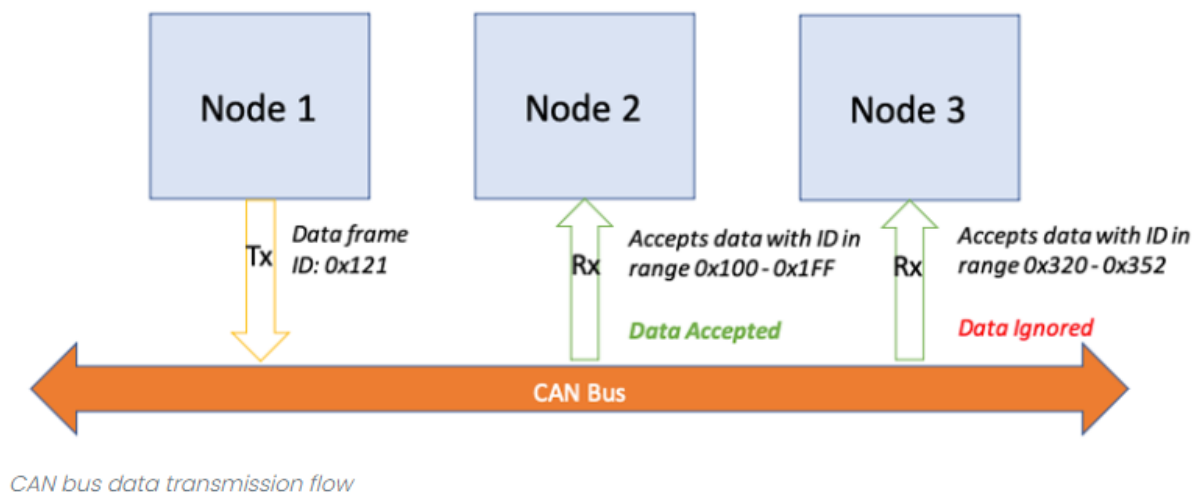
In turn, 'nodes' or 'electronic control units' (ECUs) are like parts of the body, interconnected via the CAN bus. Information sensed by one part can be shared with another.



Data Transmission

The CAN protocol is message-based, meaning all nodes on the bus are capable of both transmitting and receiving messages, and they are always listening for a message to be broadcast. While all nodes are capable of transmitting messages, there can only be one message transmitting across the bus at any given time. Most commonly, the CAN controller affiliated with each node implements a filter that checks the arbitration ID of a broadcast message and either accepts messages when the arbitration ID is within a particular range or ignores messages outside of that range.

For example, let's say we have three nodes on the CAN bus. Node 1 transmits a message with the current speed of the vehicle. It tags the message with the ID 0x121. Node 2 accepts data with an arbitration ID in the range of 0x100-0x1FF. The ID of the message is within this range, so Node 2 accepts the message. Node 3 accepts data with an arbitration ID in the range of 0x320-0x352. The ID of the message is outside of this range, so Node 3 ignores the data.



Typical **Applications of CAN:**

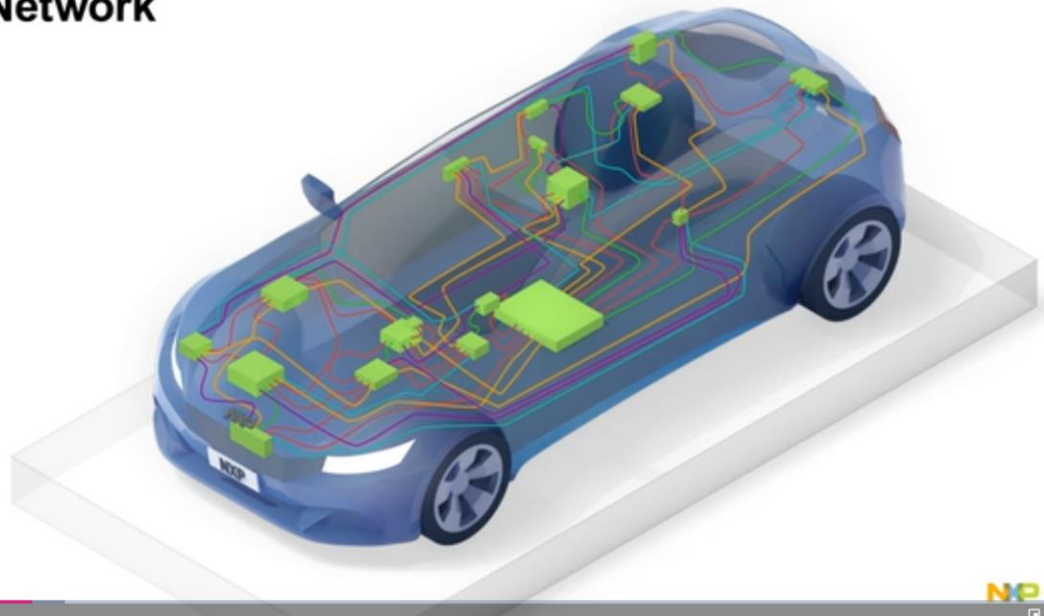
- Widely used in automotive systems for communication between various electronic control units (ECUs) such as engine control, transmission, airbags, antilock braking, and other in-vehicle systems.
- Industrial automation, medical equipment, and other areas requiring reliable and efficient communication between multiple controllers.

Advantages and Disadvantages of Using CAN:

- **Advantages:**
 - High reliability and error detection capabilities.
 - Efficient for real-time data transfer with low latency.
 - Supports multi-master architecture, making it flexible for system design.
 - Cost-effective and reduces wiring complexity compared to traditional point-to-point wiring.

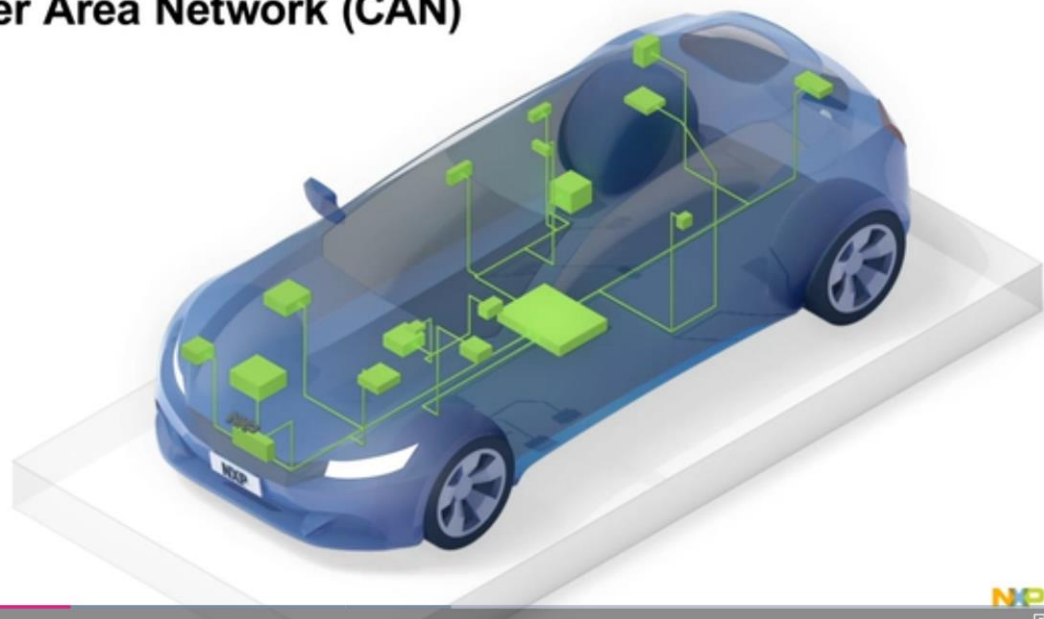
Example:

Analog Network

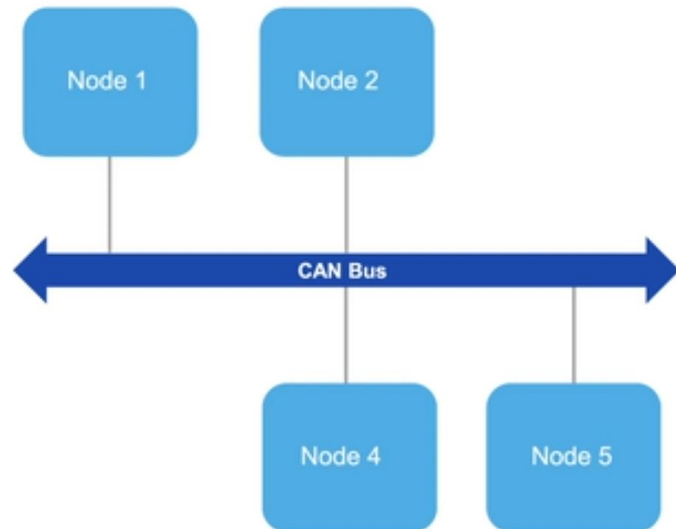


In the past the nodes were dedicated by analog signal wires which was architecture complex and costly, but in 1986 the Controller Area Network (CAN) was standardized allowing in-vehicle nodes to communicate via multiplexed wiring rather than dedicated ones.

Controller Area Network (CAN)



Advantages:



- Disadvantages:
 - o Limited data transmission rate (typically up to 1 Mbps).
 - o Not ideal for very large networks due to limitations in address space and message priority.
 - o Complexity increases with the number of nodes on

Applications:

INDUSTRIAL APPLICATIONS



Building Automation



Medical Devices



Aviation