NET H AND NET L  NET D IS A 2.5V ENVELOPE  0 STATE
NET R IS LOW  AND IS A 1 STATE

Signals have two states, dominant (0) and recessive (1). The transceiver in each node determines whether a signal is a 1 or a 0 based on the differential voltage between NET-H and NET-L.

Dominant (D)  Recessive (R)

NET-H
NET-L

Dominant Differential  Recessive Differential

The transceiver subtracts the NET-H and NET-L signals to determine the bit. The same noise is induced in both wires, so the differential signal is unaffected.
NMEA 2000

A millivoltmeter accurately measures these voltages as defined in the next diagram.
NMEA2000

common mode voltage (caused by voltage drop in the cable) is the primary
shift illustrated above. Noise induced in the data wires also contributes to
combination of DC common mode voltage and induced noise causes the s
WAVE FORM OF A BAD SYSTEM
WAVE FORM IS SHIFTED DOWN
THIS RESULTS IN HIGH BIT ERROR RATE
MORE ABOUT THIS LATER
GOOD WAVE FORM
NET L ( D)
NET LOW R

2.38 V
NET H (D)
NET-H R
NET H/L DIFFERENTIAL VOLTAGE D SHOULD BE 2 VOLTS AND R SHOULD BE 0
COMMON MODE SHOULD READ AS CLOSE TO 0
NET-H VOLTAGE READING  UPPER PART OF WAVE FORM

3.44 V
BUS TRAFFIC  THIS NUMBER CHANGES AS TRAFFIC PASSES

0.4
BUS TRAFFIC
MAC 0 NO BUS ERRORS
MAC 2  16 /S BUS ERRORS
SYSTEM IS NOT GOOD. NOT THE SAD FACE IN MIDDLE OF SCREEN ABOVE THE NUMBER 2. THIS IS ALSO INDICATING DEVICE ADDRESS #4
TEST SET
KNOW WHAT YOUR VOLTAGES ARE. THIS IS THE KEY TO THE SYSTEM WORKING. BAD GROUNDS AND NEGATIVE CONNECTIONS WILL DEGRADE THE SYSTEM.

These out-of-range signals could be misinterpreted.

Good signal.

Common mode voltage (caused by voltage drop in the cable) is the primary cause of signal shift illustrated above. Noise induced in the data wires also contributes to this effect. The combination of DC common mode voltage and induced noise causes the signal to shift.
BALANCED WAVE FORM
The voltage reading for NET-H and NET-L must be within spec's.

When the system is loaded down, one side or the other will shift up or down and change the differential. This will also look like a valid data bit and the bit error rate will go up.

Signals have two states, dominant (0) and recessive (1). The transceiver in each node determines whether a signal is a 1 or a 0 based on the differential voltage between NET-H and NET-L.

<table>
<thead>
<tr>
<th>Dominant (D)</th>
<th>Recessive (R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 VOLTS</td>
<td>2 VOLTS</td>
</tr>
<tr>
<td>1.5 VOLTS</td>
<td>2 VOLTS</td>
</tr>
</tbody>
</table>

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WAVE FORM OF A BAD SYSTEM
WAVE FORM IS SHIFTED DOWN
THIS RESULTS IN HIGH BIT ERROR RATE
NMEA 2000 IS MORE THAN JUST NAVIGATION
LOOK AROUND THE VESSEL