**BUS SYSTEMS**

**Profibus-DP**

Physical layer: RS-485

Topology: Trunk with drops

Transmission rate (Speed): 9.6 K to 12 M bits/second

Data transfer: max 246 bytes (input & output)

Advantages: Capable of handling time critical functions with high-speed data access.

**Profibus-PA**

Physical layer: IEC 61158-2

Topology: Trunk with branching

Transmission rate (Speed): 31.25 Kbits/second

Data transfer:

Developed to connect directly into Profibus-DP .

**DeviceNet**

**CANOpen**

**Foundation Fieldbus H1**

**Ethernet**

**National Marine Electronics Association (NMEA)**

**NMEA** has 2 main protocols:

**a. NMEA 0183** is based on **serial communication network.**

It is common standard to manage electronic system input and output connection.

**b. NMEA 2000** is **controller area network (CAN)** based technology.

It is designed as a single cable (backbone) replaces most of the NMEA 0183 wiring interconnections and can handle data content between 50 to 100 NMEA 0183 data streams.