

Information Technology and the Modern Motor Vehicle

We the customer constantly demand more from our cars, increased safety, reduced emissions, better fuel efficiency, reduced service intervals and an extension of the comforts of home or office with air conditioning, better levels of in car entertainment and communication.

All of these requirements have resulted in manufacturers having to introduce ever more sophisticated electronic systems to meet our expectations. Modern luxury vehicles with antilock brake systems, air bags, active suspension, traction control, electronic engine management systems, climate control, multi. CD changer, satellite navigation and blue tooth communication can have upwards of fifty electronic control units managing all the systems.

When electronics were first introduced for engine management and antilock brakes these systems were independent of each other. As more and more systems have been introduced the operating functions have overlapped and each system has to react or interact with other areas, an example of which may be the in car entertainment system volume being muted as the satellite navigation gives the driver direction instructions. Another example might be the traction control system interacting with the engine management and active suspension in slippery road conditions.

With the increase in the number of control units fitted all around the vehicle, under seats, in doors, behind panels, inside the dash and so forth and the need for the units to be able to communicate with each other a system of networking has had to be developed. The computer industry uses a system called BUS and this is being adopted for use in the motor vehicle.

In a computer or on a network, a BUS is a transmission path on which signals are dropped of or picked up at every device attached to the line. Only devices addressed by the signals pay attention to them, the others discard the signals. According to Winn L. Rosch, the term BUS derives from its similarity to an ordinary bus that stops at each street or town to pick up and drop off passengers.

In general, the term is used in two different contexts:

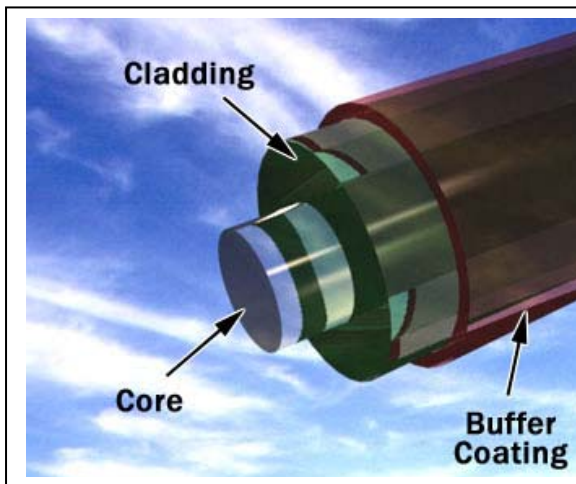
- (a) A BUS is a network circuit arrangement in which all devices are attached to a line directly and all signals pass through each of the devices. Each device has a unique identity and can recognise those signals intended for it.
- (b) In a computer, a BUS is the data path on the computer's motherboard that interconnects the microprocessor with attachments to the motherboard in expansion slots such as hard disc drives or CD-ROM drives. (*A Whatis.com definition*)

There is obviously a need for a physical connection between all the units. Traditionally the motor industry has used copper cables for electrical circuits, however for the transfer of data between the units this has some problems.

Discuss with your group the problems with traditional cables for this application.
Problems:

Manufacturers have started to use fibre optic cables to overcome the problems of traditional cables.

Fibre optic (or 'optical fibre') refers to the medium and the technology associated with the transmission of information as light impulses along a glass or plastic wire or fibre. Fibre optic wire carries much more information than conventional copper wire and is far less subject to electromagnetic interference. Most telephone company long-distance lines are now fibre optic.



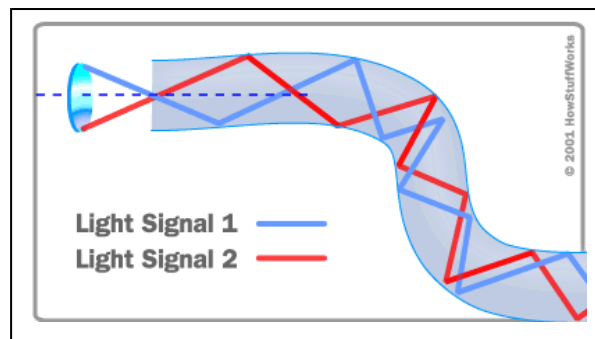
Core: Thin glass (or plastic) centre of the fibre where the light travels.

Cladding: Outer material surrounding the core that reflects the light back into the core.

Buffer Coating: Plastic coating that protects the fibre from damage and moisture.

A transmitter L.E.D in one control unit produces light signals that pass down the cable to a receiver photodiode or photo cell in the next control unit and so on until the circuit or network is complete. It is possible to send more than one signal at a time along the same cable.

Transmitter



Receiver

The light is passed along the core and when the cable has a bend in it the light is reflected back and forth by the inside surface of the cladding until it reaches the other end.

Assessment

List three reasons for the increase in the use of electronic systems in motor vehicles.

List three electronic systems in a modern car.

How many control units may there be in a modern vehicle.

- (A) 1
- (B) less than 30
- (C) more than 50
- (D) 10

What is the name for the network transmission path through which the signals travel from one control unit to another?

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List three advantages of fibre optic cables over traditional copper.

Name the three parts of a fibre optic cable.

Complete this statement

A _____ at one end of the cable produces the signal and a _____ at the other end collects the signal.