# OPEN, CLOSED AND DIGITAL PROTOCOLS—WHAT DOES IT ALL MEAN?

## WHAT ARE PROTOCOLS?

The term 'protocol', when used with reference to electronic products, refers to the way in which the products communicate with each other. People use 'language' to say things to each other; electronic products have a simplified 'language' which is termed 'protocol'.

Protocols are often referred to as 'open', 'closed', 'digital' and 'analogue'. It is important to be sure what each term means when comparing different types of intelligent fire detection system.

## BUILDING SERVICES PROTOCOLS

With the development of more and more products that need to communicate with each other, in particular products used for building services in sophisticated modern buildings, the need has arisen for protocols to be agreed across a whole range of manufacturers or even entire industries. For instance, the electrical trade has systems for switching large numbers of current-consuming devices, such as lights, by using simple loop wiring and a protocol, rather than miles and miles of cables for individual circuits. Examples of such protocols are 'LonWorks' and 'EIB'.

Because such protocols are available for any manufacturer to use, they are often referred to as 'open'. The fire detection industry does not currently use such protocols and the term 'open' has come to mean something different *in this particular industry.*

## FIRE INDUSTRY PROTOCOLS

In the fire detection industry intelligent systems use control panels and detectors (and, of course, devices such as interfaces) which communicate with each other by means of a protocol. Some manufacturers offer both panels and detectors. These companies have no need to disclose the nature of their protocol to anyone, since they offer all the elements needed to provide an intelligent system. No equipment supplied by other manufacturers is expected to be compatible with such systems, so the protocol used is said to be 'closed'.

A number of manufacturers of detectors, including Apollo, make no control panels; they have built up partnerships with independent panel manufacturers and, in some cases, companies who offer special equipment such as aspirating detection systems. The detector manufacturer determines the protocol used by the detectors and publishes the information and technical data required by panel makers in order to design panels that will drive the detectors. Since all details of the protocol must be disclosed, it is referred to as an 'open' protocol.

## CLOSED PROTOCOLS

Manufacturers of equipment using closed protocols claim that all elements of their equipment (detectors, panels, call points, interfaces, special detectors such as beam detectors) will work harmoniously with each other, since it is all designed and made by the same company. The implication is that a system comprising detectors and interfaces from one manufacturer and panels from another *cannot* work as well with each other.

## OPEN PROTOCOLS

The manufacturers of the components of a system with an open protocol would reply that products from different manufacturers of fire products work just as well with each other as does, for example, a Maclaren racing car with a Mercedes-Benz engine. Indeed, there might even be an advantage in having different specialist manufacturers concentrating on their own skill areas.



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**AFTER-SALES SERVICE**

Whatever the arguments for either system may be, one point is indisputable: the owner of a fire protection system with a closed protocol is dependent on just one supplier for all spare parts, servicing, modification and upgrade of the system, since no other manufacturer's products will be compatible

The owner of a system using an open protocol can freely choose a different company to service the system or to supply different upgraded equipment.

**ANALOGUE AND DIGITAL PROTOCOLS**

The term 'analogue' is used to describe a signal which goes up and down steplessly. See Fig 1.

Signals that record phenomena such as the increase of smoke or heat are necessarily analogue at source and this is why fire detectors are described as *analogue*. For example, a heat detector will record *stepless* increases in temperature from a typical starting point of 20–21°C (comfortable room temperature) to an alarm level of 55°C, however fast the increase.

Each point on the analogue signal indicates a particular value. The problem with analogue signals, however, is that, if, during transmission, electrical corruption affects the signal, a '2' might appear as a '3', for example.

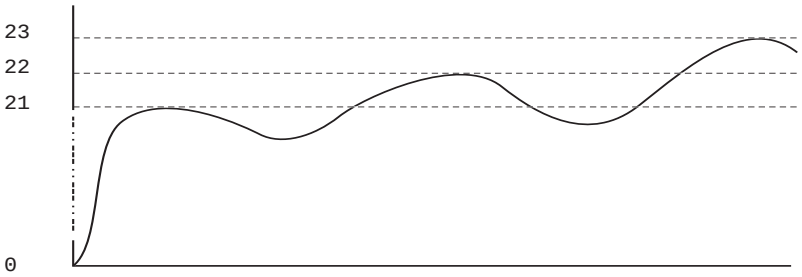


**Fig 1** *Analogue signals*

**DIGITAL SIGNALS**

The word 'digital' describes a signal that consists of a series of '0s' and '1s' or 'offs' and 'ons' which go to make up a message in binary arithmetic. The advantage of this system is that there is a much lower risk of the signal being poorly transmitted and hence giving wrong information.

Fig 2 shows the simple levels of 21, 22 and 23, (illustrated by the curve in Fig 1) as digital signals.

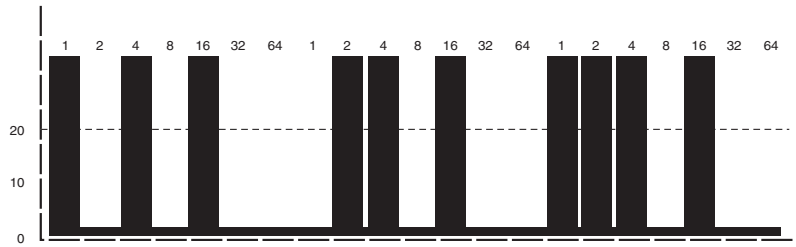


**Fig 2** *Digital signals*

Each degree in the example of a heat detector given the previous section can be expressed in digital form (ie, binary arithmetic). '30' degrees Celsius would then be '11110' and this is what Apollo detectors would transmit. Apollo fire detectors have always used a digital protocol which has remained basically unchanged since its inception in 1986. It has been extended—in two steps, once for XP95 and a second time for Discovery—but never modified.

Most detector manufacturers have now adopted digital transmission protocols.

In summary, an open protocol allows freedom of choice by the specifier, the installer and the end user of the fire detection system.

A digital protocol is much less susceptible to corruption than the analogue protocol and is to be preferred in a system which is life-critical.

*Apollo has a digital, open protocol.*