

## **Open Systems-based solutions maintain downward pressure on forecourt costs**

Members of the International Forecourt Standards Forum (IFSF) in the US, Europe and worldwide are reaping significant cost benefits through the implementation of forecourt device networks based on Open Systems standards.

With uncertainty affecting world petroleum markets, retailers need to minimise all sources of risk impacting their businesses. Now is a good time for petroleum retailers and other interested parties, including equipment manufacturers and consulting engineers, to assess the IFSF offering.

Since its formation in 1993, IFSF's petroleum retailer members have been creating forecourt networks exploiting the most suitable retail devices, and integrating them readily with corporate head office applications. Through Open Systems-based technology, members avoid being locked into any given equipment manufacturer's product platform. This enables members to minimise their installation and maintenance costs and to be assured of straightforward future expansion.

### **The problem**

In 1993 petroleum retailers started introducing computer systems into service stations to handle integrated pump control, payment cards, EPoS (electronic point of sale) terminals, and loyalty promotions. Service stations also had to be integrated with corporate head office IT applications such as inventory management, distribution, accounting, and sales statistics.

There were no common standards in existence at this time, although several initiatives had been started by major oil companies within their retail petroleum operating units. There was limited purchasing choice for equipment and systems because of the cost of integrating solutions from different vendors, who rarely wished to co-operate.

Consequently, forecourt retail automation projects suffered from high cost and time overruns.

At the same time, international petroleum retailers started to take a multinational view of forecourt systems for marketing, operational and cost reasons. Therefore, internationally-accepted standards were vital.

IFSF's objective was to create interconnectivity between disparate retail devices, by setting *de facto* standards which open up the equipment market in much the same way as IBM's publication of its PC architecture had done for the personal computer market..

Several different approaches, described below, are available - but only international Open Standards achieve IFSF's objective.

### **IFSF's Mission Statement**

The IFSF is a forum of international petroleum retailers with the common objective of the harmonisation of equipment interconnectivity and communication standards for use in the petroleum retail business

## **Solutions**

Failing an approach based on common standards, petroleum retailers can opt to use equipment and systems from a single vendor or to mix and match different vendors' offerings. Both approaches have serious shortcomings.

### **The single vendor proprietary approach**

A popular solution often proposed is to standardise on a single supplier for a given geography. However, this approach has frequently failed because:

- No single vendor is best of breed with all devices
- No price competition for development, innovation or enhancements
- No single supplier can provide and support all devices in all markets
- Few forecourt equipment suppliers can meet all petroleum retailers' corporate IT system requirements
- Petroleum retailers' marketing initiatives were restricted without costly and lengthy supplier developments
- The oil company's future is tied to a supplier's fortunes and marketing strategy

Petroleum retailers have been forced to stay with a specific systems configuration, incurring prohibitive costs because of the difficulty of introducing an alternative item of equipment or new software applications.

### **The mixed vendor proprietary approach**

Specific problems of this approach include:

- Lack of interoperability between devices
- Interfaces must be written for each supplier/device model
- Every new interface needs regulatory approval
- Black box protocol converters are high-cost integration solutions
- Change management is expensive
- Suppliers cannot keep pace with the need of petroleum retailers to innovate and compete
- Little cooperation between device suppliers

As an example of the wide scope of the problem is the plight of a single oil company, which prior to the implementation of IFSF Standards had 69 different systems, from 25 different suppliers, using as many as 126 different dispenser protocols.

### **The IFSF approach**

IFSF's objective remains to provide for complete Open Systems interoperability on the forecourt. That is, the ability to connect any device, from any supplier, into the same network, to seamlessly exchange data and control instructions.

The IFSF approach is:

- Multi-device
- Multi-vendor
- Multi-purpose
- Multi-national

The result is freedom of choice and exposure to the full advantages of competitive market forces.

IFSF's desired interoperability has now been achieved for a decade. There are many working sites where dispensers from different vendors not only operate on a single forecourt network, but also interwork with EPoS site controllers from different suppliers, and where several types of tank gauges are used – all with full transparency and functionality.



The Shell site in Ireland, illustrated above, is an example of the success of IFSF interoperability. Dispensers from two manufacturers operate side by side, and the site simultaneously used EPoS terminals from different manufacturers. The site did not cease trading during the installation of the second vendor's equipment.

IFSF interoperability is also powerfully demonstrated through the business expansion of LPG onto forecourts. IFSF LPG dispensers are installed alongside other suppliers' equipment. On many sites this means the coexistence of dispensing equipment from *three* vendors.

## **IFSF's Business Case**

### **Advantages of competitive procurement in the IFSF-compliant environment**

- Switch between manufacturers in the same network without interfacing limitations
- Competitively source IFSF-compliant devices from any vendor, worldwide
- On an IFSF-compliant site it is possible to select the best devices for a purpose regardless of existing vendor
- The lower cost to vendors of developing and supporting a single IFSF interface
- New vendors can enter and compete without major developments
- Easier to introduce site systems and central applications such as EPoS, across an IFSF network, without multiple interface developments
- Fewer processors and protocol converters needed
- New equipment such as COPT or car wash, can be introduced more rapidly into an IFSF network
- Marketing initiatives, such as loyalty terminals, can be applied across an entire IFSF-compliant network without high interface costs
- LONWORKS® cable topology, by the US-based Echelon Technology Corporation, reduces the number of junction boxes, ducting, and conduits, and cuts cabling requirements
- Where business requirements dictate, alternative TCP/IP-based applications are easily introduced

### **Advantages of IFSF's unified service station architecture**

- Only one technology means a reduced skill set, and only one engineering centre of expertise
- New sites are up and running sooner
- The cost of developing and approving duplicate interfaces is avoided
- New devices, such as vehicle ID, can use existing IFSF standards without development delays
- The simpler IFSF design and engineering means less on-site multi-vendor testing
- A single systems architecture simplifies IT applications and interfaces
- Controlled evolution of IFSF standards avoids sudden obsolescence imposed by manufacturers
- The recommended LONWORKS® cabling topology is shorter and less expensive
- IFSF also fully supports TCP/IP

### **Maintenance benefits**

- IFSF LONWORKS® cabling is highly resilient, reducing cabling faults by around 75%
- With greater resilience, contracted maintenance cover can be reduced to prime time only
- Fault diagnosis is simpler because all devices are similar, reducing multi-vendor intervention
- Not tied to manufacturer device specific remote diagnostic devices and services.
- Reduced spares stocks: units are interchangeable and replacements can be sourced rapidly from any vendor
- Engineering training and diagnostic tools are reduced with only one base technology
- Technical knowledge to service IFSF devices is cross-vendor, so new contractors can be used
- Maintenance services sourced independently of manufacturers can be more price competitive
- One systems architecture leads to fewer costs in central Retail IT applications support

### **Other cost control opportunities**

There are further significant benefits to be derived by implementing IFSF concepts including LONWORKS® in other areas, especially in the area of Building Management Services (BMS):

- The cost of cabling & switching forecourt lights can be reduced using LONWORKS® power-line principles
- Forecourt sensing & lighting can be managed more cost effectively (around 40% reduction) by BMS applications
- Around 45% savings in energy efficiency (refrigeration, air conditioning, lighting, chillers) can be achieved
- Monitoring of devices, such as drinks dispensers and coffee-makers, controls cash and stock costs
- Multifunction alarms such as smoke, presence, burglar and fire alarms, are less costly than separate systems
- Interactive controls are possible on an IFSF forecourt network – for example, reduced lighting on dispenser until the customer arrives
- BMS devices are controlled by software, so advantages can be gained without staff input

From January 2005, all new public buildings in Europe are required to use LONWORKS®-based BMS. This decision has significantly increased the number of vendors of compatible equipment to the petroleum retail sector, whilst at the same time reducing costs and with no significant impact on the complexity of installation or implementation.

### An independent business study

IFSF commissioned an independent study to assess the commercial benefits available to IFSF Member companies and vendors in the IFSF's Technical Associate community. A report, *IFSF Business Case*, is available from the IFSF Administrator ([admin.manager@ifsf.org](mailto:admin.manager@ifsf.org)).

This study identified many accessible beneficial scenarios and opportunities following the IFSF concepts and using the IFSF standards – although some were mutually exclusive.

The benefit potential was calculated for a 250-site network in a single country, to be up to €12m (\$14m) in capital costs, and €49m (\$56m) in operating costs, over 10 years.

It was not expected that petroleum retailers would achieve maximum benefits from each scenario, and few retailers were actively seeking to maximise the full potential of these benefits.

SUMMARY of BENEFITS					
BENEFIT AREA		CAPITAL		OPERATING (pa)	
	Number of	Value (Euro 000)	%	Value (Euro 000)	%
Procurement	11	9,500	79.2	400	8.2
Station Architecture	11	2,450	20.1	750	15.4
Maintenance	12	0	0.0	1,900	38.9
Opportunities	5	50	0.4	1,850	37.9
<b>Total</b>	<b>39</b>	<b>12,000</b>		<b>4,900</b>	

*Estimated benefits for 250 sites in one country*

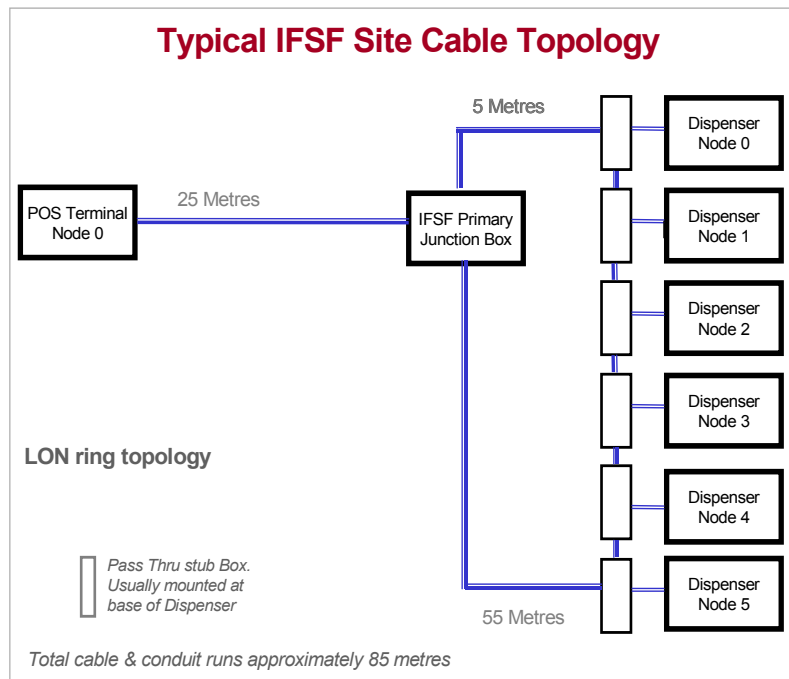
Since 1999, thousands of sites have been installed, and greater savings achieved than reported above. In procurement, LONWORKS® compliant devices have halved in price every 18 months. PCI LONWORKS® cards are now less than 15% of the cost used in the above calculation, yet proprietary interface cards have increased in cost. Similarly, higher operating benefits than originally envisaged are obtained since multiple single points of failure are proven to be eliminated, which results in reduced site downtime.

**Other technical issues**

**Cable topology**

Where IFSF LONWORKS® is installed using ring topology, cabling and engineering work is vastly simpler than the traditional star configuration. A typical potential saving is €4,000 (\$4600) per site.

The major advantages of LONWORKS® cabling are: the free wiring topology (star, loop, bus or a combination) illustrated below; the choice of cabling options (optical, radio frequency, infrared, and power-line signalling) as well as in all installations to date the reuse of existing cables. The latter is not the case for TCP/IP forecourts.

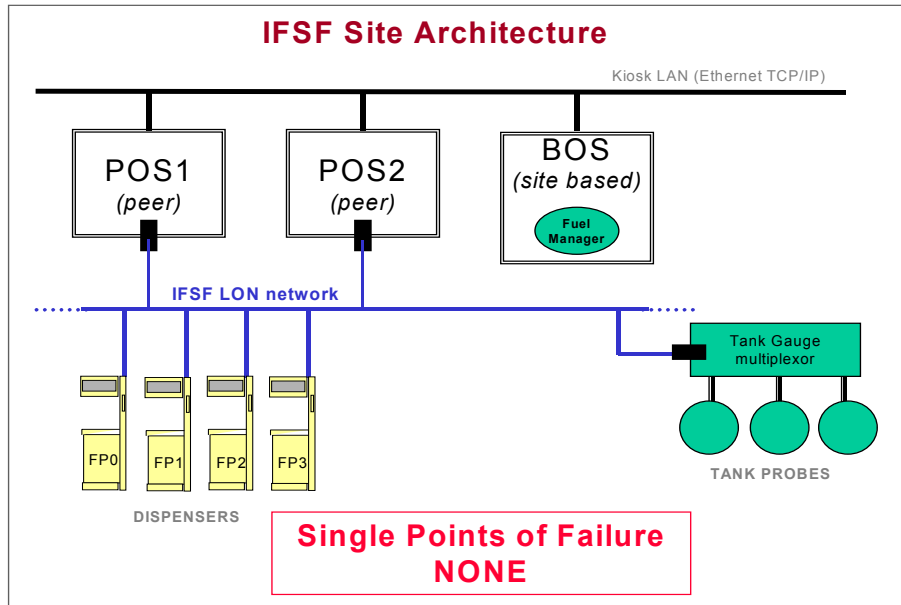


**Avoidance of a Single Point of Failure**

The ability to trade resiliently without disruption requires a systems architecture without any single point of failure.

A traditional forecourt has multiple single points of failure, such as the wiring connections box, the pump-controller, or any protocol converter.

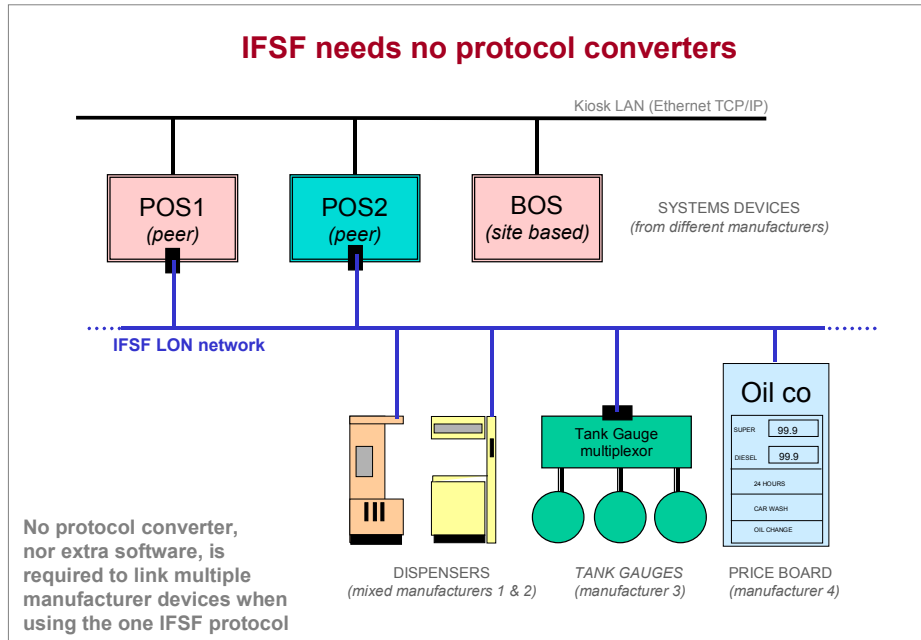
The IFSF site architecture can eliminate single points of failure and dramatically increase resilience, so saving on the level of contracted support. Experience suggests that this resilience reduces non-trading occurrences by a factor of three or four on a typical site configuration.



**Avoidance of protocol converters**

An IFSF forecourt has numerous devices from a number of manufacturers, but needs no protocol converters. With an architecture that uses proprietary interfaces, the investment in developing new interfaces, and testing and supporting, can require considerable resources and prohibitive investments.

In achieving interoperability, manufacturers often introduce additional processors for protocol conversion, which further increases the price and often introduces additional single points of failure.

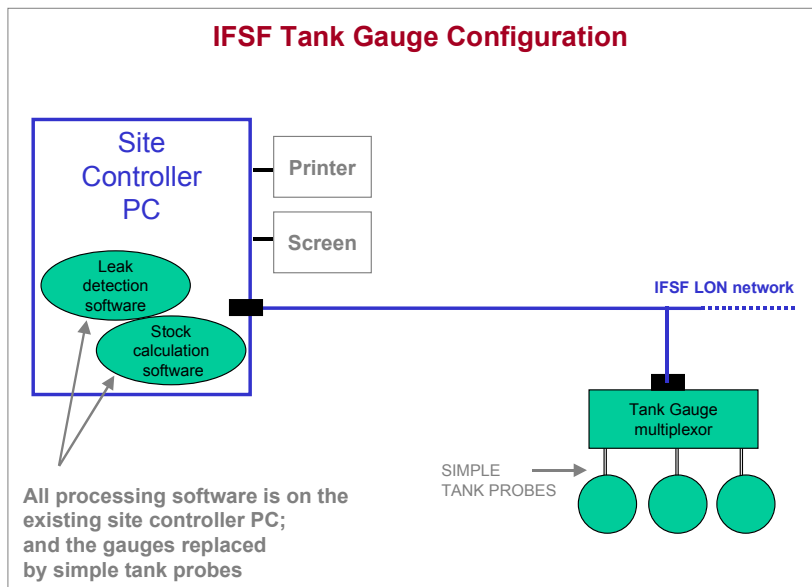




**Elimination of duplicate processors**

As a traditional proprietary supplier architecture becomes more sophisticated, there is a tendency to increase the number of processors – for example, one for each EPoS, another for a car-wash controller, a tank gauges controller, or for a delivery control system.

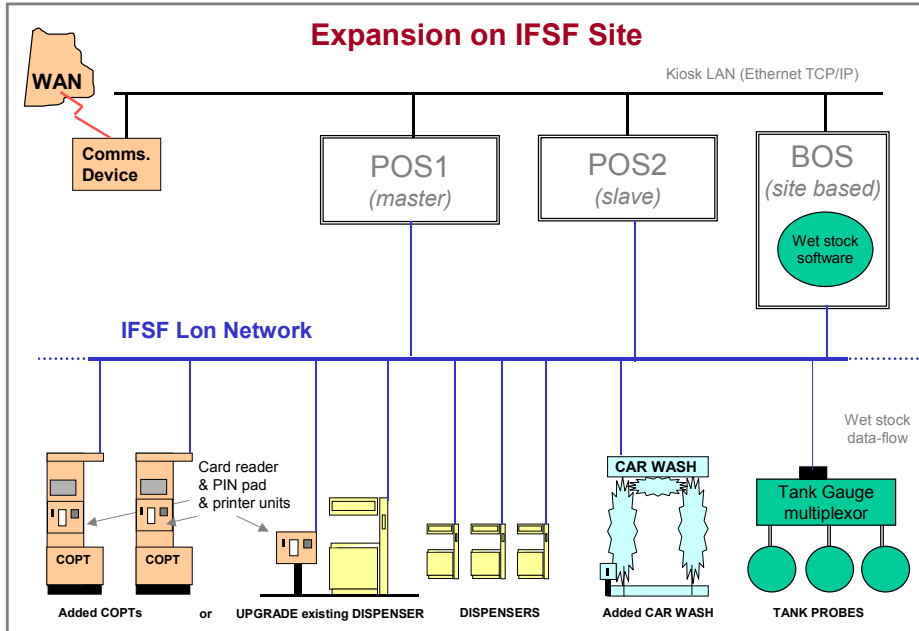
The IFSF architecture includes lower-cost dumb devices connected to site controllers that have sufficient processing capability for all applications across the forecourt. Where a proprietary system might require separate processing power and software from the tank gauge manufacturer, the IFSF solution would use simple tank probes with the application resident on the site-controlling PC, along with other applications.



**Expansion of site networks**

The addition of extra items of equipment to a forecourt, for example, a Customer Operated Payment Terminal (COPT) or car wash, and the installation of newly developed devices such as vehicle identification, are both essential aspects of site management and marketing strategies.

Extension of the site network is vastly simplified if all sites have the same systems architecture which has been designed for interconnectivity between devices from different manufacturers. In some instances, expansion can be achieved with less additional equipment, for example, upgrade of an existing dispenser to customer operation.



*Addition of a COPT and a Car Wash to an IFSF site*

**Building Management Services**

The IFSF conceptual design recognises the desirability of interconnecting devices, such as dispensers, from the forecourt with those in the building services, such as lighting, and derives further benefits from the standardisation and integration of control facilities in a common architecture. This is an optional enhancement of the site architecture and IFSF implementation is not dependent on this.

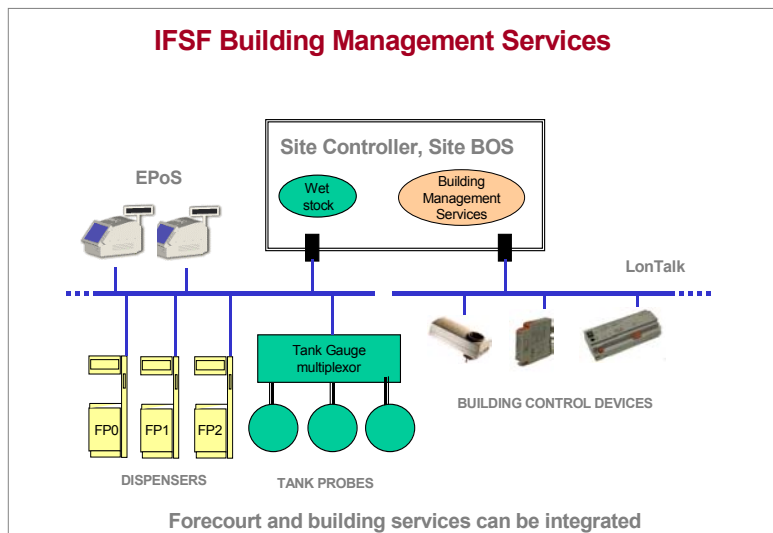
This was a factor in the decision to select LONWORKS® as the principal communications technology, although the IFSF standards are also compatible with TCP/IP. LONWORKS® is now the leading *de facto* standard worldwide for networking systems in retail forecourts as well as in homes, trains, semiconductor fabrication equipment, and intelligent buildings. Interoperability between devices on LONWORKS® networks is assured by the compliance testing of the LONmark Association, which also assures availability of trained systems integrators.

The scope of Building Management Services (BMS) devices includes:-

- Electricity meters
- Lighting control – for both shop and forecourt
- Heating, ventilation and air-conditioning
- Refrigeration – chillers and freezers
- Access management – sensing occupancy, and operating locks and lighting
- Closed circuit television
- Cafeteria equipment, including ovens, microwaves, and coffee machines
- Door controls and alarms, including burglar, fire, smoke, and attack
- Dispensers for drinks, packaged food, videos and other items
- Climate sensing of rain, ambient temperature, or sun brilliance

In addition to the normal benefits from BMS, such as reduction in power costs, interoperability with the forecourt can have additional benefits, like integrated alarms, or matching of canopy lighting to vehicle or ambient light.

Although the BMS standards are separate from and not part of IFSF's set of standards, the IFSF conceptual model allows for these separate BMS devices, with their applications, on the site-controlling PC network. This reduces total processor costs, and gives remote access for site management, such as central site monitoring of CCTV or power consumption/tariff optimisation.



**Integration options provided by using IFSF and high bandwidth to forecourt devices (TCP/IP)**

It is recognised that nowadays the prevalent data communications technology is TCP/IP, and although this is currently more costly than LONWORKS®, IFSF has worked with manufacturers (IFSF Technical Associates) and the National Association of Convenience Stores to publish an alternative IFSF Communications Layer Protocol based on TCP/IP. See the IFSF website for the TCP/IP specifications.

The IFSF guidelines utilise the IT characteristics of TCP/IP and guarantee that IFSF device applications (for example for dispenser or car wash) operate over either TCP/IP or LONWORKS®.

**PARTICIPATION**

There are a number of ways to participate in IFSF:

**Direction** – join IFSF as member. Any company with a network of retail service stations can become a Forum member. The current members are: BP, ExxonMobil, Kuwait Petroleum, OMV, Shell, Statoil, and TOTAL

**Standards design** – join IFSF as a Technical Associate.

**Information** – join IFSF as a Technical Correspondent.

**Supplier** – design and certify products to IFSF standards

**Purchaser** – insist that IFSF is specified in all tenders, and purchase only certified equipment

**Engineer** – study the benefits and technology options

**Manager** – recognise the financial, operational and marketing benefits of open standards

Over 220 organisations in 40 countries have participated in IFSF.

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