INTERNATIONAL FORECOURT STANDARDS FORUM

IFSF PROTOCOLS
PART I
MANAGEMENT INTRODUCTION VERSION 3.01- May 2004

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FOREWORD

All references in this document to Version numbers or Release numbers relate to the date of publication of this document. The very latest information on the IFSF and its Standards can be obtained from the web-site www.IFSF.org

Where any item of equipment or manufacturer is mentioned in this document it is for example only and this does not imply any IFSF endorsement. Neither do omissions infer the converse.

Any comments or queries regarding this document should be directed to the IFSF Administration Manager by email admin.manager@IFSF.org

DISCLAIMER

No member of the IFSF, or its agents, employees or contractors, shall have any liability (whether in contract, tort (including negligence) or otherwise) save in respect of liability for death or personal injury arising through negligence by any member of the IFSF, as a result of the IFSF manufacturing or selling any item of equipment manufactured in accordance with any specification or requirement contained in any computer program or document at any time supplied by or at the request of the IFSF or by or at the request of any member of the IFSF;

and
The Agreement resulting from membership of the IFSF or enrolment as a Technical Interested Party of the IFSF shall in all respects be governed by and construed in accordance with English law and that the English courts shall have exclusive jurisdiction in relation to such Agreement and all matters relating to such Agreement.

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1 INTRODUCTION

The International Forecourt Standards Forum ("IFSF") is a company limited by guarantee and constituted under the laws of England and Wales. Its Members are petroleum retailers who back the development and use of international standards in the petroleum retail sector for the inter-operability of service station systems and equipment.

This Management Introduction is intended to give an understanding of the objectives, organisation, operation, technical architectures and standards of the IFSF.

For full technical details and the study into the business benefits, see the specific documents – which are on the IFSF web-site (www.IFSF.org)

1.1 Background history

In 1992 there was great concern within the retail oil industry regarding the different protocols or interfaces used by equipment manufacturers in their communications between forecourt controllers and forecourt devices. Proprietary protocols effectively locked customers to individual suppliers – who could often not meet the changing computer system needs of the Oil Company. There were also bottlenecks in Weights & Measures certification procedures due to complex configurations.

This made it difficult for petroleum retailers to "mix and match" dispensers (and other forecourt devices) and led to the tendency to adopt "black boxes" to convert protocols, thus inflating equipment prices, maintenance costs and delaying projects.

There were several initiatives to address this problem by sections of the petroleum retailindustry in Europe, all attempting to achieve the same limited objective of defining a standard protocol for interfacing dispensers with forecourt controllers. These included: the European Petrol Station Interface ("EPSI") standard developed by the Physikalisch-Technische Bundesanstalt ("PTB") in conjunction with the oil industry in Germany, Shell in Germany and several other oil company specific projects.

Under the sponsorship of Olivetti (then a significant systems supplier to the industry), nine petroleum retailcompanies met to seek to combine all these initiatives into one.

Then in quick succession :
The IFSF was formed.
the design requirements were set – including the mapping to the OSI 7 layer model
an IFSF Working Group provided a specification for the Applications Layer 7
CECOD ("Comité de Fabricants Européens d'Installation et de Distribution de Pétrole") wasasked to select itspreferred technical common implementation for the Physical Layer 1, and the Communications Layers 2-6.

In March 1993,
CECOD unanimously recommended as its starting point LON ("Local Operating Network") technology which is a three microprocessor chip manufactured by Toshiba and Motorola, as its suggestion for Layers 2-6.
CECOD also made its recommendations for Layer 1.
the IFSF Working Group, representing the Forum member companies and the manufacturers, produced the first draft of Layer 7, called "Standard Dispenser Protocol - Application Layer"

Thereafter other standards were produced and gradually adopted by more retailers in Europe.

Despite several amicable meetings it was never possible to achieve integration with the German PTB "EPSI" standards, since these were largely limited to the German market and restricted to forecourt measuring devices. Consequently the operating companies of the IFSF members migrated to IFSF.

1.2 The Member Companies

Currently the member companies and their representatives are:

IFSF Member Companies

BP
ExxonMobil
Kuwait
OMV
Shell
Statoil
Total

Figure 1 – the current member petroleum retailers

Founder members in 1993 were Agip, BP, Conoco, Fina, Mobil, Shell and Total.

Membership of the IFSF has grown –

1993 Aral, Kuwait, Texaco
1994 Burmah Castrol, Conoco
1996 Esso
1998 Statoil
2000 OMV.

Many companies had been active contributors from the outset.

Members have left the IFSF, generally due to mergers – Aral, Mobil, Burmah Castrol, Conoco, Fina, and ChevronTexaco.

1.3 Technical Interested Parties

Many third parties have co-operated with the IFSF through the Technical Interested Parties (“TIP”) scheme, and the previous Register of Interested Parties (“RIP”).

To date this is approximately 220 organisations, from nearly 40 countries in all continents.

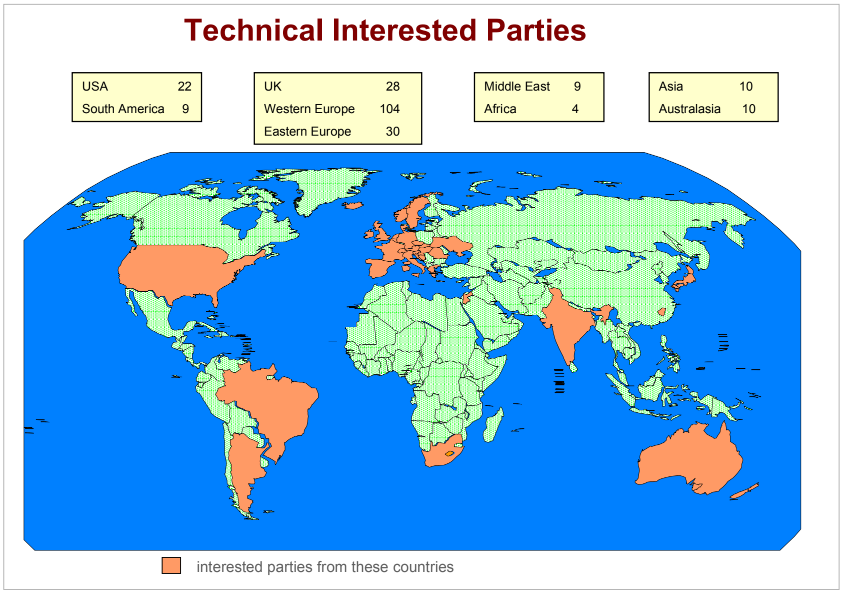


Figure 2 – Geographic Distribution of Interested Parties

Suppliers and other interested parties can become Technical Associates and then participate in the design, production and development of these standards, but they are not “members”.

Alternatively they can register as Technical Correspondents to receive information, but cannot participate in the setting of standards.

1.4 Frequently Asked Questions

The following are the most Frequently Asked Questions concerning the International Forecourts Standards Forum ("IFSF").

1.4.1 What is the IFSF Mission Statement?

> "The IFSF is a forum of international petroleum retailers with the common objective of the harmonisation of equipment inter-connectivity & communication standards for use in the Petroleum Retail Business."

1.4.2 Who are the Member companies?

Any company with retail service stations can become a Forum member. These are currently BP, ExxonMobil, Kuwait, OMV, Shell, Statoil, , and TOTAL.

Certain organisations have been granted Affiliated Organisation status where this is deemed helpful to the IFSF, for example the National Association of Convenience Stores ("NACS") in America and the Comité de Fabricants Européens d'Installation et de Distribution de Pétrole / European dispenser manufacturers organisation ("CECOD").

1.4.3 How does the IFSF work?

The IFSF preferred approach is to work with established professional bodies or other interested organisations *(e.g. industry associations, manufacturers, computer suppliers)* in order to achieve common standards., These are principally the many suppliers who are Technical Associates within the TIP scheme

Where possible existing standards are adopted or adapted. Only if suitable standards are incomplete or non-existent will the IFSF develop any new standards. Frequently development merely consists of clarification as to the precise use of an existing standard to make it appropriate for the forecourt; with the provision of relevant documentation.

1.4.4 Why was the IFSF formed?

The IFSF was formed in 1993, in response to the growing business problems caused by the proliferation of proprietary interfaces linking the forecourt equipment with the computer systems required on service stations. This was creating system delays, increased costs, and limiting the choice of equipment.

The simplistic objective was to create "plug and play" interconnectivity between devices in a service station, by setting "de facto" standards which would open up the market in much the same way as "IBM compatible" had done for PCs.

1.4.5 Is the IFSF completely independent?

The IFSF is a strictly non-profit making body that operates for the collective benefits of all member companies and its supplier community.

It takes the position that technical standards and standardised methods are beneficial to the petroleum retail industry as a whole, whereas commercial advantage is gained by the investment strategy of member companies.

Any information obtained about the activities of a member company is treated in extreme confidence and is never disclosed to the other members, or suppliers.

Development and funding decisions require the agreement of 75% of member companies.

Other organisations (e.g. vendors) may become Technical Associates and participate in achieving the standards – but cannot set policy nor make strategic decisions.

1.4.6 What is the legal status of the IFSF?

The IFSF is now a company limited by guarantee registered under English law. It does not have shareholders, but rather has members who meet the qualifying criteria set out by IFSF.

1.4.7 How 'International' is the IFSF?

This question is rarely asked today, as it is now fast becoming the 'de facto' inter-operability standard in virtually all continents.

Several member petroleum retailers have implemented IFSF-only policies world-wide, and several major vendors have designated the IFSF version their 'normal' product model for global markets.

The IFSF is based in Europe but operates on an international basis, by making full use of the Internet through its web-site.

Several Forum members have been USA based companies and have had active representatives at the four main Forum meetings each year.

There are currently 22 USA based manufacturers registered as Technical Associates and who take an active part in developing standards through participation in the Working Parties.

To promote the IFSF standards in the USA, the IFSF works with PCATS (having formerly worked with NACS) and NRF-ARTS ensuring the standards incorporate American requirements. PCATS co-operated with the IFSF on the development of a TCP/IP based carrier mechanism as an alternative to LonWorks. PCATS sends Incident Reports to the IFSF about appropriate extensions for the USA market; and shares its standards (e.g. Lottery terminal) with the IFSF.

1.5 Participation

There are many ways to participate with IFSF : -

Direction – join IFSF as member
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.

The IFSF, by reducing costs and increasing inter-connectivity, has the potential to greatly benefit everyone in the retail petroleum industry.

2 REASONS FOR STANDARDS

The IFSF was formed in 1993 when petroleum retailers were starting to introduce computer systems into the service station architecture to handle integrated pump-control, payment card-systems, connected EPoS, plus loyalty promotions - and with the consequent need to integrate service stations with corporate head-office IT applications (e.g. inventory management, distribution, accounting, sales statistics etc).

There were no universal 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 retail automation projects suffered from high cost and time over-runs. Petroleum retailers were starting to take a multi-national view on forecourt systems for marketing, operational and cost reasons. Hence internationally accepted standards were vital.

Several different approaches, described below, are available - but only international open standards achieve the stated objectives of the IFSF and maximise the benefits as shown in Chapter 3.

2.1 The mixed vendor proprietary approach

Specific problems of the proprietary approach include : -

Lack of inter-operability between devices.
Interfaces to be written for each supplier & device model.
Every new interface needs Weights & Measures approvals.
"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 co-operation between device suppliers.

As an example of the scope of the problem, in 1991 one oil company had 69 different systems, from 25 different suppliers, using 126 different device protocols.

2.2 The single vendor proprietary approach

A popular solution often proposed was the concept of "standardising" on just one supplier for a geography. However this approach frequently failed because : -

No single vendor is best of breed with all devices.
There can be no price competition with only one vendor.
No single supplier is able to provide and support all devices in all markets.
Few forecourt equipment suppliers can fully meet individual petroleum retailer's corporate IT system requirements.
The introduction of petroleum retailer's marketing initiatives were restricted without costly and lengthy supplier developments.
The oil company future is tied to a supplier's fortunes.

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.
2.3The IFSF standard approach
The objective was and remains complete open-systems inter-operability on the forecourt - i.e. the ability to connect any device, from any supplier, onto the same network and exchange data and control instructions – virtually "plug and play".

This means IFSF aims to be : -
multi-device
multi-vendor
multi-purpose
multi-national

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

This inter-operability has now been achieved for a decade and there are many working sites where different dispensers from different vendors operate on the same forecourt network, inter-operating 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 below, is an example of the success of inter-operability. There are dispensers from two manufacturers operating side by side, and the site operates EPoS from different manufacturers simultaneously. The site did not need to cease trading during the installation of the second vendor's equipment.

IFSF inter-operability is clearly demonstrated through the business expansion of LPG onto forecourts. IFSF LPG dispensers are installed

alongside other suppliers' existing equipment. In many sites this means three different vendors' dispensing equipment co-exist on the one forecourt.

Figure 3 - a Shell IFSF site in Ireland showing some of the multi-vendor equipment.

3 THE MAJOR BUSINESS BENEFITS

3.1 IFSF Business Case

The IFSF commissioned an independent study to assess the commercial benefits available to IFSF Member companies and vendors in the Technical Associate community (see separate report "IFSF Business Case - Release 1.40" which is available from the IFSF Administrator (admin.manager@IFSF.org) .

This study identified many beneficial scenarios and opportunities that could be ascribed to 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 Capital €12m ($14m) , and Operating €49m ($56m), 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
Total	39	***12,000***		***4,900***	

Figure 4 – estimated benefits for 250 sites in one country (in 000s Euros) (multiply by 1.15 to convert to $)

Since 1999 thousands of sites have been installed and greater savings achieved than reported above. In procurement, LonWorks devices have halved in price every 18 months. PCI Lon cards are now less than 15% of the cost used in the 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.

3.2 Procurement beneficial scenarios

There are major savings to be obtained by competitive procurement of IFSF equipment :-

Possible to switch between manufacturers in the same network without interfacing limitations.
The freedom to competitively source IFSF compliant devices from any vendor, in any country.
New vendors can enter and compete in countries without major developments.
The lower cost of developing and supporting a single IFSF interface reduces vendor costs/prices.
The number of processors and protocol converters that have to be purchased is reduced.
Marketing initiatives can be applied across an entire IFSF network without high interface costs (e.g. loyalty terminals).
On an IFSF site it is possible to select the best devices for a purpose regardless of existing vendor.
New equipment (e.g. COPT or car wash) can be introduced more rapidly into an IFSF network.
Easier to introduce site systems and central applications (EPoS etc.) across an IFSF network without multiple interface developments.
LON cable topology reduces the junction boxes, ducting, conduits and cabling requirements.
Where business requirements dictate alternative TCP/IP applications are easily introduced.

3.3 Service station architecture beneficial scenarios

The possibilities presented by universal IFSF service station architecture include : -

Only one technology means a reduced skill set, so only one engineering centre of expertise.
The cost of developing and approving duplicate interfaces is avoided by adopting IFSF standards.
New devices (e.g. vehicle id) can use existing IFSF standards without development delays.
The simpler IFSF design and engineering means less on-site multi-vendor testing.
Controlled evolution of IFSF standards avoids sudden obsolescence imposed by manufacturers.
The recommended IFSF LON cabling topology is shorter and less expensive, albeit IFSF fully supports TCP/IP.
IFSF LON networks have proved so resilient that extra redundancy can be avoided (e.g. UPS).
Overall the greater simplicity means new sites are operative faster, so trade sooner.
All data is held in a single systems architecture simplifying IT applications and interfaces.

3.4 Maintenance beneficial scenarios

Maintenance benefits are proving to be significant : -

IFSF LON cabling has proven highly resilient reducing cabling faults by ~75%.
Engineering training and diagnostic tools are reduced with only one base technology.
Fault diagnosis is simpler because all devices are similar, reducing multi-vendor intervention.
Reduced spares stocks as units are inter-changeable and replacement units can be sourced rapidly from any vendor.
With proven greater resilience contracted maintenance cover can be reduced to prime time only.
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 the central Retail IT applications support.

3.5 Other Opportunities envisaged

There are further potentially significant benefits to be derived by following all IFSF concepts including LONworks, especially in the area of Building Management Services ("BMS"): -

The cost of cabling & switching forecourt lights can be reduced using LON power-line principles.
Forecourt sensing & lighting can be managed more cost effectively by BMS applications (~40%).
Savings in energy efficiency (refrigeration, air-con, lighting, chillers) can be achieved (~45%).
Device monitoring (e.g. drinks dispensers, coffee-makers etc.) controls cash and stock costs.
Multi-function alarms (smoke, presence, burglar, fire) are less costly than separate systems.
Interaction possible on an IFSF forecourt network – e.g. reduced lighting until customer on pump.
BMS devices are controlled by software so advantages can be gained without staff input.

It should be noted that from January 2005 all new public buildings in Europe are required to use LON 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 with no significant impact on the complexity of installation or implementation.

4 ORGANISATION

4.1 IFSF Limited

International Forecourt Standards Forum Limited ("IFSF") is a company limited by guarantee and constituted under the laws of England and Wales. Its members are petroleum retailers who support the development and use of international standards in the petroleum retail sector for the inter-operability of service station systems and equipment.

4.2 Membership of IFSF Limited

4.2.1 Full Member

An organisation or person which is a Petroleum Retailer and is the owner of the brand or a formally nominated representative of the brand owner.

4.2.2 Associate Member

A organisation or person that is a Petroleum Retailer (including those eligible for Full Membership that do not wish to be a Full Member but prefer to participate in the activities of the Company as an Associate Member) including companies affiliated to a Full Member.

4.2.3 Technical Associate

Other interested parties participating in the Retail Petroleum Industry.

4.2.4 Technical Correspondents

Those who wish to track development of standards and key issues in the Retail Petroleum Industry.

4.2.5 Affiliated Organisations

Important organisations participating in the Retail Petroleum Industry.

4.3 The Board

The Board of Directors is comprised of representatives nominated by each of the Members of IFSF Limited.

Usually at least two board meetings are held per year, rotating between offices of the member companies whenever possible.

4.4 Sub-Committees

The Board currently delegates powers to Sub-Committees. These are currently are ;-

The Executive Committee meets approximately four times per year and performs such duties as the administration of the Company, including managing the implementation of issues that have been approved by the Board.

The Technical Committee meets as necessary, and normally through working parties undertakes studies, develops technical solutions, makes recommendations to the Board and implements Board approved technical programmes.

4.5 Officers of IFSF Limited

The Board elects :-

a Chairman of the Board, who should not be a current employee of any Member. The Chairman is responsible for co-ordinating the activities of the Company and taking the chair at meetings.

a President from amongst the representatives of the Full Members. The President is identified to outside organisations and persons as the main spokesman and figurehead for the Company.

a Technical Committee Chairman, from amongst the representatives of the Full Members.

4.6 The Administrator

The IFSF Administrator is appointed by the Board and is based in the UK.
Main responsibilities include general administration of meetings, accounting, and maintenance of the Technical Interested Party scheme and the IFSF web-site content.

4.7 The Company Secretary

The Board appoints a Company Secretary, who may be a representative of a Full Member.

4.8 Out-sourced services

The IFSF out-sources Technical Services and professional advice.
Where a Member company provides services to the IFSF there is provision for reimbursement of any costs and resources.

4.9 Project management

The IFSF may use a Project Manager to assist the Technical Committee Chairman to expedite developments and follow-up technical issues.

4.10 Fees (The following might be too explixit for general publication???)

Full Members and Associate Members:
The cost of the development of standards and their maintenance, plus the cost of administration of IFSF, less the contributions received from Technical Associates and any other income (except for tool sales).

Technical Associates:
Net cost of development of tools after deduction of any income from the sale of tools, plus a contribution to the cost of maintenance of standards and the administration of IFSF.

Technical Correspondents:
Fixed fee reviewed periodically.

Affiliated Organisations:
By negotiation

Others:
By negotiation

4.11 Web-site

The principle communication method, and repository of all information, is the IFSF web-site – www.IFSF.org

Information is available from public areas, and secure password protected sections for Technical Associates and Member companies.

See Figure 5 below for an illustration copy of the current IFSF web-site Home page.

See also Figure 6 on the next page for the IFSF web-site contents and navigation.

IFSF Web-Site: Contents & Navigation

Home Page

www.IFSF.org

Member Company Logos and links to their web sites

What Is The IFSF?	Introduction to the IFSF in 4 languages
Information Download	Information Pack with overview of the IFSF
FAQ	List of Frequently Asked Questions
TIP Scheme	The IFSF Technical Interested Parties Scheme, benefits and how to join
Main Sections	***Contents and Links***
Technical Associates	List of TAs + links to their web sites
Technical Correspondents	List of TCs + links to their web sites
Technical Services	Sections for - Support - Discussion Groups - Incident Reports - Training – details & schedule of courses - Self Certification Test Tools - Inter Operability Centre - Link to the IFSF Library
Systems Integrators	List of SIs + links to their web sites
Certification Report	List of certified equipment and manufacturers
News	News items
Diary	Board Meetings, Technical Work Group Meetings, etc
Library	Sections for downloading - Engineering Bulletins - Technical Working Party Papers - IFSF Standards - Current - For Discussion - Archive - Self Certification Test Tools
Administration	Private Section to provide web-site Admin facilities.
Forum Members	Private Section IFSF Members (Petroleum Retailers) only
Links to Affiliated Organisations	CECOD, NACS and LonMark

Figure 6 – the IFSF web-site and contents

5 METHODS OF IFSF OPERATION

5.1 Co-operation

The IFSF approach is for the Member petroleum retailers to meet to set the direction, and the priorities.
This often results in the setting up of a Working Party to identify, adapt and adopt the most suitable standard already in existence; or develop a new standard if appropriate.

To do this the IFSF members work together in close collaboration and with interested third parties.

5.2 Technical Interested Parties

The IFSF has a scheme for Technical Interested Parties (the "TIP Scheme") which replaced the Register of Interested Parties in 1998.

5.3 Technical Associates

Technical Associates ("TAs") are companies, usually equipment vendors, who have entered into a commitment to assist with the development and support of the IFSF standards. To date this has involved about 220 companies in nearly 40 countries.

5.4 Technical Correspondents

Technical Correspondents ("TCs") are organisations who do not want to actively participate in the development and support of standards, but wish to be kept informed and have privileged access to technical information regarding IFSF standards and operations.

5.5 Affiliated Organisations

Certain organisations, usually non-commercial bodies, have a beneficial relationship with the IFSF.
These are invited by the IFSF Forum members to be Affiliated Organisations ("AOs").
Examples are CECOD ("Comité de Fabricants Européens d'Installation et de Distribution de Pétrole), and LON Interoperability Association.

5.6 Systems Integrators

Successful implementation of equipment on IFSF networks needs experience and expertise. The IFSF identifies Systems Integrators ("SIs") with experience of the forecourt business.

5.7 National Approvals Bodies

The requirements of the national approvals bodies, (e.g. Weights and Measures) are considered and discussed during the development and maintenance of a standard.

5.8 Other standards organisations

The IFSF co-operates with other organisations' standards initiatives where the IFSF petroleum retailer members believe they are complementary to the IFSF standards, objectives and philosophies.

Currently these initiatives include the National Retail Federation and National Association of Convenience Stores who have led similar activities in USA - e.g. ARTS, UPOS, NAXML, IXRetail.

The IFSF has held discussions with EMV (Europay, Mastercard and Visa International) and other card management bodies, on the principle of achieving one standard for all public payment cards. To date this has resulted in the application by IFSF to have significant extensions to accommodate fuel cards to be added to the ISO 8583 EMV specification.

6 OPERATIONAL PROCESSES

6.1 Policy and priorities

The direction, policies and priorities are set by the IFSF petroleum retailer company Members.
Standards development is carried out by Technical Working Parties (“TWPs”) under the auspices of the Technical Committee Chairman, who is the ISFS officer with responsibility for ensuring technical issues and all current project work is within time schedules and established budgets.

6.2 Technical Working Parties

IFSF Members, Technical Associates and Affiliated Organisations are invited to provide people and input to these Technical Working Parties. Outside experts may be co-opted as required.
Each TWP will have a person appointed by the IFSF as Chairman.
The objective of each TWP is the production of a document which defines the standard.

6.3 Document procedures

Draft Standards are passed to the members for comment and approval, then put onto the Discussion Documents area of the web-site for wider comment.
When the standard is approved by the IFSF it changes status to ‘Final’
Then it is published in the Current Documents area on the web-site.
When a document is withdrawn or replaced it is moved to the Archive area of the web-site.
Technical Associates are advised by email where documents change status.

6.4 IFSF self-certification test-tools

The IFSF is concerned that equipment is proven to be fully compliant and inter-operable between suppliers. Thus compliance testing is an important aspect of the standards.

A self-certification test-tool is available for purchase and download from the web for most IFSF standards. See Chapter 10 ‘The Published Standards’.

These self-certification test-tools enable a developer to create and test a dialogue between devices and the forecourt site-controller. The test-tools check and report on all mandatory attributes and conditions. Later versions additionally report on optional attributes.

A self-certification report is produced by the developer as part of the testing process stating whether the device had successfully completed those tests necessary for IFSF compliance.

6.5 Product compliance certification

The self-certification report produced by a successful test can be sent to IFSF Technical Services – see web-site for details.

IFSF Technical Services will check that all mandatory tests were reported as successfully complete and then issue a Compliance Certificate. There is an administration charge for this service.
When a device has been certified an entry will be made on the list on the web-site.

The Compliance Certificate provides evidence to oil company procurement managers that a particular product/model is suitable for purchase against a requirement which specifies IFSF equipment.

However this only identifies that the individual device complies with the appropriate IFSF standard. Further testing of the interoperability between different manufacturers and devices can be carried out at the Inter-Operability Centre (see §6.9 below)

6.6 Engineering Bulletins

When required the IFSF publishes Engineering Bulletins (and Administration Bulletins or Newsletters) which contain extra practical information for the implementation, operations and management of IFSF standards. See web-site www.IFSF.org for details.

6.7 IFSF Technical Services

The IFSF currently contracts a third party to provide a range of IFSF Technical Services.
Currently these are provided by Calon Associates Ltd, located in Runcorn, UK.

These services include support for Technical Interested Parties via a telephone/email help line; the progressing of technical queries from Members, Technical Associates and Affiliated Organisations; investigation and resolution of Incident Reports; updating of standards; development of test-tools; support of Technical Working Parties.

Supervision is by an IFSF Project Manager reporting to Technical Committee Chairman.

6.8 Training courses

IFSF approved training courses for development and implementation are currently provided by IFSF Technical Services.

6.9 Inter-Operability Centre

Calon Associates also provide an IFSF Inter-Operability Centre that contains IFSF compliant sample equipment from a wide variety of suppliers. This Inter-Operability Centre can be hired by anyone to test that equipment from different vendors works when connected together.

6.10 Change control procedures

Standards are not static and the IFSF change control procedure starts with an Incident Report (“IR”) entry on the web-site by a petroleum retailer member, a Technical Associate or Affiliated Organisation.

These IRs are processed by the IFSF Technical Services and should lead to a resolution within a defined time-scale. The status of each IR can be monitored on the web-site.

Incident Reports which would materially affect existing standards, or change direction, are considered by the IFSF for strategic direction.

6.11 Maintaining compatibility

The strict change control policy of the IFSF is that no existing feature/attribute should be removed or altered in a later release. This is so that existing devices will continue to be compliant with devices built to new releases – i.e. to ensure backwards compatibility, and avoid obsolescence.

New features/attributes, even corrections, are therefore introduced in addition to existing features. Thus new features will only inter-operate devices built to later releases.

6.12 IFSF Technical Conferences

Periodically, the IFSF holds a Technical Conference to which all Member companies, Technical Associates and Affiliated Organisations are invited to attend. The purpose is to exchange information regarding the standards and their use, as well as any other related topics (e.g. new standards, Incident Reports, initiatives by other standards bodies and practical implementation issues).

7 THE TECHNICAL DESIGN CRITERIA

To meet the objective of complete inter-operability between forecourt devices on an international scale the IFSF set the following design criteria for the standards : -

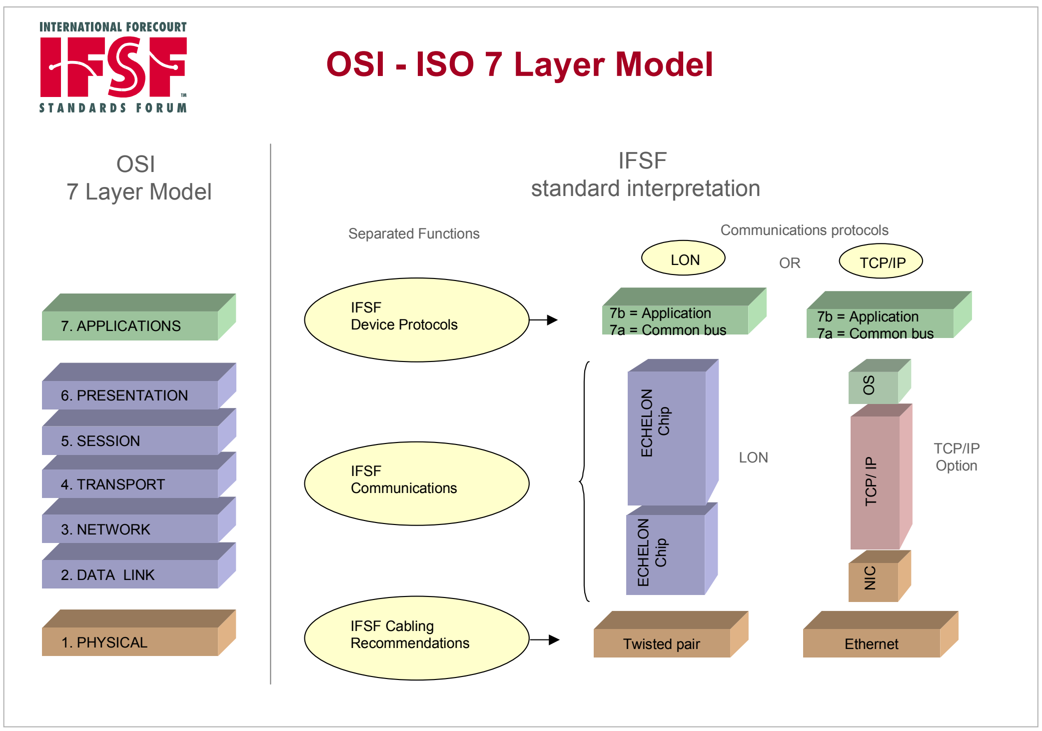
To be an Open System
Supplier independent
Flexible and include all appropriate forecourt devices
Minimum of 10 years availability of components
International approvals
Low acquisition, installation, testing and support costs
Adequate system response time and resilience
Short development time frame

These are examined below : -

7.1 Open System design layers

The protocol is based on Open Systems architecture so any device can communicate with any other.
Thus each originating device should not need to know the technical characteristics of the recipient device, other than it complies with the IFSF Protocols.

To achieve these Open standards, IFSF adhered to the OSI 7-layer model : -
Figure 7 - the IFSF implementation of the ISO OSI seven-layer model



It is important to understand how the IFSF standards map to this internationally accepted model : -

The Application Layer 7 is specified by the IFSF in the various device protocol documents
The IFSF makes recommendations for the Physical Layer 1 (wires, connectors etc.).
The Communications Layer is specified in the IFSF Communications Protocol separately for LONworks and for TCP/IP. Both options use established IT technology, with some IFSF implementation recommendations.

However to take this topic into more technical detail (see Figures 8 & 9 below) : -

Layer 1 – is the Physical Layer where the cabling, connections and voltages are considered.
The IFSF make recommendations, but for LON virtually any existing cable with two wire cores will suffice (see web-site for Engineering Bulletin No. 1).

For TCP/IP Ethernet cabling is required.

RJ45 connectors are recommended for both communications options.

Layer 7 – is the important Application Layer where all the IFSF Device Protocols reside.
This is separated into the Common Bus and the actual Application protocol.

Separate Device Protocols exist for all forecourt devices (e.g. dispenser, tank gauge, price sign etc.).

Messaging – Applications are composed of a simple message, each message with defined attributes. There are 6 different basic messages specified to access the data elements in the system:

1. Read Message
General method of reading data element(s) from the devices.

2. Answer Message
General method of replying to a Read message from the originator with the data elements requested.

3. Write Message
General method of writing any data element to the devices.

4. Unsolicited Data Message with Acknowledge
General method of sending data elements where it is necessary to send a response message.

5. Unsolicited Data Message without Acknowledge
General method of sending data elements where there is no need to send a response message.

6. Acknowledge Message
General method for any recipient device to respond to a message.

Layers 2-6 – these are the technical IT layers which the IFSF wanted "fixed in silicon" to avoid the possibility of different implementations by different suppliers or on different sites - with the consequent overhead of extra specifications, device testing, fault diagnosis and blame.

In LON these layers are all contained within the solid state 'chips' on a LON board and cannot vary between installations.

An IFSF LON circuit board has 3 chips (see Figure 9 below) : -
a Memory chip to hold the application
a Neuron chip to manage the LonTalk protocol
a Transceiver chip to manage the connectivity.

In TCP/IP these layers are managed both in hardware (i.e. the NIC cards) and in software (the TCP/IP stack & operating system). Thus there is a need to ensure that these layers are consistently applied by each vendor and installation. The IFSF is about to publish guidelines for these technology implementations, but this option is potentially less consistent between vendors, devices, sites and implementations.

IFSF is a peer-to-peer network using explicit messages, and the only broadcast function is the heartbeat – which confirms device active presence, or not. In TCP/IP the heartbeat will be a UDP message.

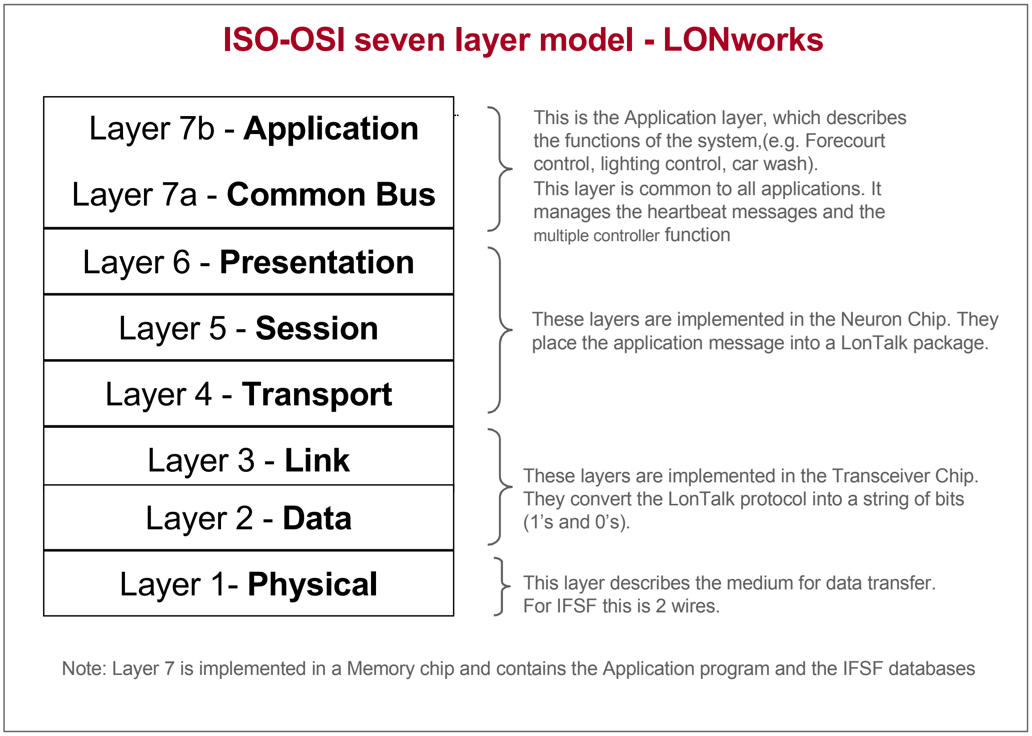


Figure 8 – a detailed view of ISO seven-layer model for LON

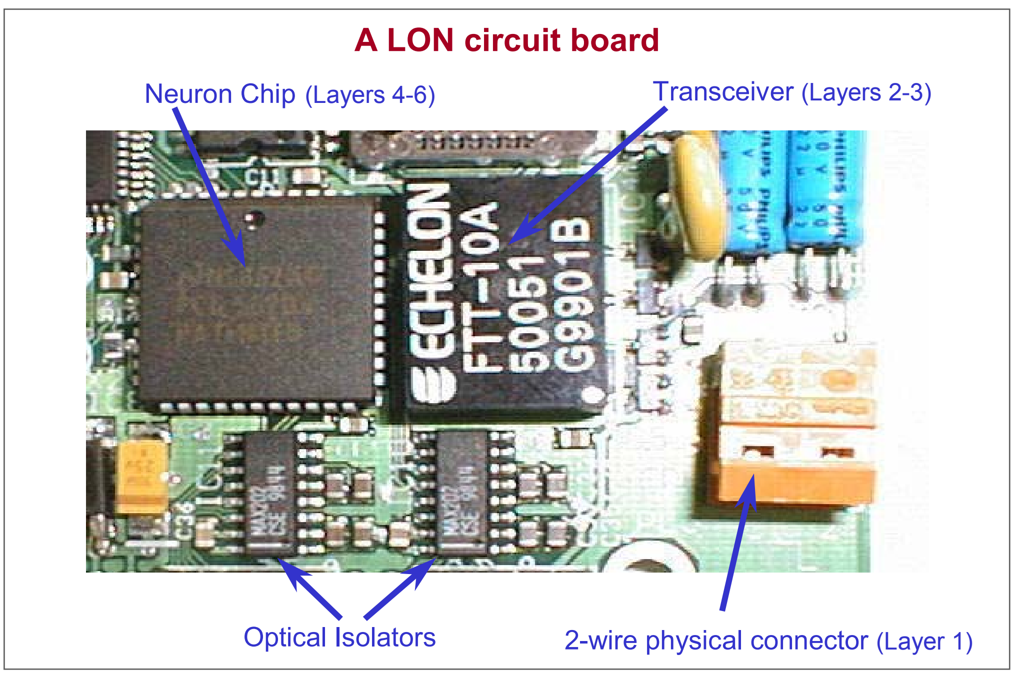


Figure 9 - photo of a LON board

7.2 Supplier Independence

Supplier independence is one of the main reasons for the IFSF. The inter-operability provided by these standards facilitates rational procurement decisions based on the price or functionality of a product – instead of being constrained to a particular supplier because of proprietary interfacing technology.

However standards alone do not automatically ensure this benefit – they have to be proven to work.

The IFSF provide test-tools which enable manufacturers to develop equipment, and to test that the equipment is compliant with the appropriate IFSF standard.

These test-tools are self-certification tools which produce test reports which can be sent to the independent IFSF Certification Service who check the test report and issue a Certificate of Conformance for that specific device and model.

This Certificate of Conformance enables the Procurement Departments of the IFSF member petroleum retailer companies to insist that they only purchase equipment that meets the IFSF protocol standards.

Further, IFSF Technical Services maintain an independent Inter-Operability Centre. This is a test laboratory with examples of many IFSF devices so that equipment from multiple suppliers can be proven that they will work together. This can save considerable implementation time on the forecourt.

7.3 Flexibility for all forecourt devices

IFSF application standards have now been published for most forecourt devices (see Chapter 10).

Altogether these have over 170 data-attributes, which are either optional or mandatory. This ensures that the protocol can be configured for virtually all operational requirement.

A change control procedure (via "Incident Reports") is available for all Technical Associates (e.g. including vendors) to suggest ideas for consideration and approval (see §6.10). These Incident Reports are often submitted to cover special requirements of different markets – including requirements for the American market submitted by PCATS and USA based Technical Associates.

The result is that the protocols are flexible, universal and reflect market needs.

7.4 Minimum of 10 years availability of components

Forecourt equipment is not updated frequently so it is essential that the IFSF protocols, including the communications protocols, use components that have a guaranteed minimum 10-year availability.

This concern originally related to the LON components where manufacturer guarantees were obtained, but should also be applied to the hardware and software components in the TCP/IP communications option.

7.5 International approvals

In most countries, especially in Europe, trading standard bodies, metrology and safety legislation can be a major hurdle to any forecourt system – referred to here generically as "Weights & Measures".

Although there is much disparity, approximately 90% of countries where the IFSF service stations of member are located, have legislation which demands that devices which measure product or calculate customer prices, and the system interfaces between these devices, must be tested and approved before they can be used on any service station. The number of permutations of these interfaces (dispensers, EPoS, tank gauges etc.), and the uncertain testing criteria applied, have often caused months of delay and significant cost over-runs on service station systems projects.

The IFSF discussed these requirements with some of these national bodies, and considered their ideas in the standards design. The most important aspect is the separation of the dispenser applications, and the security of data-elements and attributes, from all other system activity. This enables similar tests to be undertaken on different manufacturers' equipment – and greatly simplifies testing procedures.

For example – the IFSF manner of communicating between a dispenser and an EPoS is defined, so a number of regulatory bodies have agreed that once one IFSF compliant device has passed their tests, then future devices using the same IFSF standard interface do not require further tests, or these will be granted with less complication – thus a substantial saving in cost and time.

The approvals issue will be revisited when the IFSF TCP/IP Communications Layer protocol is introduced because of the ability to alter crucial values over a much wider network.

7.6 Low costs for acquisition, installation, testing and support

The IFSF standards had to meet the requirement for low initial acquisition, development, testing, and ongoing support costs.

It was considered that this was best achieved by an established process control network, rather than an IT data-network. This was why LON was initially adopted as the preferred Communications Layer.

An important cost reduction benefit of an IFSF site systems architecture is the avoidance of unnecessary processors – for example by using the existing site-controller instead of purchasing an extra processor specifically for a tank gauge system.

The IFSF protocols allow any dispenser to communicate with any site-controller/EPoS without a protocol converter. However these devices are useful for backwards compatibility (see §8.10).

7.7 Short development time-frame

Initially developers took considerable time to produce IFSF compliant devices, although some examples of less than six weeks from start to certification do exist.

The situation today is that a motivated manufacturer can develop new products to the IFSF standards very quickly, and with relative ease. This has resulted in a wider selection of suppliers and device models in the market. Certain vendors entered new geographic markets with lower product re-engineering and launch costs. In some developing markets the IFSF standard has been adopted as the normal standard for that market.

New device types benefit from ready-made technology standards – e.g. for vehicle identification, loyalty terminals etc. – with the result that these new devices are now simpler to develop and introduce into an IFSF forecourt network – hence faster innovation.

7.8 Network response time and resilience

Although the data-traffic on a forecourt is low volumes of short messages, absolute 100% resilience is vital. Thus automatic retries, device status detection, no time-outs or service interruptions even when adding or removing devices for maintenance, and the ability to work non-stop in a hostile environment were all important criteria for which LON has proved its suitability.

Important - It is to be noted that the IFSF recommended network topology removes any single point of failure (see §8.2).

8 OTHER TECHNICAL ISSUES

8.1 Cable topology

Where IFSF LON is installed using ring topology, then 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 LON cabling is the free wiring topology (star, loop, bus or a combination) illustrated below; and the options of alternative cabling options (optical, radio frequency, infrared, and power-line signalling).

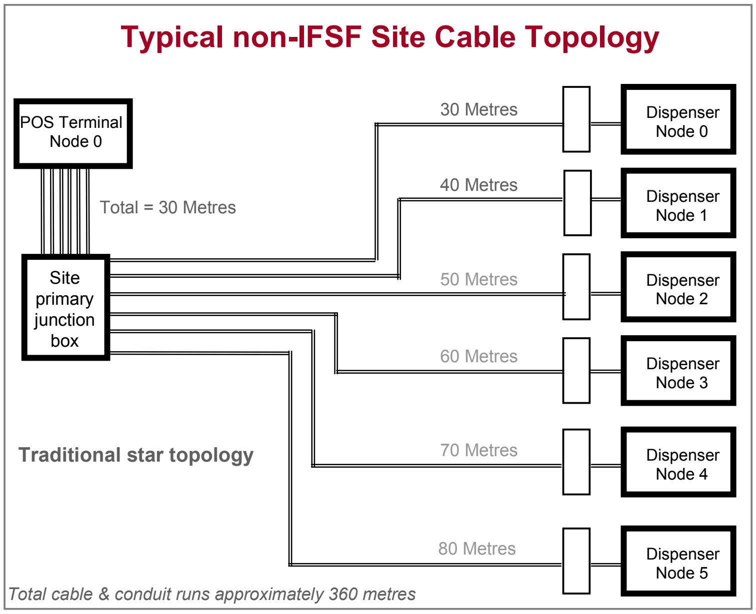


Figure 10 – typical star cabling topology

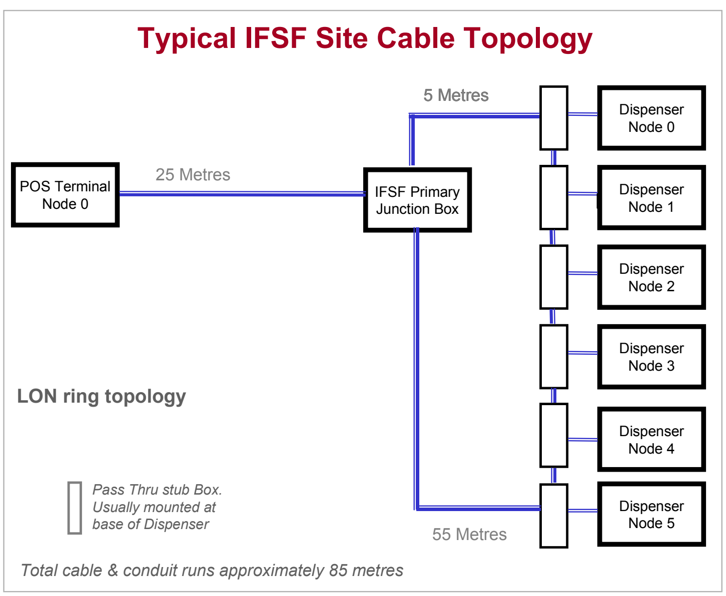


Figure 11 – an IFSF ring cable topology

8.2 Avoidance of a Single Point of Failure

The ability to trade resiliently without disruption requires a systems architecture without any single point of failure, and this architecture provides the ability to isolate equipment during maintenance.

A traditional forecourt has multiple single points of failure – e.g. the wiring connections box, the pump-controller etc.

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

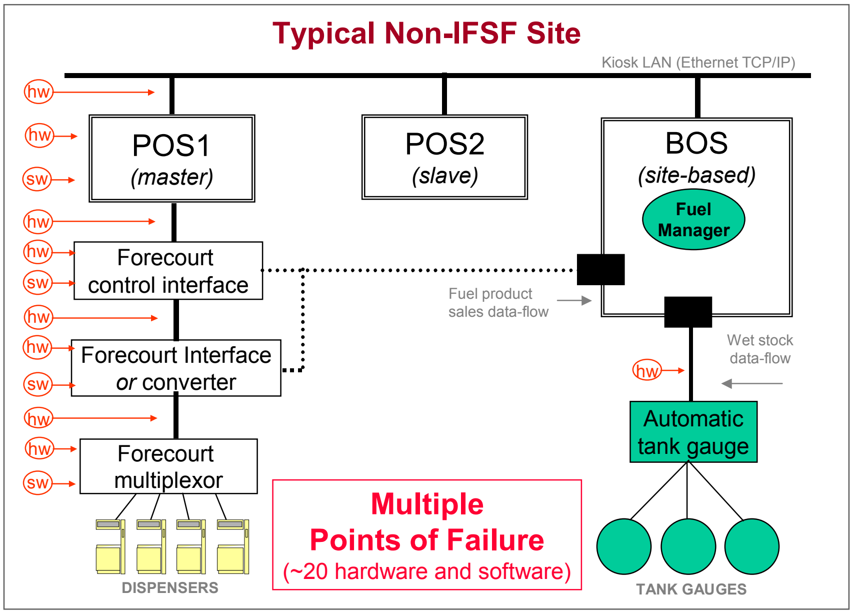


Figure 12 – typical non-IFSF site connectivity

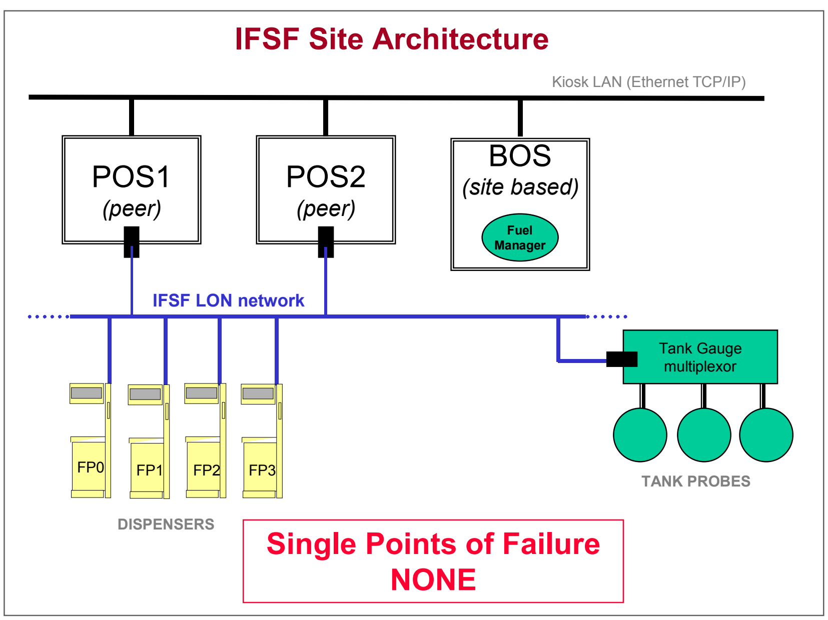


Figure 13 – IFSF connectivity is simpler & more resilient

8.3 Avoidance of proprietary solutions

A forecourt is made up of numerous devices from a number of manufacturers. With an architecture that uses utilises proprietary interfaces, the investment in developing new interfaces, and testing, and supporting can require considerable resources and prohibitive investments.

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

See §8.10 'Migration and Backwards Compatibility' to understand circumstances where protocol converters can be used to advantage.

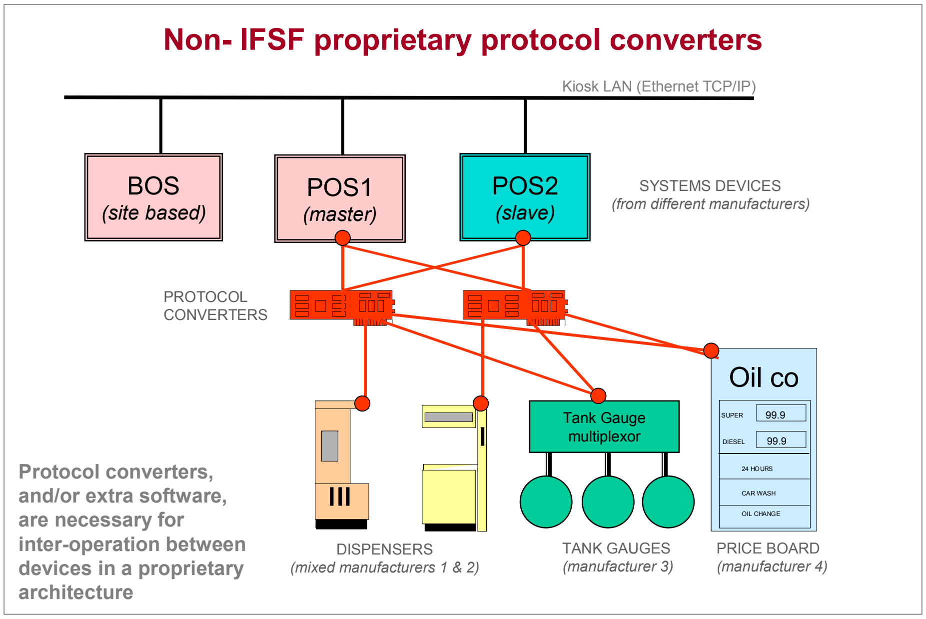


Figure 14 – the need for additional processors to convert protocols

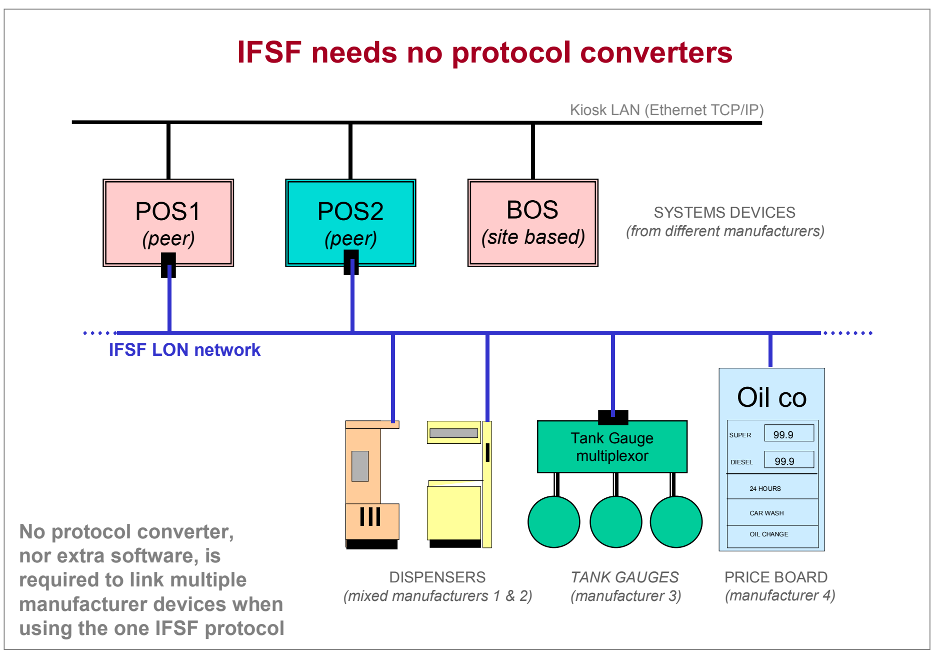


Figure 15 — IFSF without protocol converters

8.4 Elimination of duplicate processors

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

The IFSF architecture envisages lower cost dumb devices connected to site controllers that have sufficient processing capability for all applications across the forecourt.

This can best be illustrated by contrasting the tank gauge alternatives where the system could either require separate processing power and software from the tank gauge manufacturer; or merely simple tank probes with the application resident on the site controlling PC, along with other applications.

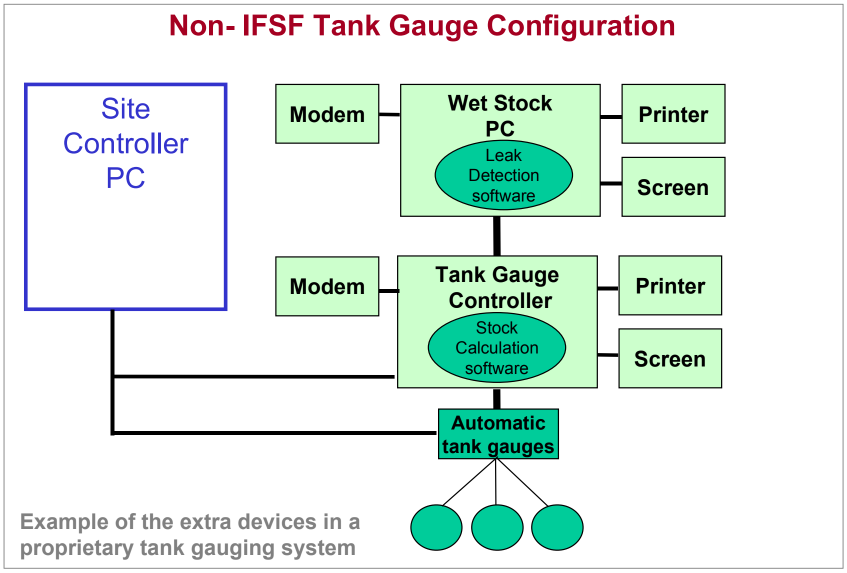


Figure 16 – typical extra devices for proprietary tank gauge system

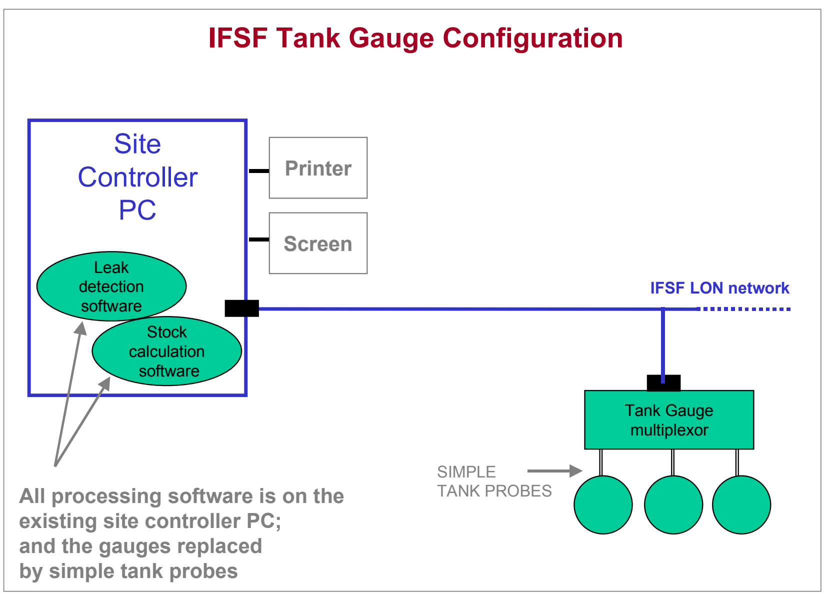


Figure 17 – simpler devices and software on existing PC

8.5 Expansion of site networks

The addition of extra items of equipment onto a forecourt, for example a Customer Operated Payment Terminal ("COPT") or car wash, and the installation of newly developed devices (e.g. 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, e.g. upgrade of an existing dispenser to customer operation.

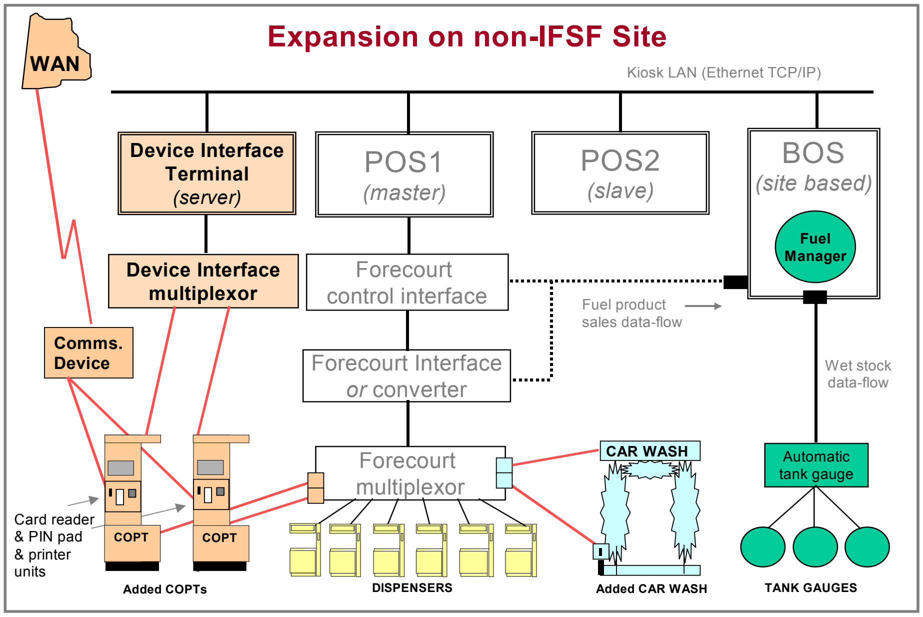


Figure 18 – addition of a COPT and a Car Wash to a non-IFSF site

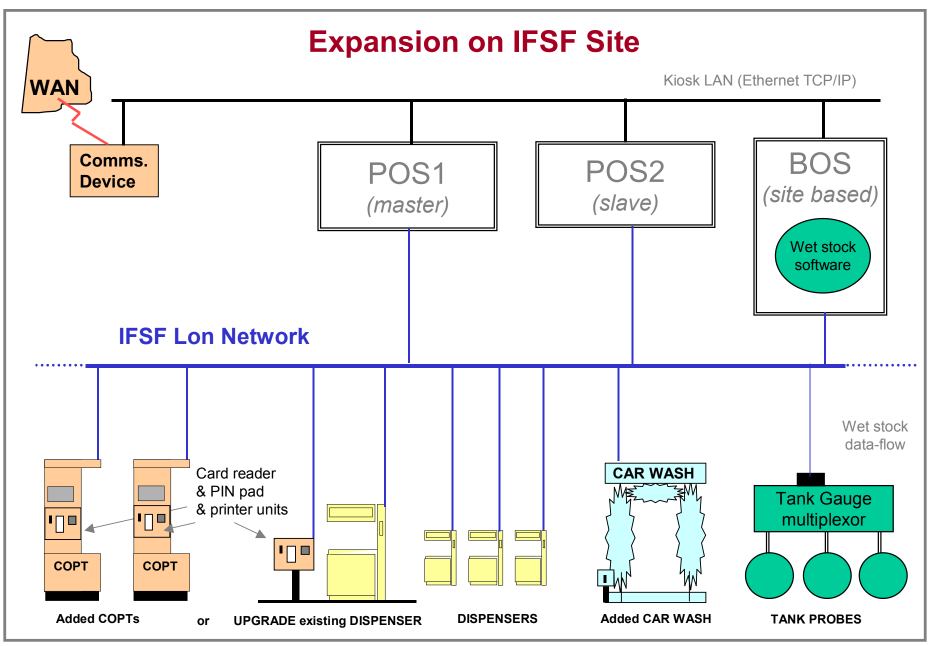


Figure 19 – addition of a COPT and a Car Wash to an IFSF site

8.6 Building Management Services

The IFSF conceptual design recognises the desirability of inter-connecting devices from the forecourt (e.g. dispensers) with those in the building services (e.g. lighting); and to derive benefits from the standardisation and integration of control facilities in a common architecture.

This was a factor in the decision to select LON as the principal communications technology. In 1993 the Echelon Technology Corporation had a world-wide market lead in all devices used in building services and the range of devices available is unequalled. The inter-operability between these devices 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 – ("HVAC")
Refrigeration – chillers and freezers
Access management – sensing occupancy, operating locks and lighting etc.
Closed Circuit Television – ("CCTV")
Cafeteria equipment – ovens, microwaves, coffee machines etc.
Door controls and Alarms – burglar, fire, smoke, attack etc.
Dispensers – drinks machines, packaged food, videos etc.
Climate sensing – e.g. rain, ambient temperature, sun brilliance

In addition to the normal benefits from BMS itself (e.g. reduction in power costs etc.) inter-operability with the forecourt can have addition benefits (e.g. matching canopy lighting to vehicles/ambient light etc. or integrated alarms).

The IFSF conceptual model envisages all these separate BMS devices with their applications on the site controlling PC network – so reducing total processor costs, and giving remote access for site management (e.g. central site monitoring of CCTV or power consumption/tariff optimisation).

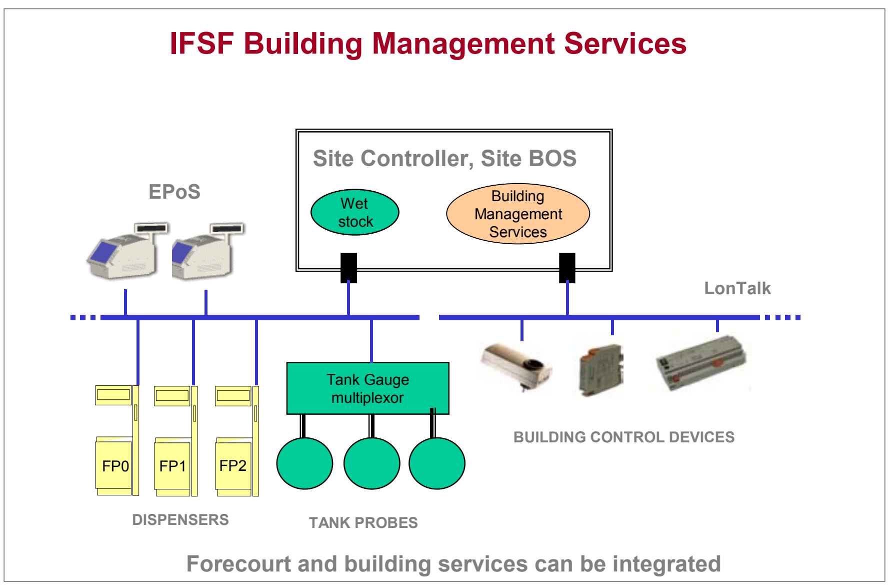


Figure 20 – integration possibilities provided by using IFSF and LON

8.7 Echelon LON was chosen because …

Inter-operability of software applications is insufficient for ‘plug and play’ unless inter-connectivity (the physical cables and connectors) is also defined. The IFSF had to select a basi communications technology which was low cost and had proven resilience. These criteria were met by LON and therefore it was chosen as the principal IFSF technology because : -

Was recommended by the dispenser manufacturers’ organisation CECOD
Manufactured to highest standards by Motorola and Toshiba
Layers 2-6 built-in processor chip(s), leaving less room for errors in development, so less testing
Straight forward integration with the IFSF application protocol at layer 7
Already being used extensively in Building Management Services, and industrial process control
Strong development tools and system integration skills available on the market
Relatively low cost getting started in comparison to current environment
Options to cabling with optical, radio frequency, infra-red, and power-line signalling
Future development proof

8.8 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 the IFSF worked with manufacturers (IFSF Technical Associates) and NACS and published an alternative IFSF Communications Layer Protocol based on TCP/IP. See the IFSF website for TCP/IP specifications.

The IFSF guidelines utilise the IT characteristics of TCP/IP and guarantee that the IFSF device application (e.g. for dispenser, car wash etc.) operates over either TCP/IP or LON. IFSF has also considered mixed forecourts of both TCP/IP and LON device.

8.9 Other Standards initiatives

The IFSF has been working with the National Association of Convenience Stores (“NACS”) and the National Retail Federation (“NRF”), both based in the USA, on additional standards initiatives.
See www.cstorecentral.com and www.nrf-arts.org.

ARTS Data Model Release 2.1 included the IFSF database definitions for Dispensers and generic forecourt equipment (30+ entities with 250+ attributes). ARTS data Model is now at Release 4.1.
Further work is planned to extend this to Tank Gauge, Price Pole and Car Wash. This will result in applications across the service station – whether forecourt or shop –sharing the same database.

The IXRetail Data Dictionary provides XML (“eXtensible Message Language”) messages for application-to-application communications (e.g. exchanging a stock management message from a tank management system in response to a request from a head office inventory system). This is based on the ARTS data-model, including IFSF entities to further simplify application software design for retail forecourts systems. This is a joint initiative between NRF-ARTS, Microsoft ActiveStore and the Digital Receipt Alliance.

The IFSF is working to further simplify software developments – including support for UPOS (“Unified Point of Sale”) - by endorsing existing drivers for generic devices (e.g. card-readers, printers etc.), and will include specific drivers for specific forecourt devices.

8.10 Migration and Backwards compatibility

In considering the implementation of IFSF Standards a company must consider integration with legacy systems and equipment. To enable all the petroleum retail companies to agree a common standard for the future which could utilise current technologies and topologies it was agreed that there would be no guarantee of backwards compatibility.

The advantage of implementing IFSF communications topology with legacy systems on a forecourt is that it offers a facility for widening the choice of vendors, e.g. mixing dispenser models and manufacturers and implementing new 'best-of-breed' solutions.

This can be achieved by either retrofitting the current equipment (e.g. IFSF electronics added to the existing dispenser); or through proprietary interface code in parallel with IFSF protocol converters; or using "black box" protocol converters.

Therefore all equipment device types on a forecourt do not have to be IFSF compliant at the same time. For example: - one option is to insist on IFSF for all new devices (e.g. controllers & tank-level gauges) and then to upgrade progressively as part of planned site refits.

This approach simplifies the implementation with backward compatibility as the protocol conversion is either to or from IFSF standards, not between a variety of proprietary protocols and manufacturers.

It should be recognised that all of these are "temporary solutions" which remove some of the advantages, and introduce additional costs at the implementation stage, until the site is fully IFSF.

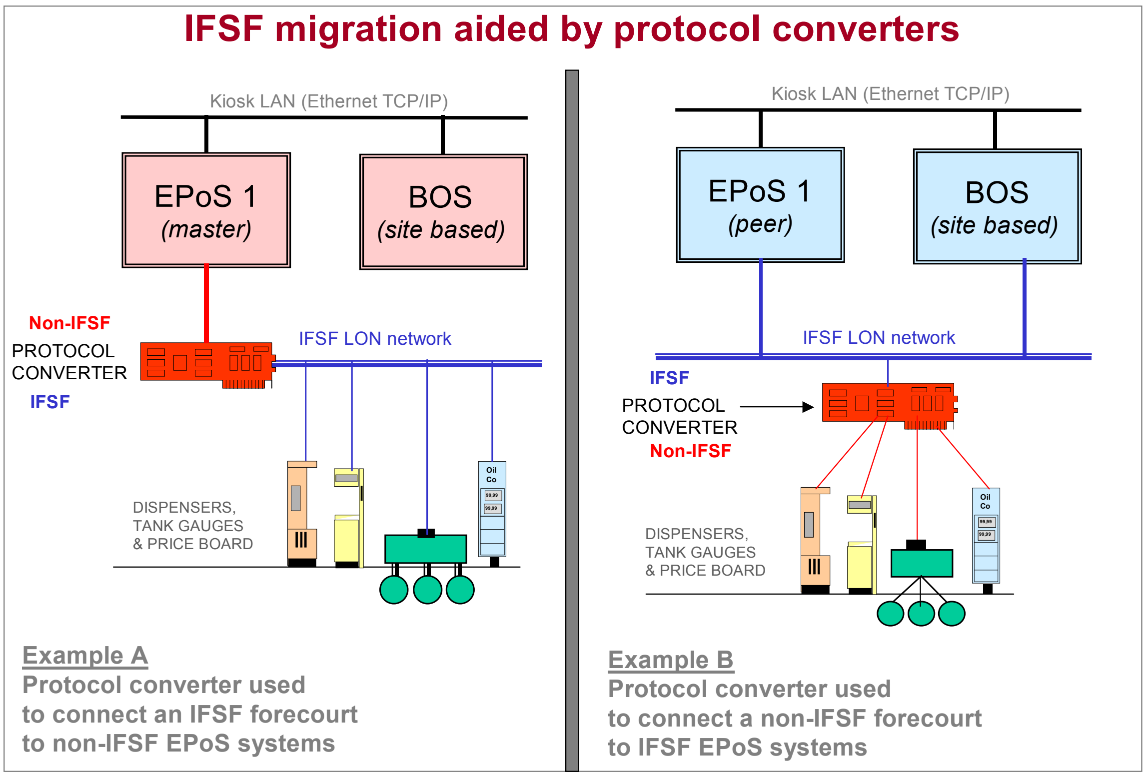


Figure 21 – examples of protocol converters being used in IFSF migrations

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9 SERVICE STATION SYSTEM ARCHITECTURES

This next section is a compilation that brings together all aspects covered in this report and contrasts the traditional and IFSF conceptual designs for system interconnectivity on service stations.

9.1 Traditional proprietary design

In a service station with a traditional systems architecture using proprietary equipment, it is difficult to integrate devices from different suppliers and the inter-connectivity of a device with the system is often a limiting factor - so there are many links to make and support.

For example: -
Dispensers are selected from one of the suppliers who normally provide such equipment in that country /region.
The systems vendor is selected from the limited vendors supplying EPoS/BOS to the petrol market.
The pump control and systems are connected with inter-faces developed by the two vendors.
The tank gauging system comes from one of the specialist vendors, often with a separate PC to determine volumes from levels and run some applications.
The car wash is chosen because of its facilities and may have its own separate processing capability.
The price signs come from a vendor chosen to conform to corporate image, usually with separate price data-updates.
Other special devices (e.g. vehicle identification, bank note acceptors, card-readers etc.) come from other specialists as self-contained products.
Payment systems are added to the EPoS and/or the dispensers then have to be linked to the banking systems.
Building services are traditionally manually switched power circuits.
Shop equipment is not interconnected and has separate control processors (if any) for heat, ventilation, air-conditioning or refrigeration.
There are often multiple remote data-comms for many individual devices (e.g. payment card processing, loyalty terminals, fault monitoring, stock control, management information, sales, banking etc.).

The result is a design that is not operationally cost efficient.

For example: -
Forecourt equipment is often selected on a site, or regional basis, from an increasingly restricted number of possible vendors.
The site implementation is complicated by equipment coming from many different suppliers.
Developing interfaces between each item is complex and expensive, resulting in a compromise between what is achievable and what is efficient.
Often this allows different vendors to include extra computer processing into their units, increasing costs and making interfacing even more difficult to achieve.
Data is not integrated, so additional on-site procedures and head office controls have to be implemented, often systems are written specifically for this.
Data-communications requirements are complicated by the need to communicate with different pieces of equipment.
The ongoing costs are higher in terms of maintenance, breakdowns, lost trading, control audits, and data-errors.
See diagram (Figure 22) on the next page.

Traditional Service Station Architecture

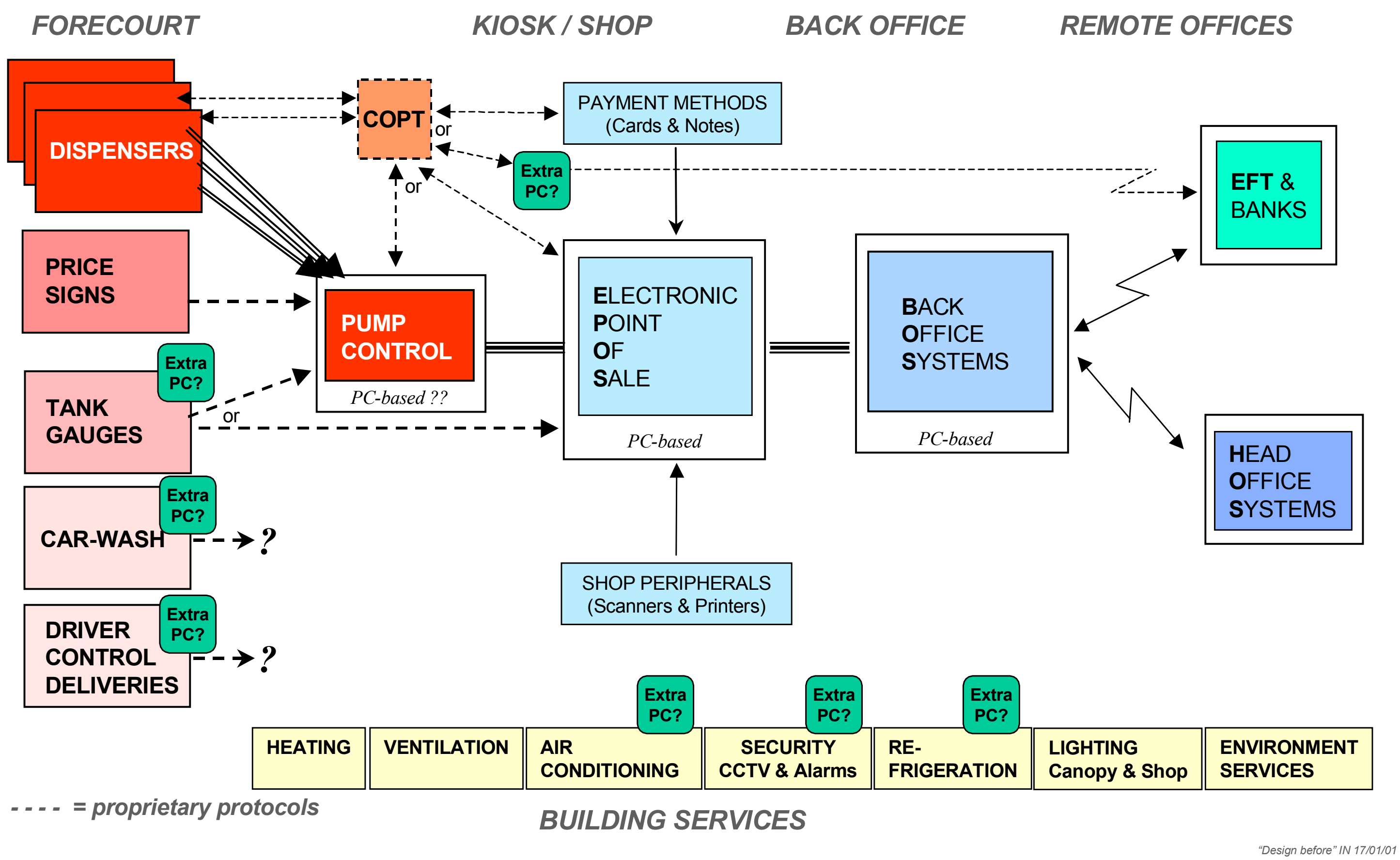

Figure 22 - traditional site inter-connectivity

9.2 IFSF Service Station Architecture

In a service station designed in accordance with the IFSF architecture, each device is sourced from the best supplier with items that are certified as "IFSF compliant". Inter-connectivity of IFSF compliant equipment from different vendors within the system is virtually assured when inter-operability tests have been completed.

For example: -
IFSF compliant devices, including dispensers, car wash, tank gauge, price signs can be selected from any supplier world-wide, not just in one country/region.
Any IFSF compliant EPoS/BOS system vendor can be selected. NB general retailing systems can be used for the cost of developing only one IFSF interface.
The pump control and systems are connected with IFSF standard interfaces, and these applications are often integrated on the Controller/EPOS PC.
The integration of IFSF versions of other special devices (e.g. vehicle identification, bank note acceptors, card-readers etc.) is simpler with only one protocol.
All payment device data is passed via the single communications controller, which simplifies data-control, co-ordination, data-comms. NB the integration of COPTs is much simpler.
Building management services can be installed without the overhead of additional PCs.
LON shop equipment is interconnected with the site systems, avoiding separate control processors for heat, ventilation, air-conditioning or refrigeration.
The IFSF communications architecture avoids multiple remote data-comms. (E.g. for card processing, loyalty, fault monitors, stock controls, management information, sales, banking etc.).

The result is a design that is more operationally effective, more flexible, with less inherent costs.

For example: -
Forecourt equipment can be selected from a wider range of vendors, world-wide.
The site implementation is simplified despite equipment coming from many different suppliers, by "plug and play".
Development of interfaces between each proprietary device is not necessary, reducing the cost of testing or upgrading when one model or supplier changes.
Vendors no longer need to include extra computer processing into their devices.
With the integration of data into the site-controller it is unnecessary to develop additional on-site procedures and head office controls to close any gaps.
Multiple data-communications requirements are avoided with a single systems architecture.
All data is in one systems architecture that facilitates data to be shared between cross-functional applications.
The ongoing costs are therefore lower – in terms of maintenance, equipment upgrades, reduced breakdowns, and related lost trading.

See the diagram (Figure 23) on the next page.

IFSF Service Station Architecture

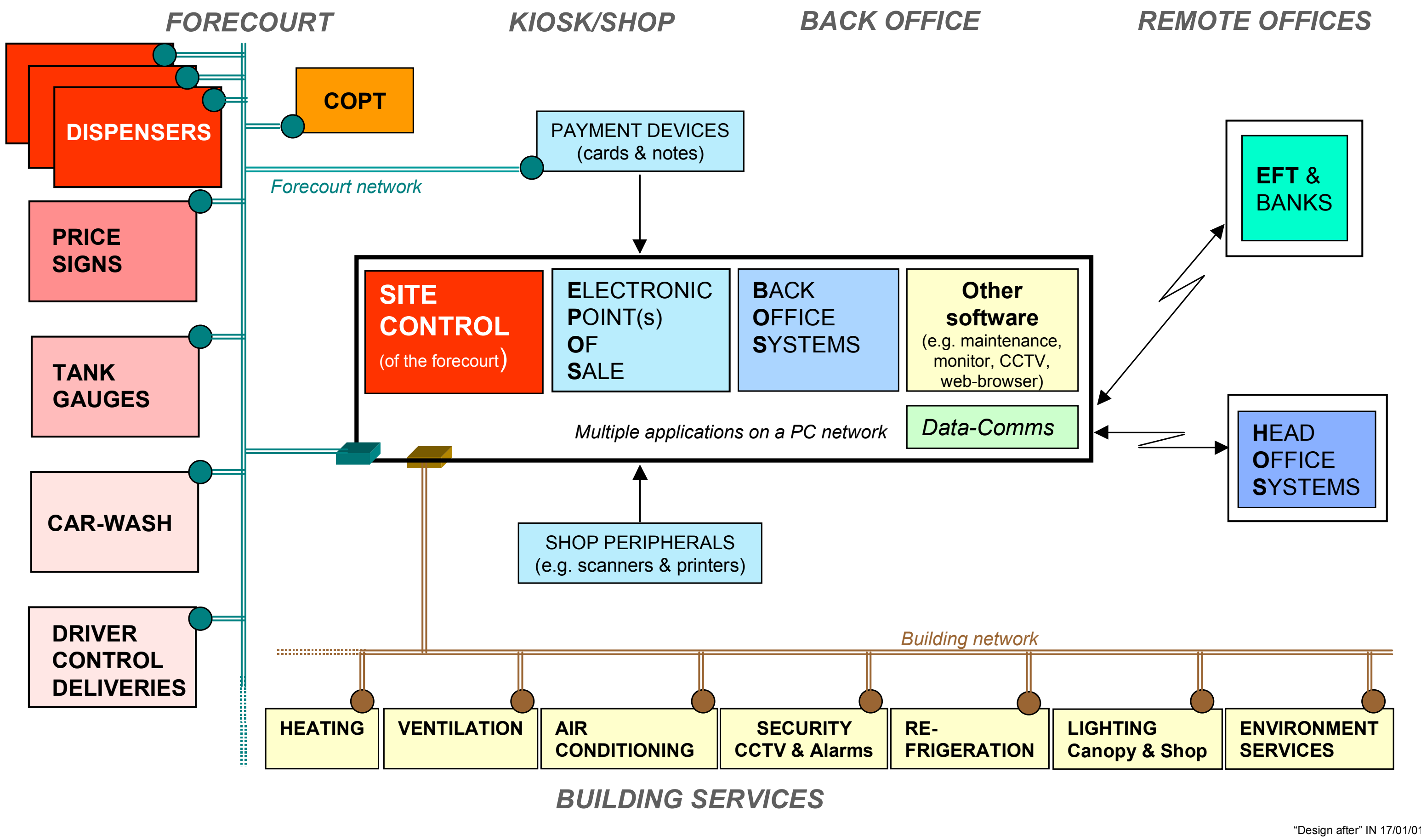

Figure 23 – IFSF site inter-connectivity

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10 THE PUBLISHED STANDARDS

10.1 Scope and Field of Application of the IFSF Protocols

The IFSF standards specify a common communications interface by which messages originated by one forecourt device can be exchanged with forecourt controllers, or other devices on the same network.

It publishes device application standards which specify the IFSF use of the 7 layer model of the 'Open System Interconnection / International Standards Organisation' ("OSI-ISO"), including message structures, formats, data elements and values.

It is beyond the scope of the IFSF to participate with company implementations, or to address the corporate systems between petroleum retailer company head offices & their retail outlets. However the published IFSF documents provide valuable guidance and experience ids exchanged.

10.2 Document Numbering

The standards are segregated into three 'Parts' :
Part 1 is for Management documents
Part 2 is for Communications Specifications
Part 3 is for the Device Application protocols

Within each Part, there are individual documents - (numbered serially – e.g. 00, 01, 02, 03,….15 etc.)
(e.g. Part 2.00 or Part 3.02)

Each Standard is controlled by Version and Release numbers
(e.g. Part 2.00 is at Version 1, Release 8; or Part 3.02 is at Version 1, Release 8)

A Version is an entirely re-worked standard, whereas a Release is an update or correction.
(e.g. Version 1, Release 3 progresses →1.4 →1.5, until a re-work becomes →2.0 →2.1 etc.)

The same numbering principles apply to the test-tools, and where possible a test-tool Version & Release number will match the standard to which it relates.

See also §6.10 'Change Control' for further explanations of compatibility policy between Releases.

10.3 The Documented Standards

Part 1.00 Management Introduction
Part 2.01 Communications over LONWorks
Part 2.02 Communications over TCP/IP
Part 3.01 Dispenser Application
Part 3.02 Price Pole Application
Part 3.03 Tank Level Gauge
Part 3.04 Car Wash
Part 3.04.1 Car Wash Overview
Part 3.05 Card Handling Devices and PIN-pad Application
Part 3.06 Magnetic Card Reader Application
Part 3.07 Bank Note Acceptor Application
Part 3.08 Printer Application
Part 3.09 Public Network Server Application
Part 3.10 Card Handling Server Overview and Application
Part 3.11 Delivery Control Application
Part 3.12 Network Configuration Manager Application
Part 3.13 Human Interface Device
Part 3.14 Environmental Monitoring Sensor Application
Part 3.15 Line Leak Detection Application
Part 3.16 Customer Operated Payment Terminal Application ("COPT")
Part 3.17 Code Generating Device Application
Part 3.18 POS to FEP Interface Specification
Part 3.19 POS to EPS Interface Specification
Part 3.20 HOST to HOST Interface Specification
Part 3.24 Code Entry Device Application

10.4 Engineering Bulletins

Engineering Bulletins are produced to provide extra information, explanation or advice. These can be seen on the web-site (www.IFSF.org).
The following are current examples: -

Engineering Bulletin 1 – 'Cables, cabling & connectors'
Engineering Bulletin 2 – 'Dispenser initialisation requirements'
Engineering Bulletin 3 – 'Handling of country codes'
Engineering Bulletin 4 – 'Handling backwards compatibility'

Engineering Bulletin 5 – 'Character and number representation'
Engineering Bulletin 6 – 'Inter-Connectivity Centre requirements'
Engineering Bulletin 7 – 'Dispenser CRC signature generation'
Engineering Bulletin 8 – 'Sub-net Addresses of IFSF devices'
Engineering Bulletin 9 – 'Route map to Plug 'n' Play'
Engineering Bulletin 10 – 'Drivers Software for IFSF Test Tools'
Engineering Bulletin 11 – 'Common Field Formats'
Engineering Bulletin 12 – 'Drivers for 32 Bit Test Engine'

10.5 Self-certification Test-Tools

Certification Test Engine
Dispenser Test Scripts

Human Interface Device Test Script
Price Pole Sign Test Scripts
Tank Level Test Scripts
Car Wash Test Scripts
Code Entry Device Test Scripts
Code Generating Device Test Scripts

10.6 Other software tools

Forecourt Devices Simulator
Card Handling Device sample applications

10.7 Other documents related to IFSF activities

ARTS Forecourt Extensions
IFSF Technical Workshop January 2004 - Presentations

11 GLOSSARY OF TERMS

	EXPLANATIONS
Application	Any set of computer code, or program, which performs a recognisable activity, e.g. calculates a price, transfers tank gauge readings.
AO	Affiliated Organisation – an organisation which has a beneficial relationship with the IFSF and has been invited to be an Affiliated Organisation.
ARTS	The Association for Retail Technology Standards is a retailer-driven organisation dedicated to creating an international, barrier-free technology environment for retailers. It is supervised by the NRF. www.nrf-arts.org
ATG	Automated Tank Gauge – a device which incorporates all equipment necessary to record & interpolate contents of fuel storage tanks, in response to a system request.
Backwards compatibility	The design considerations which determine how new devices can inter-operate in a service station architecture built to earlier principles. See 'Migration'
BMS	Building Management Services – the global term for all systems and devices which concern the equipment and facilities in a building (e.g. lighting or fire-alarms).
BOS	Back Office Systems – a term to describe the systems, normally on a PC, which for the business data-processing applications of a service station, other than the Point of Sale.
CCTV	Closed Circuit Television – used to monitor activities on a service station.
CECOD	Comité de Fabricants Européens d'Installation et de Distribution de Pétrole – the European dispenser manufacturers' organisation. http://www.syndicat-mesure.fr/cAccueil.htm
Company limited by guarantee	A company limited by guarantee is an alternative type of incorporation used primarily for non-profit organisations that require corporate status. A guarantee company does not have a share capital, but has members who are guarantors instead of shareholders.
Controller	Device to manage multiple activities between hardware or software devices.
Converter	Device to change the data-format from one protocol to another e.g. IFSF to proprietary.
COPT	Customer Operated Payment Terminal – a normally a configuration of devices (e.g. PIN-pad, card-reader, slip printer etc.) to enable a customer refuel a vehicle and pay for the transaction at the dispenser.
Dispenser	Otherwise known as a "petrol pump". i.e. a device to refuel vehicles.
Echelon	Echelon Corporation – the USA-based company which provides the LONWORKS® world-wide standard for networking controls. www.echelon.com
EEIG	European Economic Interest Grouping – a legal status available to non-profit-making organisation, with members who are based in different national legal systems.
EMV	Europay/Mastercard/Visa International - the main standards body for payment cards.
EPoS	Electronic Point of Sale – the systems device for processing customer sales transactions.
EPSI	European Petrol Station Interface – produced by the German Federal Institute of Physics and Metrology (Physikalisch-Technische Bundesanstalt) as an independent forecourt standard. http://epsi.berlin.ptb.de
EU	European Union – the political organisation combining the major countries of Europe.
IFSF	International Forecourts Standards Forum – see this document. www.IFSF.org
IXRetail	The ARTS and ActiveStore project to create XML tags for the ARTS Data-base
ISO	The International Organisation for Standardisation is a world-wide federation of national standards bodies established to create international agreements which are published as International Standards. www.ISO.ch
LON, LonWorks	Both terms refer to the LONWORKS® world-wide standard for networking controls, produced by the Echelon Corporation – see Echelon above.
LonTalk	This is the communications protocol used over LonWorks networks.
Migration	Equipment migration is the updating of the devices on a service station to more modern devices, different design generations or software versions. See 'Backwards Compatibility'
NACS	National Association of Convenience Stores – the leading retail industry trade association for convenience stores and petrol forecourts, based in America www.cstorecentral.com

NIC	Network Interface Card – installed in a PC as part of the physical connection in TCP/IP.
NRF	National Retail Federation – the leading all retail industry trade association, based in America www.nrf-arts.org Responsible for ARTS (qv)
OPOS	Open Point of Sale is a standard programming interface definition for point of sale peripheral devices. The standard was initiated by four major retail industry vendors: Epson, ICL Retail Systems, Microsoft and NCR, with world-wide support.
OSI	OSI Certified is a certification mark for software that conforms to the Open Source Definition. http://www.opensource.org
PCATS	Petroleum Convenience Alliance for Technology Standards, Inc.
Price Sign	Device which displays prices, normally on a pole indicating the price for each fuel grade.
Protocol	An agreed format for transmitting data between two devices, which determines the type of error checking, data compression, sending and receiving of a message.
PTB	Physikalisch-Technische Bundesanstalt - the German Federal Institute of Physics and Metrology and the developers of EPSI http://www.ptb.de
RIP	Registered Interested Party – this scheme preceded the Technical Interested Parties.
SI	Systems Integrator – an organisation which provides development and installation services in this technology.
TA	Technical Associate – an organisation (e.g. manufacturer) who joins the IFSF Technical Interested Parties scheme to co-operate in the development and maintenance of standards.
TC	Technical Correspondent – an organisation that has joined the IFSF Technical Interested Parties scheme to be kept informed of IFSF standards activities.
TCP/IP	Transmission Control Protocol/Internet Protocol - the suite of communications protocols used to connect hosts on the Internet. The two main ones being TCP and IP.
TIP	Technical Interested Party – a scheme open to organisations which apply to the IFSF indicating interest in the standards and join as an Technical Associate or Corespondent.
TWP	Technical Working Party – the groups of oil companies and Technical Associates who work together on a technical standard approved by the Forum.
UPOS	Unified Point of Sale is a retailer-driven initiative to combine two existing device interface standards (POS & OPOS) under one specification for Point of Service devices. http://www.nrf-arts.org/UnifiedPOS
UPS	An Uninterruptible Power Supply is a piece of equipment which provides sufficient power to maintain temporary service to a system in the event of a power failure.
Weights and Measures	A term, used generically in this document, to cover the various national regulatory bodies concerned with trading standards, and safety, of any equipment and systems involved in the sale of measurable commodities (e.g. fuel).

DOCUMENT CONTROL

This version 3.01 December 2003 has been adapted and updated from previous releases by Officers of the IFSF.

This document can be downloaded from the IFSF web-site (www.IFSF.org) in Adobe PDF format.

Member petroleum retail companies may obtain soft-file copies in Microsoft Office 97 from the IFSF Administrator (admin.manager@IFSF.org).

A CD is available containing this report and all the diagrams in this report are all available in Microsoft Powerpoint.

Version 2.02 – October 2002

Minor changes to update the address and telephone numbers for IFSF Technical Services.

Version 2.03 – February 2003

Minor changes to update the Members list.

Version 3.01 – December 2003

Major revision to reflect changes to legal status of IFSF

END