

# IFSF in China

## The Standard for Petrol Forecourts

*Ian NAYLER*

*Beijing, April 2007*

## INTRODUCTIONS

### **Ian NAYLER**

I am an independent systems management consultant.

Specialise in the oil, retail and payments industries.

Formerly head of IT, including retail automation, for Fina (now part of Total)

A founder member of IFSF and President 1996-1999

### **Echelon**

Echelon are the originators of LonWorks technology.

LonWorks is the communications platform selected for IFSF by equipment manufacturers

IFSF is grateful to Echelon China for their help in arranging these visits.

### **IBM**

IBM have been involved with IFSF since the origins.

They have IFSF products installed in Europe.

Consultants from China were trained at IFSF Technical Support Centre (UK) in March

## AGENDA

- Introductions
- IFSF
  - mission
  - membership and participation
  - challenges → ambition → success
- IFSF
  - technical overview
  - design specifics
  - site reliability
  - legacy conversion
  - forecourt controllers and protocol converters
  - card payments
  - TCP/IP and LonWorks
- IFSF for China
  - assistance for developers
  - IFSF Desktop Proof of Concept
  - IFSF Technical Support Centre - Europe
  - IFSF Technical Contact Centre - China
  - [www.IFSF.org](http://www.IFSF.org)
  - participation in China
- Question time

## IFSF - MISSION

### **Mission**

The IFSF is a forum of international petroleum retailers with the common objective of achieving interoperability of forecourt equipment through open standards.

- *Defined by the Industry*
- *For use by all the Industry*
- *To reduce Costs for all.*

### **The Standard for Forecourt Connectivity**

**I**nternational - global, not just USA and Europe  
**F**orecourts - only the site based equipment,  
**S**tandards - for a systems architecture, not products  
**F**orum - always in discussion with the industry.

## IFSF - MEMBER OIL COMPANIES



Oil companies participate at a technical level, but do not share commercial data.

***IFSF would be even stronger if more oil companies joined e.g. Chinese Nationals***

## IFSF - PARTICIPATION

**Member Oil Companies** - own the IFSF standards, provide the formal management, share the majority of the costs, and establish policy and direction.

Members must be petroleum retailers but the constitution facilitates regional membership (e.g. Asia, Africa, China).

**Technical Affiliates** - by invitation e.g. some industry bodies CECOD, PCATS, NACS

### **Technical Correspondents**

Any organisation can sign up to receive documents and information.



### **Technical Associates**

An organisation must become a Technical Associate to fully participate.



For example -

- input to the development of new standards and request changes
- to attend IFSF technical workshops where experience is exchanged with others
- to receive technical advice, guidance and training on the standards
- to use IFSF test tools, simulators, sample code to aid developments
- use test scripts and tools to certify **products** are '**IFSF Approved**'
- use Inter-Operability Centre to prove devices interoperate.



## FORECOURT CHALLENGES

### The petrol forecourt is a complex systems environment :

1. There is continual site development
  - but equipment has long life so it is inevitable that any network will have a mixture of equipment, types, models, and ages.
2. New demands in a changing world
  - for example - requirement for central information, like SAP
  - increased control and legislation, e.g. wet stock control
  - introduction of shops, needs POS
  - payment by cards, requires terminals and systems
  - site expansion, needs extra devices like price signs
3. Using many suppliers needs new interfaces to be developed
  - which means cost and delays.
4. All **oil companies** want to be free to chose best suppliers
  - without considering the already installed equipment
  - to keep service levels high and operating costs low.
5. What the **suppliers** want is simplicity
  - so just one interface to build, test, support and maintain.

## IFSF - STANDARDS

### **IFSF Standards provide :**

- An agreed infrastructure, architecture and equipment standards to achieve this
- These aim to be:
  - multi-device
  - multi-vendor
  - multi-purpose
  - multi-national

### ***Important***

There is no licence fee nor payment due to IFSF for use of the standards.

IFSF only establishes standards so it has no products to sell



## IFSF - SUCCESS TODAY

All IFSF member companies, and some other companies, are installing IFSF devices as their preferred option.

IFSF member companies declared 9,500 sites installed, but suppliers know of 16,000.

IFSF member companies have installed IFSF equipment in 27 European countries, and more than 7 countries in Rest of World (inc. USA & China).

IFSF member companies have been able to introduce new functionality faster.

IFSF member company(s) have seen site reliability increase by up to 2.5%.

IFSF member company(s) reported significant capital equipment cost reductions.

More than 17 forecourt equipment suppliers have IFSF certified products available.

IFSF suppliers report benefits by reduced interfaces to manage, and are often providing IFSF interfaces as their normal option.

# IFSF - TECHNICAL OVERVIEW

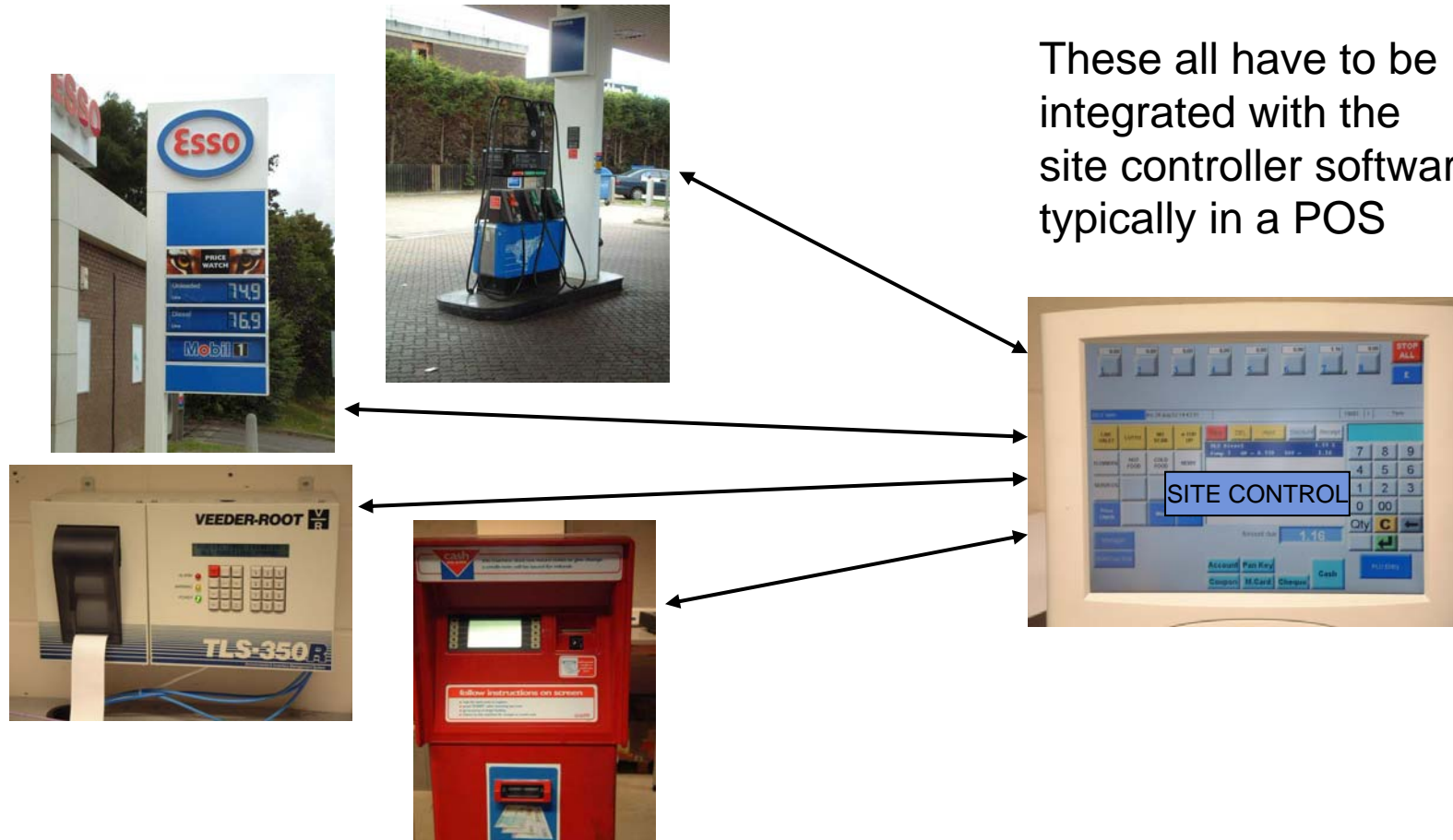


iners Club  
international

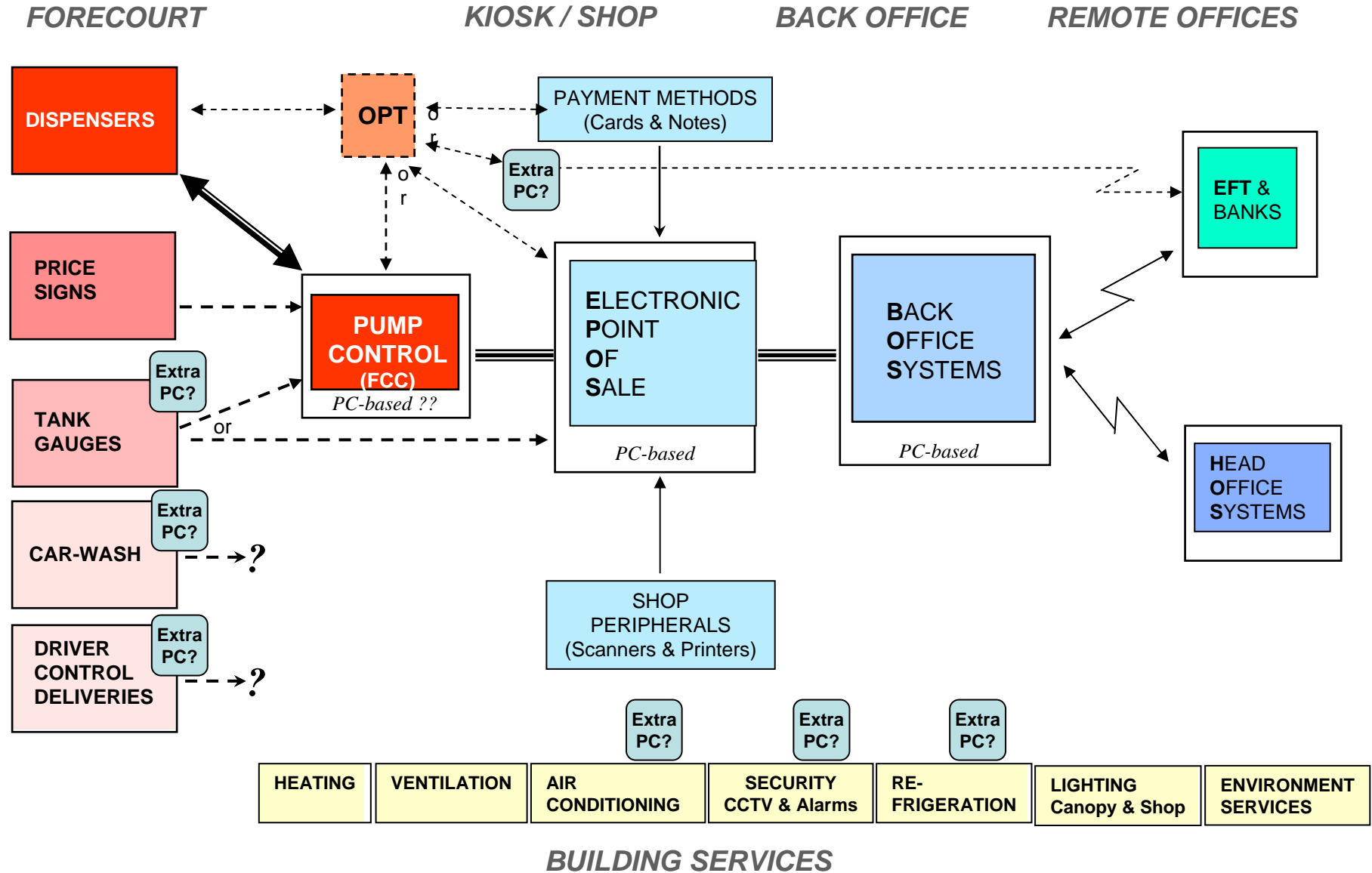


# DEVICE INTEGRATION

A forecourt is a complex environment with many different devices



# SERVICE STATION - TRADITIONAL ARCHITECTURE



## SERVICE STATION - TRADITIONAL ARCHITECTURE

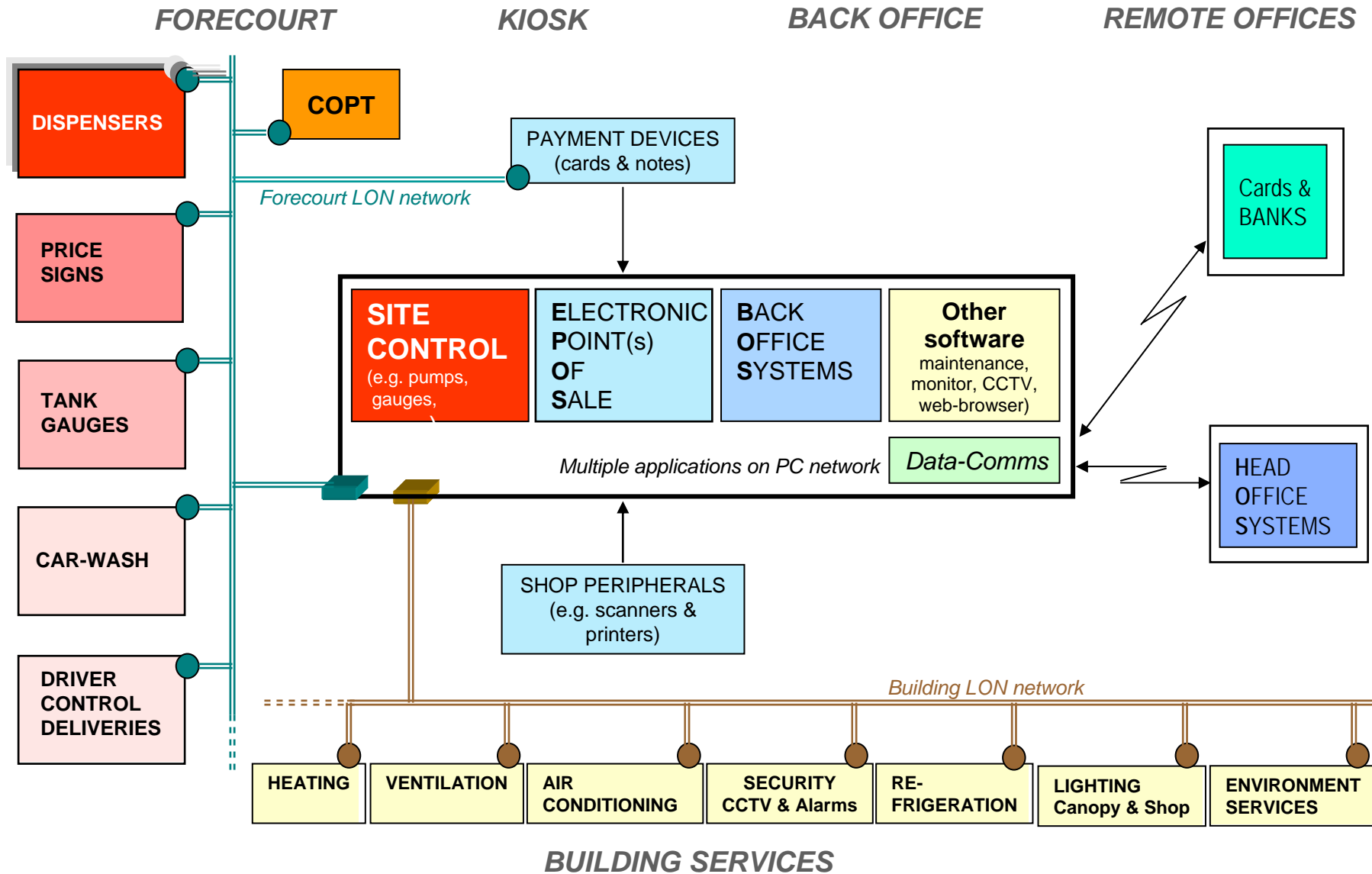
### ***BY DESIGN***

- Choice limited to existing vendors, products & markets
- Extra devices are costly to integrate
- Little interaction between data-systems
- Unnecessary connections & processors = cost
- Many single points of failure - especially the Forecourt Controller
- Different system designs for station sizes

### ***CONSEQUENCES***

- *High cost of procurement because of restricted vendor choice*
- *Costly, and potentially less reliable operation*
- *Low resilience and higher site non-trading hours*
- *Slow to change & meet marketing requirements (e.g. shops)*
- *No building services opportunity*

# SERVICE STATION - IFSF CONCEPTS



## SERVICE STATION - IFSF CONCEPTS

### **BY DESIGN**

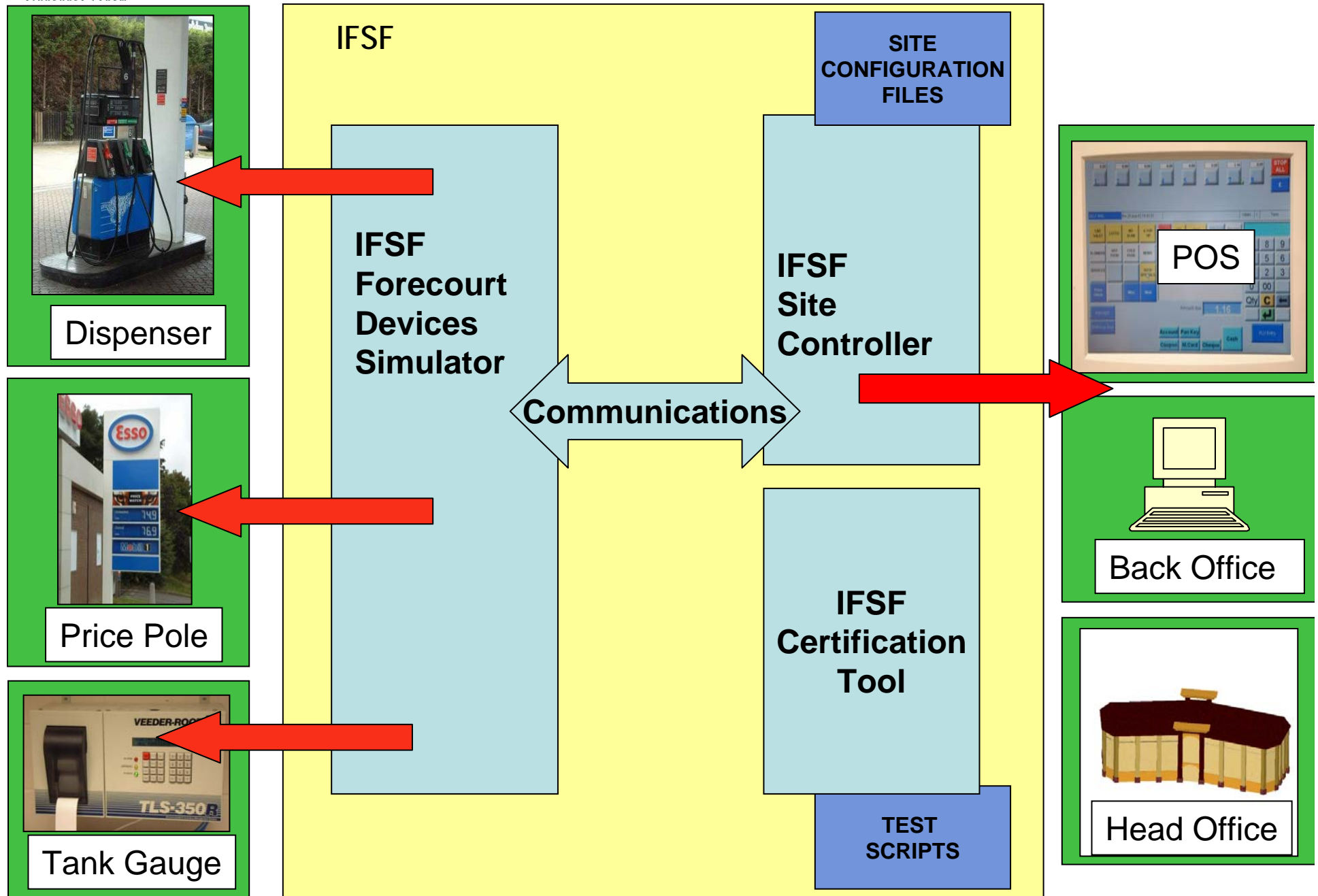
- Wider choice of vendors possible, across geography and device ranges
- Easier to add devices & functions without replacement
- All systems can share data
- Less duplication & redundancy
- Same architecture for any size station

### **CONSEQUENCES**

- *Better prices for all equipment*
- *Can avoid replacing existing devices if work OK*
- *Scaleable for station sizes*
- *Lower operational costs*
- *Greater resilience and less non-trading time*
- *Faster adoption of new marketing needs*
- *Building services opportunities*



# SERVICE STATION - IFSF CONCEPTS





# IFSF STANDARDS & PUBLICATIONS

## **Communications**

IFSF Comms over LonWorks

IFSF Comms over TCP-IP

## **Devices**

IFSF Dispenser Application

IFSF Price Pole Application

IFSF Tank Level Gauge application

IFSF Car Wash Application

IFSF Delivery Control Application

IFSF Human Interface Device

IFSF Environment Monitoring Sensor Application

IFSF Customer Operated Payment Terminal Guideline

IFSF Customer Operated Payment Terminal Application

IFSF Code Generating Device - CODEC

IFSF Controller Device Application

## **Payments**

IFSF EPS to POS interface

IFSF PIN-pad Application

IFSF Magnetic card handling specification

IFSF Bank Note Acceptor application

IFSF Card Voucher Receipt Printer application

IFSF Card Handling server application

## **Implementation**

IFSF POS to EPS Implementation Guidelines

IFSF Engineering Bulletin - Cables

IFSF Engineering Bulletin - Backward compatibility

IFSF Engineering Bulletin - Plug and Play

IFSF Engineering Bulletin - Site Common Configuration XML

IFSF Network Configuration Application

## **Management**

IFSF - BUSINESS CASE version 1-40

IFSF MANAGEMENT INTRODUCTION - V3.01

## **Other Standards**

IFSF draw on PCATS (was NACS) in USA.

& use NRF IXRetail Data Dictionary

& use IXRetail schemas

## **More ...**

IFSF Site Configuration application

New standards under development or consideration.

# IFSF APPLICATION MODEL

## OSI - ISO 7 Layer Model

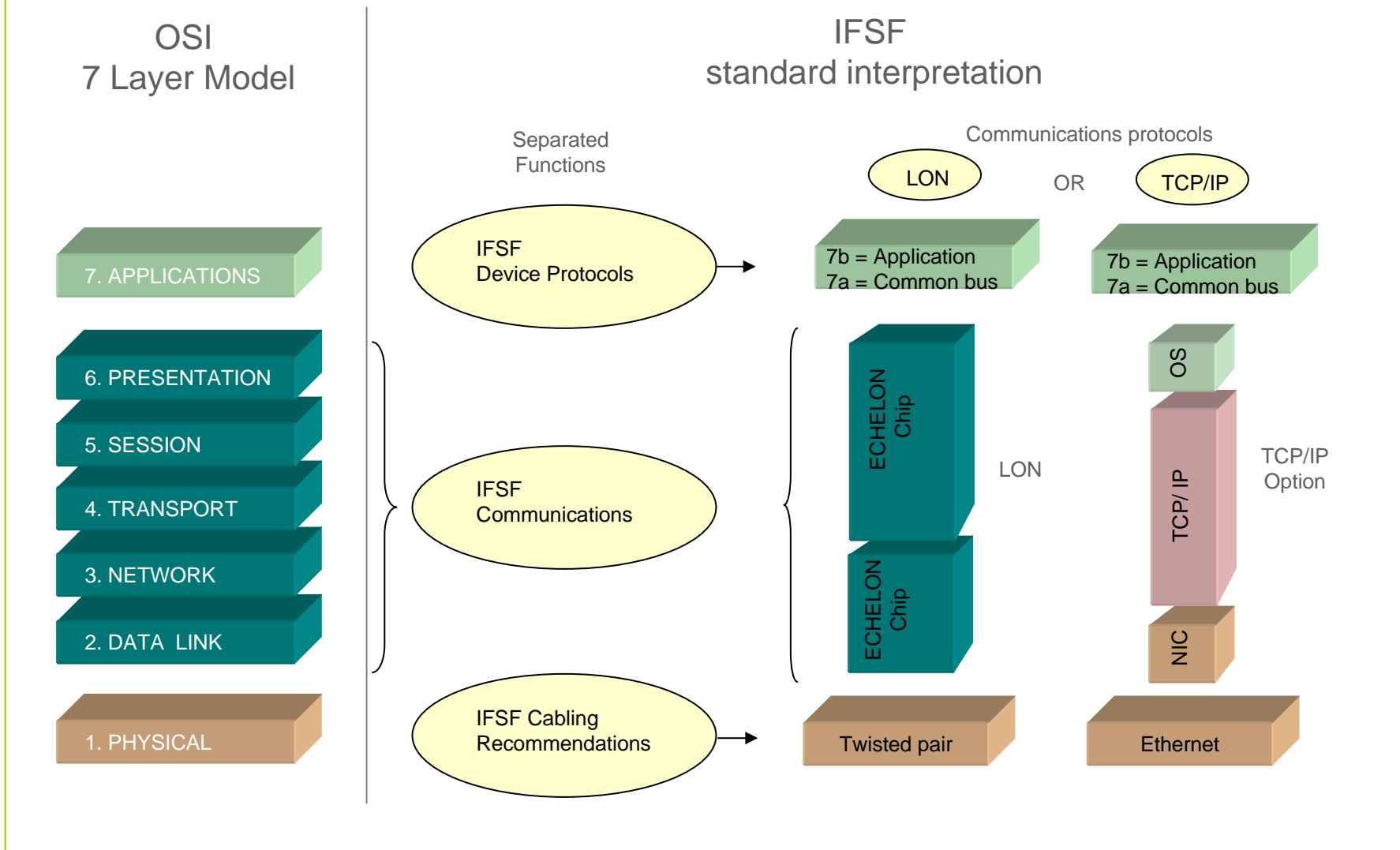
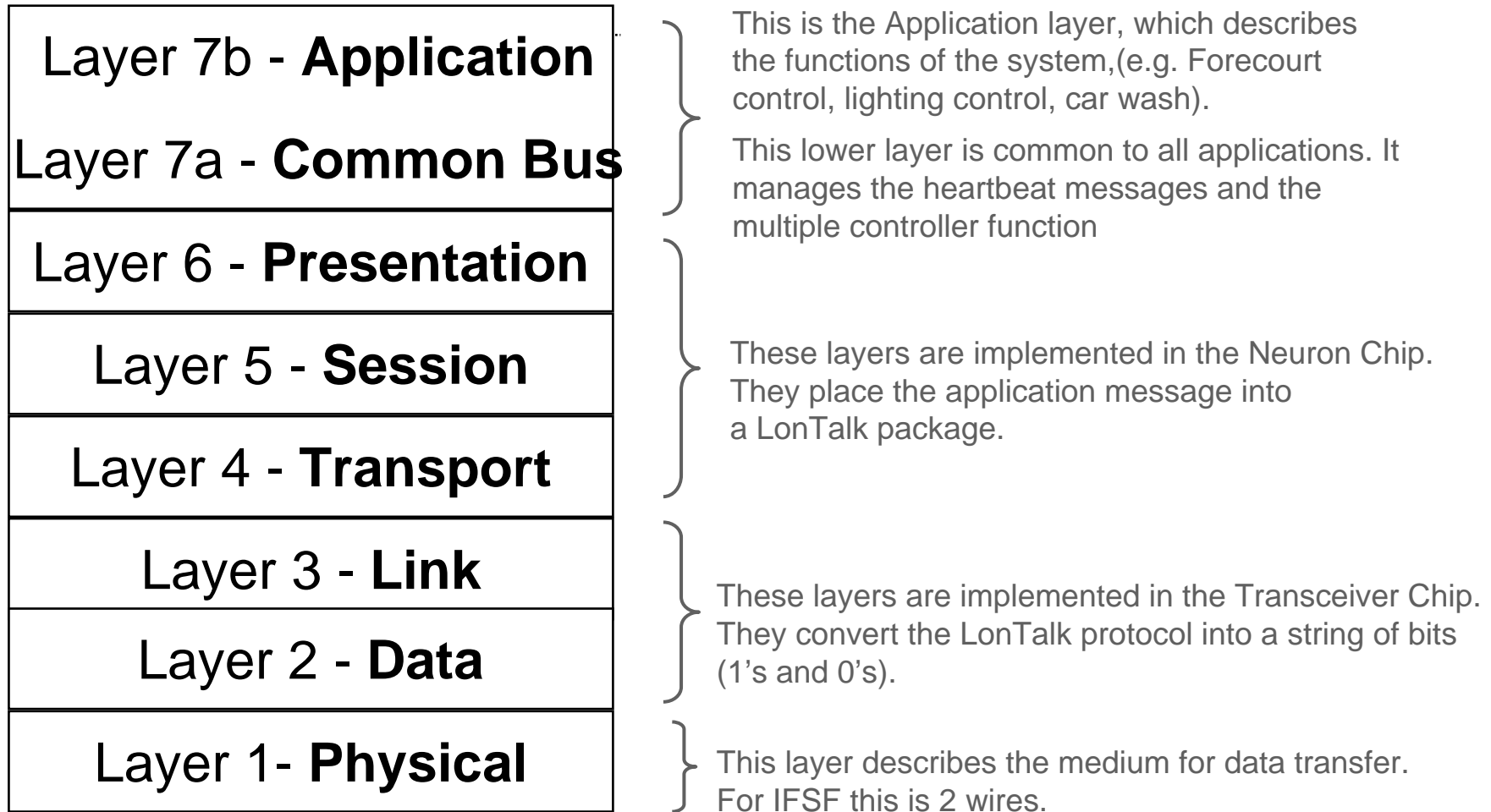


Figure 7 the IFSF implementation of the OSI-ISO seven-layer model

## ISO-OSI seven layer model - LonWorks



Note: Layer 7 is implemented in a Memory chip and contains the Application program and the IFSF databases

Figure 8 - a detailed diagram of the IFSF interpretation of the ISO-OSI seven layer model

## A LON circuit board

Neuron Chip (Layers 4-6)

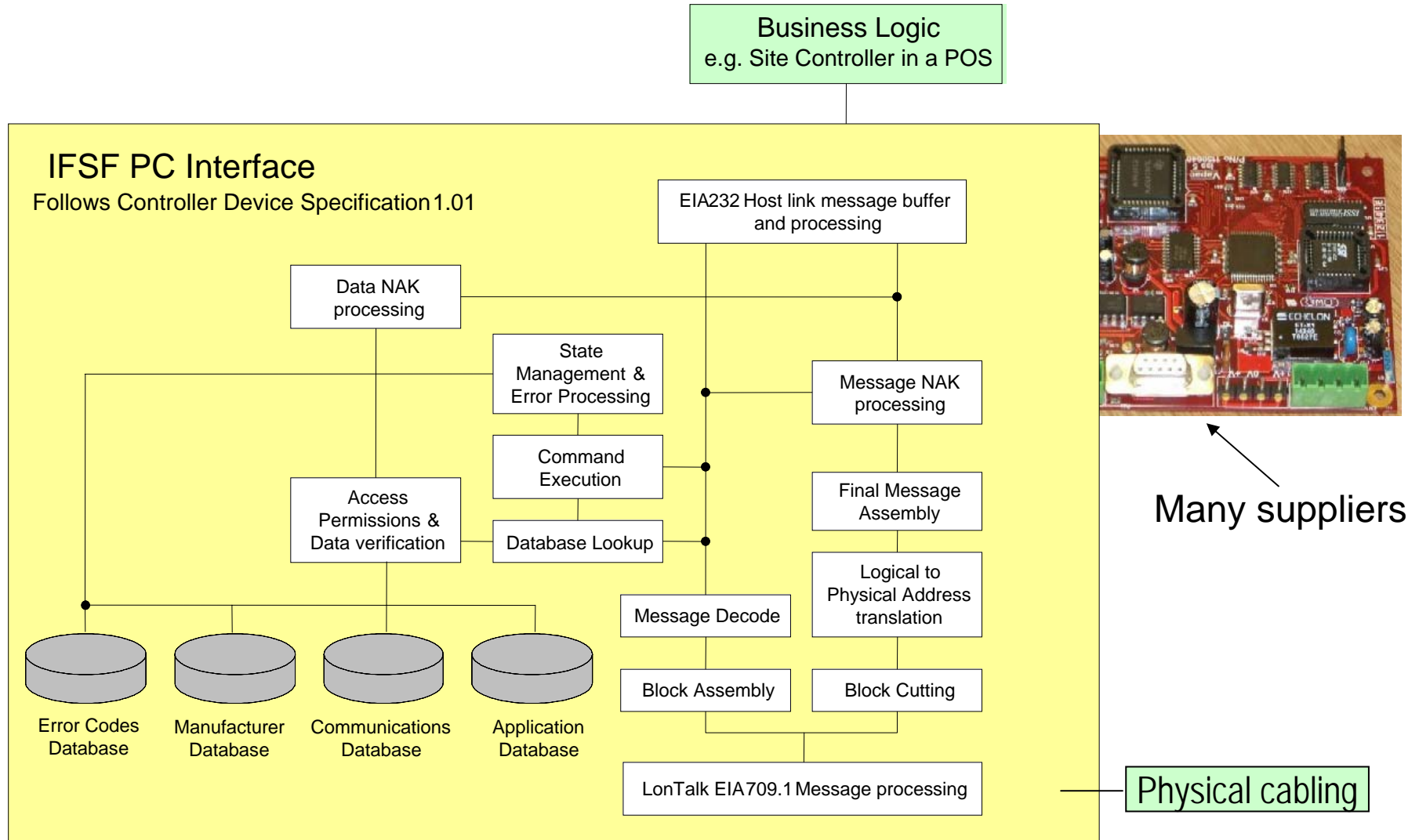
Transceiver (Layers 2-3)



2-wire physical connector (to Layer 1)

Figure 9 - photograph on a LON board showing the components

# IFSF CONTROLLER BLOCK DIAGRAM



## IFSF PROTOCOL DESIGN PRINCIPLES

- ◆ Peer to peer addressing mechanism
- ◆ FT10 transceiver allows Free Topology - bus, loop, star, or mixture
- ◆ Cable types - use almost any & even works on sub-standard sites (also wifi etc).
- ◆ Defined behavioral state diagram for each device type (see later slide)
- ◆ Device heartbeats (normally 10 seconds)
- ◆ Event driven - *not* polling, and is bandwidth efficient
- ◆ Only 5 message types - Read-Answer pair, Write-Acknowledge pair, Unsolicited
- ◆ 64 devices per physical channel - or more
- ◆ IFSF can support 127 devices of same type (i.e. dispensers)
- ◆ Standards based
  - EIA 709.1 LonTalk Protocol (in China GB/Z-20177.1)
  - EIA852 LonTalk tunneling over IP (in China GB/Z-20177.4) .....

# IFSF DEFINED STATE DIAGRAMS

## Example - Dispenser

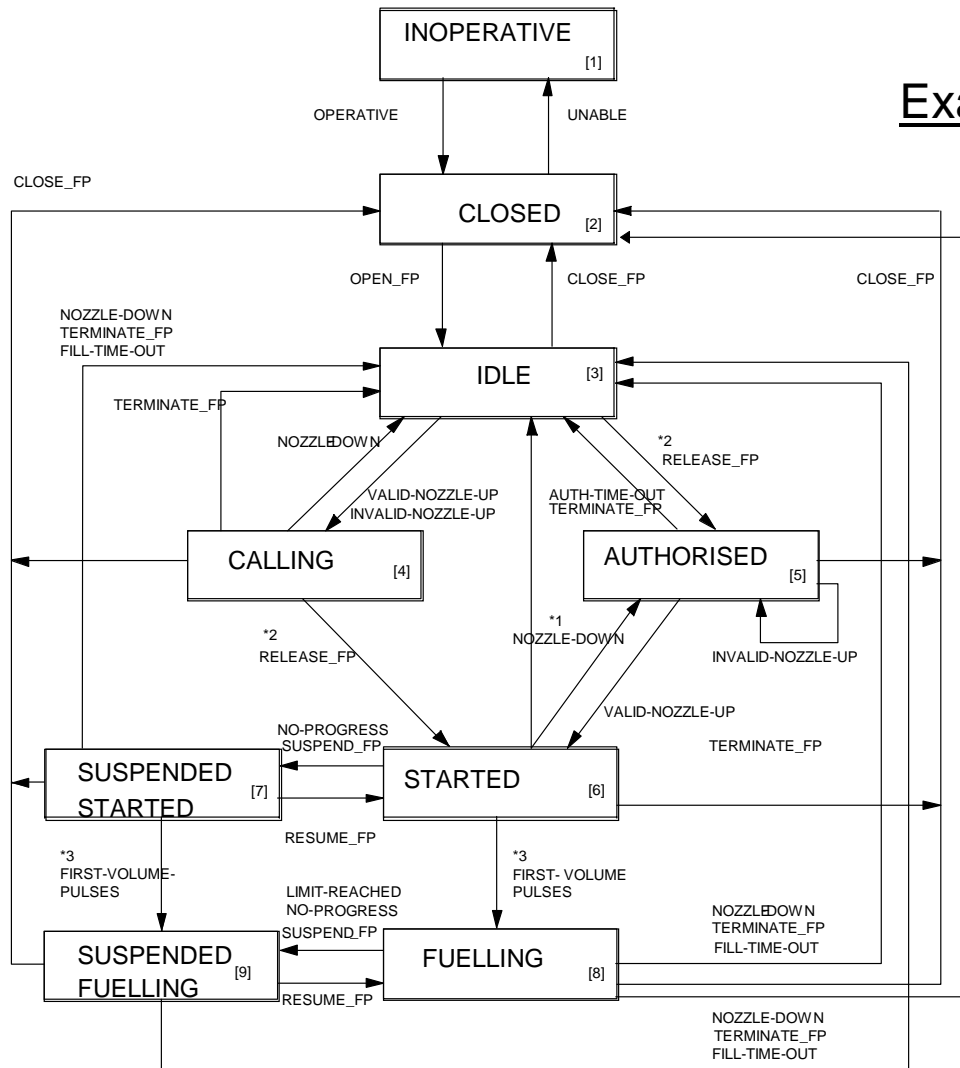


Figure 3

\*1 "NOZZLE-DOWN" moves only to state AUTHORISED if the state AUTHORISED is allowed (by configuration), else it moves to state IDLE

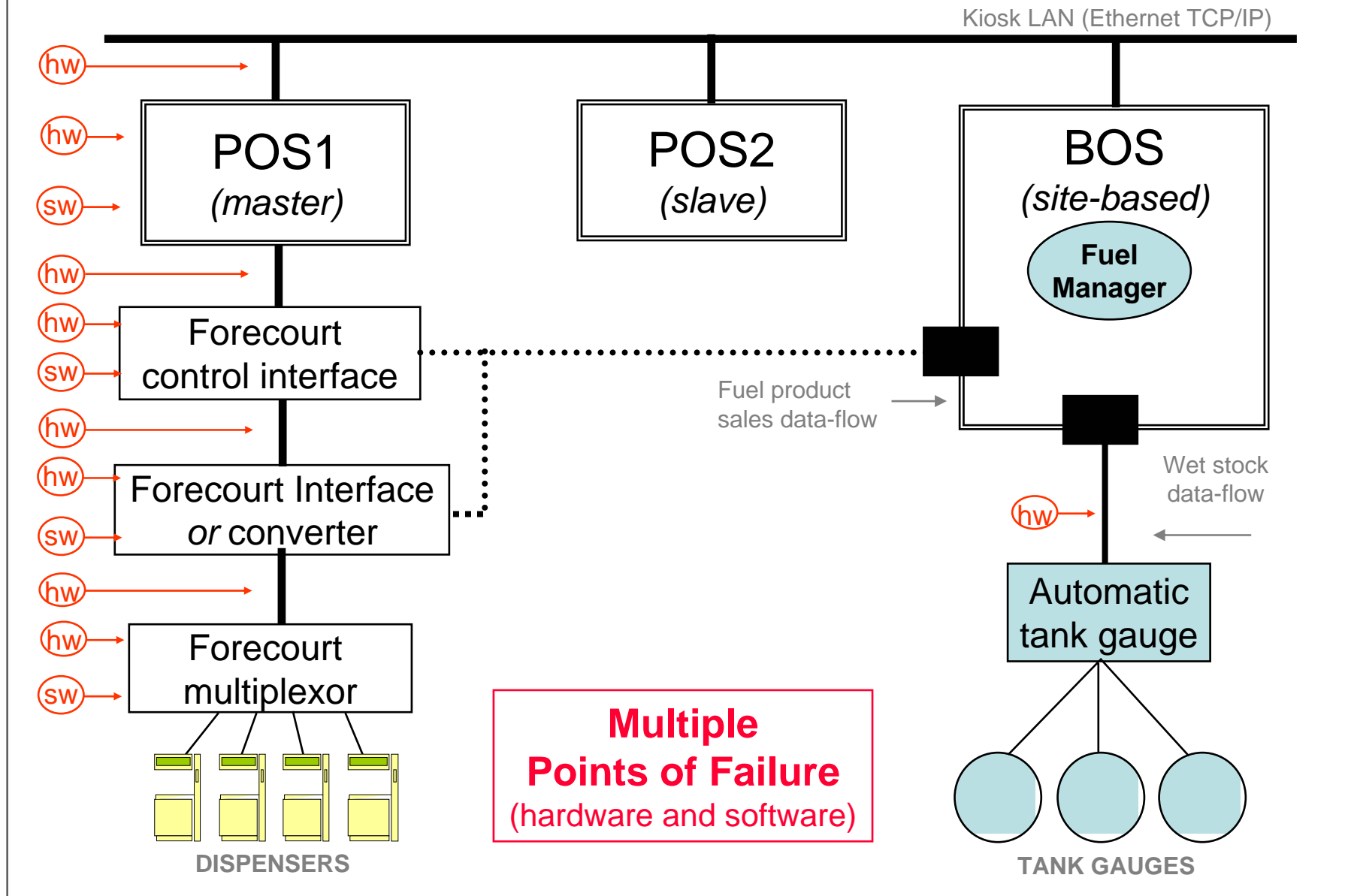
NB. NO-PROGRESS TIME-OUT is less than FILL-TIME-OUT

\*2 The event RELEASE\_FP is only accepted if a transaction is available

\*3 Defined number of pulses from where a started fuelling transaction starts. The number of pulses is defined by the configuration.

# SITE RELIABILITY

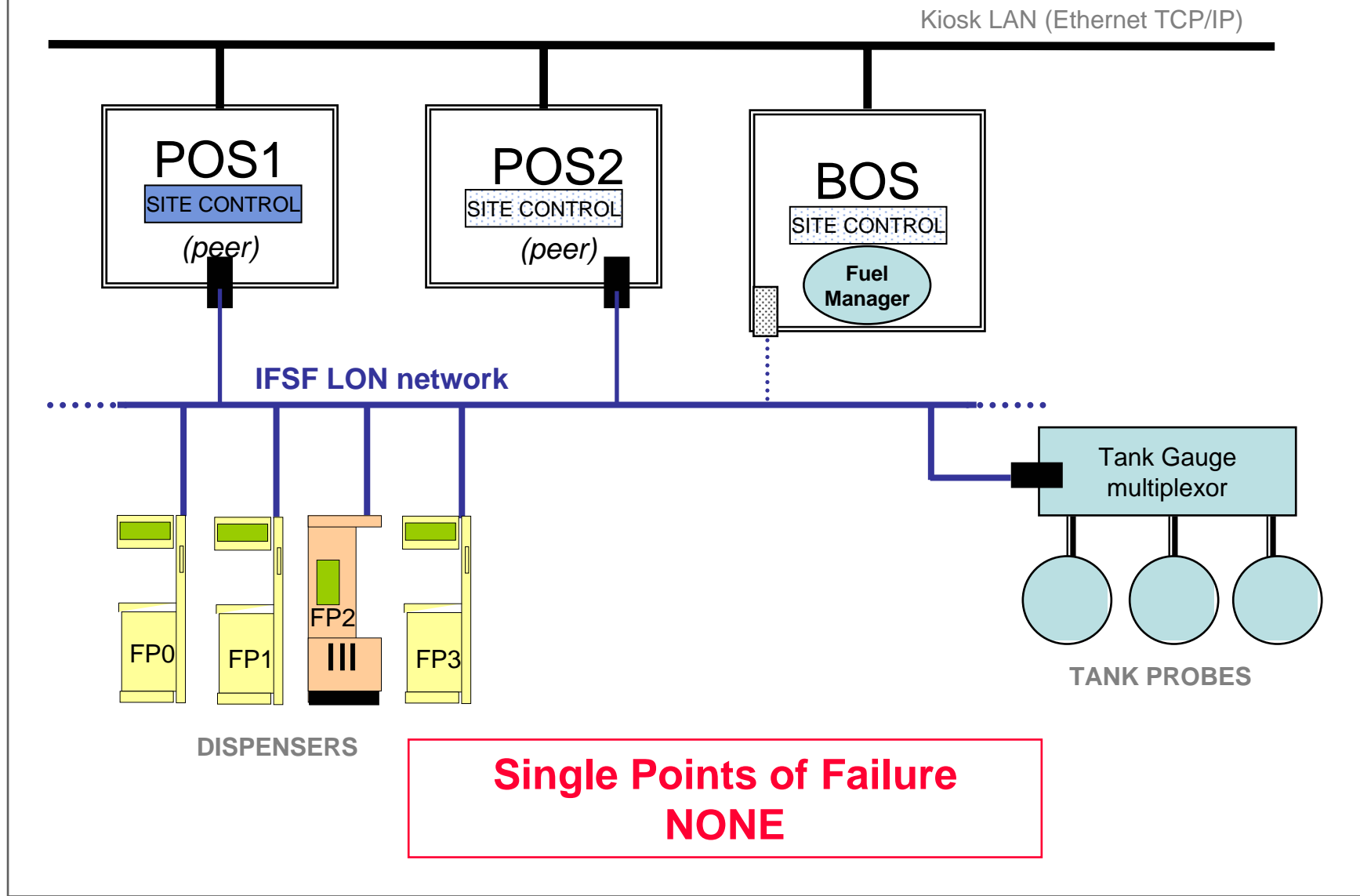
## Typical Non-IFSF Site





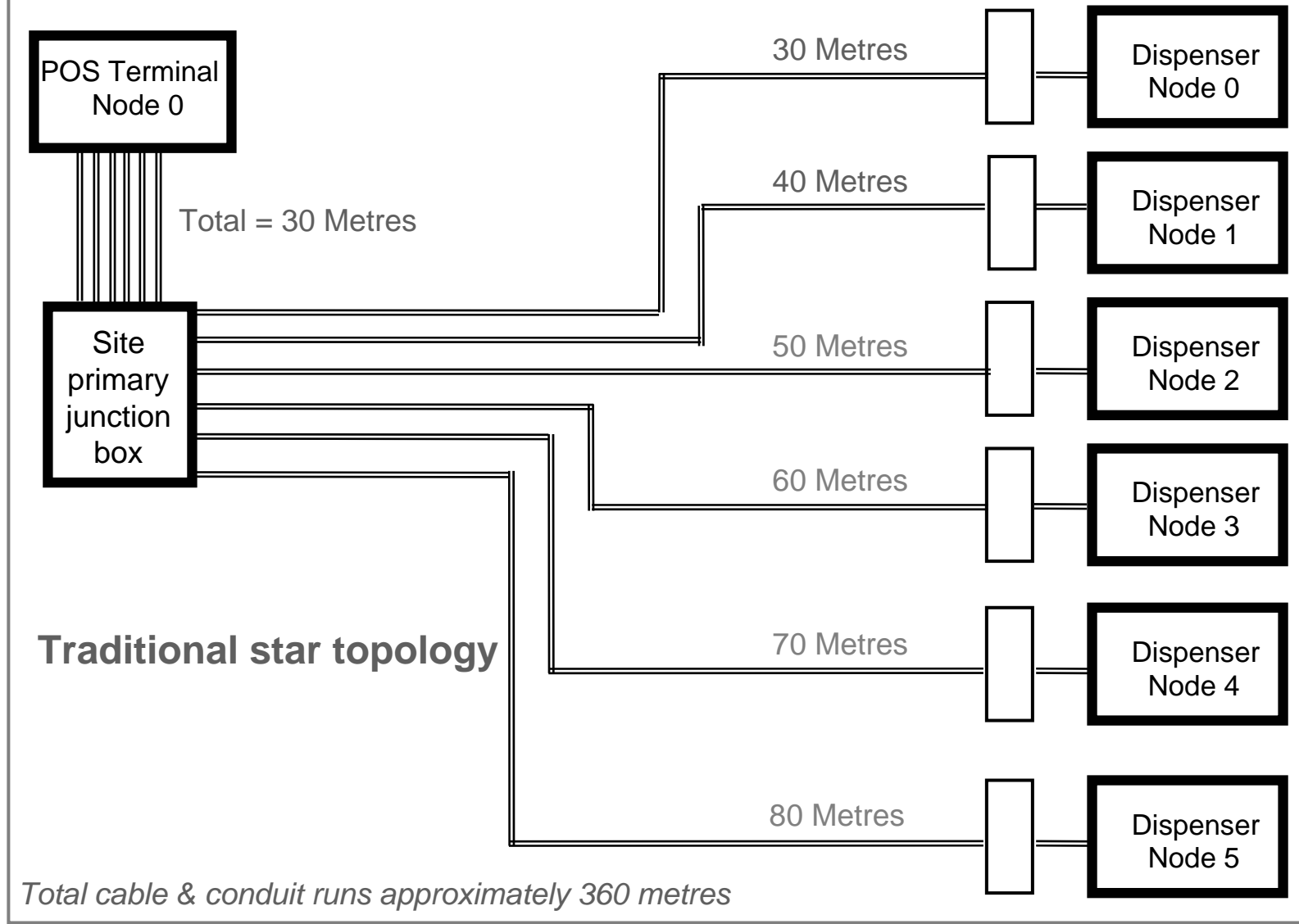
# SITE RELIABILITY

## IFSF Site Architecture



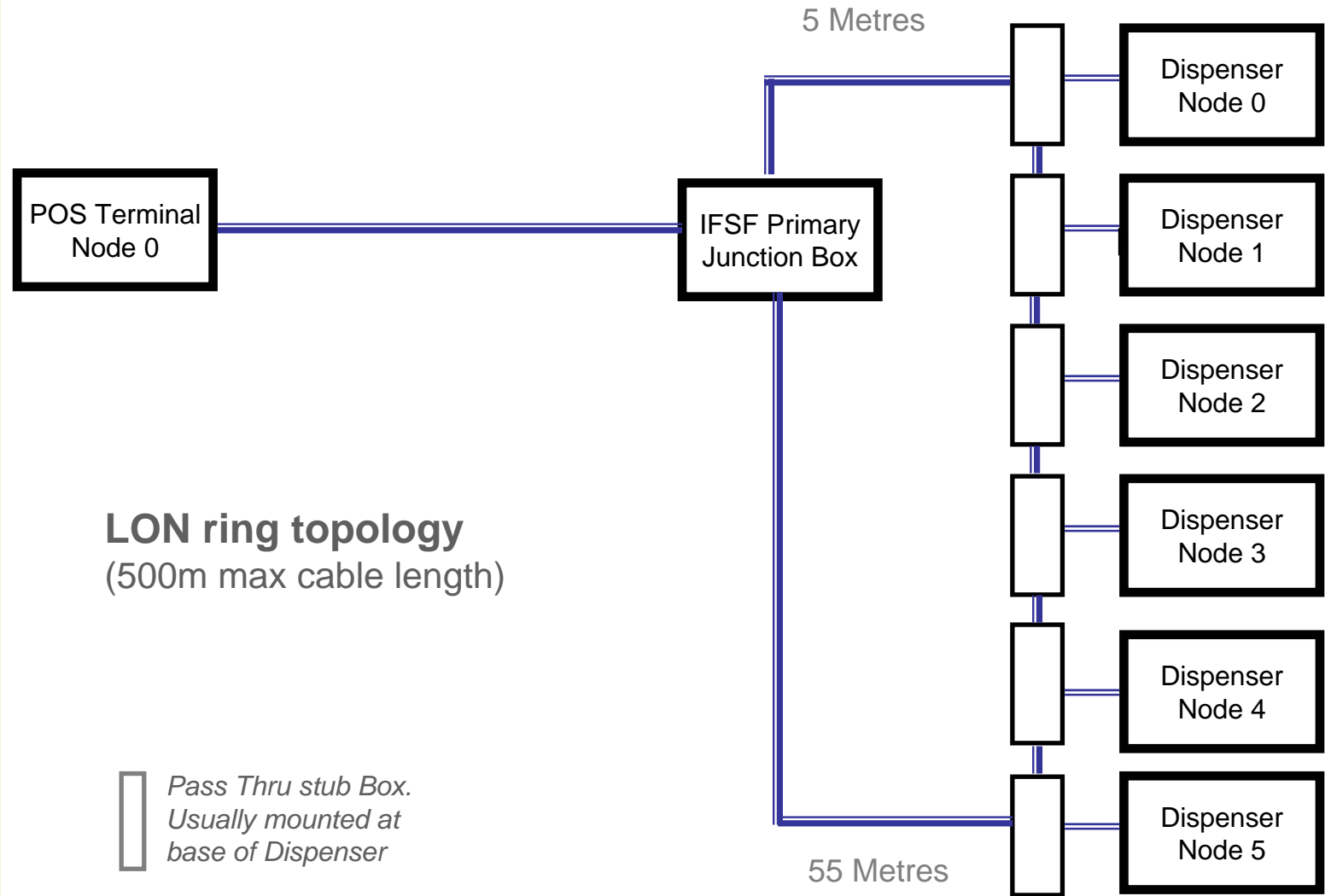
# SITE CABLING

## Typical non-IFSF Site Cable Topology



# SITE CABLING

## Typical IFSF Site Cable Topology

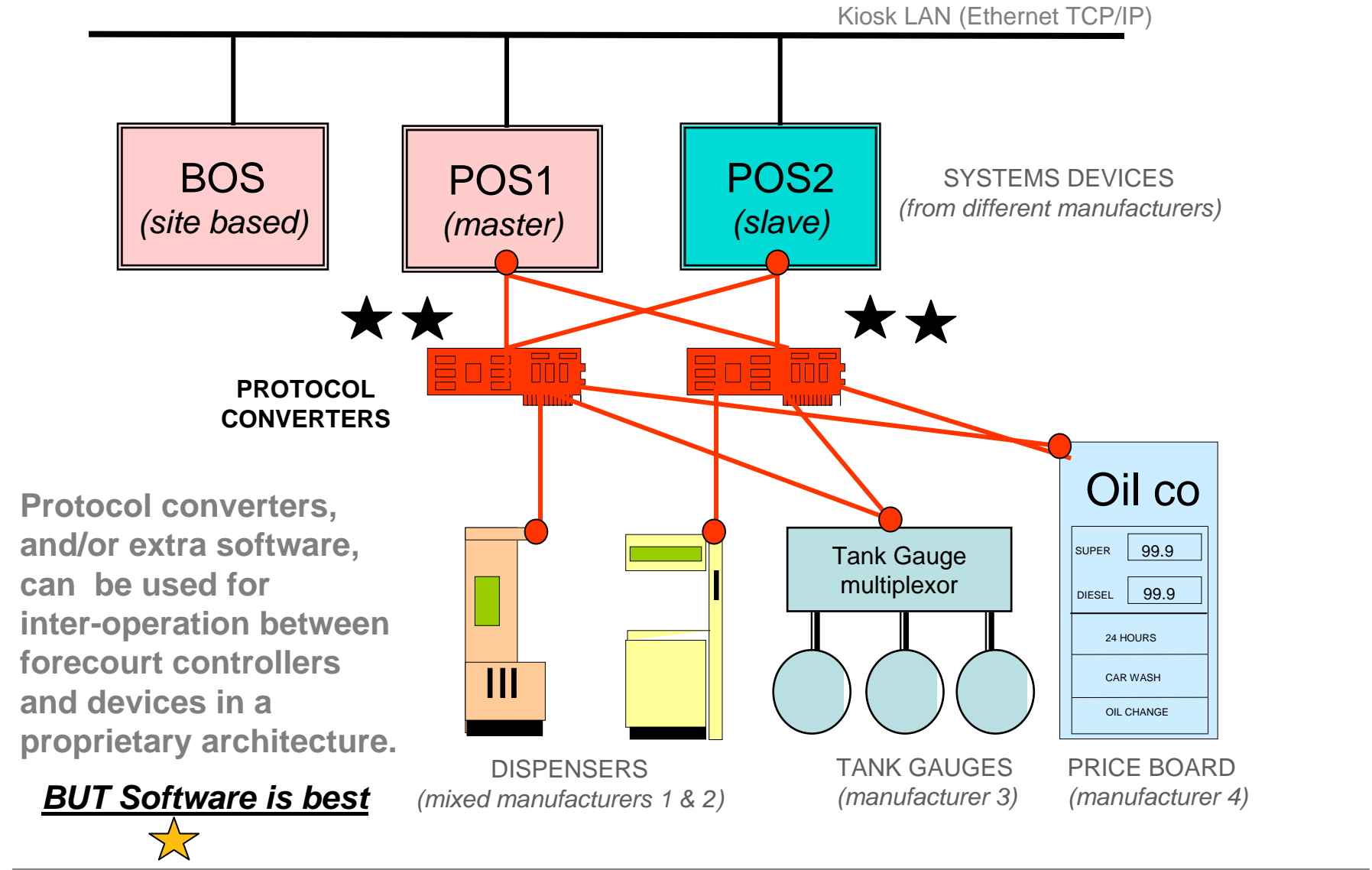


*Total cable & conduit runs approximately 85 metres (compared to 360 metres on previous slide)*

**LEGACY CONVERSION**

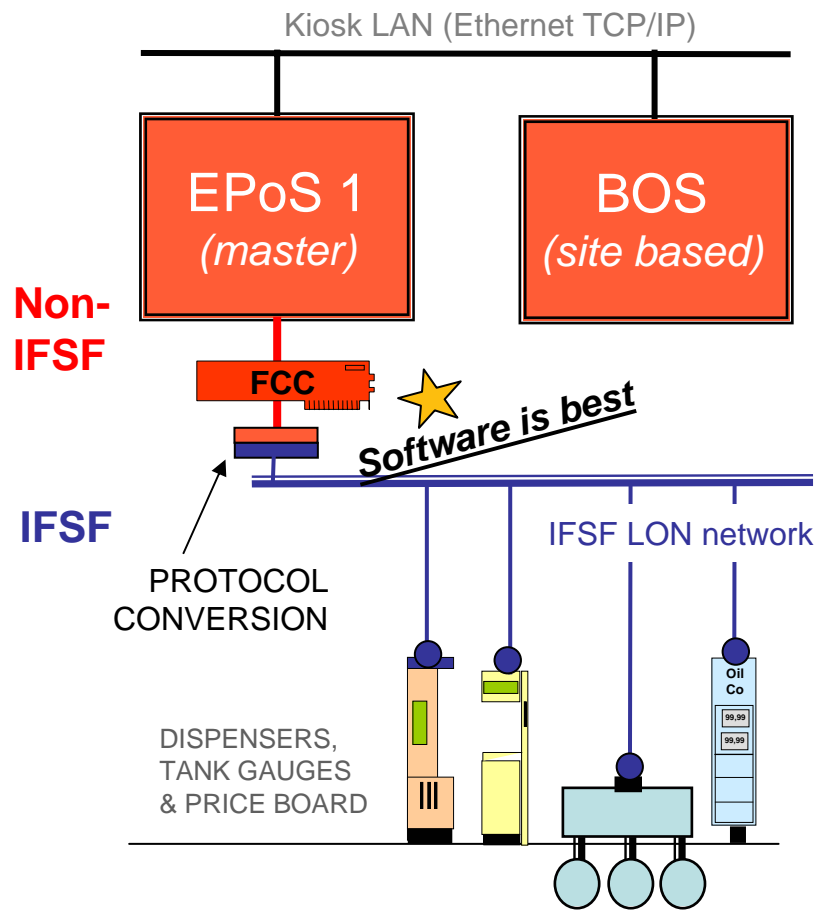
# LEGACY PROTOCOL CONVERSION

## Non- IFSF proprietary FCC & protocol converters

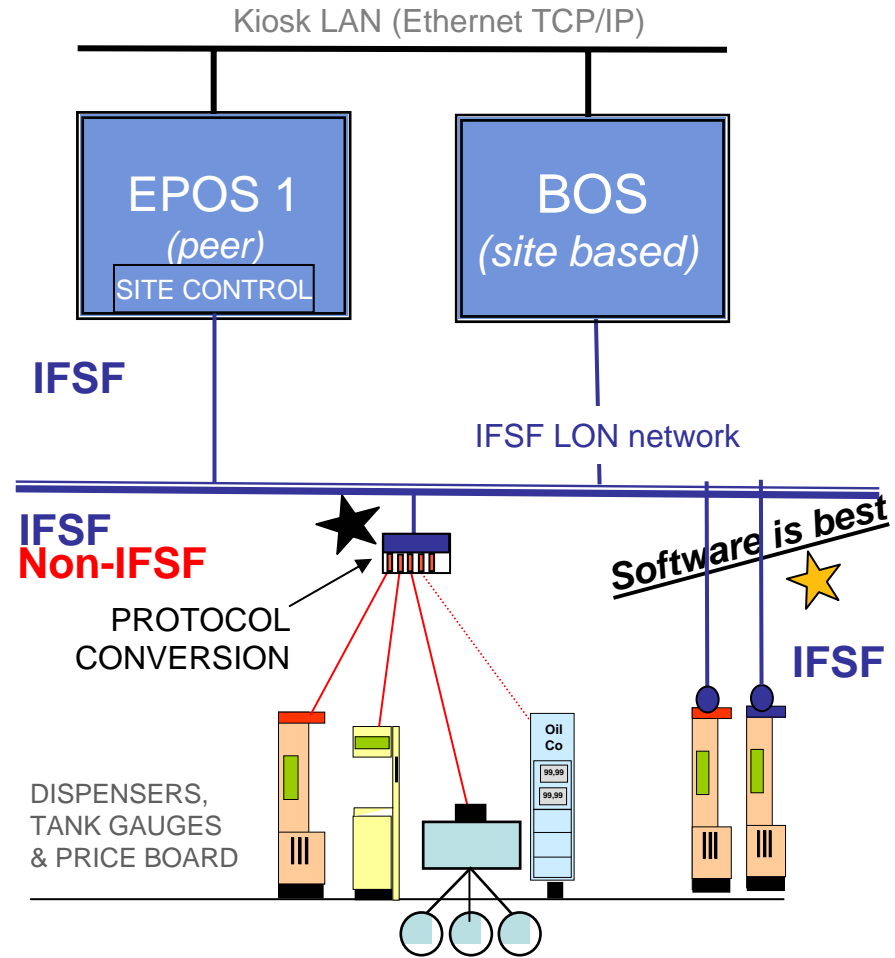


# LEGACY PROTOCOL CONVERSION

## IFSF migration aided by protocol conversion



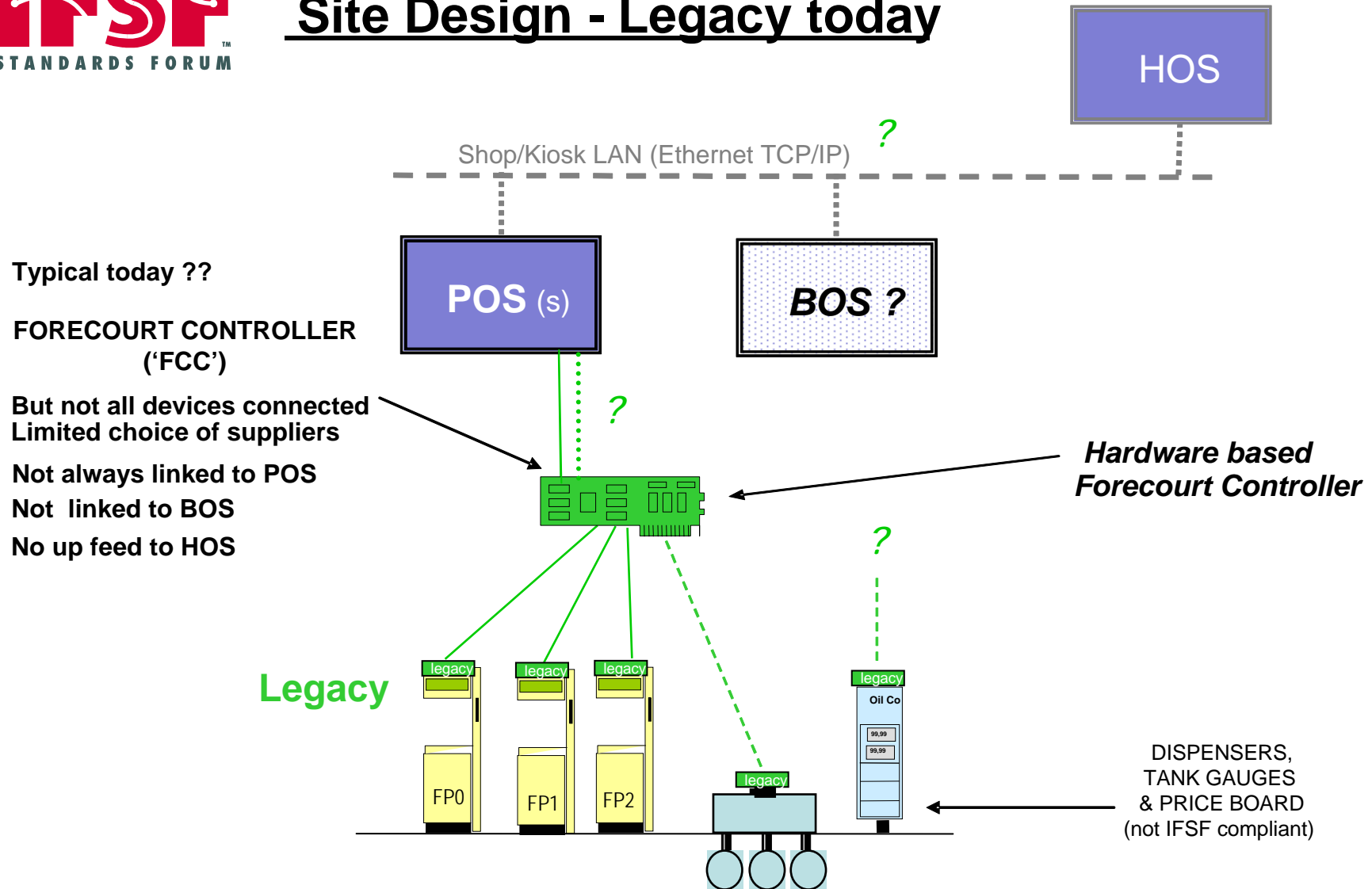
**Example A**  
 Protocol conversion is used to connect an IFSF forecourt to non-IFSF EPOS systems



**Example B**  
 Protocol conversion is used to connect a non-IFSF forecourt to IFSF EPOS systems - options exist

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

# Site Design - Legacy today



# Site Design 100% IFSF



Shop/Kiosk LAN (Ethernet TCP/IP)



**For ultimate IFSF Compliance**  
 Use only IFSF certified devices

1. Site Controller software,  
 usually in POS (s)

2. IFSF communications  
 network (LonWorks or TCP/IP)

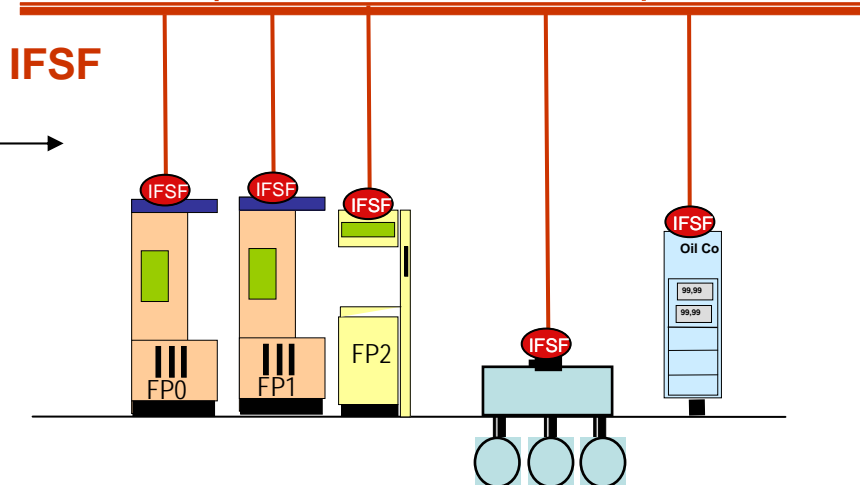
3. All forecourt devices to be  
 IFSF certified

4. Link POs to BOS

5. Use BOS links to up feed  
 information to HOS

6. Consider site configuration by  
 XML

EVERY thing fully software  
 integrated.



**All IFSF forecourt**

Suggest use  
 IXRetail or NAXML messages

*Software is best* ★

**IFSF**

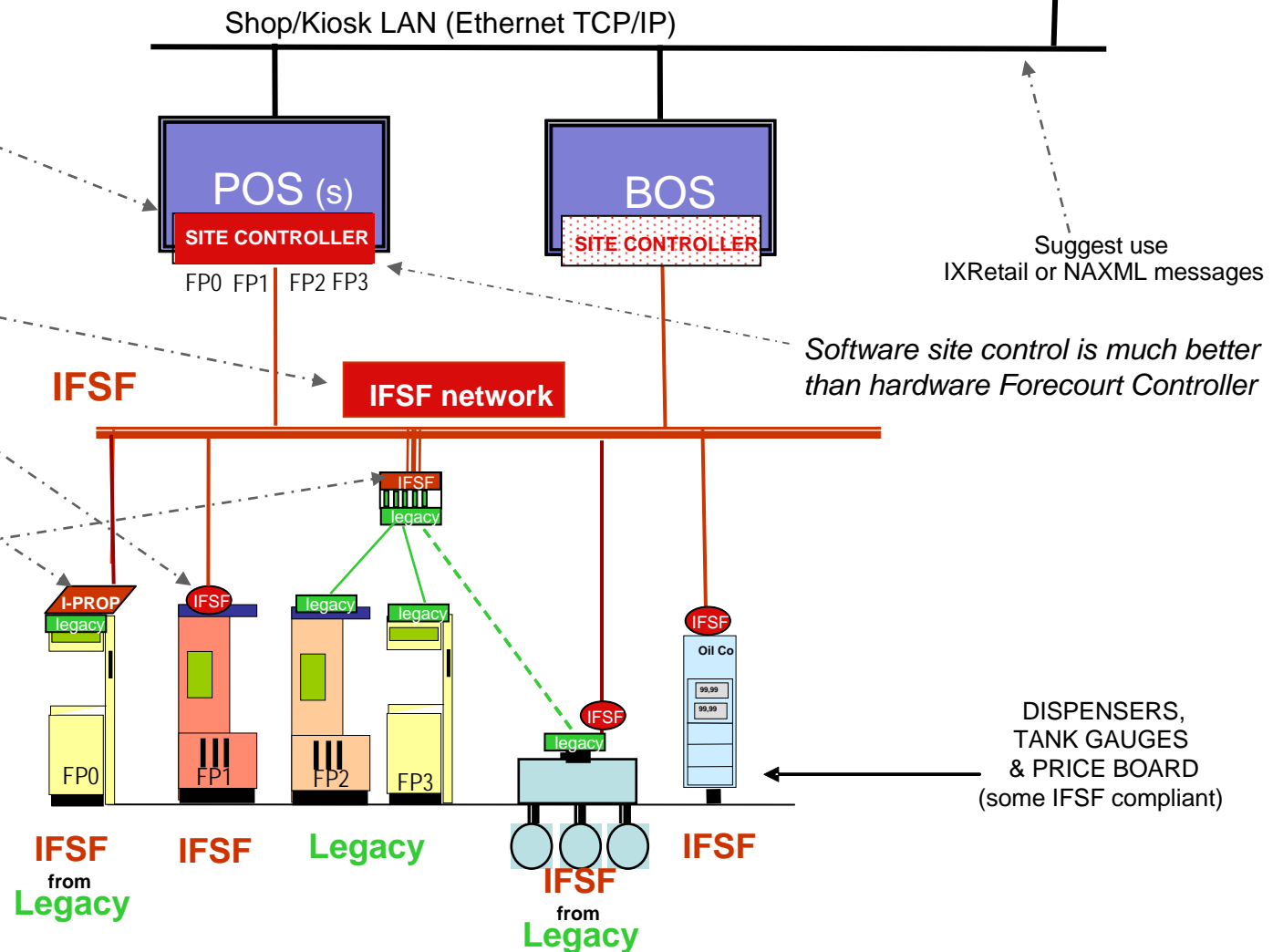
DISPENSERS,  
 TANK GAUGES  
 & PRICE BOARD  
 (all IFSF Certified)



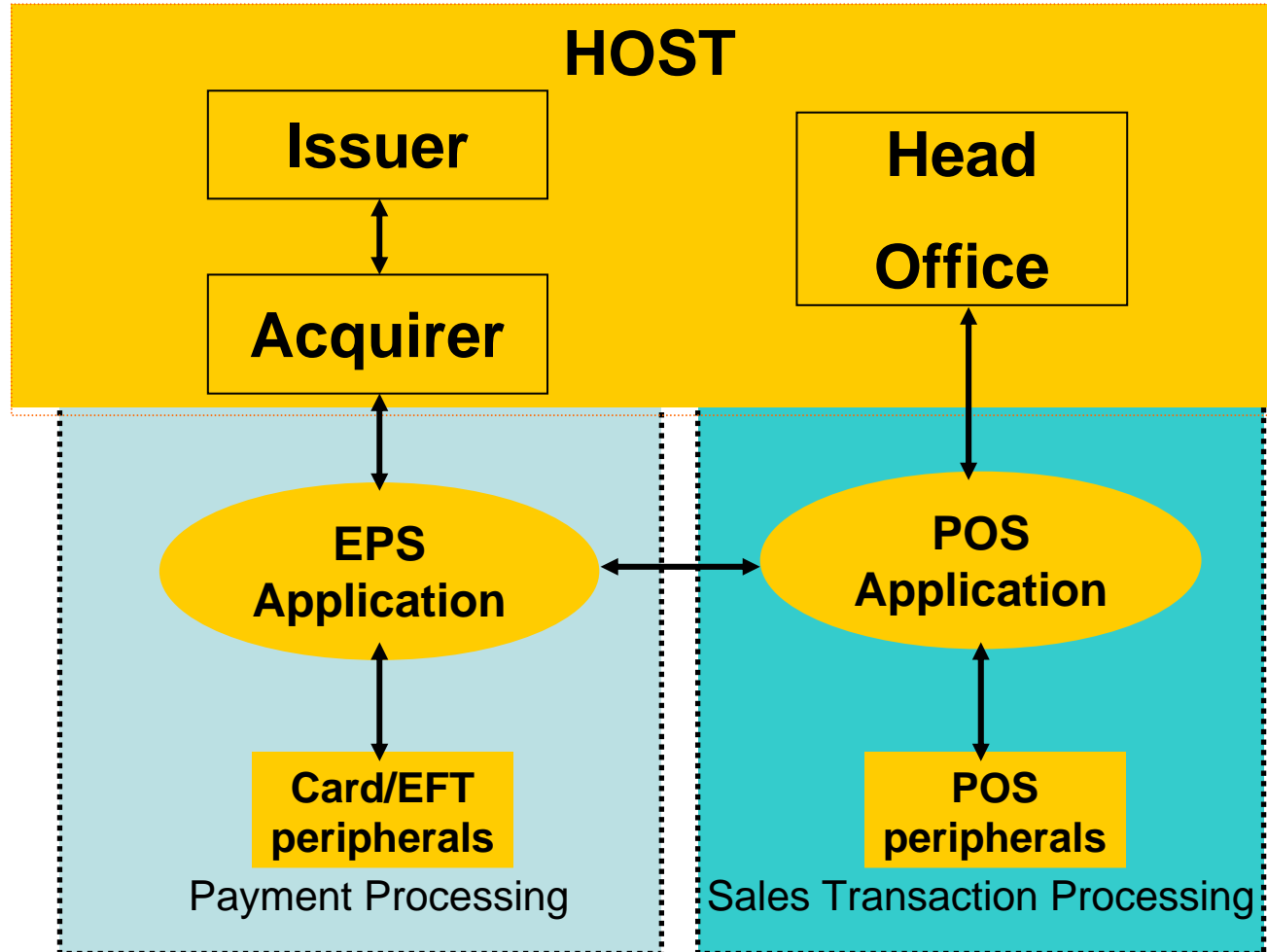
# Site Design - options from Legacy to IFSF



- A POSSIBLE STRATEGY**
1. Load IFSF Site Control software on PC(s), probably POS.
  2. Specify all new POS to be IFSF certified.
  3. When site rebuild /new sites:
    - Setup IFSF network
    - New forecourt devices to be IFSF
  4. Existing equipment
    - if possible convert by manufacturer
    - if not possible then use **PROTOCOL CONVERTER** to give IFSF protocol at IFSF Site Control software (**NOT** a FCC)



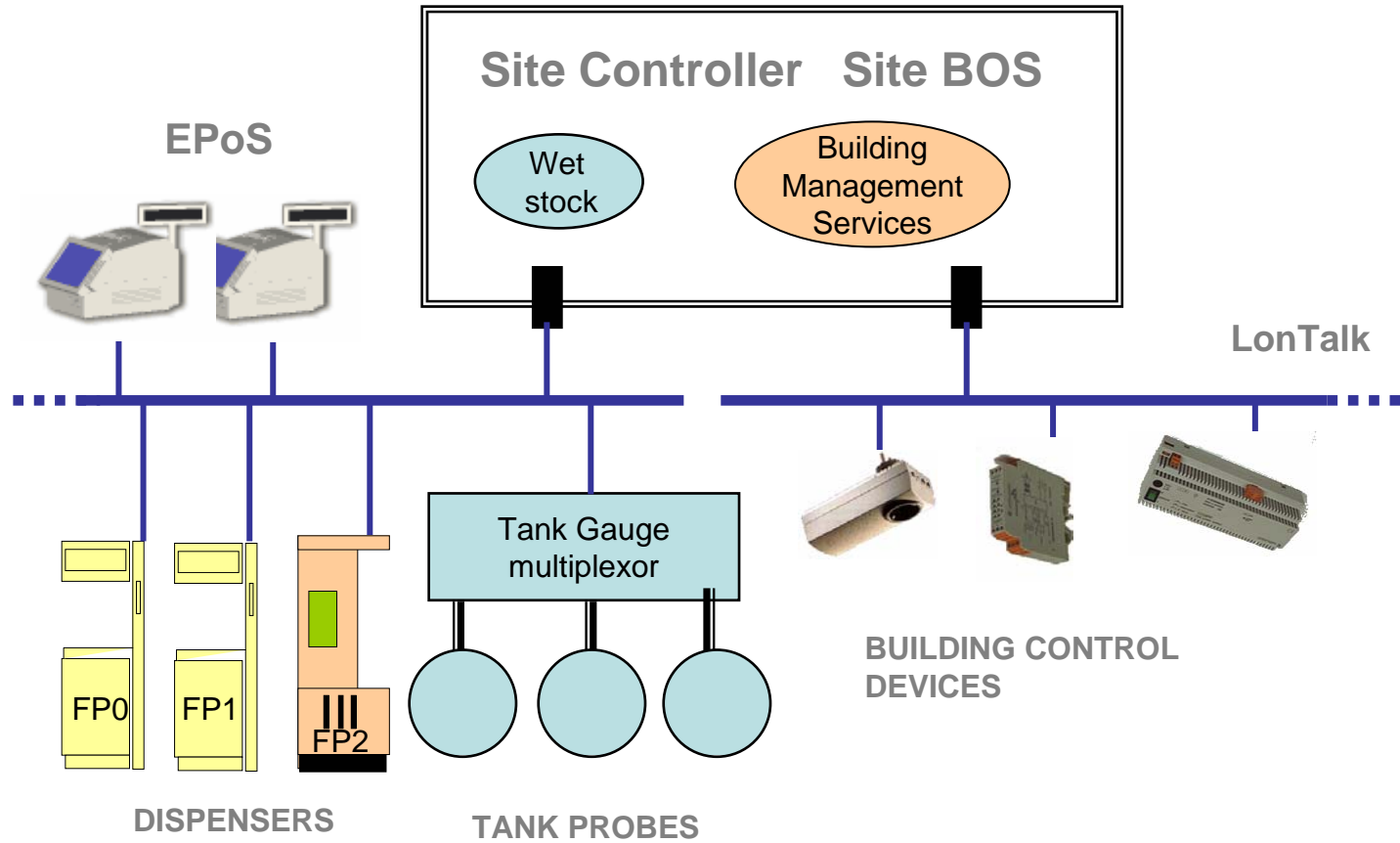
# CARD PAYMENTS - AN IFSF ARCHITECTURE



## CARD PAYMENTS - IFSF STANDARDS

- POS to Payment Systems
  - POS to EPS v1.00 August 2002
  - POS to EPS Implementation Guideline v1.00 July 2005
  - ISO8583Oil POS to Host v1.3 February 2006
  - ISO8683Oil Host to Host v1.4 February 2006
  
- Other related standards (EMV, IXRetail, PCATS)
  - POSLog v2.2 (FuelSale.xml)
  - Arts Data Model v5.0
  - OPOS Pin Pad standard v1.8
  - Digital Receipt v2.0
  - PCI Security
  - EMV 2000 (v4.0 and v3.1.1)
  - ISO8583(1997) and American ASC X.9 TG23

# IFSF - BUILDING MANAGEMENT SERVICES



**Forecourt and building services can be integrated**

Figure 20 - integration opportunities provided by using IFSF and LON

## IFSF - PROVIDE ASSISTANCE

FOR DEVELOPERS  
& IMPLEMENTERS

### IFSF provides assistance for Developers and Implementers

- **Web-based Documentation** - all standards are published on web
- **Engineering Bulletins** - to share practical best practice from all participants
- **Forecourt Devices Simulator** - with sample code for quicker, quality development
- **Site Controller Simulator** - to operate devices so simpler to test development
- **Site Configurator application** - sets-up site data parameters for test scenarios
- **Self-Certification test tool** - test scripts and simple to prove device conformity
- **Web-site** - publishes certificated devices to promote in competitive markets
- **Technical Conferences** - to share experience and feedback change requests
- **Training courses** - to accelerate technology levels
- **Technical Support Centre** - telephone, email & internet advice line
- **Inter-Operability Centre** - many devices to prove compatibility away from site
- **Desktop Proof of Concept** - PC-based simulation of standards, tools and comms.

## INTER-OPERABILITY CENTRE

FOR DEVELOPERS  
& IMPLEMENTERS

### Vendor equipment in the IFSF Inter-Operability Centre

|   |   |
|---|---|
| <p><b>Dispensers</b><br/>Tokheim WWC<br/>Tokheim COCA<br/>Gilbarco SK700<br/>Gilbarco EC2000<br/>Gilbarco Epsilon<br/>Tatsuno<br/>Dresser Wayne GEM<br/>Dresser Wayne 9000<br/>EIN<br/>Logitron<br/>Beta Control</p> <p><b>Price Pole</b><br/>Lumitronic<br/>Able<br/>PWM</p> | <p><b>Tank Gauge</b><br/>Veeder-Root 350R<br/>EMCO<br/>EECO Galaxy<br/>Incon Franklin Fuelling TS-5<br/>Kathoffer</p> <p><b>POS Systems</b><br/>Fujitsu E90<br/>Tokheim Fuelpos<br/>Scheidt &amp; Bachmann<br/>Wincor-Nixdorf (coming soon)<br/>Torex-Lucas</p> |
|---|---|

# IFSF SITE CONFIGURATION APPLICATION

## A sample XML file

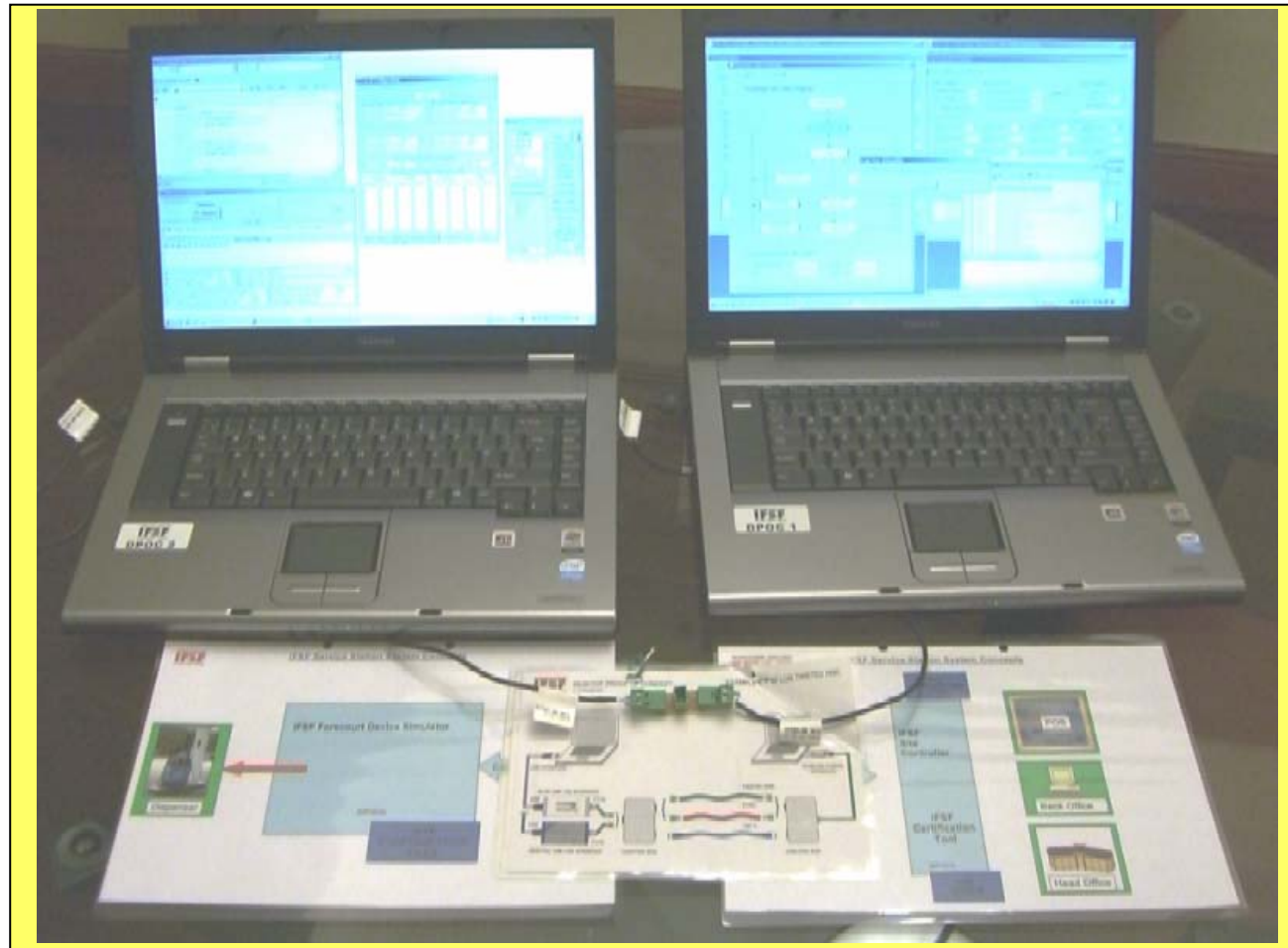
FOR DEVELOPERS  
& IMPLEMENTERS

```
<?xml version="1.0" encoding="UTF-8" ?>
- <SiteConfiguration UnitsOfMeasure="metric" TrainingModeFlag="false" IFSFVersion="1.0" xmlns="http://www.nrf-
  arts.org/IXRetail/namespace/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.nrf-arts.org/IXRetail/namespace/ IFSFSiteConfiguration.xsd">
- <Outlets>
+ <Outlet Type="RetailStore">
  </Outlets>
- <Products>
+ <Product ProductType="Sales" ProductDescription="UNL PREM">
- <Product ProductType="Sales" ProductDescription="DIESEL">
  <ProductDatabaseAddress>42H</ProductDatabaseAddress>
  <ProductNumber>2</ProductNumber>
  <ProductCategory>39</ProductCategory>
  <FuelProductID Name="DSL" Description="Diesel">DSL</FuelProductID>
  <ProductCode>2010</ProductCode>
  <ReconciliationTolerance Type="percent">0.7</ReconciliationTolerance>
- <FuellingModes>
  - <FuellingMode Name="Post-pay">
    <FuellingModeDatabaseAddress>11H</FuellingModeDatabaseAddress>
    <ProductUnitPrice CurrencyCode="GBP">1.000</ProductUnitPrice>
    </FuellingMode>
  </FuellingModes>
  <TaxId>1</TaxId>
  </Product>
+ <Product ProductType="Sales" ProductDescription="OPTIMAX">
  </Products>
+ <Taxes>
- <Tenders>
+ <Tender>
- <Tender>
  <TenderId>3009</TenderId>
  - . . . . .
```

## IFSF DESKTOP PROOF OF CONCEPT

FOR DEVELOPERS  
& IMPLEMENTERS

A PC-based simulation of IFSF standards, tools, and communication options. Shows how all work together. Available from IFSF Technical Support on request.






# IFSF - PROVIDE ASSISTANCE

FOR DEVELOPERS  
& IMPLEMENTERS

[www.IFSF.org](http://www.IFSF.org)

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|---|---|---------------|-----------------|------------|--|---|--|
| Date Released   | Title & Summary   |               |                 |            |  |   |  |
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| <p><b>IFSF Head Office:</b></p> <p><b>Carol Winders</b><br/>           IFSF Limited<br/>           Daresbury Innovation Centre<br/>           Kestwick Lane<br/>           Daresbury<br/>           Cheshire WA4 4FS<br/>           United Kingdom</p> <p>Tel: +44 (0) 870 741 8773<br/>           Fax: +44 (0) 870 741 8774</p> <p>eMail: <a href="mailto:admin.managers@isf.org">admin.managers@isf.org</a></p> | <p><b>IFSF Technical Contact Centre China</b></p> <p><b>George Liu</b><br/>           IFSF<br/>           Vstar Communications &amp; Control Technology<br/>           2 Zhongguancun South Avenue<br/>           Cyber Tower Building A, Suite 1511<br/>           Beijing 100086<br/>           China</p> <p>Tel: +86-10-51980468<br/>           Fax: +86-10-88507596</p> <p>eMail: <a href="mailto:IFSF.China@isf.org">IFSF.China@isf.org</a></p>  |               |                 |            |  |   |  |
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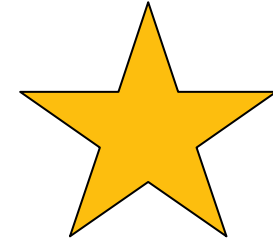
## IFSF - STANDARDS SUMMARY



- **Designed by oil companies & technical associates**
  - so practical and relevant to the industry
- **All published and available free of charge**
  - so not proprietary, nor commercially biased
- **Continual update procedures**
  - so fast handling of new requirements, incident reports and backward compatible
- **Consistent infrastructure & architecture**
  - so IFSF certified equipment from any supplier should be inter-operable
- **Uses established open market components**
  - so suppliers and implementers have a wider choice and lower costs
- **Communications based on global standards**
  - (e.g. LonWorks and/or TCP/IP) - so open and future proof
- **IFSF Standards really exist and proven products are available**
  - investment over 15 years development with 10 years of installation experience.

**“The Standard for Forecourt Connectivity”**

## WAY FORWARD FOR IFSF IN CHINA?



### For companies in China market

- **Oil companies** in China could become a IFSF members
  - get full rights with other oil company members
  - meet with other oil companies to set direction for standards,
  - or form a regional sub-board.
- **Suppliers** in China can join as Technical Associates
  - to obtain support, training, buy tools, certify product
  - participate in progressing the standards.
- **IFSF support** in China
  - IFSF trained technicians from China in UK during March 2007
  - IFSF Desktop Proof of Concept for demonstrations
  - will encouraging establishment of training courses in China
  - is progressing an IFSF Technical Contact Centre in Beijing
  - will upgrade this to Technical Support Centre if enough interest

***IFSF will start a public contacts list of anyone who wishes to exchange knowledge and experience.***

Send contact details by email to : - [IFSF.China@IFSf.org](mailto:IFSF.China@IFSf.org)

# Thank you

[Ian.Nayler@IFSF.org](mailto:Ian.Nayler@IFSF.org)