

# Remote Site Monitoring Products and Solutions



# Welcome

Nortech have supplied innovative technology to our customers for over 20 years.

We are passionate about our products and dedicated to working with our customers to help solve real world problems.

We've pulled together our core products and a few of our recent solutions into this brochure. We realise however this is just the start; the future promises new challenges and we are committed to working with our customers to meet them head on.



Julian Brown. Managing Director



Rt. Hon. Edward Davey

Secretary of State for Energy and Climate Change.  
Meeting with energy industry innovation leaders, 2012.



Winner Best Asset Security Innovation

UK Energy Innovation Awards 2013. Presented by Barry Hatton, Asset Management Director at UK Power Networks

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# Nexus micro RTUs

The Nexus™ family of micro RTUs provide the asset operator with economical, reliable, remote site monitoring for a wide range applications out in the real world.

Offering a versatile mix of inputs, power supply options and local communications they can be used to monitor alarms and data from almost any equipment in any location.

Used in conjunction with the Central iHost Platform, Nexus micro RTUs give reliable, accurate, real-time reports on the operating state of remote equipment.



NX30 monitoring an embedded generation connection and power meter



NX21 being installed on a distribution pole in the Middle East

# NX11

## Self contained micro RTU

The NX11 provides a low cost alternative to traditional RTUs. Self contained with its own power supply, battery backup, communications and enclosure the NX11 is a ready to install solution.



### Binary inputs

16 inputs, accept volt free contacts.  
Configurable debounce time.  
Date/Time stamp Open and/or Close events.  
Immediate report to Host when Open and/or Close event occurs.  
Local memory for 100 binary input events.

### Analogue Inputs

8 inputs, accept 0-25mA, ideal for 4-20mA transducers.  
Sampling and datalogging interval configurable.  
Date/Time stamp of:

- Routine Interval reading
- 4 configurable threshold levels per input
- % hysteresis configurable per input
- % dead-bands configurable per input

Immediate report to Host when event detected.  
Local memory for up to 1000 analogue events.

### Counter inputs

16 inputs (shared with binary inputs), accept volt free contacts.  
Minimum pulse duration 10ms.  
Count on Open and/or Close events.  
Immediate report to Host when preset thresholds exceeded.  
Local memory for 100 counter input events.

### 30-minute Datalogging

Counter inputs can be configured to record the number of pulses each half-hour of each 24 hour period.

### Output Contacts

8 outputs for control of external relays.  
Supports ENERGISE, DE-ENERGISE, PULSE ENERGISE and PULSE DE-ENERGISE operations.

### Temperature monitoring

On board temperature sensor. The temperature of the unit is reported to the Host during every contact.

### Modbus communications

Option for Modbus master over RS485. Used to collect data from slave devices such as power meters or weather sensors.

### Remote communications

Onboard GSM/GPRS modem. Signal strength reported to Central Host every contact. Real Time Clock synchronises with Central Host.

### Power Supply

- 110-230V AC

### Battery backup

- Rechargeable sealed lead acid battery
- Status monitored, updates to Central Host System
- Simple replacement

### Enclosure

Polycarbonate, IP54, vented.  
182mm x 180mm x 90mm.  
Variety of cable entry and mounting options.

### Local Configuration (serial port)

A "Field Support Kit" is available for local reconfiguration (example change of SIM card network) or diagnostics. For most customers there is no need to use the serial port.

Standard Part Numbers	NX11-1000	NX11-1050
NX11 GPRS RTU with Stub Antenna	✓	✓
Modbus RS485 card		✓

# NX12

DUE 2014

## Micro GPRS RTU

The NX12 provides a low cost alternative to traditional RTUs. With on board GPRS communications and battery backup option the NX12 is a flexible solution for remote equipment monitoring.



### Binary inputs

16 inputs, accept volt free contacts.  
Configurable debounce time.  
Date/Time stamp Open and/or Close events.  
Immediate report to Host on Open and/or Close event .  
Local memory for 100+ events.

### Analogue Inputs

8 inputs, accept 0-25mA, ideal for 4-20mA transducers.  
[Factory option to accept 0-10V]  
Date/Time stamp of:

- Routine Interval reading
- 4 configurable threshold levels per input
- % hysteresis configurable per input
- % dead-bands configurable per input

Sampling and datalogging interval configurable.  
Immediate report to Host when event detected.  
Local memory for up to 1000 analogue events.

### Counter inputs

16 inputs (shared with binary inputs), accept volt free contacts.  
Minimum pulse duration 10ms.  
Count on Open and/or Close events.  
Immediate report to Host when preset thresholds exceeded.  
Local memory for 100+ counter input events.

### 30-minute Datalogging

Counter inputs may be configured to record the number of pulses each half-hour of each 24 hour period.

### Output Contacts

8 outputs for control of external relays.  
Supports ENERGISE, DE-ENERGISE, PULSE ENERGISE and PULSE DE-ENERGISE operations.

### Temperature monitoring

On board temperature sensor. The temperature of the unit is reported to the Host during every contact.

### Modbus RS485 communications

Modbus master over RS485. Collect data from slave devices such as weather stations, meters, IEDs.

Up to 16 analogue values (8 x 8-bit + 8 x 16-bit) may be collected via the Modbus interface. All analogue values support routine logging, threshold and dead-band events.

Standard mappings exist for several devices and new ones may be added, contact Nortech for more information.

### Remote communications

Onboard GSM GPRS modem. Signal strength reported to Central Host every contact. Real Time Clock synchronises with Central Host.

### Power Supply

Factory option for either AC or DC powered. Power supply is monitored and failure/restoration are date/time stamped and reported to Host.

- 110-230V AC
- 12-24V DC

### Optional battery backup

- Non rechargeable lithium battery
- Status monitored, updates to Central Host System
- Simple field replacement

### Installation

2 part screw terminals for most connections, DIN rail mount version and option for IP rated enclosures.

### Remote Configuration (over GPRS from Host)

Almost all the I/O configurable parameters and communication parameters may be remotely reconfigured from the central Host via GPRS. Simple browser-based forms allow users to fine tune individual RTUs and inputs.

### Local Configuration (USB serial port)

A "Field Support Kit" is available for local reconfiguration (example change of SIM card network) or diagnostics. For most customers there is no need to use the USB serial port.

# NX21

## Self powered micro RTU

The NX21 provides a low cost alternative to traditional RTUs for use in locations where there is no auxiliary power available.



### Binary Inputs

12 inputs, accept volt free contacts, e.g. relays.  
Date/Time stamp Open and/or Close events.  
Immediate report to Host when Open and/or Close event occurs.  
Local memory for 100 binary input events .

### Analogue Inputs

2 inputs, accept 0-20mA and 4-20mA transducers.  
Sampling and datalogging interval configurable.

Date/Time stamp of:

- Routine Interval reading
- 4 configurable threshold levels per input.
- Date/Time stamp on Threshold crossing events.

Immediate report to Host when event detected.

Local memory for up to 1000 analogue events.

Optional board to power external 4-20mA transducers .

### Temperature monitoring

On board temperature sensor. The temperature of the unit is reported to the Host during every contact.

### Remote communications

Onboard GSM/GPRS modem. Signal strength reported to Central Host every contact. Real Time Clock synchronises with Central Host.

### Power Supply

3.9V dc non rechargeable lithium battery.  
Battery packs sizes available to suit application requirements.  
Typical life expectancy 10 years (subject to application).  
Simple replacement.

### Enclosure

Various options available to suit the application and environment.

Small enclosure: Polycarbonate 130 x 130 x 75mm.

Large enclosure: Polycarbonate 182 x 180 x 90mm.

Variety of cable entry and mounting options.

### Local Configuration (serial port)

A "Field Support Kit" is available for local reconfiguration (example change of SIM card network) or diagnostics. For most customers there is no need to use the serial port.

Standard Part Numbers	NX21-0100	NX21-0110	<b>NX21-0150</b>	NX21-0200	NX21-0240
NX21 PCB	✓	✓	✓	✓	✓
GSM Modem		✓	✓	✓	✓
Stub Antenna			✓	✓	✓
32Ah battery pack			✓		
64Ah battery pack				✓	✓
Analogue Power board				✓	
Enclosure 130x130x75			✓		
Enclosure 182x180x90				✓	✓
Mounting bracket				✓	
Condensation point fitted				✓	✓

If the option combination you require is not shown please contact Nortech for a part number.

Highlighted part numbers are the most commonly used.

# NX30

## DC powered micro RTU

The NX30 provides a low cost alternative to traditional RTUs. With on board GPRS communications and battery backup option the NX30 is a flexible option for remote equipment monitoring.



### Binary inputs

16 inputs, accept volt free contacts.  
Configurable debounce time.  
Date/Time stamp Open and/or Close events.  
Immediate report to Host when Open and/or Close event occurs.  
Local memory for 100 binary input events.

### Analogue Inputs

8 inputs, accept 0-25mA, ideal for 4-20mA transducers.  
Sampling and datalogging interval configurable.  
Date/Time stamp of:

- Routine Interval reading
- 4 configurable threshold levels per input
- % hysteresis configurable per input
- % dead-bands configurable per input

Immediate report to Host when event detected.  
Local memory for up to 1000 analogue events.

### Counter inputs

16 inputs (shared with binary inputs), accept volt free contacts.  
Minimum pulse duration 10ms.  
Count on Open and/or Close events.  
Immediate report to Host when preset thresholds exceeded.  
Local memory for 100 counter input events.

### 30-minute Datalogging

Counter inputs can be configured to record the number of pulses each half-hour of each 24 hour period.

### Output Contacts

8 outputs for control of external relays.  
Supports ENERGISE, DE-ENERGISE, PULSE ENERGISE and PULSE DE-ENERGISE operations.

### Temperature monitoring

On board temperature sensor. The temperature of the unit is reported to the Host during every contact.

### Modbus communications

Option for Modbus master over RS485. Used to collect data from slave devices such as weather stations and power meters.  
Standard mappings exist for the following meters:

- Schneider PM710
- Schneider PM800
- Autometers IC995

### Remote communications

Onboard GSM/GPRS modem. Signal strength reported to Central Host every contact. Real Time Clock synchronises with Central Host.

### Power Supply

- 12-24V DC

### Optional battery backup

- Rechargeable sealed lead acid battery
- Status monitored, updates to Central Host System
- Simple replacement

### Enclosure

Aluminium.

### Local Configuration (serial port)

A "Field Support Kit" is available for local reconfiguration (example change of SIM card network) or diagnostics. For most customers there is no need to use the serial port.

*If the option combination you require is not shown please contact Nortech for a part number.*

*Highlighted part numbers are the most commonly used.*

Standard Part Numbers	NX30-0110	NX30-0170
NX30 GPRS RTU with Stub Antenna	✓	✓
Modbus RS485 card		✓

# TS04

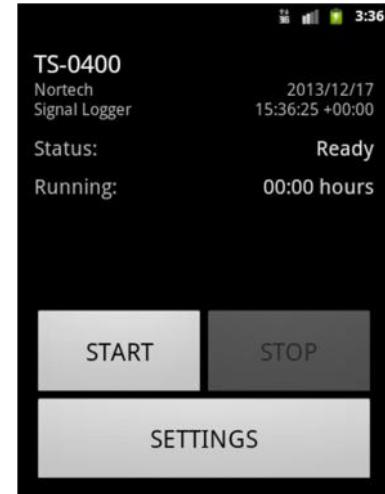
# GSM Network Signal Surveyor

How reliable is the GSM signal on site?

What base stations are being used?

What technology is being accessed (GSM/GPRS/HSPDA)?

The TS04 is used by engineers to log the GSM / 2G / 3G network signal at a location. Download the log files to any PC as a CSV file.



## Features

- 230V AC powered with battery backup
  - IP66 wall mount enclosure (180x182x90mm)
  - Internal antenna
  - Locally configurable via touch screen
  - USB connection for file download to PC
  - Option to log APN connection
  - Option to PING target IP address
  - Option to PING iHost

## Configuration

Parameters are set locally using touch screen interface. Values are saved in non-volatile memory ready for the next survey.

- Site ID
  - Site Name
  - Logging interval
    - 15s, 30s, 1min, 5min, 10min, 30min
  - Modem reboot interval (Never | 1 hour)
  - APN Name [optional]
  - APN Username [optional]
  - APN Password [optional]
  - PING IP address [optional]
  - PING IP port number [optional]

## Installation - Start Surveying

SIM card inserted.

Installed on wall / temporary location.

Power up the TS04 by connecting to 230V AC supply.

Use touch screen to type in the Site ID and Site Name, change default settings if necessary.

**Press START SURVEY.**

## **Removal - View Survey Results**

Press STOP SURVEY.

Connect PC to TS04 using USB cable.

The TS04 appears as a new disk drive on the PC.

Browse the survey files available. One file is generated for each survey. Filenames include Site ID and date of survey.

## Copy files from the TS04 to your PC

## **Survey File Format**

Survey files are saved in CSV format and may be viewed by most PC spreadsheet programs.

Survey files are stored in non-volatile memory . The TS04 can store up to 1 year of surveys. Survey files are transferred to a PC via USB cable.

The survey file include the parameters used for the survey (see configuration settings).

The file contains one row per logging interval.

TS-0400 - 2014-02-02 00:00 [Read-Only] - Microsoft Excel																	
Site ID																	
ID	Site Name	Logging Interval	Connection Restart Interval	Ping IP Address	NX Comms Test IP Address	NX Comms Test Port											
TS-0400	TS-0400	1 Minute	Never	Not set	89.151.113.237	1285											
4	SIM Operator SIM Phone Number	SIM Serial Number IMEI		8.94412E+14	3.59037E+14												
5	Orange																
ID	Time	Time Zone	SIM Status	Network Operator	Network Type	Cell ID	Location Area Code	Connection Status	Roaming Status	APN Name	APN Username	APN Password	BSI (dBm)	PPF Activity	NX Comms Test Result	NX Comms Test Response Time (ms)	
1	02/02/2014 00:00 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-105	Inactive	Received Correctly	2440	
2	02/02/2014 00:01 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-105	Inactive	Received Correctly	2402	
3	02/02/2014 00:02 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-105	Inactive	Received Correctly	2543	
4	02/02/2014 00:03 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-111	Inactive	Received Correctly	2363	
5	02/02/2014 00:04 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-103	Inactive	Received Correctly	2342	
6	02/02/2014 00:05 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-105	Inactive	Received Correctly	2384	
7	02/02/2014 00:06 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-107	Inactive	Received Correctly	2320	
8	02/02/2014 00:07 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-105	Inactive	Received Correctly	2359	
9	02/02/2014 00:08 +00:00		Ready	T-Mobile UK	HSDPA	13739433	181	Connected	Not Roaming	orangeinternet			-104	Inactive	Received Correctly	2348	

# NX Field Support Kit

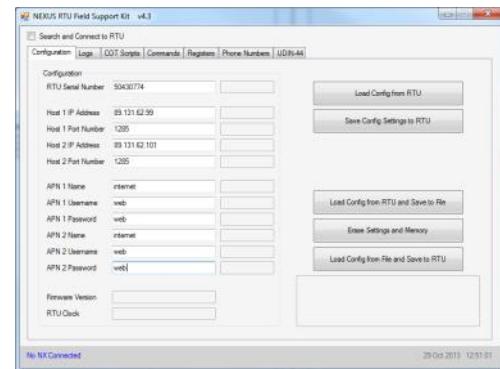
## You may not need this!

We ship our RTUs fully configured and tested with either a Nortech SIM card or a customer provided SIM card. This generally means there is no need for configuration by the user prior to installation.

It really is a case of wiring up on site and then powering up the RTU. The RTU will automatically connect to the GPRS network, connect to iHost and start communicating.

Once communicating with iHost any configuration changes should normally be done remotely from iHost without the need for a site visit.

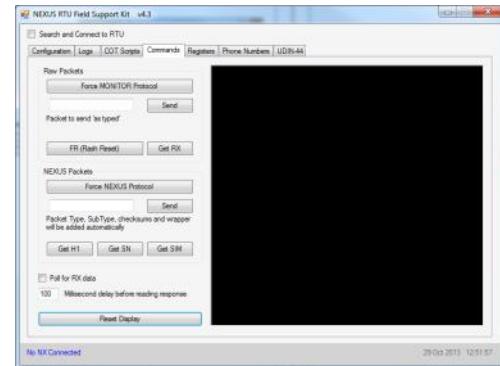
However there are a couple of situations where the Field Support Kit can be useful ...



## Fitting a SIM card

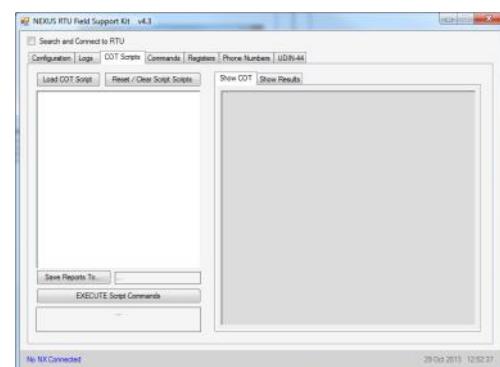
In certain circumstances users need to install their own SIM cards. To do this the settings associated with using the GPRS network have to be saved to the RTU. The Field Support Kit is the software tool for the job.

The Field Support Kit allows users to save copies of RTU configuration and to upload new sections of configuration from file. These are referred to as "COT Scripts". This can be especially useful when several RTUs need to be given the same settings. For example it is possible to create a COT Script with just the communication settings, uploading this file will amend these settings with all other RTU configuration remaining unchanged.



## Fault finding

Should an RTU struggle with communications to iHost, or have intermittent communication issues a trip to site is often the only way to get to the bottom of the issue. In this case the Field Support Kit provides access to internal logs and full communication diagnostics.



## Programming cables

Depending on the age and model there are two different cables required to connect your PC to the RTU.

The NXA-0110 cable connects RTUs which have a RJ45 serial port.

More recent RTU models have a standard USB connector and use a standard USB cable.

### Standard Part Numbers

FSK-0200	Field Support Kit software
NXA-0110	RJ45 to DB9 NX RTU programming cable

# Accessories

## Antenna

The starting point for GPRS antenna is the “stub antenna”. It is small, low cost and works well inside our polycarbonate enclosures.

For poor signal strength areas and for RTUs installed in outer metal enclosures we offer a range of GPRS antenna.

Standard Part Numbers	ACC-0730	ACC-0700	ACC-0660	ACC-0640	ACC-0350
GSM/GPRS dual band	✓	✓	✓	✓	✓
SMA connector	✓	✓	✓	✓	✓
Cable length (metres)	-	3	5	15	2
Mag mount		✓			
Wall mount			✓	✓	
Panel mount—anti tamper					✓



## SIM cards

We are able to provide SIM cards for multiple networks as well as roaming SIM cards. Depending on the application Static IP addresses can be provided as can Private APN's to improve security.

For the majority of NX RTU applications 1MB per month data is sufficient. For data hungry applications , often using the ENVOY, up to 1GB per month tariffs are available.

We recommend discussing SIM card requirements as early as possible for any new application.

Standard Part Numbers	SIM-0090	SIM-0071	SIM-0040	SIM-0030	SIM-0031	SIM-0100	SIM-0020	SIM-0010
Network: UK Orange	✓			✓				
Network: UK Vodafone		✓		✓	✓			
Network: UK O2			✓					✓
Network: EIRE O2								✓
Dynamic IP	✓	✓	✓					
Private Static IP				✓	✓	✓	✓	✓
Inclusive MB per month	1	1	1	500	500	1GB	1GB	1GB
Contract Length (months)	24	24	24	24	24	24	24	24

## Batteries

Replacement batteries for all our products are available.

Standard Part Numbers	
ACC-0760	F10, F20 battery
ACC-0270	NX21 32Ah battery
ACC-0500	NX21 64Ah battery
ACC-0320	NX11, NX30 battery
ACC-0751	NX41, NX43, NX52 battery



# ENVOY Communications Hub

The ENVOY™ platform provides the asset owners and operators with a powerful, flexible, data processing and communications hub.

Connected equipment is polled for data, data is transformed and stored as called for by the application and then forwarded to central systems for use.

As a Communications Hub ENVOY allows engineers to tunnel through to remote equipment to perform diagnostic checks and updates.

ENVOY allows engineers to deploy solutions quickly without having to build large and complex SCADA and IT systems to collect and process data.



# EV10

ENVVOY

## Ready for anything (almost)

### Hardware features

- ARM9 processor
- 64MB SDRAM
- 256MB FLASH
- RTC with standby power
- LCD display with function buttons
- GPRS quadband modem, 3G option
- Ethernet 10/100 Port
- SD card (2GB)
- 4 Digital Inputs, 2 Analogue Inputs, 2 Control Outputs
- USB slave, USB host
- 3 external serial ports (RS485, RS232)
- 12-24V dc

### I/O expansion cards

- 16 digital Inputs
- 8 analogue Inputs
- 8 control outputs

More than one expansion card can be fitted to each Envoy

### Standard software features

- LINUX OS with multitasking and interrupt
- Over-air software upgrades
- Web server access to configuration / diagnostics
- VPN tunnelling

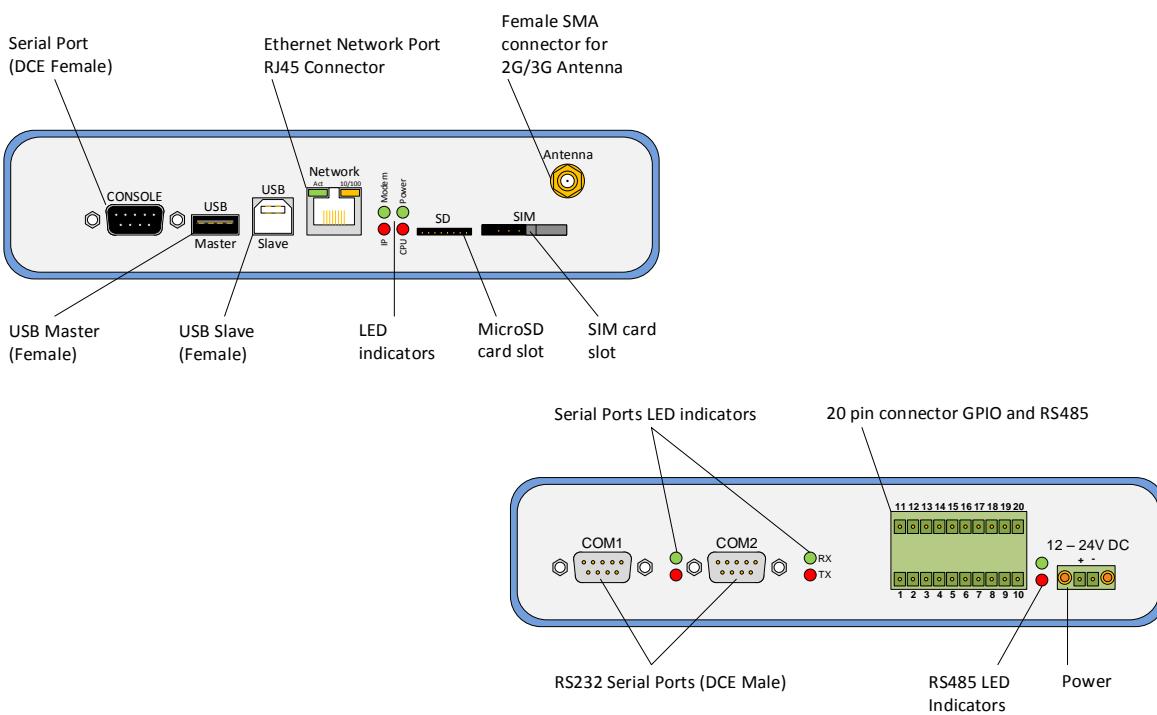
### Host facing / Slave protocols

- NEXUS 32-bit
- DNP3
- IEC 61850
- CANBUS

### Host / Master protocols

- MODBUS
- DNP3
- CANBUS

*Note: Protocols are not necessarily available over all communication channels*

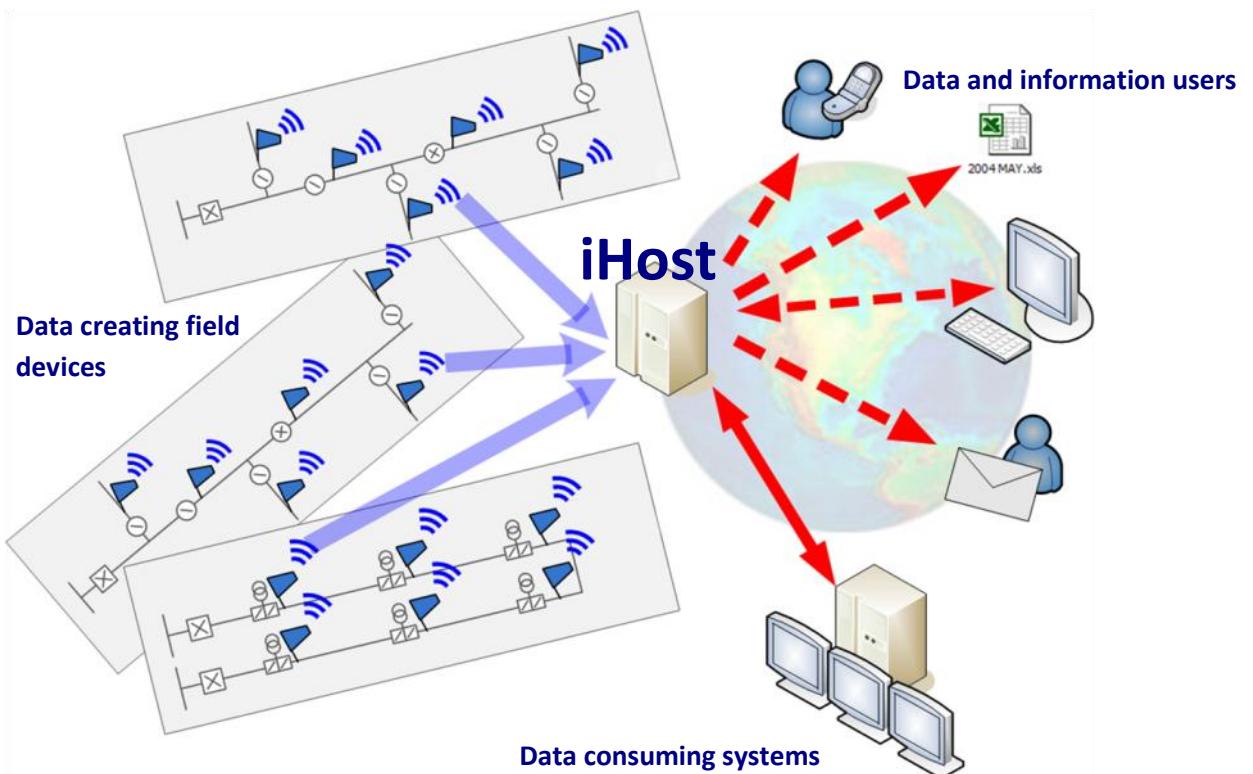
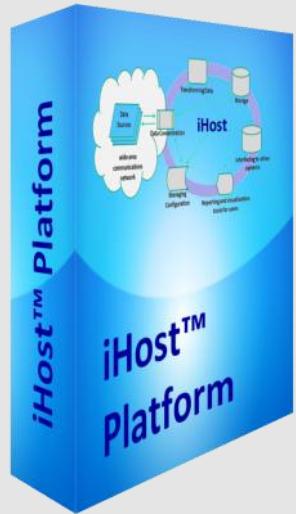


# iHost™ Platform

iHost™ provides a single platform enabling customers to manage the increasing numbers of small, low cost, communicating 'smart field devices' installed at remote locations.

Visualisation of alarms and status, archiving of data, reporting and trending all available on one flexible platform.

As well as supporting Nortech's own Micro RTUs manufacturers of communicating smart devices automatically get a ready made central host and configuration management tool by allowing their products to be 'iHost Supported'.



# building the connected utility

## The iHost Concept

To provide a central location to accept, process, store and visualise data from the increasing number of low cost monitoring sites installed throughout customers' asset bases.

iHost is an open platform ready to accept data from any communicating device and the combine and share that data with other users and systems.

## The need to adapt

Manufacturers are producing products with embedded communications and engineers and managers are keen to exploit the benefits this new functionality offers.

Managers need to find new ways of thinking about these smart field devices which goes beyond the hopeful assumption that they are simply RTUs to be integrated into existing SCADA / NMS systems.

## Flexibility vs. Consistency

Each new smart field device on the market is likely to be different from those already being used. Each offers a new design approach, from a different manufacturer, fulfilling a different business need.

Any approach to using populations of these new field devices needs to have a flexible solution ready to share this newly collected data throughout the customers IT infrastructure.

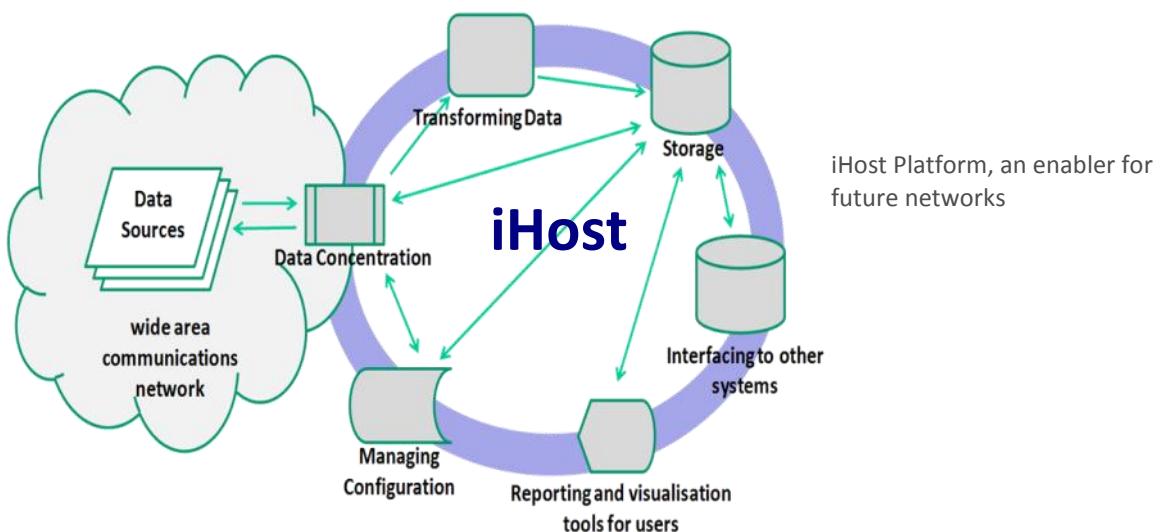
It is clear that traditional SCADA and network management and IT systems do not have the capacity, flexibility or cost base to take up the challenge of managing large populations of disparate products with atypical functionality.

## Introducing iHost

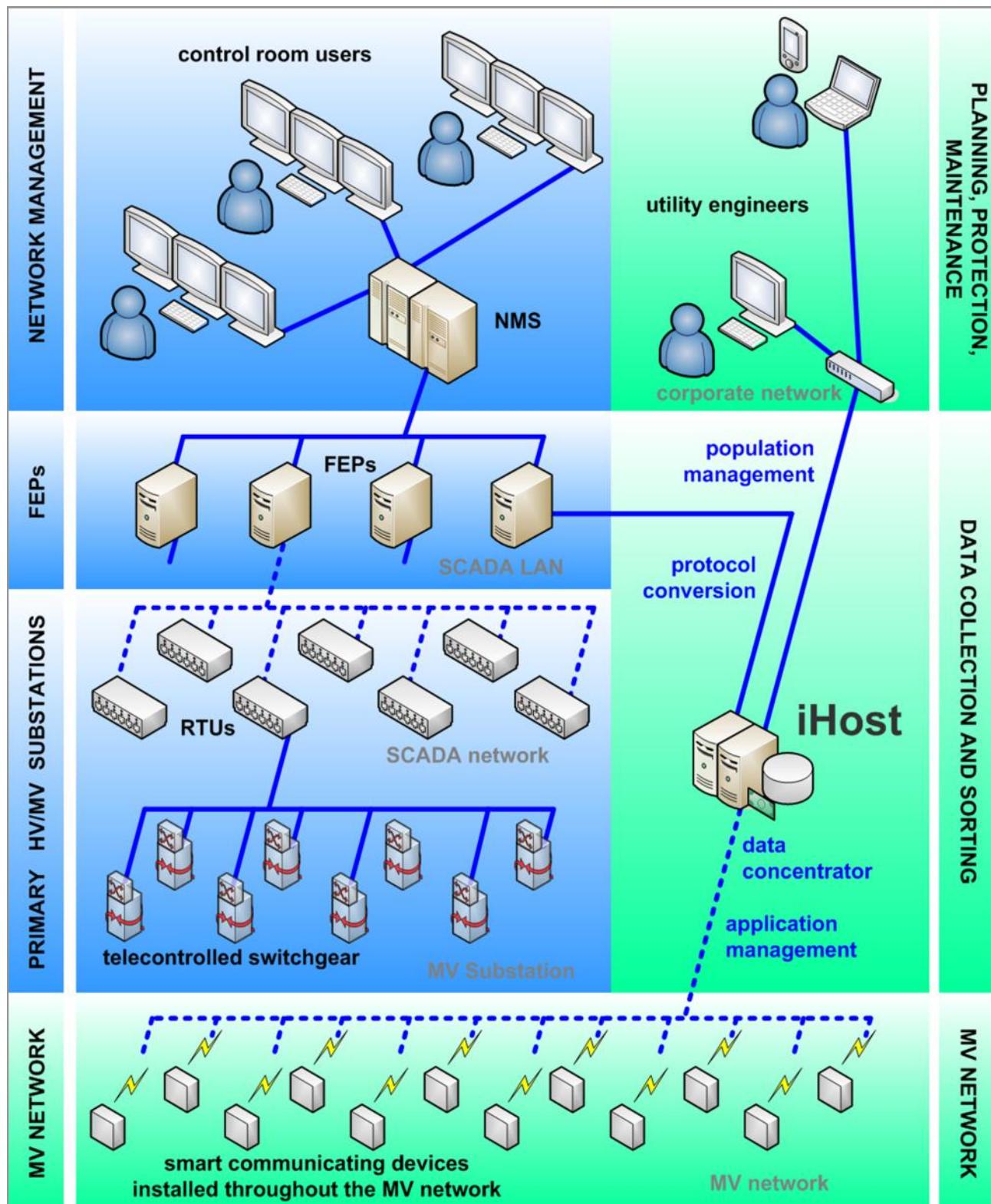
iHost provides a unified approach to these new communicating field devices. Designed with large scale deployments in mind, iHost embraces both the divergent behaviours of each new type of field device with the need for customers to manage the implementation, deployment, security and support of these devices.



iHost™ Platform software modules run under Windows™ Server OS installed on standard server hardware



# Example: power utility deployment



Blue areas represent existing SCADA and NMS system.

Green areas show iHost—routing some data to NMS, providing all data direct to users.

# Function

## One incoming connection for remote data

A single iHost™ system will collate data from, and provide full management of, multiple remote monitoring applications such as MV fault passage indicators, LV substation monitoring, embedded generation, network AVC systems etc..

The function played by iHost complements existing SCADA and IT systems. Installing iHost means you get continuing technical and commercial choice over the field devices you install, with unified management of the system, at a lower cost than building and maintaining multiple host systems or by using traditional SCADA or IT systems.

## Protocol Conversion

iHost provides protocol conversion between the field device protocol (many of which are proprietary) and the industry standard protocols supported by your DMS / NMS control system.

iHost screens provide simple set-up, configuration and deployment testing tools for these protocol conversion functions. Interoperability between your remote field devices and control room systems is guaranteed, straight forward and future proof.

So when you next upgrade your DMS system there will only be one link to re-commission. When you switch to a new field device type, with a new protocol, there will be no changes to make at your DMS.

## Population Management

- Commissioning

Installation teams can now commission remote field devices on the network without involving the control room. Commissioning checks are completed to iHost. Commissioning links between iHost and DMS/NMS can be completed in batches whenever convenient.

- Remote configuration

Most field devices support some remote configuration. As part of its implementation for each supported device iHost provides and maintains a configuration database. Users can 'drill down' to view the current configuration for a specific unit and make changes. iHost will automatically update the device's configuration during the next communication.

- Maintenance challenge

Installing several thousand remote communicating devices represents a significant asset monitoring task in its own right; each requiring maintenance, usually on a very infrequent basis. iHost maintains its own equipment register complete with specific data points associated with each type of field device. Typically this will include GPRS signal strengths, internal battery health flag etc. Dynamically generated reports are available identifying which devices need maintenance, what kind, and when.

## Data Concentrator

iHost acts as a data concentrator; accepting data over a number of different data channels including PSTN modems, GSM modems, RS232, RS485 and of course TCP/IP traffic including GPRS data.

These different data streams are monitored and managed by an iHost TaskManager process. If a data channel breaches preset limits then alarms are generated; for example if no data is received on a channel for longer than a preset period.

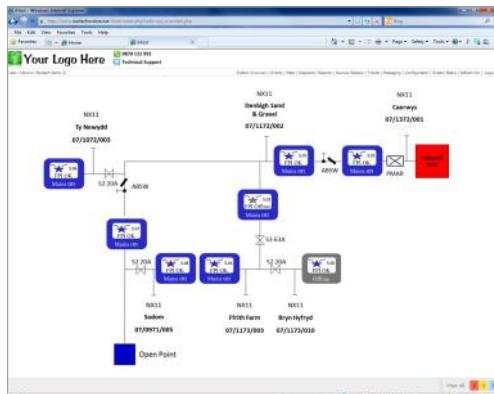
Where possible data channel hardware is also monitored on a continuous basis and in case of failure restorative action is taken automatically.

## Cyber Security

This is one of the key assessments to be made by the utility when considering and operating any IT system including iHost. Discussion on how we approach security within the design of iHost is limited to technical papers at selected industry conferences and discussions with customers directly. Please get in touch for more information.

# Your view of the system

iHost™ provides an user-friendly, intuitive interface for accessing your smart field devices. Data from all your remote sites is visible on a series of well organised pages. There isn't room to list all the screens here, but these are a few to be going on with...



## Where do you want to go today?

You can make virtual site visits without leaving your desk. You can see the current status of all feeders or just an individual field device. You are never more than a click away from opening up the searchable, filterable, sortable event log which keeps a record of everything that has happened on every site.

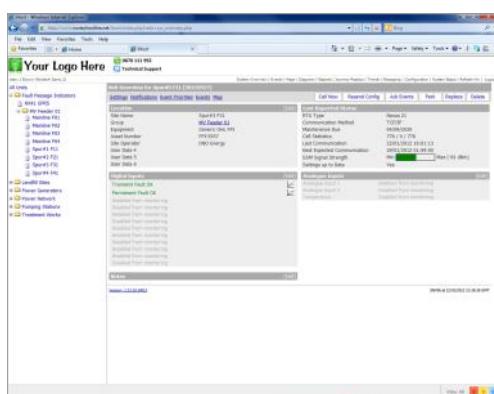
## Mimics

Data from field devices or collections of devices can be displayed in any number of visual representations; in iHost terminology these are referred to as Mimics.

## System overview screen

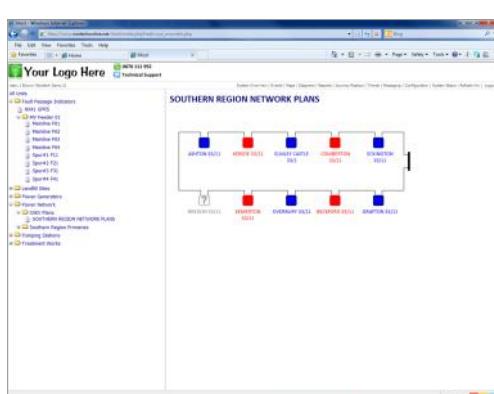
A sortable, filterable screen listing every field device monitored on the system; one row per device. The list is colour coded and can be restricted to show only certain types of sites such as those with current alarms or with communication problems.

Field devices are organised into Groups and nested Sub-Groups, to any depth, just like the folder structure in Windows™. Typically Groups are arranged as Region / MV Primary Substation / MV Feeder. The option to compartmentalise different applications or device types is also provided.



## Unit overview screen

The Unit Overview screen provides more detail about a single field device typically including all the sensor data, GPIO data, power supply status, data quality flags, last communication date/time, next expected communication and most recent alarms.



## Secure Login

Access to the system is via secure login pages with everything you would expect from a secure user friendly web site. If you forget your password then the central server will email you a link to follow to change your password. For companies using Windows Active Directory then there is no need to login to iHost as you can be pre-authenticated using your windows logon.

## System status screen

The System Status screen provides information about all of iHost's incoming communication channels including channel type, protocol in use, last data transfer etc.

## Export data

Whilst the iHost pages have a variety of tools to help you display the information from your field devices it can be helpful, from time to time, to use this data in other programs such as Excel or PowerPoint presentations. iHost provides various options for downloading data; for example on the graph pages there is a one-button link to download the data being used to plot the graph.

# Time saving tools

iHost™ provides several innovative features which reduce the amount of time users have to spend administering their field device systems. The result is a user-friendly, intuitive and effective tool for managing your remote field devices.

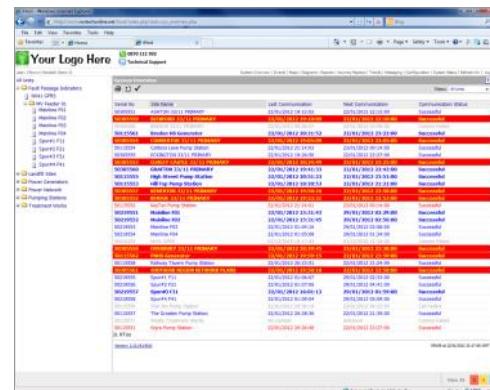
There isn't room to list all the time-saving features, but here are a few to be going on with...

## Site Templates

To speed up installation and commissioning of each field device you can create an unlimited number of 'Templates' which store configuration information. You only need to enter this data once, no matter how many field devices of this type you install. To help further, iHost also allows you to save an existing field device site as a template.

## Uploading from spreadsheets

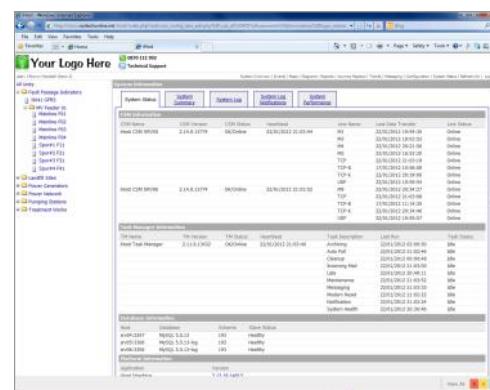
Spreadsheets are a convenient way to move data from system to system. It is common for field device site installation information to be identified in external asset management systems prior to installation. Once the sites have been identified and saved into a spreadsheet they can be uploaded onto iHost. Our import tool automatically creates a database record for each site using the template selected and any additional information provided in the spreadsheet.



## Virtual RTUs

Managing the link between iHost and top end SCADA / DMS / NMS is simplified using 'Virtual RTU' and associated tools. Define what alarm points you want reporting into DMS / NMS from each type of field device and then use this rule to automatically build Virtual RTUs. You can create as many Virtual RTUs as your system requires. You have the freedom to organise as you wish; for example by feeder location, geographical area, field device type etc.

Once built the SCADA / DMS / NMS can poll for data from iHost's Virtual RTUs.



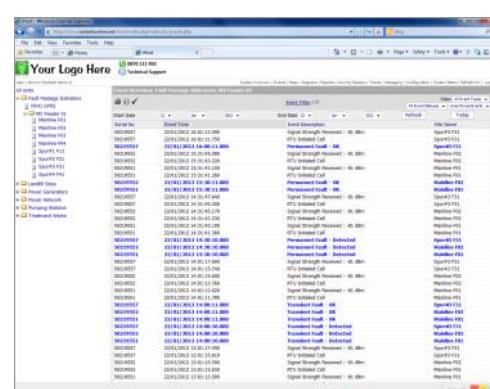
## User profile management

Different users need different privileges. The control room administrator needs to be able to build Templates and Virtual RTUs but might not be the best person to add new field device sites to the system.

Commissioning staff should be able to see field device sites, acknowledge alarms and activate 'test DMS link' functions but should not be able to add new incoming data channels and change protocols in use.

iHost allows unlimited 'User Roles' (each a collection of privileges) to be created. Each user of iHost is assigned to a Role and inherits its privileges. iHost's user friendly, intuitive screens, make managing users and User Roles both simple and secure.

Users can be restricted to just seeing specific iHost folder Groups or applications. So your LV substation teams don't get their views cluttered with the FPI field devices they're not interested in.



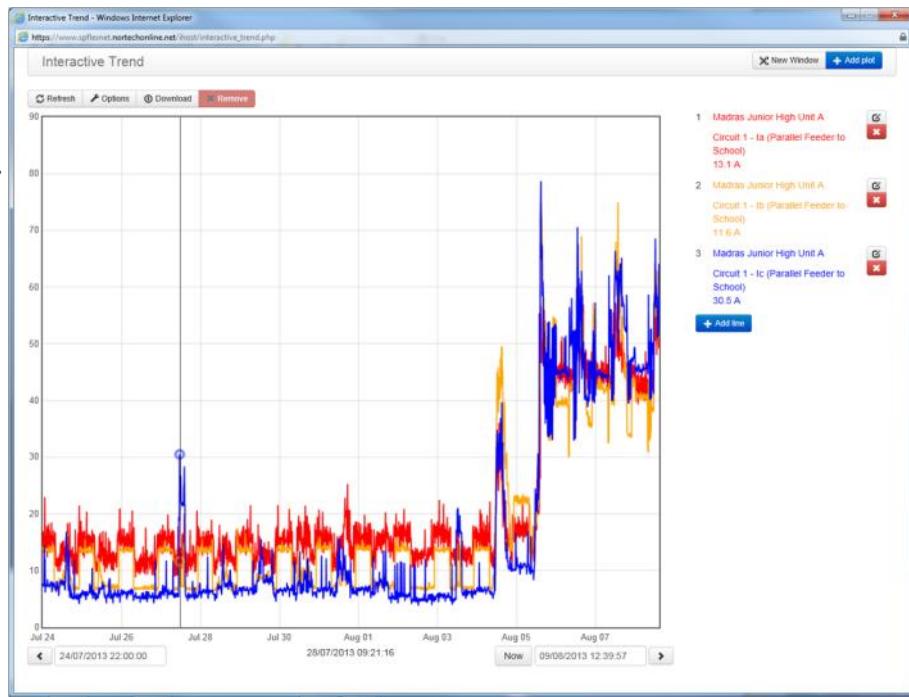
## Pilot schemes with multiple users

For pilot schemes, where Nortech's web-based iHost is used, access to the system is from any internet connected PC. This enables utility engineers, academic partners and device manufacturers to all access the pilot project data. This speeds up pilot schemes and encourages a collaborative, convenient, safe environment for checking results prior to full system deployment.

# iHost™ data

Collecting data was just the start...

Creating real-time, interactive, access to it presented a whole new challenge...



## SQL database

At the heart of the iHost system is an SQL database and file structure. The database design has evolved to meet the changing needs of iHost users and the manufacturers of field devices which generate the data we look after.

## Interactive trends

Providing access to the data is a separate challenge and something we invest a lot of software developer time and effort getting right.

The new interactive trends feature, developed in conjunction with Scottish Power, allows users to visualize and manipulate the data in numerous ways.

## Automated reports

Sometimes you know what data or information you want the system to provide. Perhaps a weekly snapshot of the data in the system which meets certain criteria. This is the role of iHost Reports. Once a report is designed it can be scheduled to run at regular intervals emailing the results to users who've subscribed to the report.

## File archive

Generated reports and other file types (waveform files from field devices for example) are all archived by iHost and accessible through intuitive user friendly pages.

## How raw do you like your data?

# iHost™ developer

## It's your data

We have always been committed to making access to data for iHost owners as simple and open as possible (albeit behind firewalls on a secure network).

Whilst we aim for iHost to provide users everything they need to interact with data collected from field devices we realise there may be times when this isn't the only approach.

So if you want to build your own reports, design something special for use on smart phones or tablets or even build an entire analytics application you are free to do so.

## iHost developer API

Users and manufacturers who want to build their reports, pages and applications using iHost data can use the API (Application Programming Interface).

You'll be pleased to hear that we use the API ourselves to build our complex mimics. We're adding features to the API in response to user community requests.

## Protecting your IPR

As a value adding, IPR owning, developer you can make iHost home for your application and data. This is easiest illustrated using an example:

You have developed an algorithm to calculate the Ampacity for cables. The algorithm calls on raw data parameters such as recent cable load, load imbalance and soil temperatures, all of which are available in iHost. You write your own software code which uses the API to get the raw data from iHost, your code runs the algorithm to calculate Ampacity, then uses the API to insert the Ampacity values back into iHost. Your users can now use iHost interactive trends and reports to access Ampacity values alongside other iHost data. If you want to create some Ampacity specific display, reports etc you can do so using the API.

You can license the Ampacity application direct to iHost owners or through Nortech, your IPR is protected as no one has access to your algorithm embedded in your application code.

The benefits of this approach are clear: The iHost wrapper makes the Ampacity values accessible to users without having to build an entire application and go through the pain of trying to get it installed at the utility.



Build your own reports, pages and applications



# Ready to go devices and applications

## Flexible data handling for any device

If a device has data and can communicate then iHost is the ideal platform to manage the device and share the data. Each device and application calls for a different approach to how this is achieved—the is no limit to the flexibility offered by iHost as can be seen by a few of the examples we've selected here.

### Recloser Dashboard

Default Group > (Unit Overview)

The dashboard displays real-time data from a NOJA CP-01E recloser. It includes sections for LOCAL and REMOTE status, power levels (L1, L2, L3), voltage levels (V1, V2, V3), and various protection and fault detection parameters. A timeline shows basic and detailed events, with a link to export data to CSV. To the right is a photograph of a physical pole-mounted auto recloser unit.

Last Comm: 10/06/2013 12:35:10  
Last Refresh: 10/06/2013 12:35:18

Data last fetched from server: 10/06/2013 12:33  
Oldest host calculated value: 10/06/2013 12:25

### Recloser Dashboard

SP NOJA - All Units (1 units - View All)

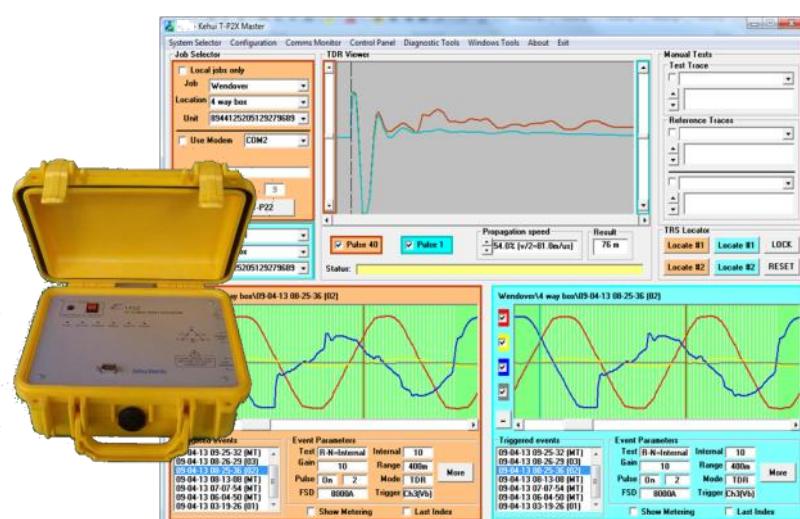
A summary dashboard for the SP NOJA unit, displaying five key metrics: Breaker Open (1), Off Supply (1), Protection Off (1), Local Control (0), and Line (1). Below these are five additional metrics: Comm Failed (0), Warnings\* (0), Pickup (24hr) (0), Opens (24hr) (0), and Opens (week) (0). A note at the bottom indicates that the 'Warnings\*' metric includes units reporting malfunctions and units with failed NOJA comms.

## Pole Mounted Auto Recloser

This is not SCADA this is full engineering access to the analogue data, pickups, fault information and protection settings. iHost has a complete suite of tools to allow the DNO engineer manage the population of PMARs including dashboard summary views, confirming and changing protection settings and even tunneled access to device RS232 ports.

## LV distance to fault

Finding faults on LV cables can be problematic. In this case the Kehui range of distance to fault devices are installed and left in substations, when faults occur the data is transmitted wirelessly (GPRS) to iHost where engineers can interpret the waveforms to identify the precise location of the fault.



## ... smart field devices



### Power Quality Monitors

These devices provide intensive logging of electrical parameters, in the case of the **PQube** (above) right up to the 63rd harmonic on each phase. iHost's innovative implementation for managing power quality devices combines both real-time data collection and indexing and providing access to the data archives stored on the device itself.



### Advanced Voltage Control

Advanced voltage control algorithms incorporated in the

#### Fundamentals

**SuperTapp n+** address modern network operational issues such as embedded generation, network interconnections, busbar configuration changes and troublesome loads. Network and device data is reported to iHost for both real-time confirmation of events and longer term analysis of data.



### LV substation monitors

At the front line of much of the low carbon technologies impact on the network is the LV substation.

Monitoring this impact has lead to several devices aimed at collecting and reporting LV substation parameters.

**Gridkey MCU** (above) and **eMS sub.net** (below) are just two of these devices supported on iHost.

### Real Time Thermal Rating

#### (Dynamic Line rating)

A perfect example of a “smart network” is achieved by applying Dynamic Line Ratings rather than seasonal ratings. This can only be achieved by using weather data collected from the network. Nortech have been involved in several such projects all of which have used iHost to collect weather station data.



Delivery of a turbine blade at Goonhilly in Cornwall



### Monitor & Control Embedded Generation

The perfect application for Nortech technology, both at the remote site (micro RTUs as used at Goonhilly above, or ENVOY) and a central iHost.

Windfarm operators use our technology to make sure their assets are performing as expected, any problems and they know as soon as they occur.

DNOs monitor voltages and power at the generation point and use iHost to send inhibit commands to reduce power output at times when the network cannot provide capacity.

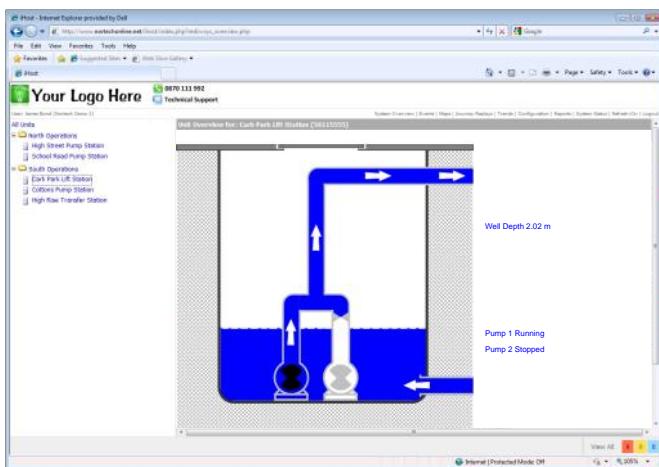
# Ready to go applications

## The pumping station

Our monitoring system is suitable for use on various types and sizes of pumping station. We can monitor single or multiple pumps as well as associated equipment such as flow meters, level and depth gauges, float switches etc.. If it needs to be monitored then our system will collect the information.

## The sensors and probes

Pump stations are fitted with various sensors and probes necessary for the correct operation of the equipment. These same sensors and probes are used by our system to monitor the operation of the pumps and pumping station. Pump running/stopped, Pump healthy/tripped, High level alarm are all examples of 'digital inputs' which provide information about key equipment and alarm conditions. Flow rate, well depth, temperature and vibration are all 'analogue inputs' which provide information for detecting changes in operational conditions.



iHost provides intuitive mimics to display latest station conditions



Control panel is monitored using a NX11 RTU

# Pump Station Monitoring

# iHost Platform

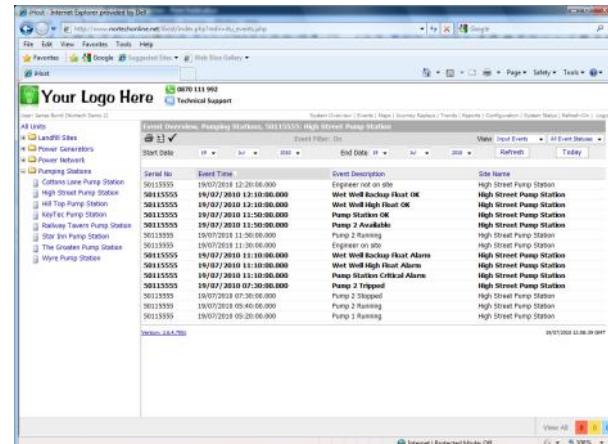
Routine data, events and alarms from all your remote pumping stations are reported to the central iHost system where users have access through a series of user-friendly, secure web (browser) pages.

**Visit all your pump stations in a day!**

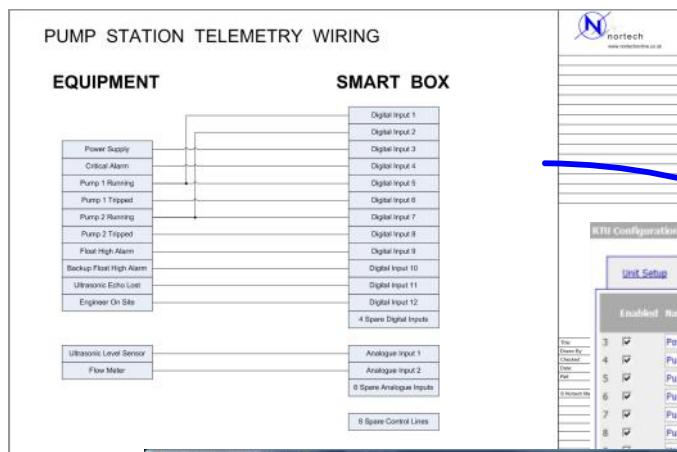
All your pump stations are visible on a series of well organised web pages. You can make virtual site visits without leaving your desk. You can see the current status of all pumps, flow meters, well depths and other monitored equipment. What is more, you are only a click away from opening up the searchable, filterable, sortable event log which keeps a record of everything that has happened on site.

## SMS and Email alarms

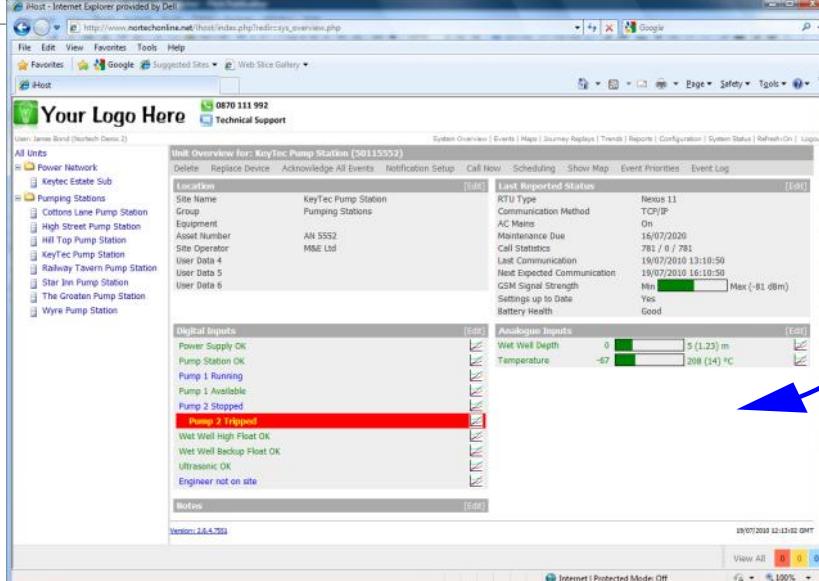
When iHost receives an urgent alarm from a remote pumping station this alarm is forwarded as SMS text messages and Emails to as many users are required. The message content includes the site name, type of alarm and the date it occurred. Messages can include other key conditions such as well levels.



All events are date/time stamped and reported to iHost



Wiring on site is recorded on the iHost settings tab for each site. In many cases templates are stored to remove the need for re-entering the same information each time a new site is added to the system



System Status | Refresh  
Log [ ]  
1:50  
1:50 Max (-81 dBm)  
3) m  
(4) °C

[1]

iHost displays up-to-the-minute status for each site using simple colour coding and flashing icons for equipment with alarms.

# Ready to go applications

NorLock™ enables any mobile phone you authorise to be used as a key. You now have control and visibility over who is using their 'keys', where, when and how often.

If you need to get keys back... NorLock can remove authorisation from a mobile phone in seconds.

Lost keys... NorLock add authorisation for a new mobile phone in seconds.

As well as indoor and outdoor safes fitted with NorLock opening you can replace cabinet-locks, door-locks, gate-controls and padlocks with NorLock, the intelligent new locking system from Nortech.



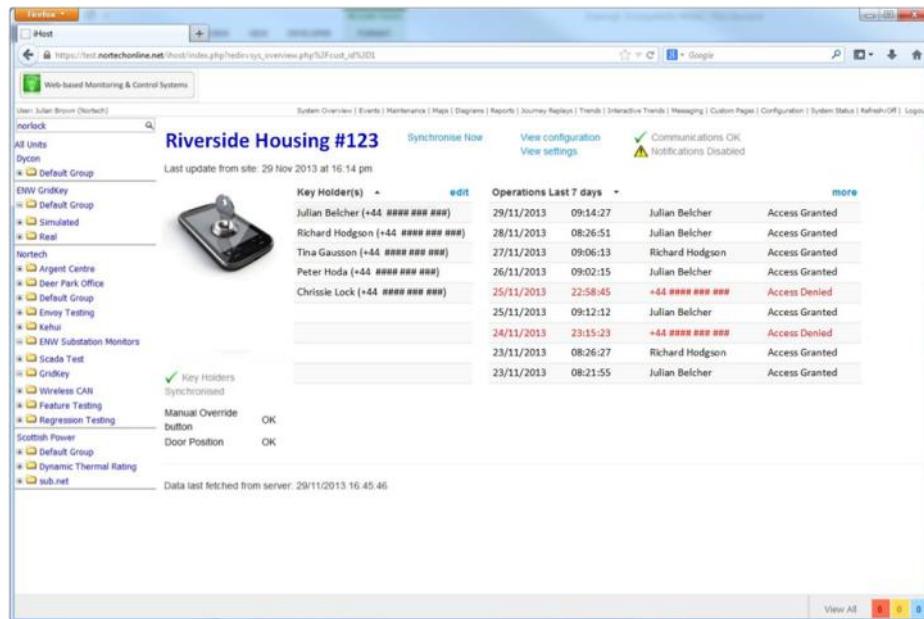
Indoor safe unit - NorLock allows access to the safe only to authorised phones



On-door unit - NorLock releases the door strike only to authorised phones

# NorLock™

Key Management without the keys! Simple and secure.



NorLock

## Suitable for applications in

- Retail premises.
- Warehousing facilities.
- Educational/nursery establishments.
- Residential properties.
- Banking Sector.
- Pub, club and leisure industry.
- Owner occupied premises.
- Managed property portfolios.
- Healthcare establishments – secure & non-secure.
- Isolated properties –market gardens, water sampling points, telecoms junctions.
- Social housing.
- Un-manned sites - pumping and electricity substations.
- Secure environments – Banks, police stations, prisons etc.

## Features

- You have a unique Username and Password to access the NorLock™ System Server.
- Tools to manage groups of sites, groups of users and different key holder privileges.
- All access attempts, successful and denied, are date and time stamped by NorLock device and reported to the NorLock server where the information is displayed and archived.
- Grant limited time access to key holders for specific events.
- Notify supervisors when unauthorised access is attempted.
- Display site access reports: how often accessed, by who and at what times.
- Display key holder reports: which sites visited, how often and on which date.
- Custom Reports provides customer specific checks - view the site and access information database to display the information you need.

# Ready to go applications

Fault Passage Indicators (FPIs) are widely used on overhead and cable networks, on radial and interconnected networks.

An emerging trend is the increasing deployment of communicating FPI devices. Alarms and data now arriving over low cost wireless communication networks.

iHost™ has been designed to provide a managed central host for both the FPI alarm data and the configuration data required by the FPIs themselves. iHost provides FEP (Front End Processing), Data Concentration and Population Management functions.

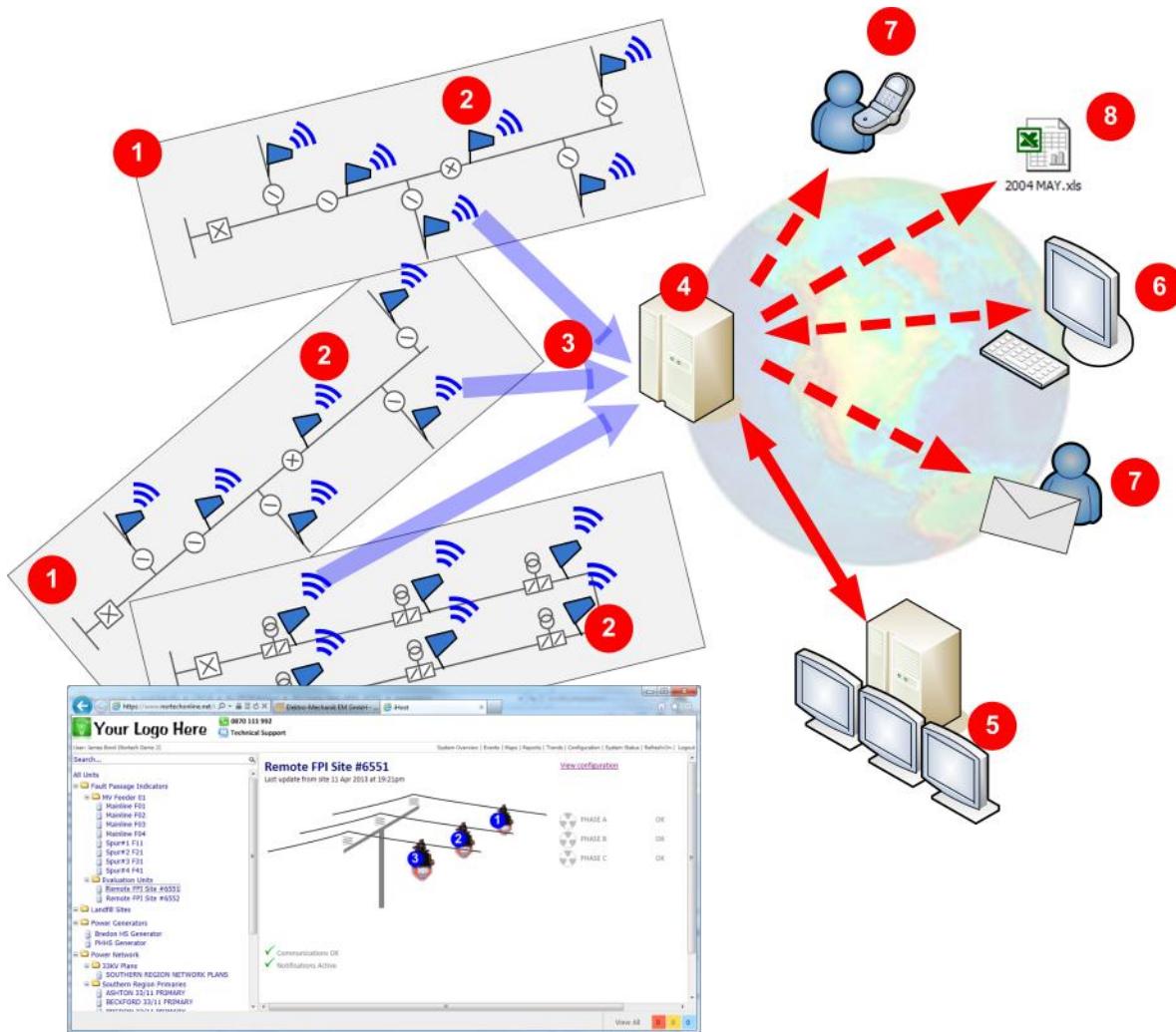
Any number of remote FPIs can be monitored from a single iHost server. All communication links are 100% monitored and links to NMS and DMS systems are provided.

## A selection of communicating FPIs...

iHost provides support for all the major manufacturers products and protocols.



# Remote Fault Passage Indicators



## 1: Distribution network feeders

Install FPIs throughout the distribution network. On overhead lines select strategic switching and branching points. On cable networks install at ground mounted distribution substations.

## 2: Fault Passage Indicator

FPIs monitor a single location on the network. When fault current passes this point on the network the FPI sends an alarm to iHost. During healthy times the FPI makes regular 'health checks' to confirm operational readiness.

## 3: GPRS network

Most FPIs available use the GPRS network as a low cost, reliable, method of communicating with the outside world. Many FPIs have modems built in as standard, for others retrofit GPRS RTUs are available. Protocols are generally proprietary.

## 4: iHost™

At the centre of the system is the iHost Platform. iHost receives incoming data from all remote FPIs, automatically actions alarms, passes updates to DMS / NMS where these are connected, displays status conditions and provides long term data storage.

## 5: Distribution Management System (DMS/NMS)

iHost provides all alarms from all remote FPIs across a single interface. iHost supports a number of connection methods including SCADA protocols, FTP and web-services.

## 6: Browser based user access

Users login to iHost web-pages from any intranet connected PC (where the system is installed on the utility's own servers) or internet connected PC (where the system is web based). Used in standalone mode iHost provides a self-contained SCADA system for the entire remote FPI population.

## 7: Email and SMS notification

Alarms from FPIs can be forwarded to as many users as required. The format of messages are configurable and typically include Feeder, FPI location, Time and Alarm descriptions. Users can select to receive alarms from all, or just some, of the FPIs monitored.

## 8: Download data

In case you need to keep a local copy of your data, or want to include tables and graphing in your own reports, you can search and download data in spreadsheet format.

# Ready to go applications

Remotely monitoring alarms and data from system assets enables the utility to operate the network at greater efficiency, more safely, with the minimum of power interruptions.

Installing a system for remotely monitoring LV substations delivers advantages throughout the utility, including :

- ▶ Control Room engineers receive network alarms in real-time
- ▶ Planning engineers get access to load and voltage data (including half hourly maximum demand)
- ▶ Asset Management and Maintenance functions gain unrivalled visibility of how an entire group of assets are performing

At higher voltages it is routine for utilities to install telemetry and SCADA systems to improve the operation of the network. Nortech's remote monitoring system for LV substations provides utilities with the option to monitor assets at lower network voltages economically.

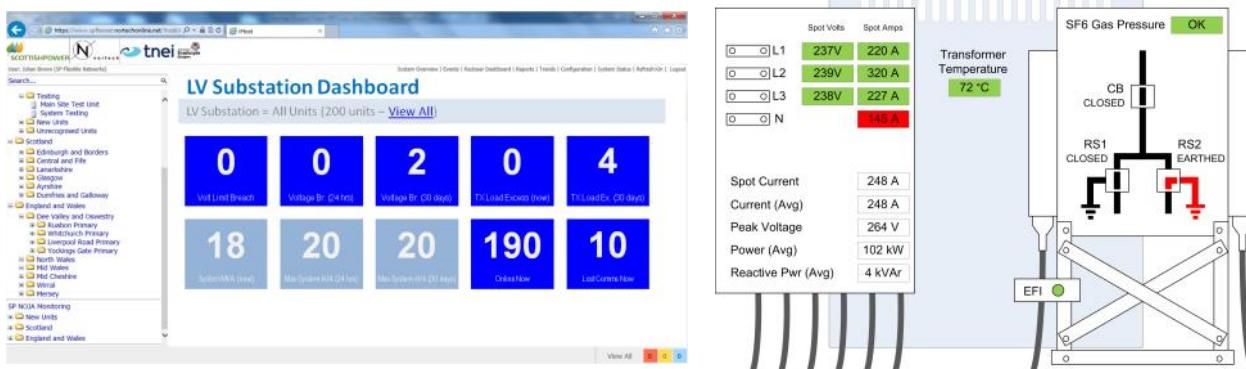


This is often the only LV substation data available



Introducing the new, smart, LV substation monitor

# LV Substation Monitoring

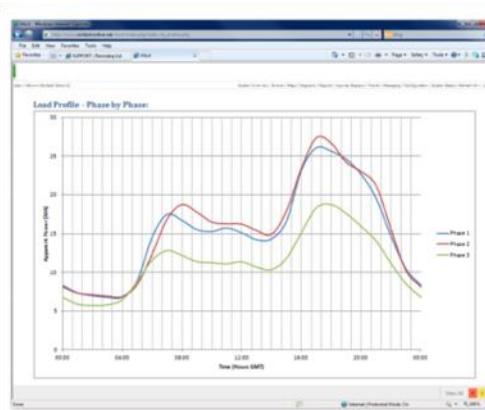
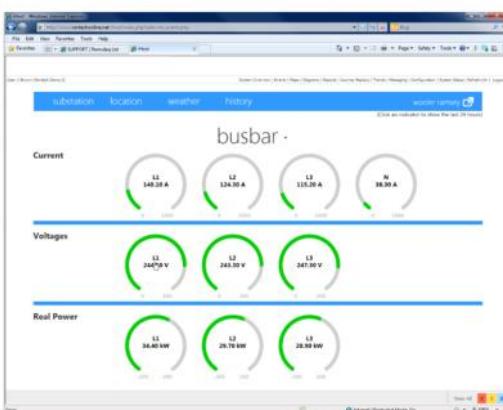
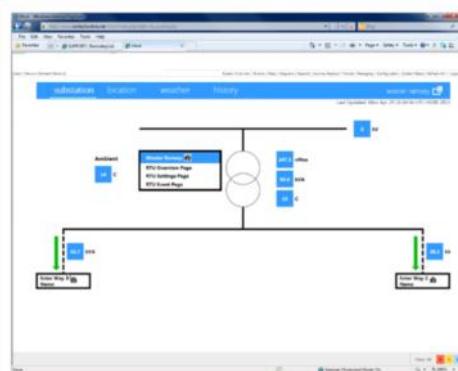


## Application Dashboard

The starting point to using the system is your dashboard. A high level view of key information about the system and its current status. Click on a tile to drill down into the information that you want to view.

## Interactive Substation Mimics

The current status of your substations are displayed on intuitive mimics, updated seamlessly in real-time. We offer standard substation mimics and can build new ones to customer requirements in a few days.



## Smart MDI views

The move to embedded PV generation, ground source heat pumps and the growing likelihood of charging electric vehicles means the data from LV substation MDIs will be crucial. We've replaced the obsolete coil meters with "smart MDIs" providing remote visibility of real-time readings (above), load profiles (above right) and load duration curves (right)



There are several manufacturers of LV substation monitoring equipment which are supported on iHost. This page focuses on how the LV substation data is managed and delivered to users. For more information on the field devices please contact us.

# iHost™ Licensing options

## **iHost: the best choice for your network monitoring applications**

We guarantee iHost remains the most economical solution for reliable remote monitoring of network assets using “field devices” through continued investment in product development. Our engineering team work closely with customers, manufacturers and end-users to make sure the product continues to offer the functionality called for as business and regulatory drivers evolve.

Our flexible licensing options mean you can confidently select the option that best meets your business needs.

### **Fast pilot schemes: Web access hosted by Nortech**

Perfect for pilot schemes as well as systems where there is no control room interface required for SCADA / DMS / NMS. There is no need for you to install any software or to involve your IT department.

Nortech operate a cluster of iHost servers in the UK; accepting alarms and data from field devices via the GPRS network. Emails and SMS notifications are sent to you from our servers. Your username and password gives you secure access to view the alarms and status from all your field devices on a single set of screens.

The monthly charge (much like a mobile phone contract) includes technical support from Nortech engineers. There are no lengthy contract terms and it is simple to upgrade to your own server as the system grows.

### **Licensed: For installation on your servers**

Ideal for customers who have a requirement to keep the data in-house or where the data needs to be shared in real-time with other systems such as SCADA, DMS or Network Management Systems.

Our fully licensed option for iHost is installed on your servers, behind your firewalls. iHost is now an integral part of your IT / SCADA infrastructure, seamlessly linking with other systems, creating the opportunity for maximum operational benefits.

Product upgrades and new features are included in the licensing costs. Technical support is offered to suit individual customer requirements and will usually involve regular site visits (or VPN visits) and preparation of system performance reports.

### **High availability: Scalable to multiple servers**

Whilst it is perfectly acceptable to monitor large populations of field devices from a single iHost server it is also common to enhance the resilience and redundancy of the system by installing iHost software modules across more than one server and location. We offer a number of options for providing high availability systems.

### **Test & Staging server licensing**

For larger systems it is common to include additional iHost instances for use as Testing and Staging servers. To promote IT best practice we offer attractive licensing options for customers wishing to implement this architecture.



# Remote Monitoring Solutions

- ▶ Remote MV Fault Indicator Systems
- ▶ LV Substation Monitoring
- ▶ Renewable Generation Monitoring and Control
- ▶ Generator Set Monitoring and Control
- ▶ Remote Tank & Silo Inventory Monitoring
- ▶ Smart Grid Applications
- ▶ Pump Station Monitoring
- ▶ Primary & Zone Substation Monitoring

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