nortech

www.nortechonline.co.uk

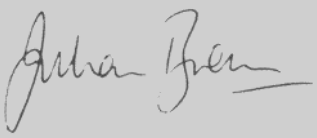
Company Profile

Welcome

Nortech supply innovative monitoring and control technology to network and system operators, with a strong emphasis on delivering working end-to-end business as usual solutions.

This brochure introduces our core products together with some of our recent projects. 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.

Founded in 1993 Nortech remains a UK SME operating as part of the **Horstmann Gmbh** group of companies.



Julian Brown. Managing Director

Nortech company introduction video

ISO 9001 ISO 14001 ISO 27001

Drivers for change

The increase in embedded generation, changes in load patterns and adoption of electric vehicles are just some of the reasons that power flows, voltage profiles and constraints on the distribution network are becoming more complex and no longer match traditional models used by network planners and design teams.

Taking action to keep the grid stable requires that operators have visibility of what is happening out on the network.

Nortech technology components provide network and system operators the ability to see deep into the network beyond the reach of traditional SCADA systems.

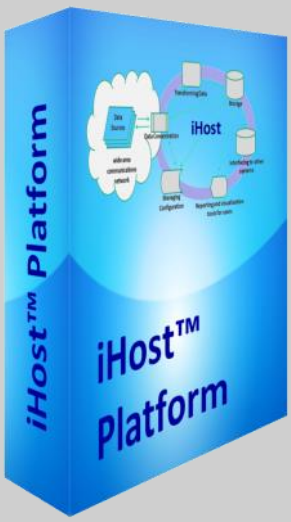
Contents

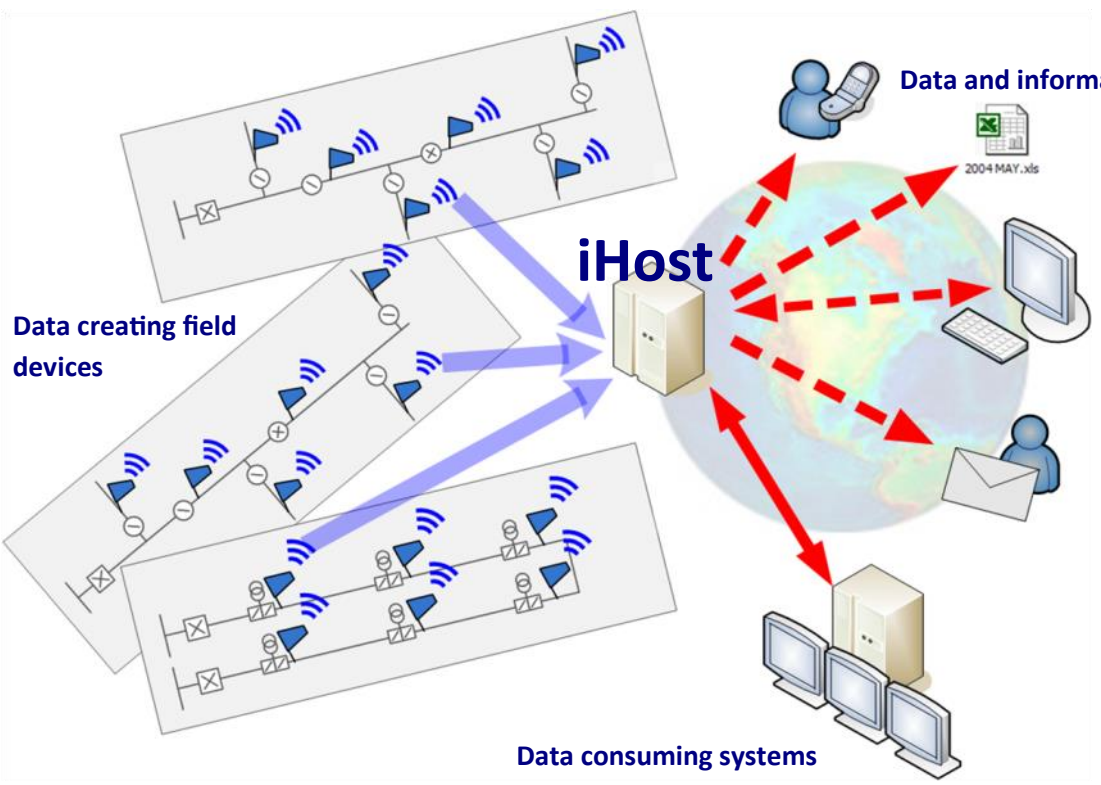
iHost™ Platform

iHost™ provides a single platform enabling customers to manage the increasing numbers of small, low cost, communicating “smart field devices” installed at remote locations as well as building “Smart Grid” applications using the data.

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, iHost offers the ideal off-the-shelf “head end system” for large populations of communicating field devices from multiple vendors.





Enabling the connected utility

The iHost Concept

To provide a central platform to accept, process, store, visualise and share data from the increasing number of low cost monitoring devices installed throughout customers' networks.

iHost is an open platform ready to accept data from any communicating device and then 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.

Network and System Operators 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.

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, cyber security and ongoing support for these devices.

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

Data Concentrator

- Collects, processes and stores data from remote field devices.
- Provide DNP3 master, NEXUS and several other proprietary vendor protocols.
- Capable of simultaneous communications with several thousands of field devices.

Historian

- Datastore provides years of data from thousands of devices with on-the-fly retrieval.
- Flexible data views for engineering, planning and asset management.

Alarm and Data Visualisation

- Visualisation of alarms and data for both real-time operations and off-line design and engineering.
- Fully configurable alarm management and prioritisation.
- Powerful "logic points" feature allows user entered formula to combine multiple data points in real-time.

Population Management

- Ongoing configuration and management of field devices (battery status, signal strength etc).
- Over-the-air firmware management and updates.
- Full and partial over-the-air configuration management and updates.
- Security Certificate Issuing Authority and Certificate Management.

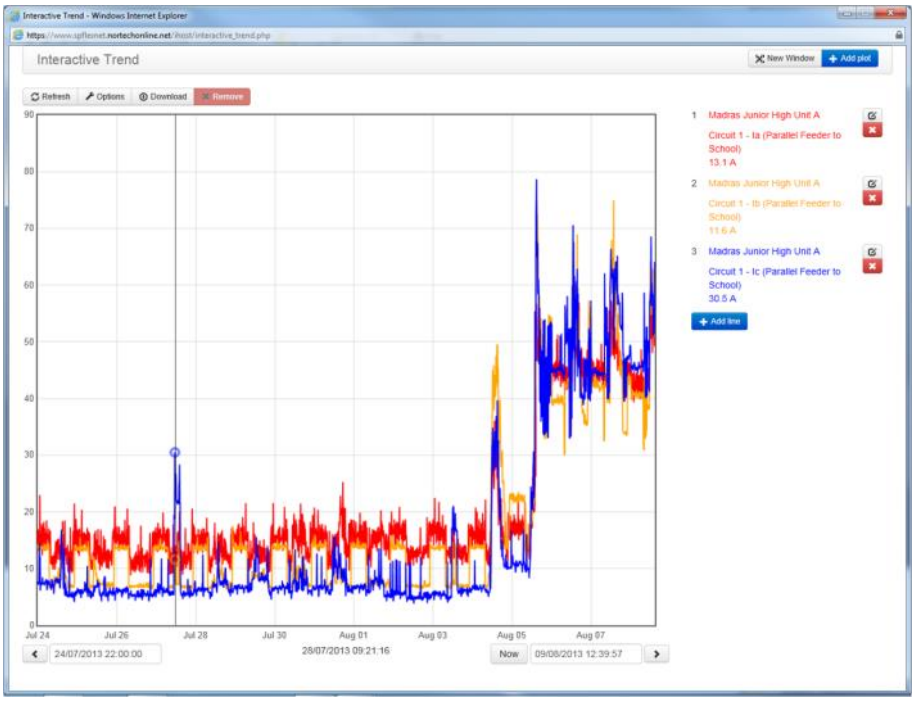
Protocol Converter / SCADA Gateway

- "Virtual RTU" feature allowing templated bespoke data-mapping from field devices to SCADA.
- Supports multiple SCADA protocols (DNP3, 101, 104) and ICCP.

iHost™ Historian

Collecting data was just the start...

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



iHost screen shot - interactive trends

SQL database

At the heart of the iHost system is an SQL database and big data "no-SQL" file structure. Our integrated datastore 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.

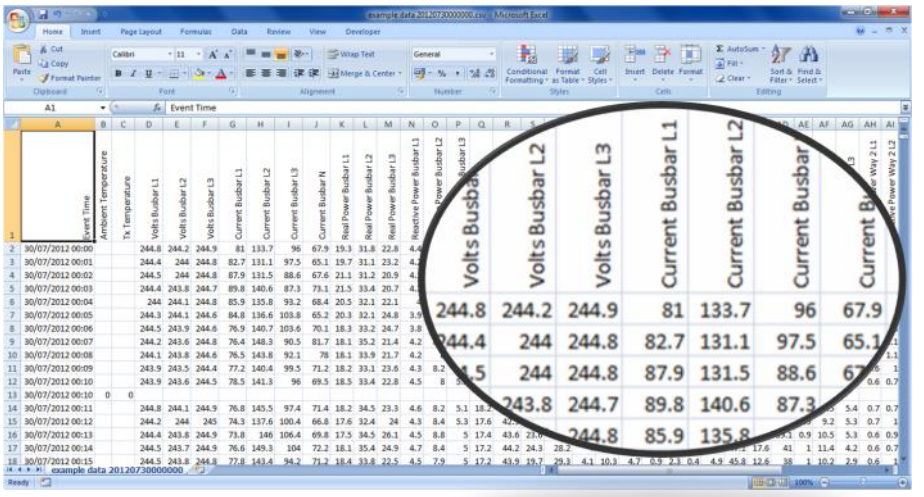
Automated reports

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 export CSV report

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).

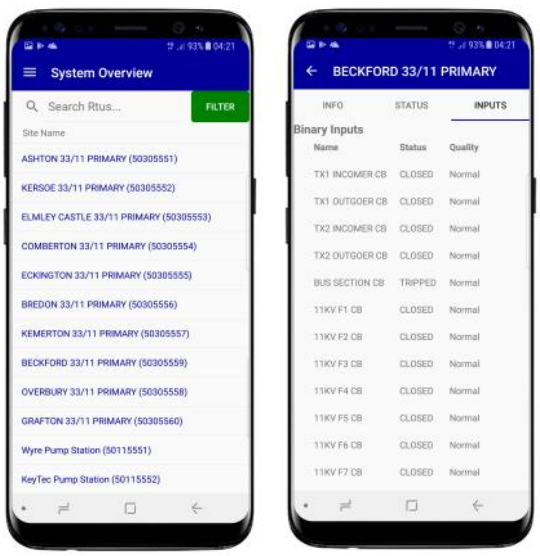
Whilst we aim for iHost to provide users everything they need to interact with data collected from field devices we realise there may be times when this isn't the only approach.

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 own reports, pages and applications using iHost data can use the iHost API (Application Programming Interface).

You'll be pleased to hear that we use the API ourselves to build our complex mimics and the recently launched "iHost App" for smart phones. We're committed to adding features to the API in response to user community requests.



iHost App for smart phones

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

Communicating FPIs
(Fault Passage Indicators)

Whilst we continue to offer standard non-communicating FPIs for both cable networks and overhead lines (not shown in this brochure) the need to drive down Customer Minutes Lost and Customer Interruptions makes a **compelling business case for fully communicating FPIs**.

Our products seamlessly integrate fault detection, load and power measurement, RTU functions, power supplies, communication and mounting enclosure—all in a single optimised device.

Nortech's **" just swap the lid "** technology allows customers with our S10, S20, S30, F20, NX41, NX42 and NX43 cable fault indicator models to be simply upgraded to NX44 or NX45 in the field.

NX Communicating FPI

FPI load data displayed on iHost

Smart Navigator Communicating FPI

NX44

Fault Passage Indicator

Provides versatile, fully configurable, Over Current and Earth Fault detection on MV cable networks. Provides HV load and loss of supply monitoring and reporting. Available as AC powered with back-up battery or DC powered.

Compatible with 1A secondary CTs as well as our flexible retrofit CT solutions. The NX44 can be offered as a directional FPI subject to suitable VPIS terminals on the switchgear.

For use with distribution automation RTUs the NX44 provides 4 configurable alarm outputs, 4-20mA and 0-10V analogue output (providing MV current status) and a Modbus slave interface.

With built in RTU functionality and the option for 4G/2G communications (field exchangeable) the NX44 can deliver a native DNP3 link direct to the control room as well as over-the-air firmware updates and configuration management from iHost.

NX45

Self Powered Twin EFI

Entirely self powered using a lithium primary battery pack the NX45 provides two separate channels of Earth Fault Indication for use on HV cable networks.

Compatible with 1A secondary CTs as well as our flexible retrofit CT solutions.

The unit comes as standard with built in RTU functionality and 4G/2G communications (field exchangeable) providing a native DNP3 link to the control room as well as over-the-air firmware updates and configuration management from iHost.

Navigator

Overhead Line FPI

A breakthrough in Over Current and Earth Fault detection for overhead HV networks. Providing Fault Reporting, HV load logging and Loss of Supply indication. Installed live-line and weighing in at less than 1kg.

Using proprietary energy harvesting technology with rechargeable battery the system is designed for even the lightest loaded lines.

Supplied as a set of 3 units (1 Central and 2 Satellites) with low power radio links between the units. The central unit includes built in 4G/2G communications providing RTU functionality and a native DNP3 link to the control room - reporting alarms and load data from all units in the set. Over-the-air firmware updates and configuration management from iHost.

Nexus micro RTUs

The Nexus family of micro RTUs provide the asset operator with economical, reliable, remote site monitoring for a wide range of 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.

Monitoring and control of embedded generation connections

Fault Location on overhead networks being installed in the Middle East

NX22
Self powered micro RTU

The NX22 provides an RTUs for use in locations where there is no auxiliary power available.

With comprehensive RTU functionality and a field upgradeable 4G/2G modem card. Over-the-air configuration and firmware updates from iHost.

The unit is entirely self powered with maintenance intervals of up to 10 years.

NX12
Micro RTU

The NX12 provides a low cost alternative to traditional RTUs. Small form factor but powerful RTU functionality, flexible I/O complete with configurable Modbus master protocol and over-the-air configuration and firmware updates from iHost.

With built in 4G/2G communications and battery backup option the NX12 is a flexible solution for a variety of remote equipment monitoring applications.

Nortech RTU providing LV Substation monitoring in the UK

Customer product training on site in the Middle East

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

Ready for anything (almost)

Hardware features

- ARM9 processor
- RTC with standby power
- LCD display with function buttons
- 4G/2G GSM modem
- Ethernet 10/100 Port
- SD card
- 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

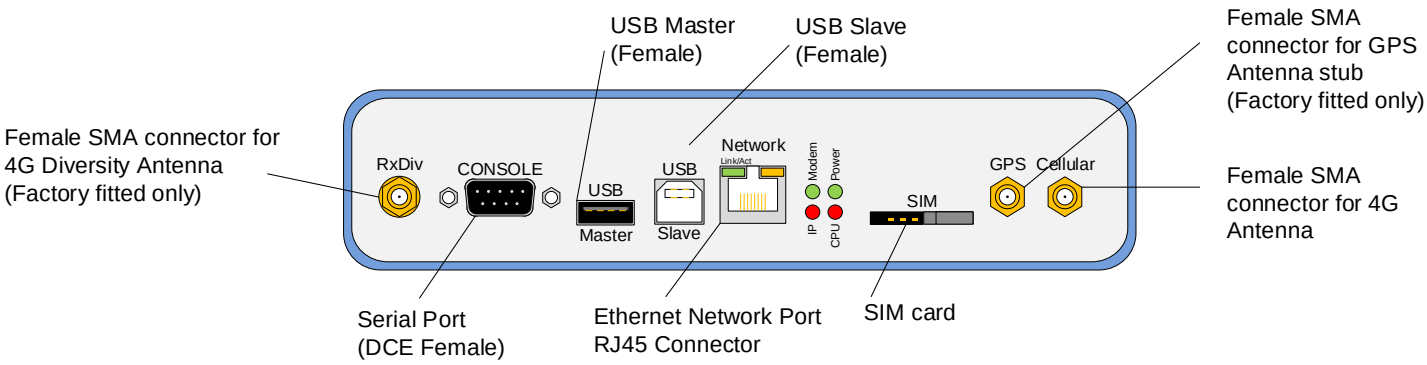
Host facing / Slave protocols

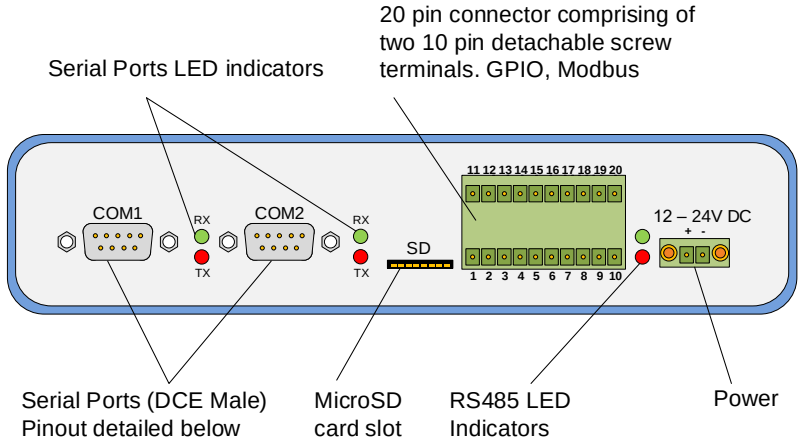
- NEXUS 32-bit
- DNP3
- IEC 61850
- CANBUS
- OCPP
- SNMP (on request)

Host / Master protocols

- MODBUS
- DNP3
- CANBUS
- OCPP
- SNMP (on request)

Note: Protocols are not necessarily available over all communication channels





LV Substation Monitoring

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 :

- Planning engineers get access to load and voltage data (including half hourly maximum demand)
- Accurate information about head-room availability prior to making connection offers
- Control Room engineers receive network alarms in real-time

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.

Supported LV monitoring products

iHost™ provides support for several LV monitoring products from Nortech, companies in our group and third-party equipment. Products include Smart MDIs, busbar only monitors and full LV distribution substation monitors.

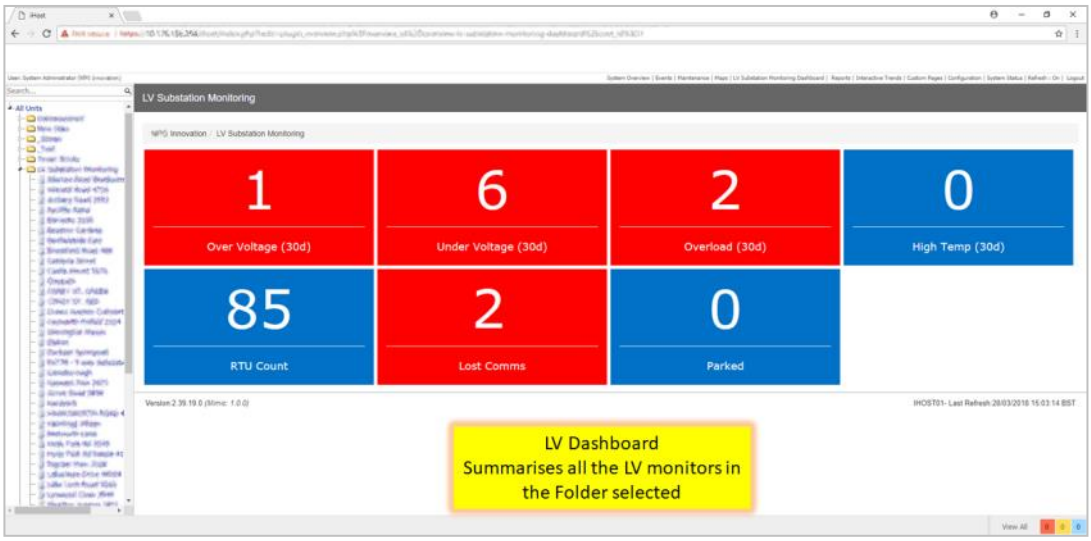
Please contact us to discuss your application.

Substation fitted with LV monitoring unit

LV Dashboard

"LV Dashboard" offers a system entry point in addition to single line diagrams, geo-mapping and list based site navigation .

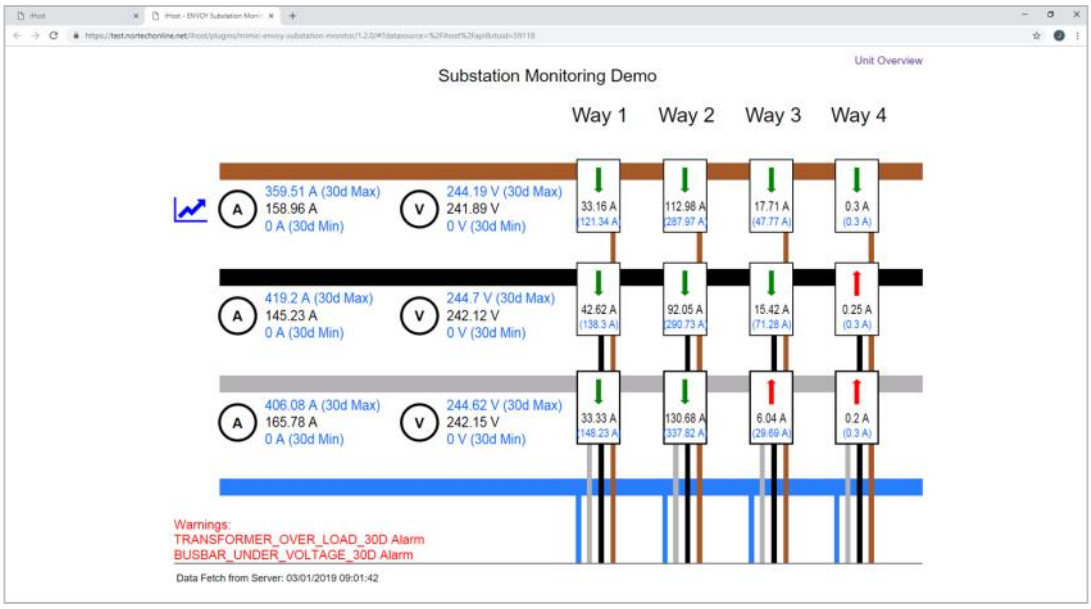
LV Dashboard provides a real-time high level view of key information about the system and its current status. Click on a tile to drill down into the information that you want to view.



Substation Mimic

Displaying the most recent data from a single LV substation. Mimics are device sensitive – they automatically reconfigure to display the data supported by the device in the substation.

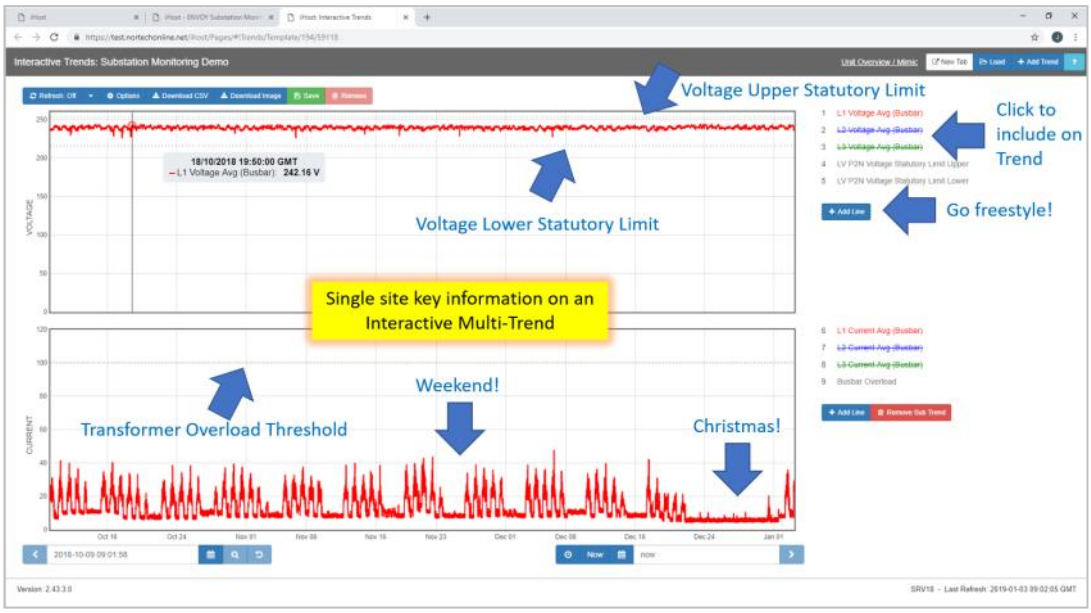
Elements on the Mimic are clickable links giving immediate "drill down" into trend/graphing data for the selected parameter.



Planning data

Designed with planning engineers in mind this screen analyses and displays key information from the last 12 months for the selected site.

Extending the data points displayed and exporting the underlying data is available directly from the screen.



Active Network Management

ANM suite of solutions

Our portfolio of deliverable products and practical experience continues to grow…

From fixed price flexible generation connections for LV and HV through to control of a 33kV 20MVA flexible power link entailing multi-objective optimisation using real-time sensitivity factors, management of network wide constraints, auditable decision making, state estimation, on-line simulations, ICCP links…

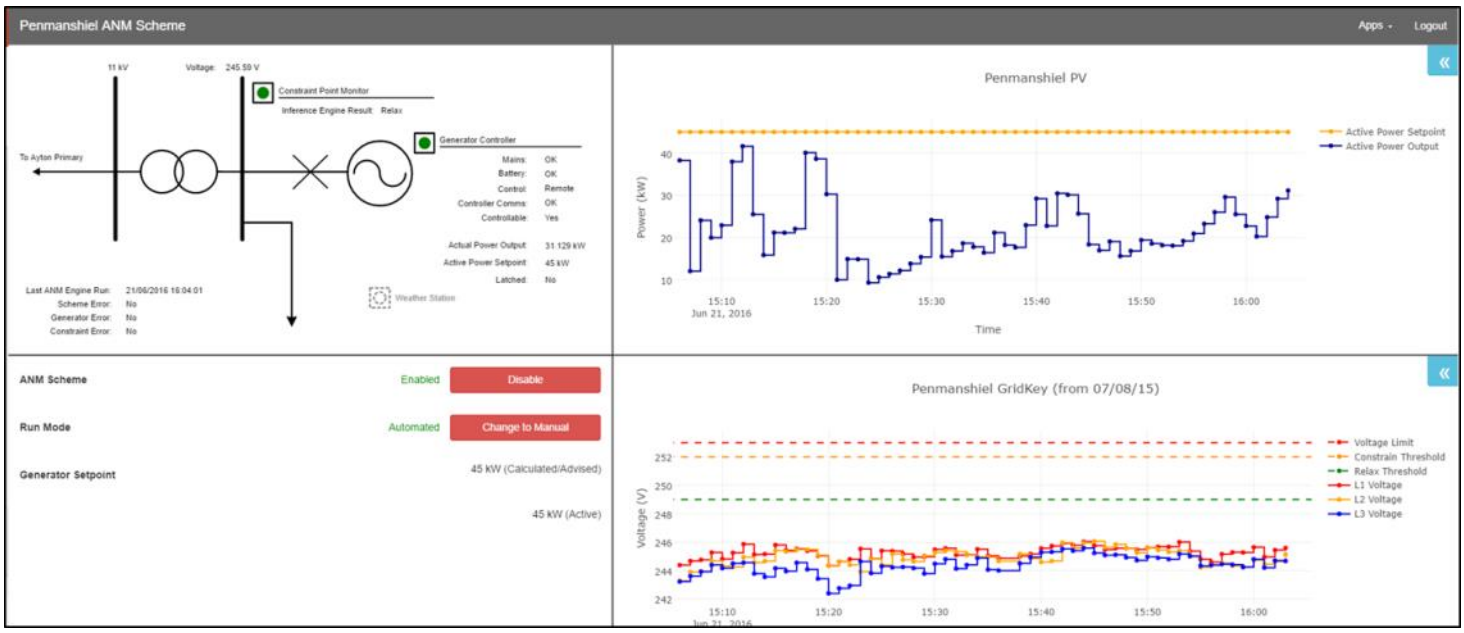
If you would like to discuss how Nortech technology can help you deliver ANM and flexible connections please get in touch.

ANM Generator Controller

PV and battery ANM controller

Enabling Flexible Connections

The iHost™ ANM Engine offers several Active Network Management algorithms. Combined with an intuitive real time user interface the system makes operating multiple ANM schemes straight forward from a single central platform.



ANM in action

This example shows a Voltage Constraint in operation. As shown in the iHost ANM User Interface the ANM Engine works seamlessly with ENVOY field devices to keep the network within limits by constraining and releasing the generator.

1. Upstream network event caused increased voltage
2. Voltages breach the "constrain" threshold
3. ANM system responds by constraining generation
4. Voltages reduce to "safe" operating level
5. Upstream network event returns to original state
6. ANM system responds by releasing the generation

Recent / Current Projects

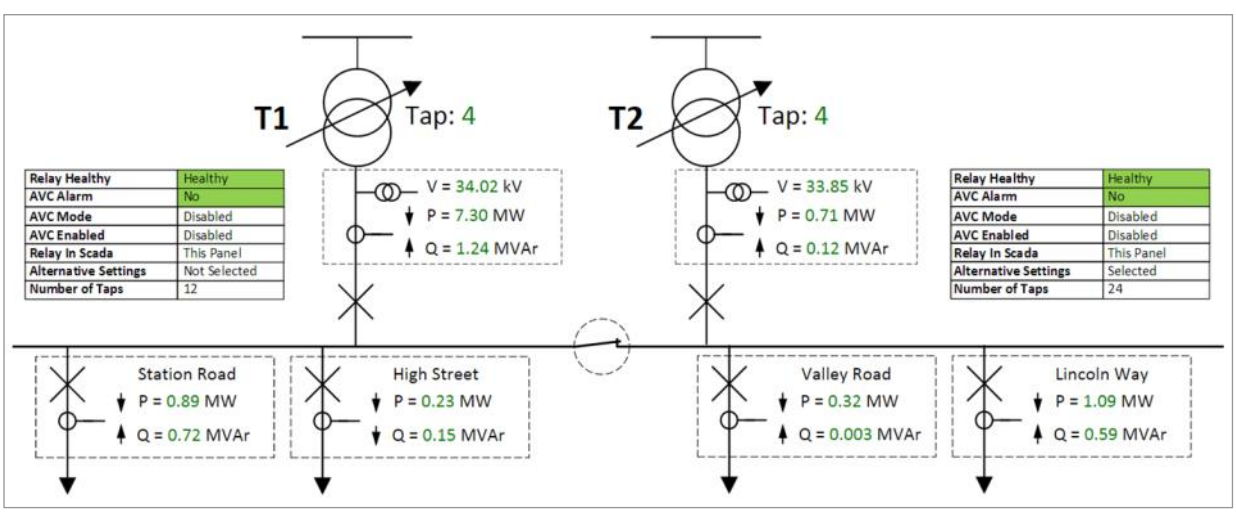
Our in-house product development team's experience with system integration, protocol implementation, cyber security, software development and whole system testing make us an ideal project partner for a wide range of projects.

Included here are a small selection of recent projects we have been involved in. Project objectives and funding vary from case to case and include government innovation funding, customer financed pilot schemes and business as usual roll-out programmes.

If you would like to discuss how we may be able to fill a "Nortech shaped gap" in your next project's team or technology please get in touch.

Advanced Voltage Control

Nortech iHost™ and ENVOY products are used to provide monitoring and control of Advanced Voltage Control schemes. Projects involve integration of vendor proprietary protocol, over the air configuration updates as well as a customised iHost User Interface.



Power Pointer

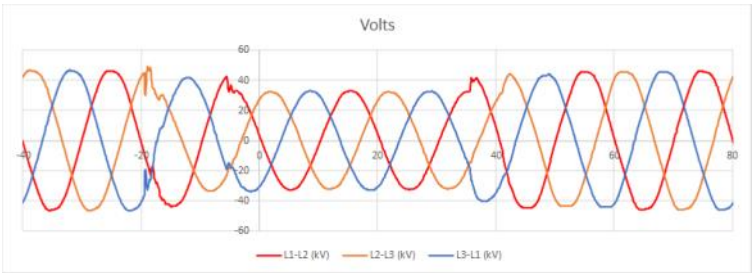
Working closely with Western Power Distribution this project delivers a step change in the information available from overhead lines at 11kV through to 132kV. Sensors transmitting real-time alarms and power flow data will be used for several applications including detection of hidden generation output, post-fault ratings of overhead lines and directional power flow monitoring.

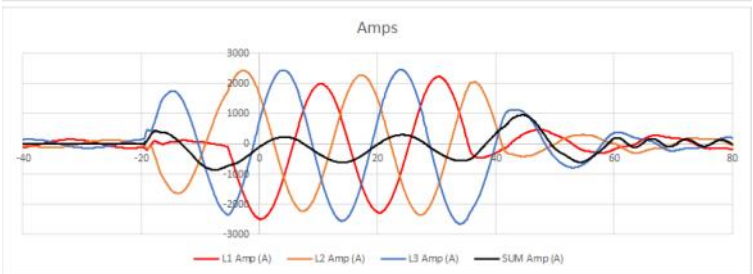
Primary Networks PQ Analysis

The “PNPQA” project aims to understand and anticipate the impact on power quality / harmonics caused by LCT generation (set to double by 2030) and the continued electrification of heat and transport.

The project automates retrieval and analysis of power quality / harmonics data from multiple vendors’ PQ equipment installed in Primary Substations.

A decision support tool for modelling and forecasting harmonic / PQ effects is also in scope.





Per second power quality data

electricity north west

Bringing energy to your door

ENVOY units installed at primary substations monitor per second power quality data and advanced voltage control data as part of the CLASS Smart Grid project led by Electricity North West.

Recent / Current Projects

LV Flexible Urban Networks

“ In particular, the use of iHost facilitated the transfer of network data between the remote substations, the PED and the control system.” [1]

The “Nortech shaped piece” of the £8m project involved:

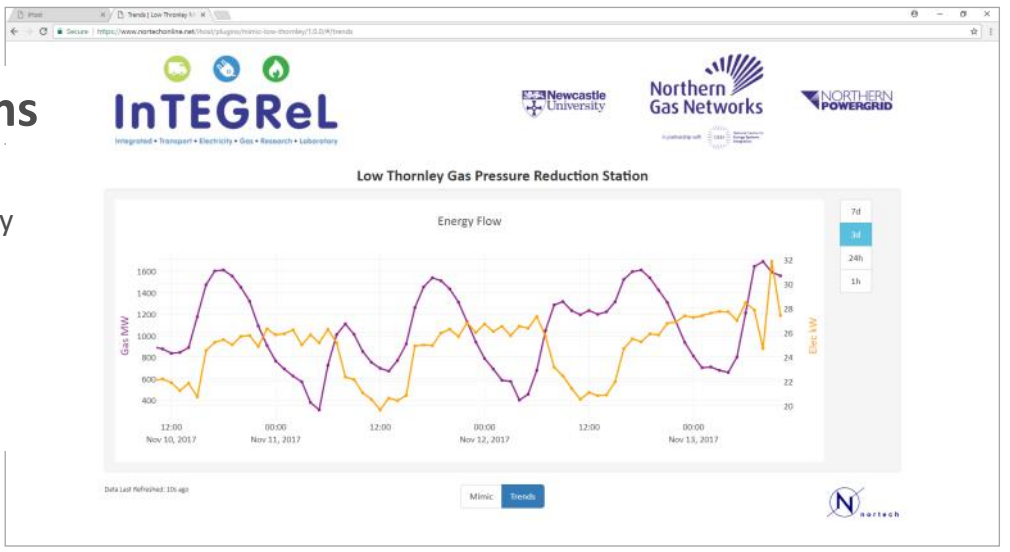
→ 30 installations across UKPN’s License Areas
→ LV monitoring and control application
→ System Integration with GE’s PowerON, TPS’s PEDS and GMCi-ProSys
→ ENVOY provided real-time monitoring (DNP3 over GSM)
→ iHost provided remote monitoring and control (DNP3 over GSM)

LV CAP ™
Common Application Platform

Developed jointly by Nortech and EATL. LV-CAP software provides a “smart phone like platform” enabling multiple applications, from different vendors, to simultaneously share use of sensors and communications links. LV-CAP opens up the possibility of low cost, future proof, substation and network monitoring. The first field trials are taking place in the UK as part of the £5m Open LV project on the WPD network.

Multi – Vector Systems

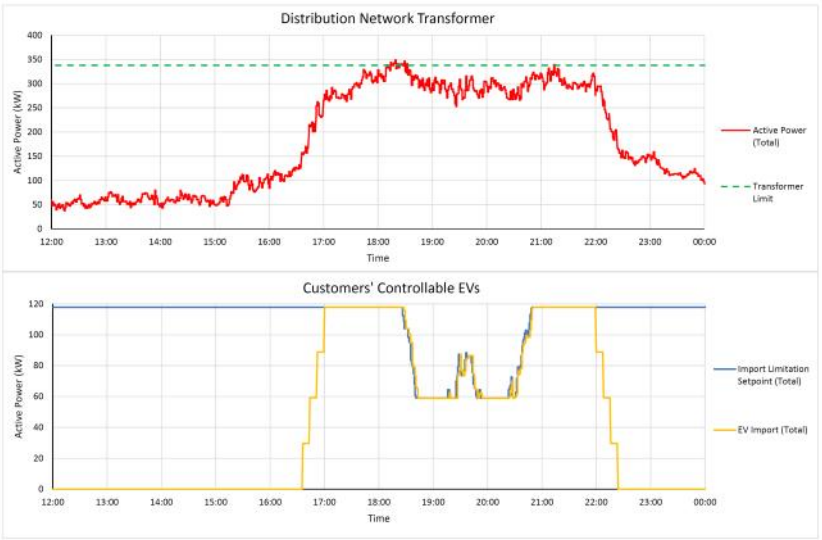
System integration of data from gas network and power network. Initially for display on the iHost cloud based portal, these are the opening steps towards a multi vector control application.



[1] UK Power Network (Operations) Ltd: FUN-LV Closedown Report

LV Connect & Manage

LV Connect and Manage (LVCM) provides emergency overload protection for the distribution network, a specific form of Active Network Management developed during the project. The solution has been successfully tested as part of a NIA project and is now ready to be deployed in areas with high concentrations of low carbon technologies (LCTs) such as electric vehicles, solar panels, battery storage and heat pumps.



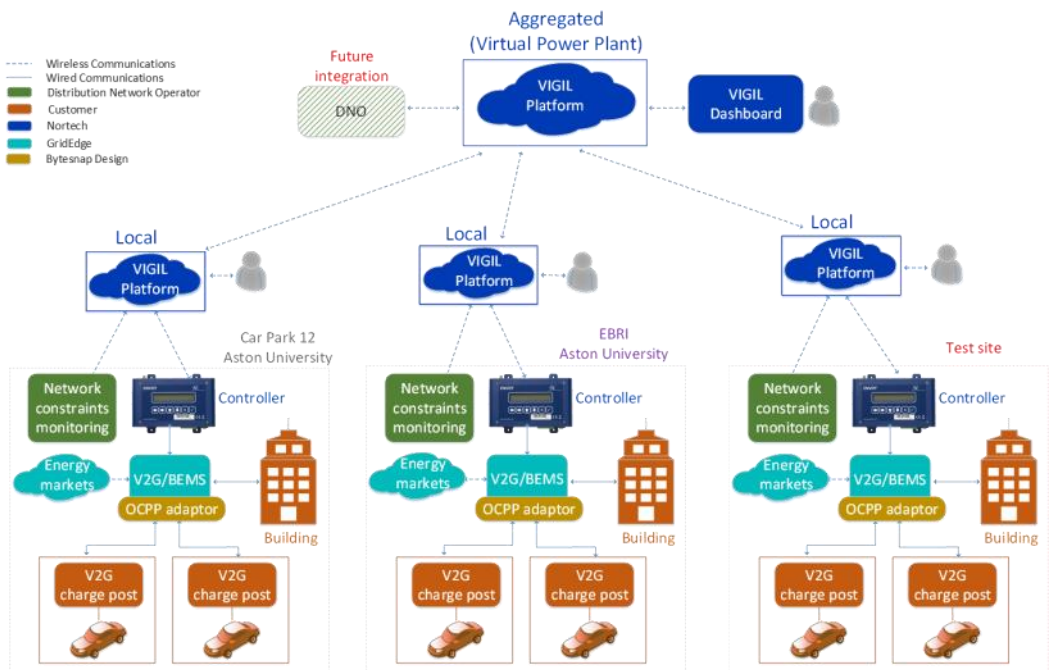
Why is the LVCM solution needed? The typical diversified maximum demand for a domestic property is between 1.5 and 2.5 kW. A typical electric vehicle will charge at 7 kW. Whilst the domestic wiring network, and the individual network connections, will already be sized to accommodate loads of this magnitude, the upstream distribution network and substation will not be able to accommodate all electric vehicles charging at maximum capacity simultaneously. (1)

VIGIL Platform

The **V**eh**I**cle-to-**G**rid **I**ntelligent contro**L** (VIGIL) platform is an off-vehicle communication and control platform that aggregates energy at different substations and controls the bidirectional flow of power from Electric Vehicle (EV) batteries with respect to the local substation's network constraints and EV/building energy requirements.

Vehicle to Grid (V2G) brings the possibility of providing network balancing for the DSO and financial incentives to the EV charge point and/or car owner. V2G is well placed to be an important consideration for future domestic and commercial EV connections.

The VIGIL project is being delivered by a consortium led by Nortech, comprising: Aston University, GridEdge and ByteSnap Design.



(1) Western Power Distribution: LV Connect & Manage Project Summary Report

Life at Nortech

Nortech Management Ltd is a UK SME. Our shareholders comprise members of the UK management team and the family owned German company **Horstmann Gmbh**.

Our company culture values the individual, placing great emphasis on working as multi-discipline teams to deliver innovative products and systems.

If you'd like to join us we are always looking for bright, capable, enthusiastic people to join the team. As well as competitive salary, pension contribution and staff bonus we offer training allowances to keep your career on track.

Latest vacancies are shown on our website. Join us and together let's improve the UK's national energy infrastructure.

Modern high-tech offices

Our main office is in Evesham, Worcestershire. Design, development, production and administration staff are based here. We also have a satellite office in the Jewellery Quarter, Birmingham, for those who prefer the excitement offered by city life.

Responsible, fair, inclusive

Nortech's ambition is bold – we aim to be regarded as a leading provider of technology enabling the transition to a low carbon power system. How we achieve this is just as important. We respect difference, value diversity and aim to provide equal opportunities for all employees.

Team working

To celebrate Horstmann's 70th anniversary we joined in with 2 days of team building, problem solving and as it happened quite a lot of German sausage, cabbage and beer.

The activity day was hosted at a Landrover experience site in Germany.

Pictured here is Keith, Nortech's Product Engineer, leading an international rescue team "problem solving" their way across a ravine.

I'm supporting The Mind Blue Light Programme

www.mind.org.uk

Mental health

Our charity of choice this year is MIND. We combined our customer questionnaire with an invite for comments about Nortech in return for charity donations. We were delighted to get a 40% response from our survey and in turn helped MIND continue supporting those experiencing mental health issues.

Planning ahead

It's not all about work, it's not all about us, it's right to give something back and support others.

Photographed is the local Under 10's football team wearing kit donated by Nortech which displays the logo of the Midlands Air Ambulance - benefitting two local good causes.

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