

SWARM INTELLIGENCE™

THE NEW EDGE SOLUTION



B+B SMARTWORX

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ADVANTECH

SWARM INTELLIGENCE™

OVERVIEW

The world around us is full of examples where complex processes and networks are constructed of simple components which, by cooperating, achieve much greater things than they could achieve alone.

In the world of industrial IoT, SWARM intelligence overcomes the single most limiting factor in today's edge devices, namely the link between the edge and a single physical entity. Instead, a SWARM edge consists of a number of devices acting as a collective, sharing their interfaces, resources and capabilities.

This delivers:

- Virtually limitless edge scalability
- Ability to add new interfaces at any time
- Ability to augment processing and storage resources as the system adapts and grows
- Easy addition of redundancy to critical interfaces
- Cost effective expansion of edge functionality over time
- Reduced installation costs and plant wiring
- Investment protection throughout lifecycle

How? Instead of having to find or pay to develop a single complex device that has all of the individual functions needed, a SWARM device is built using simpler units, which are more likely to be available off the shelf. More importantly, as system requirements grow and change, further devices can be added to the SWARM to adapt to the emerging needs.

If a proprietary interface or application needs to be supported, then the required development work can occur on a separate device to those already installed, eliminating the risk of unwanted interference with existing code and applications.

Moreover, as more devices are added to the SWARM, this also inherently provides additional processor and memory resources, reducing any limitation within the existing devices. If necessary, additional SWARM members may be added purely to increase processing or storage resources, eliminating any such constraints completely.

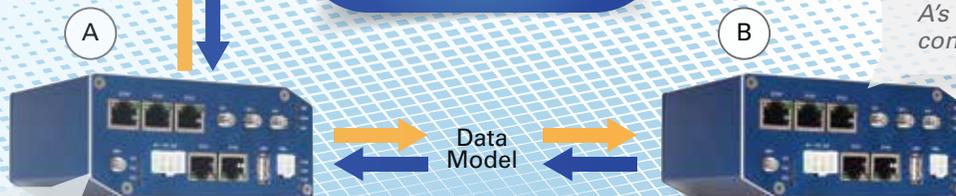
SHARE RESOURCES TO SAVE DUPLICATION

TEAM UP

*I can manage A-B Modbus.
I see A-B location on a map.
I read A-B temperature
as if they are a single device.*

**YOUR
ANALYTICS
APPLICATION**
On your network, or as
a cloud service.

*I have GPS.
I have Modbus
slaves.
I am near A.
I can see A's
temperature.
I can use
A's cellular
connection.*



SWARM DEVICE

*I have a
temperature
sensor.
I have cellular
capability.
I am near B.
I can see B's
GPS data.
I can see B's
Modbus data.*

The first operational cost benefit of this system is easy to understand. The cellular connectivity provided by unit A is available for use by unit B, meaning only a single connection and SIM contract is needed to

connect both devices to the wider system. Similarly in the enterprise application, there is no need to manage or maintain two separate devices - everything can be considered in terms of the SWARM entity.

ADAPT & EVOLVE TO PROTECT INVESTMENTS

Having deployed the initial system on site, consider what usually happens next in the real world - at some point a requirement emerges to integrate data from a new source into both the local business logic on the site and also to make this available to the wider world. This has long been the cause of significant cost additions in traditional M2M systems, which simply don't have the flexibility to cater for new device protocols, etc. Even in today's IoT gateway models, although the flexibility of data presentation to the northbound enterprise systems is often well catered for, the limitations imposed by resources and interface capabilities in the deployed devices still remain; users are forced to guess what functionality they may need in the future, and build this in on Day One of a project in the hope that they have guessed correctly.

SWARM Intelligence neatly overcomes these issues as the SWARM device does not suffer from the same physical constraints. Instead, further physical devices can be added to the SWARM when required, each

bringing its own combination of physical interfaces and processing resources. This is more than a simple data routing exercise, where the data from Device C would only be passed through Device A to the Cloud. Rather, all of the data, services and interfaces in any of the physical devices forming the SWARM are inherently available to applications running on any of the SWARM devices and can be included in any local business logic, data aggregation, filtering or enrichment.

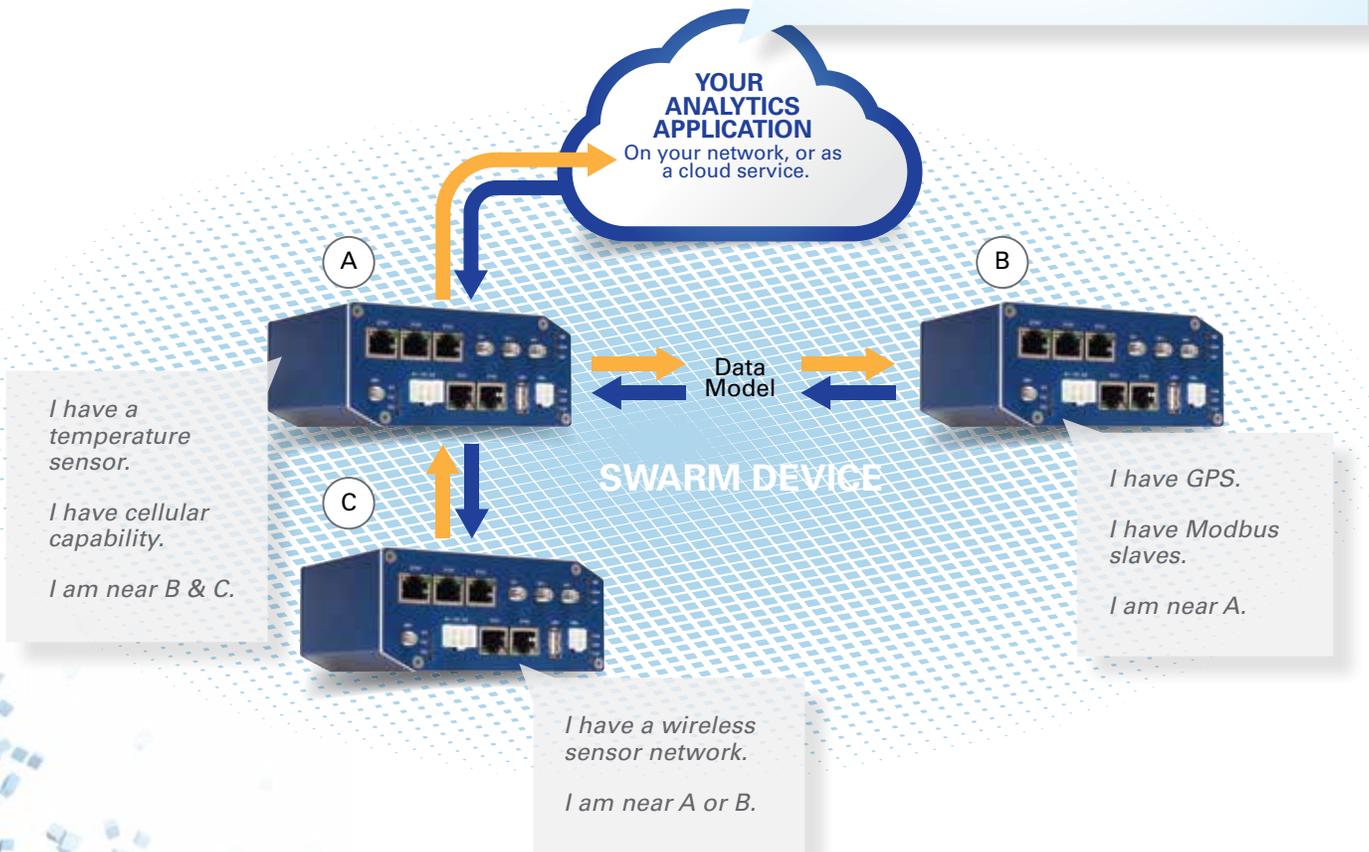
INCREASE CONNECTIVITY

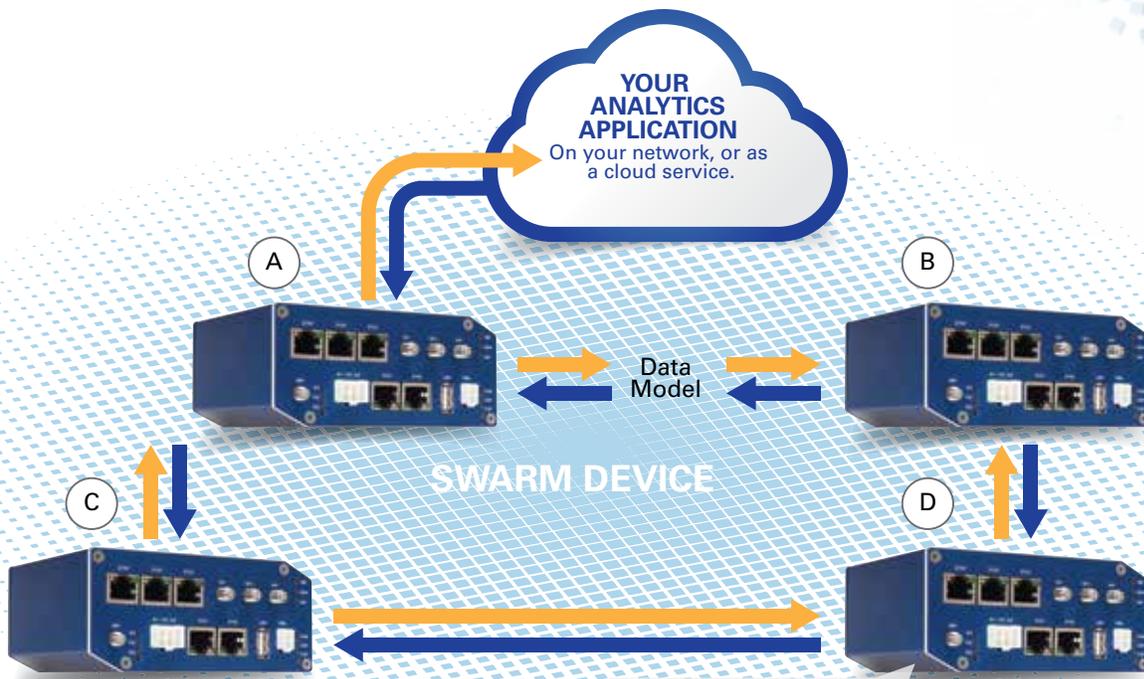
I want to manage A-B Modbus.

I see A-B location on a map.

I read A-B temperature.

I want to integrate wireless sensor data.





GET SMARTER WITHOUT ADDING RISK

SmartSWARM already provides support for multiple programming and scripting languages, together with a continuous query language allowing event based triggers and operations to be easily constructed and modified. However, when considering local business logic and applications, there are times when they may be very complex and require a large amount of processing power. In a conventional architecture, this would present a problem, most likely requiring replacement of the core gateway device with something with more processing and memory.

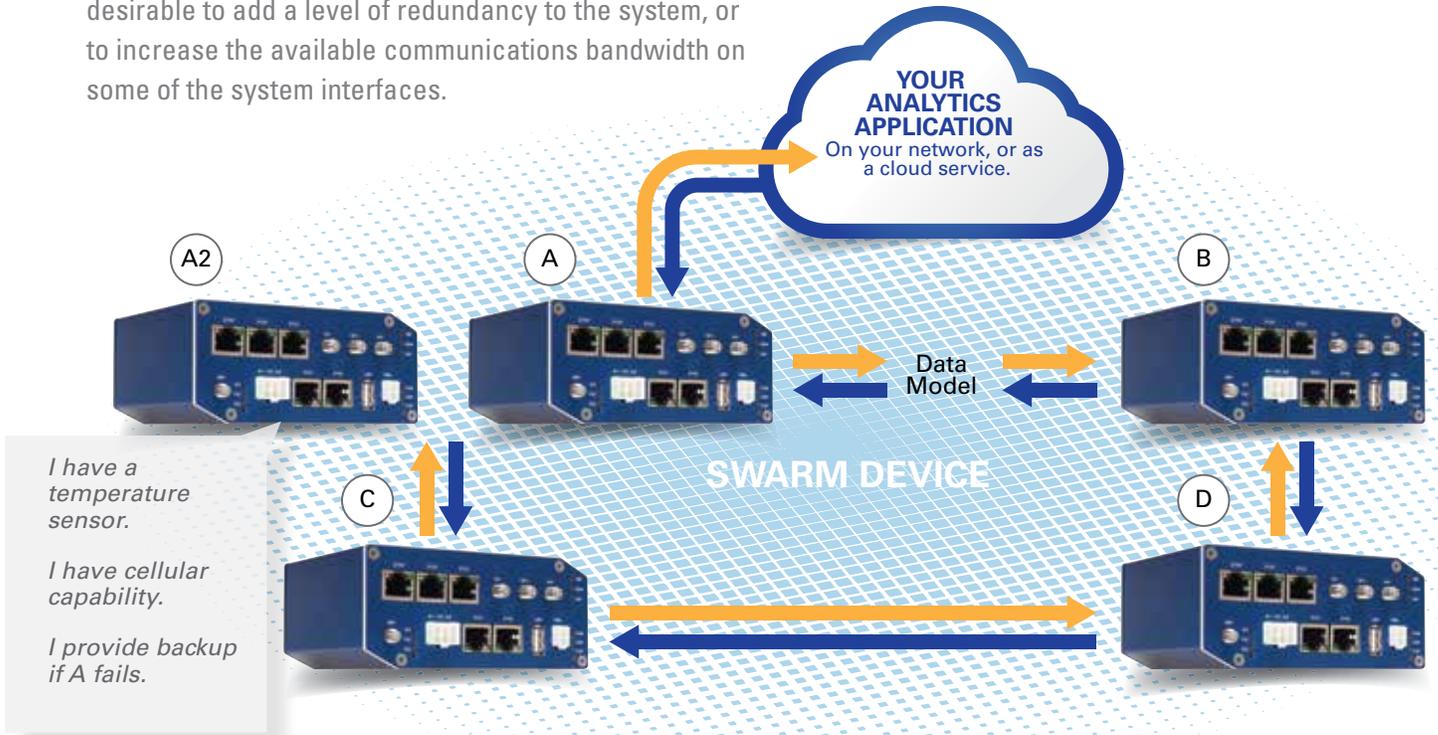
This may include the need to perform code porting, or revalidation of the existing application code and device interfaces to ensure the change out will be transparent to the surrounding system. In some cases this will be a significant amount of work, potentially affecting safety cases and needing a funded project in its own right even before the new application addition is considered.

Implementing architectures based on SWARM intelligence overcomes this obstacle to system expansion. A device may be added to the SWARM which makes no use of its own interfaces, but instead provides processor and memory resources in which the new application can run, accessing the necessary data and services provided elsewhere within the SWARM.

In doing this, none of the existing interfaces or application code need be touched, so there's no need to port existing applications to new platforms, or to re-verify operation of the currently installed functionality – a direct and significant reduction in risk, effort and cost.

GET MORE RESILIENT TO PROTECT YOUR CRITICAL FUNCTIONS

As the complexity of the SWARM grows, it may be desirable to add a level of redundancy to the system, or to increase the available communications bandwidth on some of the system interfaces.



While this would normally require a major upgrade project for a system built on a conventional architecture, it is a relatively easy modification within a SWARM based system, achieved by simple extension of service bindings. Whether it's the addition of a second cellular uplink, the provision of redundant hardwired I/O interfaces, or a failover mechanism

for a serial connection to connected appliances, it's important to remember that in making the addition, only the services or applications making direct use of the redundant component need to be modified. This avoids the cost and risk of a complete system change-out.

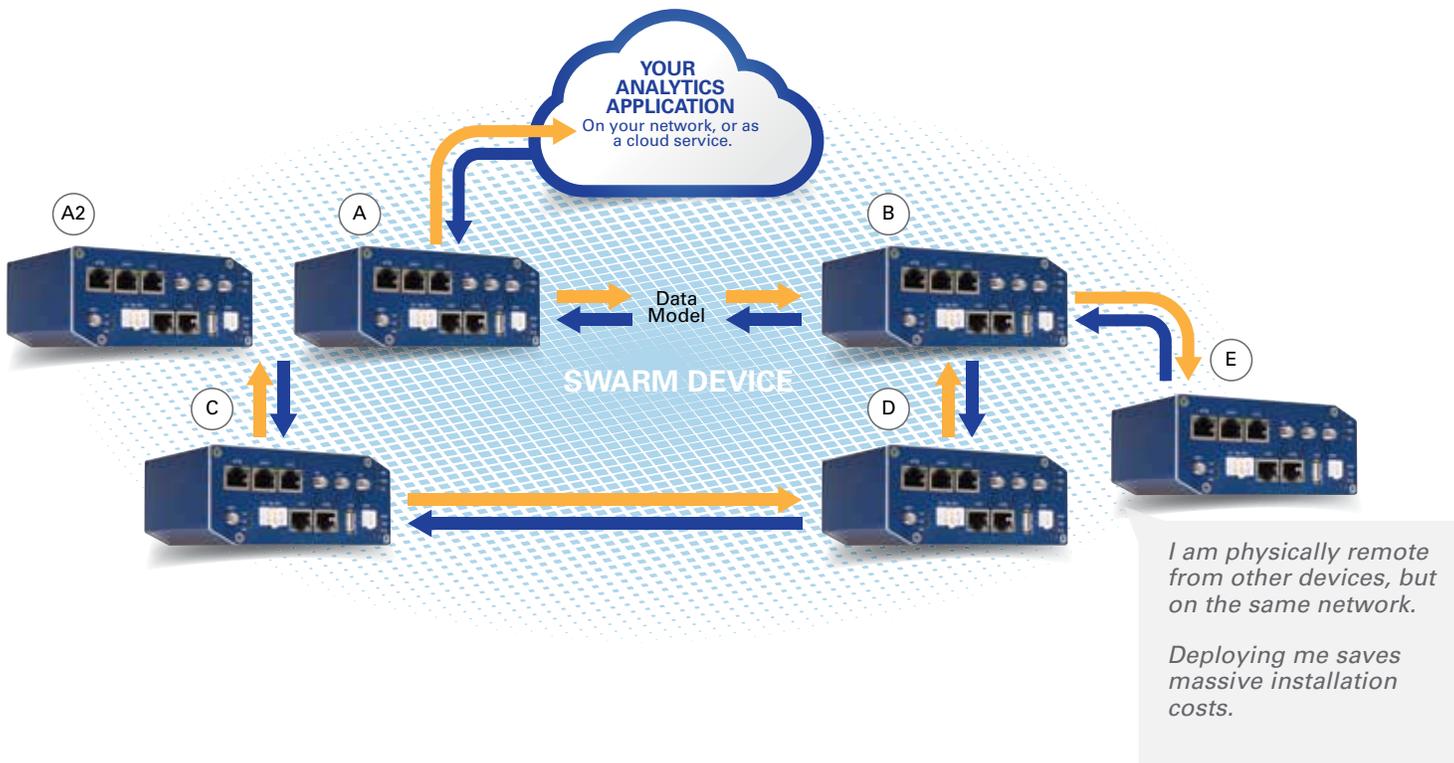
SWARM Intelligence is a new way to build edge devices that overcomes the limitations of current solutions and dramatically increases lifetime ROI.



COLONIZE TO SAVE DEPLOYMENT COSTS

There are more ways that SWARM intelligence can greatly reduce the cost of ownership in a system as it evolves. In a conventional architecture, as new interfaces are added to a gateway, it is also necessary to provide the physical infrastructure which connects the gateway to the remote devices. Installation of this infrastructure can be the most significant cost of deployment of the new functionality, especially in the case where

cabling has to be trenched or meet other industry requirements. In this case, the use of SWARM architecture means the gateway can be installed in close proximity to the process, sensors and devices being interfaced, making the resulting data available to the SWARM via a simple network or WiFi connection.





◆ SWARM INTELLIGENCE™ ENABLES INNOVATION

SWARM Intelligence is the new solution for edge devices in the age of the Internet of Things. No other architecture offers the same levels of flexibility to grow and adapt to meet emerging system requirements; to allow users to build upon their existing investment and break the continuous cycle of deployment, replacement and redeployment that has plagued the M2M industry for so long. Collaborate; Adapt & Evolve; Get Smarter; Get More Resilient; Diversify; SWARM intelligence is your evolutionary strategy for success.

- Reduced direct costs for installation and deployment
- Faster develop and deploy cycles with lower project risk
- Protection of initial investment as system requirements change
- Integrate new technologies as they emerge
- Add redundancy where and when needed
- Maximizes lifetime Return On Investment

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