THE NEW DELL TECHNOLOGIES: UNIQUELY POSITIONED TO PROVIDE INTERNET OF THINGS SOLUTIONS

EXECUTIVE SUMMARY

The Internet of Things (IoT) is real. Though much of what is written regarding the IoT focuses on "future" applications, Moor Insights & Strategy (MI&S) believes that **today** real solutions are available to enterprises to solve problems and enhance their business. These solutions allow enterprises to unlock the potential of data they already have from existing machine-to-machine (M2M) and private networks as well as new data that can be gathered and aggregated to increase efficiency, reduce risk, improve customer experience, and create new revenue streams and business models for their specific applications. This process of applying technology to change business activities, processes, and models can also be referred to as Digital Transformation, which many businesses see as the next wave of change impacting industries large and small.

Yet many enterprises are struggling with Digital Transformation or how to make IoT part of their business or ignoring it all together. They often see architecting an IoT solution as a puzzling task. *What is "IoT"? What can an IoT solution really do for me? What am I trying to accomplish, or what problem am I trying to solve? There are "thousands" of vendors, where do I start?*

The key to understanding IoT is not in looking for IoT solutions but in applying IoT principles and technologies to solve specific problems. *How can I reduce lighting costs and increase safety for my city? How can I more efficiently track items in my warehouse and get them to customers faster? How can I more efficiently monitor and manage energy or water in my community?* Specific vertical segments such as energy, manufacturing, transportation, and logistics are all having great success implementing new systems that better gather and use data for their (and their customers') benefit.

MI&S believes Dell Technologies (Dell), the newly formed merger of Dell Inc. and the EMC Federation, is uniquely positioned to help customers solve their IoT puzzle. Dell combines experience and credibility with specific vertical market enterprises, a curated partner ecosystem with deep vertical knowledge, the industry's broadest offering of IoT-focused infrastructure, and an ability to provide a world-class customer experience to help customers solve specific IoT problems—today.

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WHAT IS THE IOT REALLY ABOUT?

IoT is about data: gathering and using information to increase efficiency, provide a better customer experience, mitigate risks, or generate new revenue streams. The reality of acquiring this data, moving it to where it can be useful, aggregating and analyzing the data, and then acting upon that analysis in an existing enterprise can be quite complicated. It often requires the focused energies of both the Operations Technology (OT) and Information Technology (IT) functions inside the enterprise.

In the recent past, IT and OT environments were completely separate worlds. IT supported sales, marketing, planning, supply chain, HR, management, *etc*. with infrastructure, networking, computation, storage, applications—all in a secure environment. OT was all about hardware and software that monitored and controlled systems, processes, and events, generally supporting facilities, manufacturing, exploration, production, refinement, development, and research.

Traditionally, OT use cases have often been "islands of automation" where sensors generate data that is collected and used to make decisions or changes. Many OT applications are real-time, deterministic, or mission critical, and there can be major implications if systems crash. OT networks often store and potentially analyze data at the device or equipment level and often are not connected to other enterprise systems or never leave the premises. This situation has led to IT having limited involvement in many OT systems, networks, and applications.

The opportunity today is very different, as companies embrace Digital Transformation. Enterprises can and must extend compute, storage, and data analysis beyond their datacenter, through their network, to the point of highest business value—whether the oil field, the manufacturing floor, the gateway, or even all the way to the device sensor.

Enterprises are realizing they can now securely integrate or overlay OT and IT ecosystems to tap vast amounts of data and maximize its potential. New architectures allow data to be analyzed where it will have the most beneficial and timely effect on the system. This has driven the rise of "fog computing" or the extension of cloud computing to the "edge" of the enterprise network—specifically putting data analytics closer to the actual devices and sensors. Finally, all these new resources must be extended with security, manageability, scalability, and cost effectiveness.

To unlock the value in enterprise data, IT and OT organizations must join forces, using the strengths each has to offer. IT needs to securely add computation, storage, and connectivity closer to OT equipment and devices, including ruggedized equipment for

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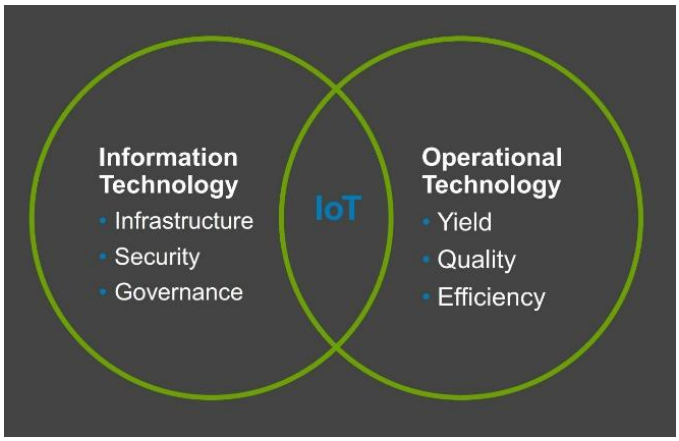
harsher environments. OT needs to find ways to gather, analyze, and move data to where it delivers the highest business value—whether the device, the fog, or the cloud. Establishing and managing roles between IT and OT is critical to success

FIGURE 1: WHERE INFORMATION TECHNOLOGY & OPERATIONS TECHNOLOGY OVERLAP



(Source: Dell)

BUYING AN IOT SOLUTION

No enterprise executive wakes up in the morning and says, "I need to direct my organization to identify and buy an IoT solution." Enterprises are looking to solve specific problems with data, taking advantage of the data they have as well as new data they can now access and turning that data into tangible benefits for their specific organization. Typical problems take the form of:

- How can I more efficiently monitor my utility usage for each of my plants and better manage my total energy consumption?
- How can I better track the location and condition of my products while being transported by truck, boat, and plane from our facility to warehouses across the globe to reduce loss and waste?
- How can I monitor and control my manufacturing line to reduce downtime by preventing issues before they become problems?

Solving these problems may touch every aspect of an enterprise's systems and software. MI&S believes that to solve these problems, enterprises must engage with vendors that understand all the layers of the solution—from device to gateway to cloud—and have experience in the specific vertical segment and user application they are working with.

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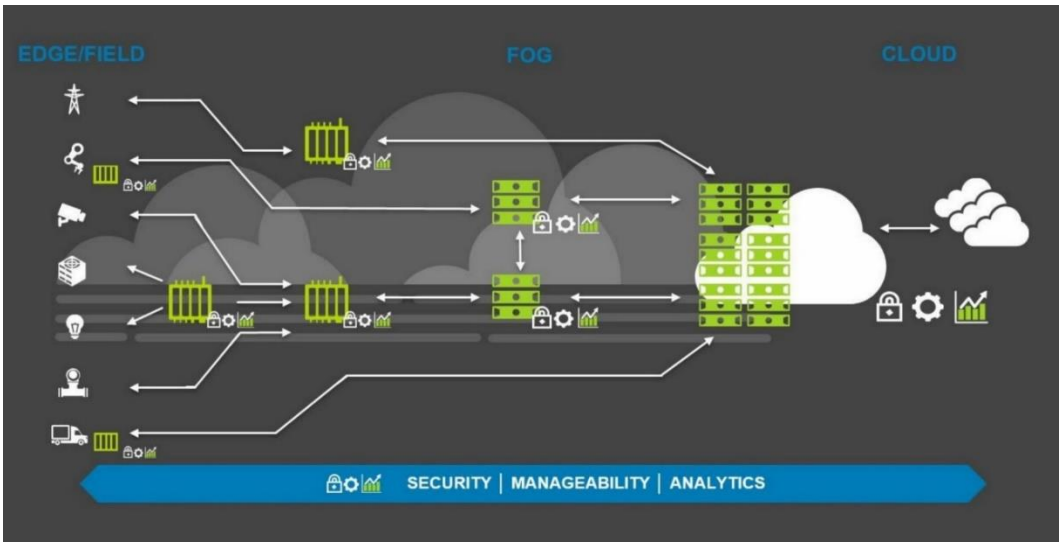
DELL TECHNOLOGIES: AN IOT POWERHOUSE

Developing solutions to help customers make the most of their data is a complex problem that covers every facet of an enterprise's business. MI&S believes there is no one supplier that can provide all the technology necessary to help enterprises make the most of their data. The successful vendors will be those that combine their skill and expertise with the most comprehensive set of partners and system integrators to provide the most value to customers.

MI&S believes the newly formed Dell Technologies will be a leading provider of solutions to enterprises that are embracing Digital Transformation and looking to get the most from their data. The merger of Dell, Inc. and the EMC Federation has assembled the industry's broadest infrastructure portfolio, including:

- Dell EMC: The company's enterprise business
- Dell: Client solutions for consumers, business, and institutional customers
- VMware, SecureWorks, Pivotal, Virtustream, and RSA

FIGURE 2: DELL TECHNOLOGIES OVERVIEW



(Source: Dell)

Given this broad offering, the new Dell Technologies can now provide enterprises with:

- A portfolio of the industry's broadest IoT-focused infrastructure products including hardware, software, and networking expertise to build and deploy complete, secure, and scalable solutions from device to fog to datacenter to cloud
- Experience and credibility with customers looking to maximize their data's value

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- A curated IoT partner ecosystem with deep knowledge and experience with IoT vertical segment technology and use cases
- Worldwide sales, service, financing, and support for a world-class customer experience

THE INDUSTRY'S BROADEST IOT INFRASTRUCTURE PORTFOLIO

Dell has traditionally provided a ruggedized, solid foundation of infrastructure hardware and software solutions, based on open standards, that provide security, flexibility, and the ability to integrate these standardized systems with systems already in place.

MI&S believes that open standards are key to the rapid expansion of IoT technologies. Dell, along with partners like Intel, play a leadership role in directing both consortia and standards activities such as Open Fog Consortium, Industrial Internet Consortium, and Open Connectivity Foundation.

The new Dell Technologies adds a number of key assets that greatly expand its IoT offerings. Included in these are:

- **VMware** Airwatch for device management
- **EMC** data management on-premise and in the cloud
- **Virtustream** for infrastructure as a service
- **RTI** for distributed analytics
- **RSA** for security
- **Pivotal Cloud Foundry**, which acts as a platform for many IoT service suites

FIGURE 3: DELL TECHNOLOGIES IOT PORTFOLIO

(Source: Dell)

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MI&S believes that the addition of these EMC pieces to the already strong Dell IoT offerings puts Dell Technologies at the top of the list for providing comprehensive IoT solutions. Dell Technologies' portfolio includes secure, scalable end-to-end IoT hardware and software solutions from device to fog to cloud including:

- **Embedded** PCs to power "things"
- **Gateways** such as the Dell Edge 5000 powered by Intel Atom processors to convert diverse OT interfaces to IP, aggregate data, and perform local analytics
- **On-Premise Appliances** for data processing, analysis, and store & forward
- **Data Center & Cloud** for advanced analytics, data management, storage, and computation
- **Cloud & App Integration** for native cloud application development and connectivity to other enterprise systems

MI&S believes that enterprises looking to rapidly deploy solutions to increase efficiency, reduce risk, improve customer experiences, and create new revenue streams and business models should look closely at Dell, together with Dell's ecosystem partners for their specific applications.

Experience & Credibility

For more than 30 years, Dell has delivered enterprise IT solutions, including secure hardware, software, and networking. Dell also has more than 15 years of experience customizing solutions for OT through Dell OEM Solutions. Dell is a recognized brand with acceptance and credibility in delivering ruggedized solutions to IoT verticals—from exploration in the field to production on the shop floor in key markets including energy, manufacturing, transportation, and logistics.

A Curated Partner Ecosystem

MI&S believes that no one vendor can "do it all" when it comes to providing full solutions for IoT. The vendors that will be successful will provide best of breed technologies in their areas of expertise and provide the same quality partnerships for complementary IoT technologies, as well as system integrators that can put the puzzle together. By providing these ready-made partnerships and solutions, enterprises can not only accelerate their development but also have true confidence in the vendors they engage.

Dell's IoT Solutions Partner Program is an example of a partnership program "done right": curated partnerships providing all the technologies and tools necessary to design, deploy, and get the most out of an enterprise's data. Dell's strategy is to provide the

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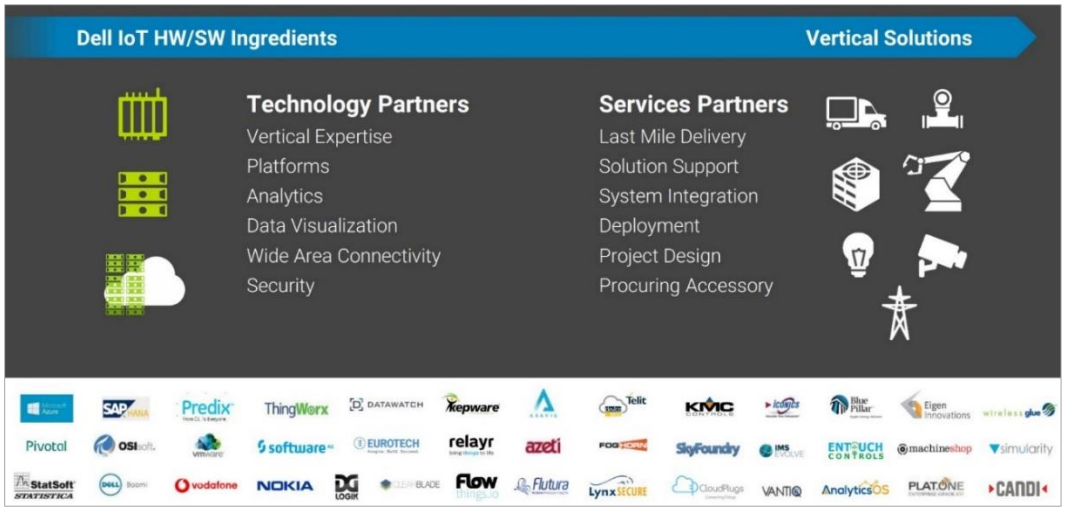
infrastructure and work with system integrators (SIs), independent software vendors (ISVs), and independent hardware vendors (IHVs) to integrate both Dell and partner technologies for specific use cases.

FIGURE 4: DELL TECHNOLOGIES IOT ECOSYSTEM



(Source: Dell)

Use cases are the heart of IoT. Identifying common use cases and removing the stigma of IoT as a 100% unique development for each different enterprise will greatly speed deployment, help reduce risk, and increase the confidence in the success of the implementation. Dell, in conjunction with its partners, has identified many of these common use cases and developed blueprints that allow enterprises to engage quickly and easily with both Dell and Dell partners, enabling them to get up and running faster and with confidence.

Dell Blueprints are use-case-specific and include edge to datacenter validated reference architectures (RA) combining Dell and partner technologies. Blueprints include implementation guides with deployment steps to consider, case studies of customers who have successfully deployed the blueprint, and whitepapers to highlight best practices around security, manageability, and analytics.

As an example, predictive maintenance is a well-identified application area where using IoT technologies and practices can provide great benefit. Dell has collaborated with Kepware, Software AG, and SAP to provide a blueprint for predictive maintenance.

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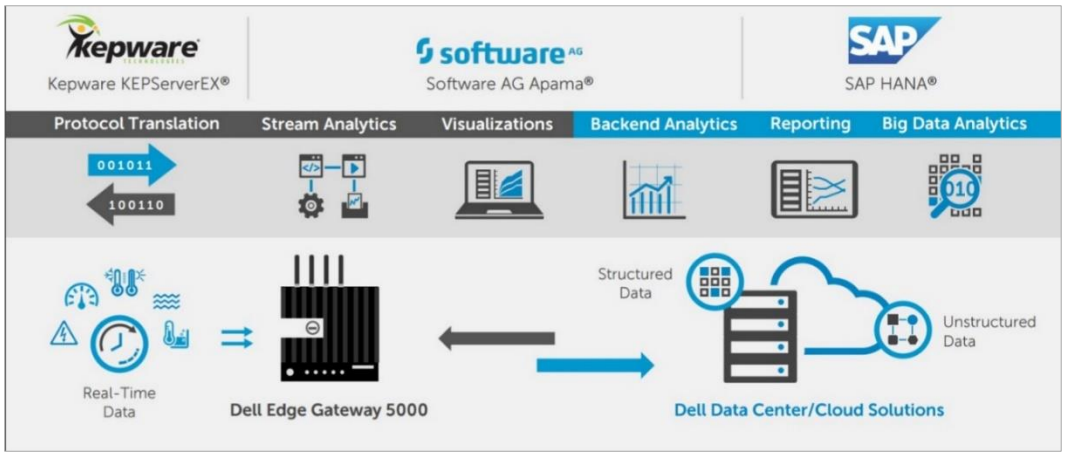
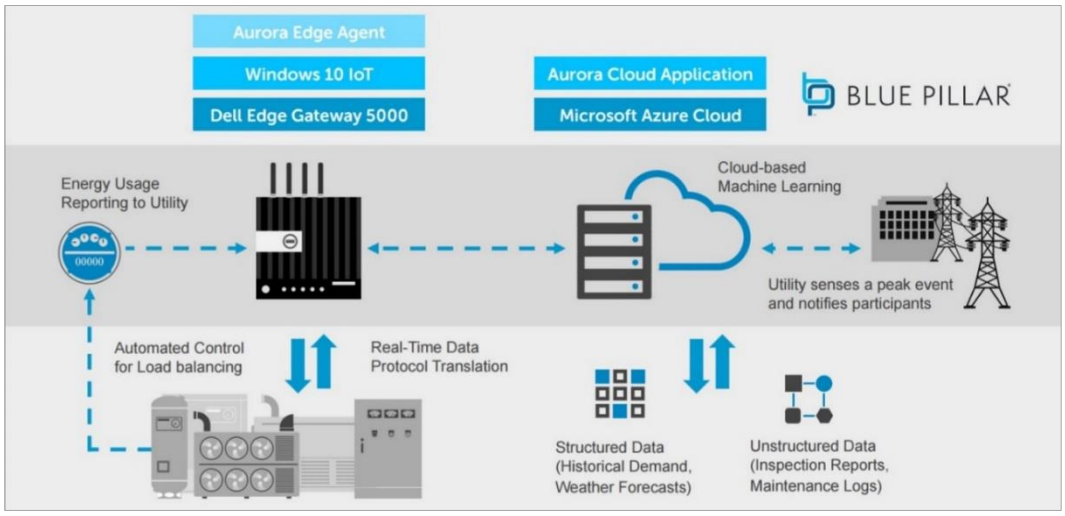
FIGURE 5: DELL BLUEPRINT FOR PREDICTIVE MAINTENANCE



(Source: Dell)

A second example use case is facilities or building maintenance. Here, Dell has collaborated with Microsoft and Blue Pillar to develop a blueprint for improving facilities management with automated demand response for energy management.

FIGURE 6: DELL BLUEPRINT FOR IMPROVING FACILITIES MANAGEMENT THROUGH ADR



(Source: Dell)

In addition to Dell's IoT partnership program, Dell is a long-time strategic partner with Intel and leverages a variety of Intel technologies (CPUs, chipsets, SOCs, SSDs, radios, and software) in its IoT products. Both companies play a leadership role in shaping the overall discussion and definitions around industrial IoT solutions.

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MI&S believes the combination of Dell's IoT Solution Partner Program, Dell Blueprints, and Dell's close relationship with Intel will accelerate deployment, reduce risk and complexity, and save time and money for enterprises.

A World-Class Customer Experience

MI&S believes that sales, service, and support should be as important to enterprises as delivering hardware and software. Enterprises need to make sure vendors they deal with allow them to both acquire equipment quickly and easily as well as keep that equipment running. MI&S believes Dell Technologies and its partners provide enterprises with a fast and easy way to acquire their IoT solutions, ramp their solutions to the proper scale, and keep them up and running. Dell's equipment is designed, supported, and serviced by Dell, a critical factor in keeping equipment up and running. In addition, Dell's global supply chain is world-class and can supply and re-supply parts and equipment quickly, should the need arise. Finally, Dell provides global financing, which is becoming a key area of leverage in the new "as-a-service" economy, providing enterprises the flexibility and the ability to balance spending between CapEx and OpEx.

Call to Action

IoT is real—today. Companies that are actively seeking to unlock the value in their data understand that solutions are on the market today to help them begin their journey toward Digital Transformation. These companies are looking to realize the benefits of their amassed data and are looking to gather even more. They also realize that by designing, developing, and deploying optimized solutions for their specific use cases, they can increase efficiency, reduce risk, improve customer experience, and create new revenue streams and business models for their specific applications.

MI&S strongly recommends that enterprises looking to maximize the value in their data target initial use cases that are commonly identified in the industry for their first IoT deployments. Problems such as predictive maintenance, energy management, and asset tracking have common features from organization to organization. Enterprises can take advantage of solutions that have already been developed that can provide value while quickly recovering initial costs.

MI&S recommends that enterprises looking to identify, design, and deploy IoT solutions strongly consider Dell Technologies as a collaborative partner. Dell's experience, broad IoT-focused product offering, well curated partner program and blueprints, and world-class customer support have made Dell a leader in solving customers' data problems—today.

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