



Dell IoT PoV – Anthony Sayers EMEA Strategy and Business Development

Jan 2016





Sustainability Facts

Rapid urbanization

Over the next 25 years, the U.N. estimates that over 65% of the global population will live in urban areas.



Resource constraints

Finite resources will not be able to keep pace.



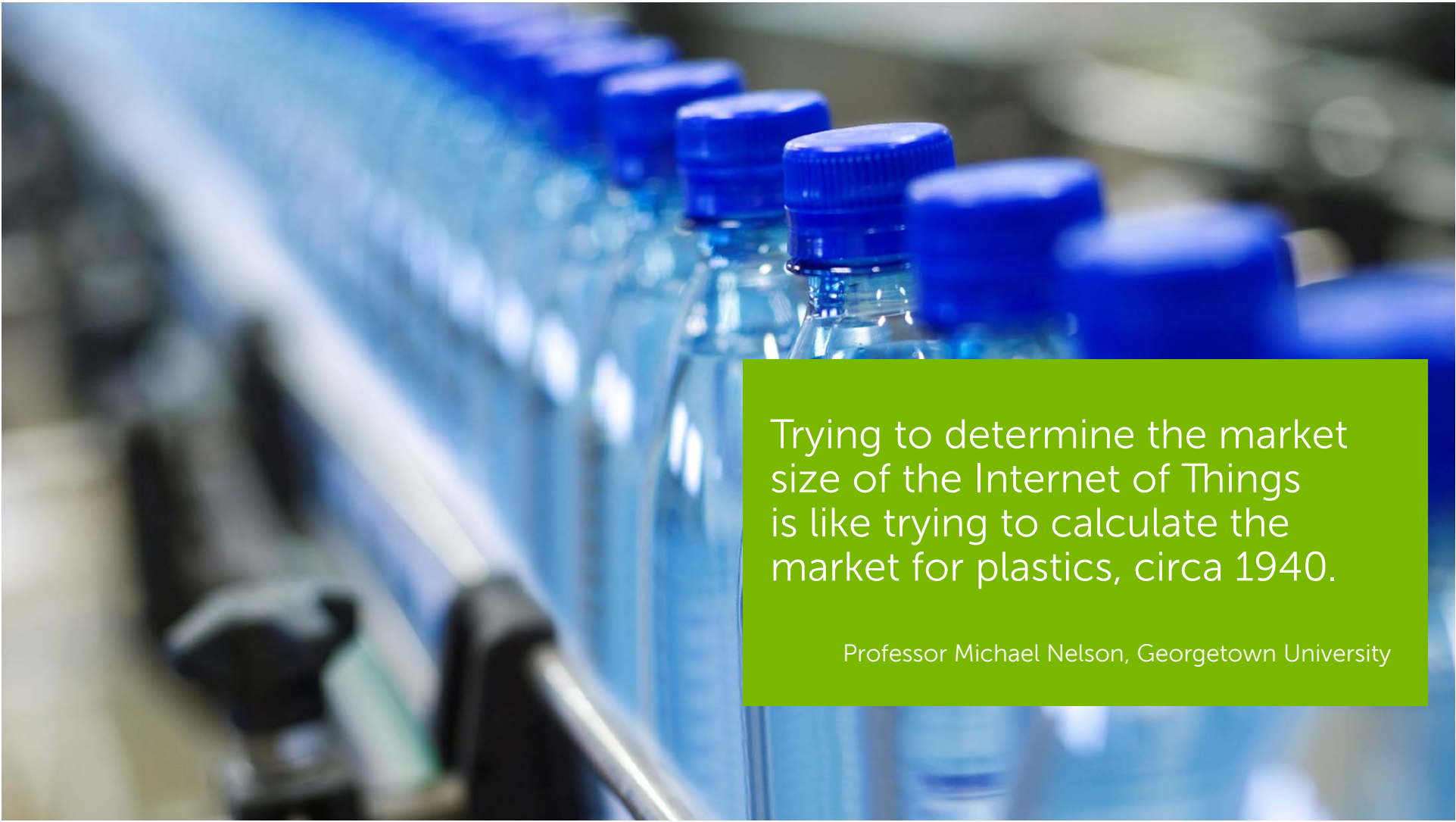
Growing Trends

Environmental protection

Urban areas will contribute 74% of global greenhouse gases by 2030.

Technological advancements

Technologies that enable end-to-end Smart City scenarios are now available.

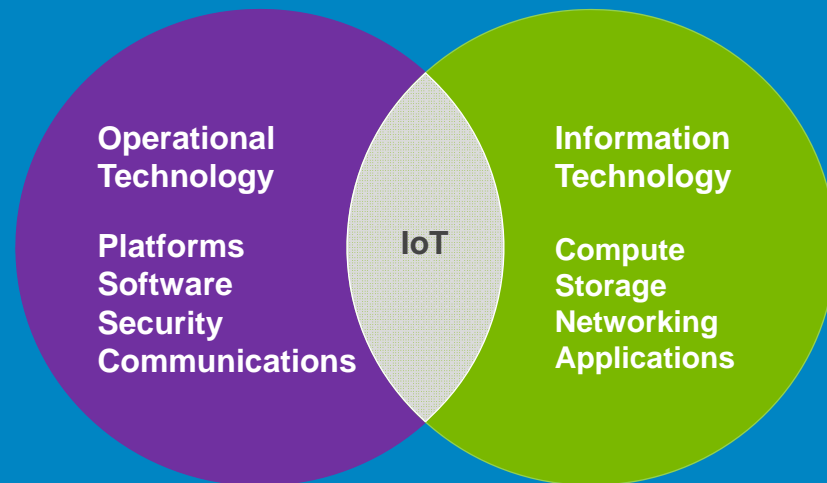


Trying to determine the market size of the Internet of Things is like trying to calculate the market for plastics, circa 1940.

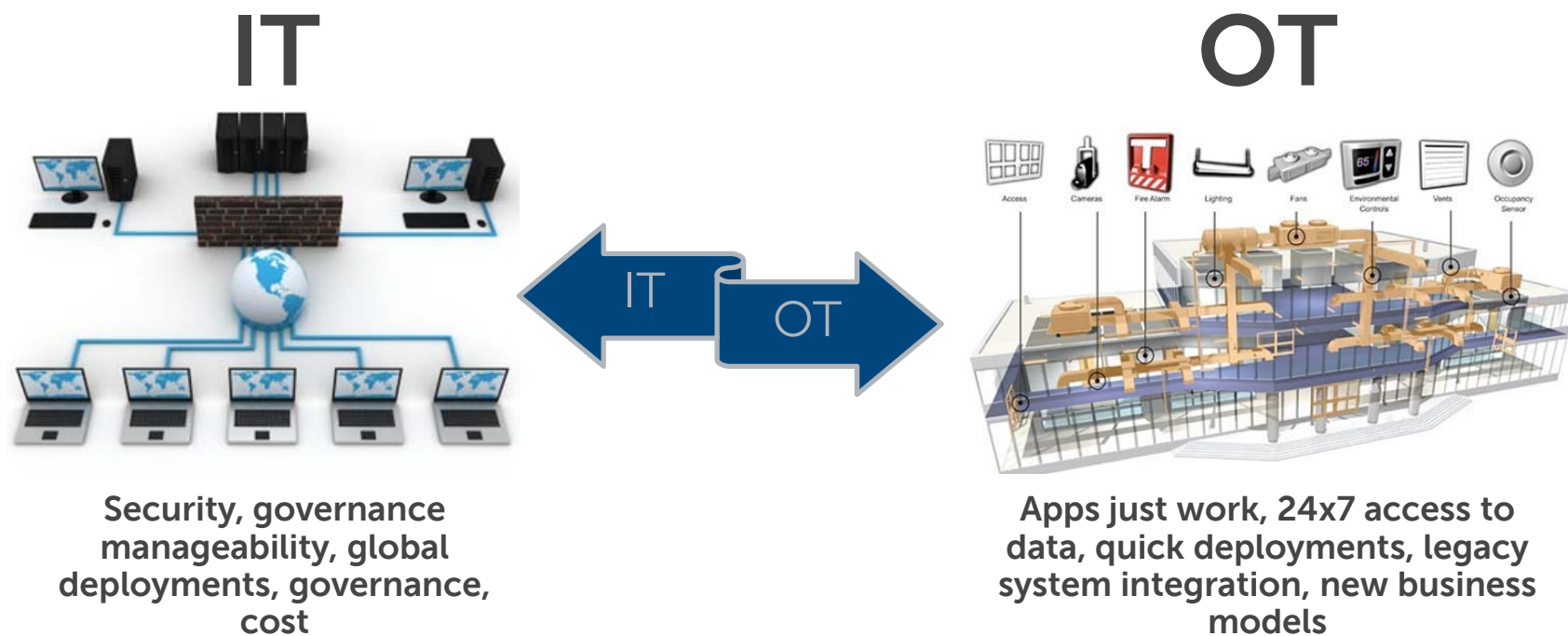
Professor Michael Nelson, Georgetown University

$$\text{IT} + \text{OT} = \text{IoT}$$

It is the integration and extension of OT and IT, technologies that have been round for decades



The IoT: Information Technology meets Operations Technology



Dell - **practical approach** to the Internet of Things

IoT has replaced Big Data as today's **most hyped** technology trend

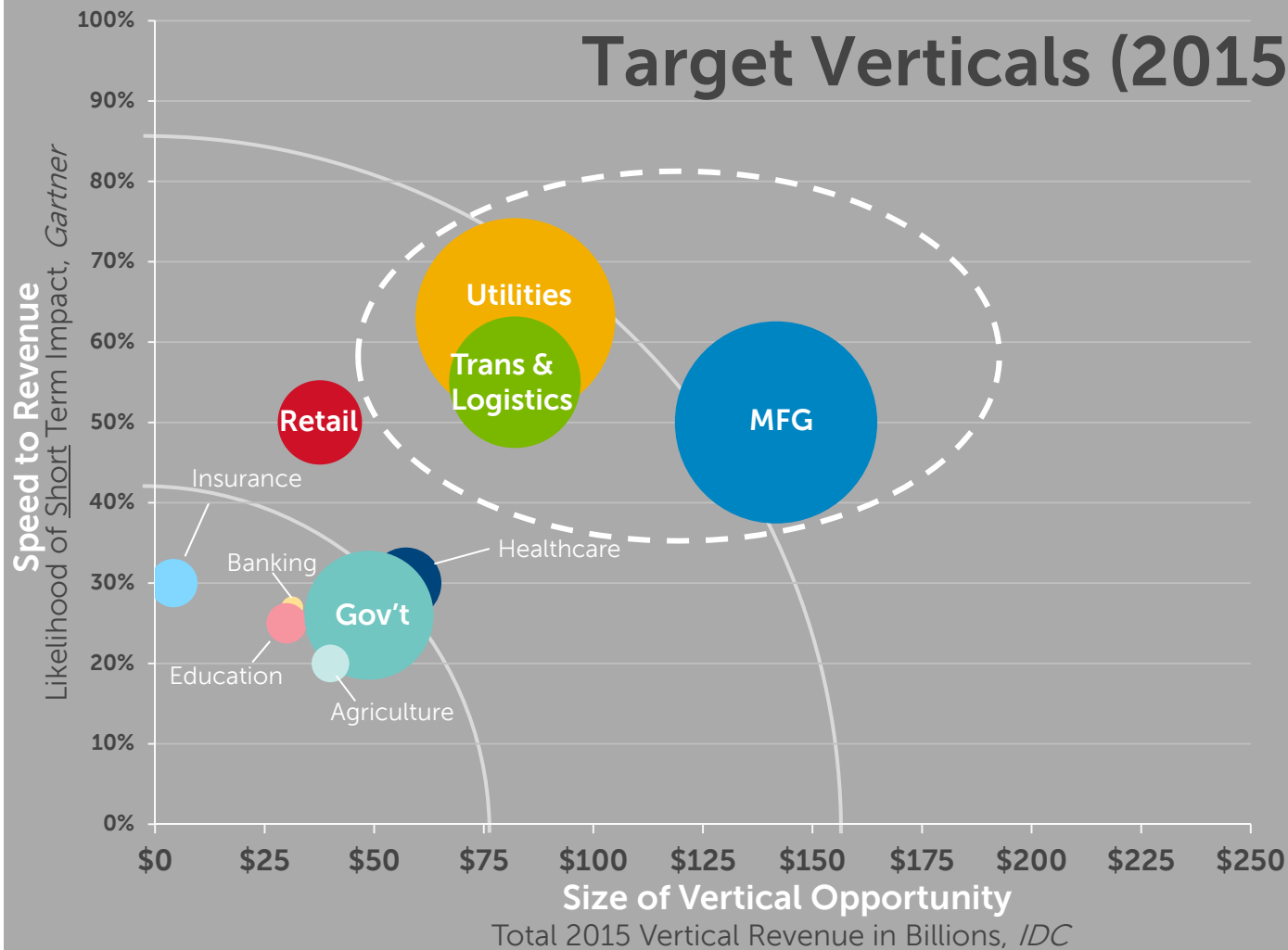
The media buzz around **consumer products** oversells what's possible today.

Industrial and commercial IoT is where the **real progress** is being made

Dell is focused on the industrial/commercial IoT.



Target Verticals (2015)



IoT initiatives drive **operational efficiencies** and **business growth**.

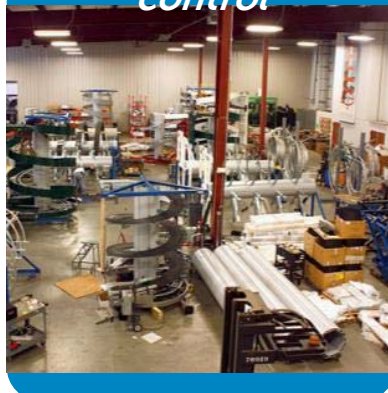
Managing resources

*Building
automation*



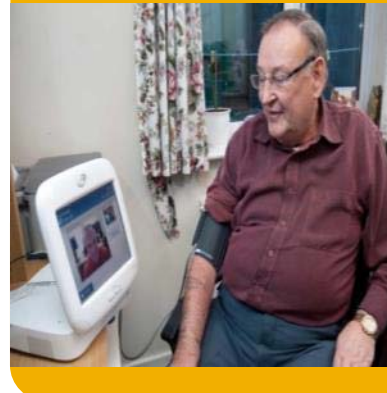
Optimizing operations

*Manufacturing
equipment
control*



Expanding services

Telehealth



Improving yields

Agriculture



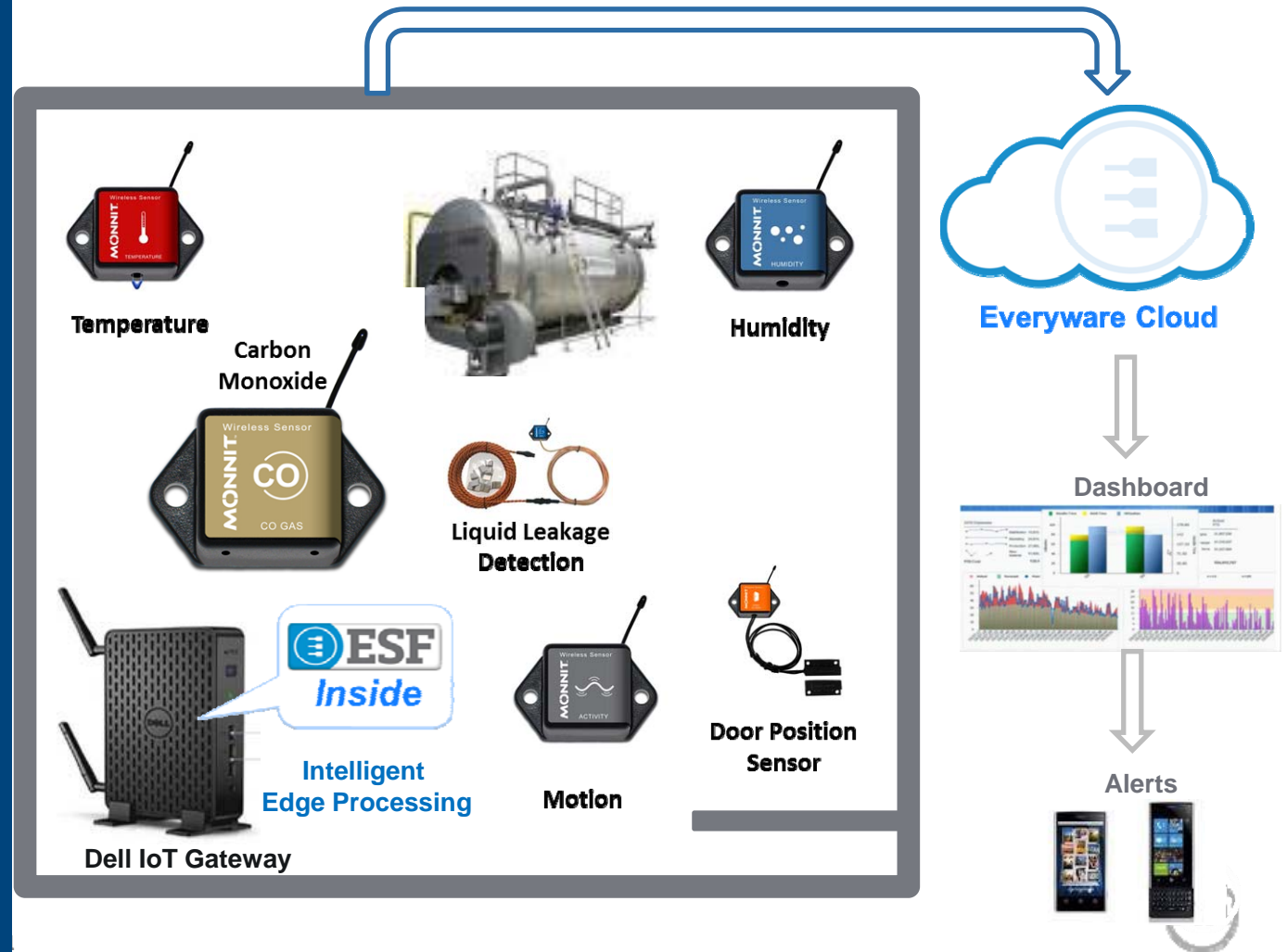
Facilities Management – Boiler Room Solution

Challenge

Facilities Management company needed to visit Boiler Room in 2,000 buildings every 2-3 weeks to check for leaks, CO2 levels, Carbon Monoxide levels etc.

Solution

Dell Gateway with 3G card attached put in Boiler Room with sensors to monitor all of the above. No need to visit all the time as solution will flag any abnormalities and an engineer can be sent out on a reactive basis.



Architecture issues in today's IoT marketplace

The common practice of sending sensor data directly to the cloud **is not always the best choice**

- Creates latency
- Drives cost
- Can open up security risk



Architecting for analytics

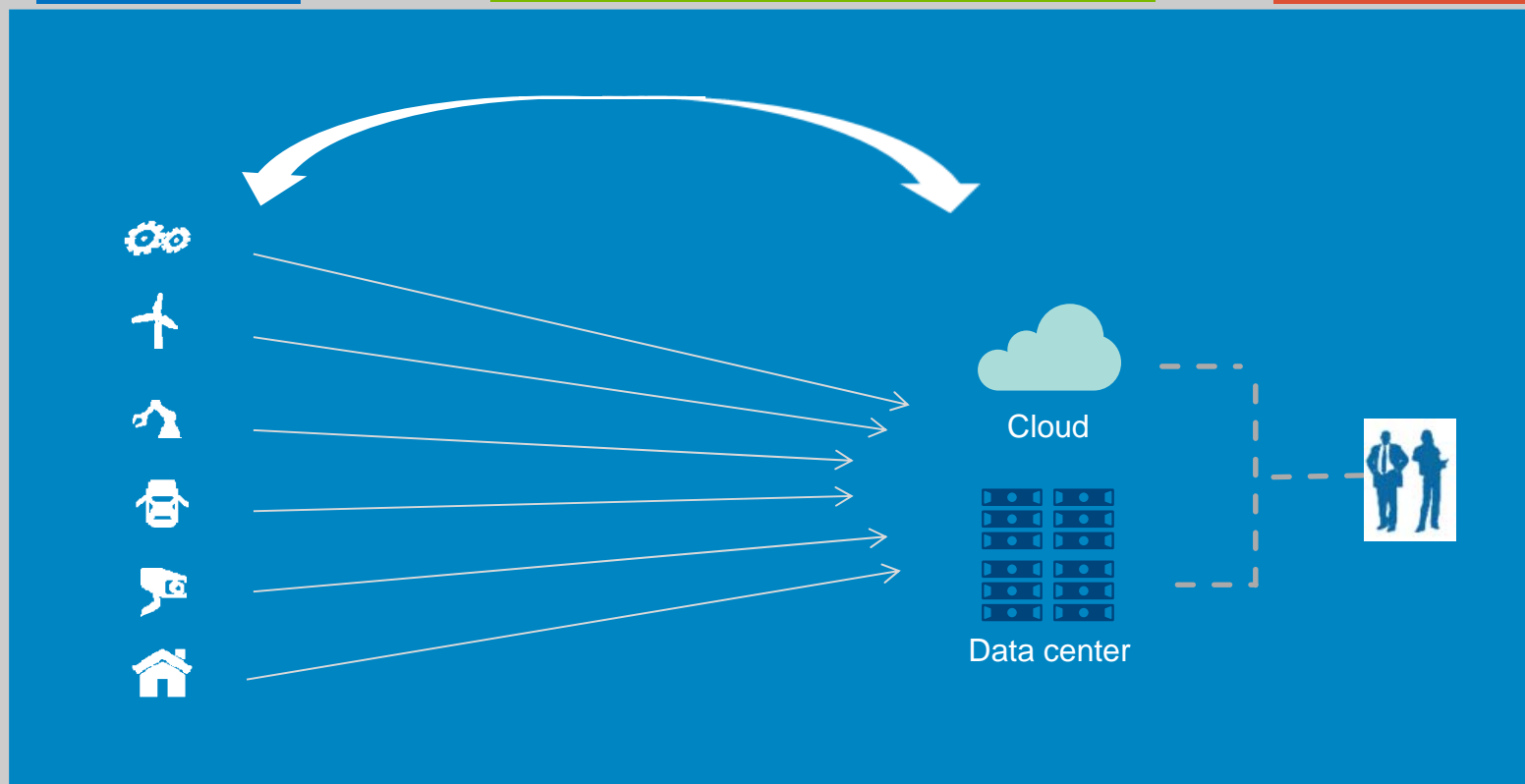


Internet of Things – Common Network Approach

Data Sources

Data Aggregation and Analytics

Insights



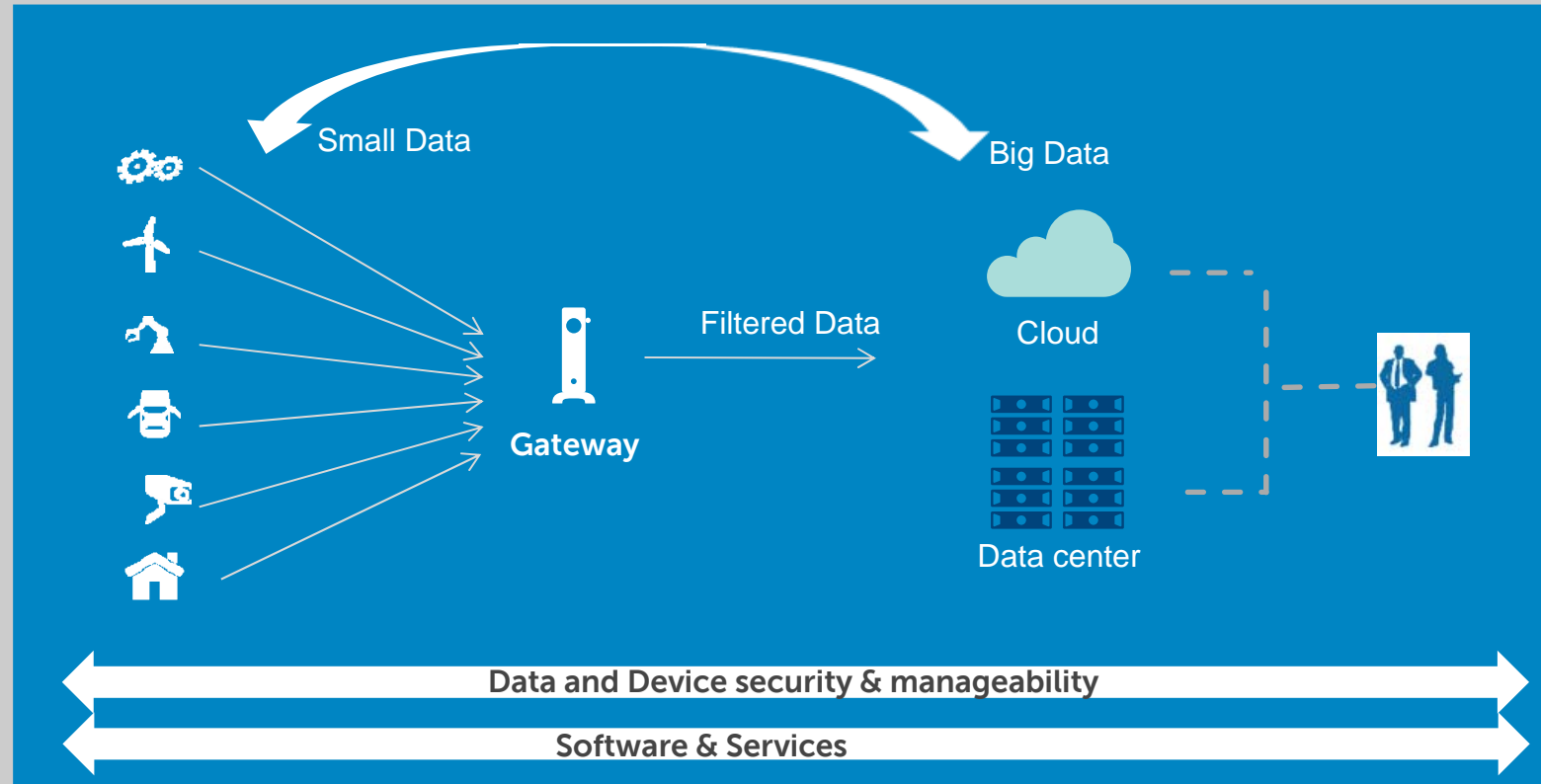
Internet of Things – Dell's Distributed Architecture

Data Sources

Edge Aggregation and Analytics

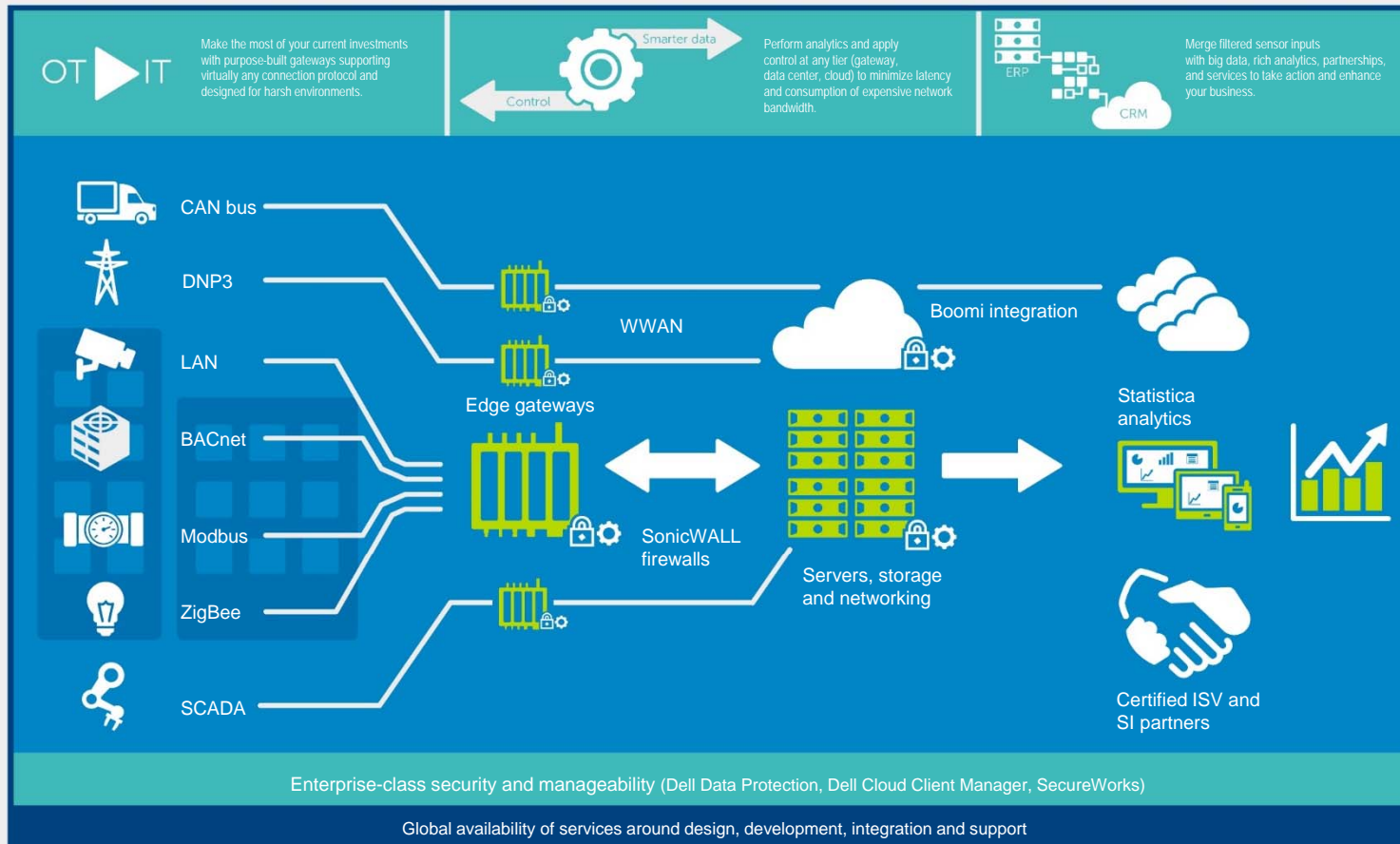
Datacenter Storage and Analytics

Insights

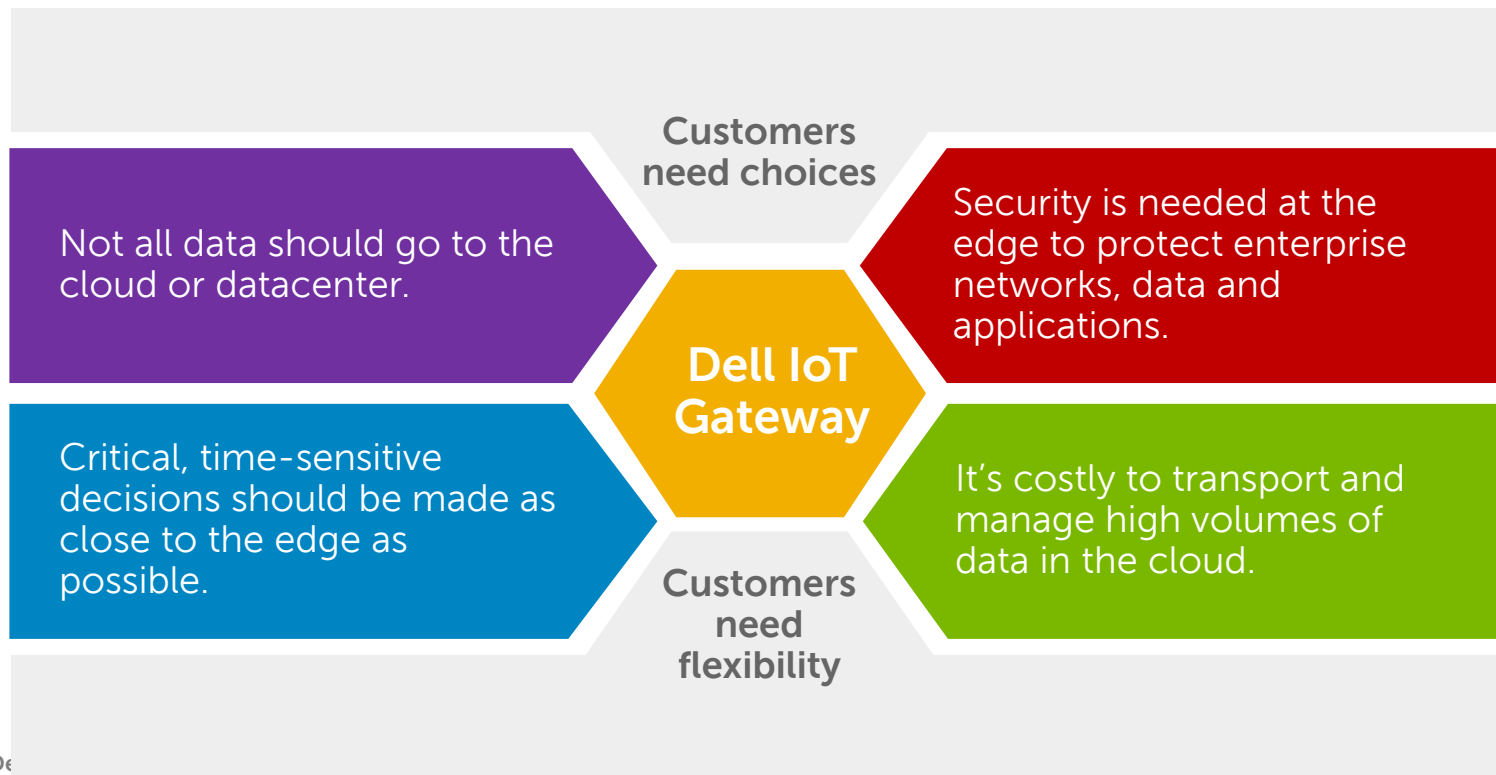


Dell Internet of Things framework

Enabling flexible, distributed IoT solutions that can be tailored to specific verticals and use cases



The Dell IoT Gateway enables you to architect for **analytics anywhere** in the IoT ecosystem



Dell Edge Gateways differ from traditional PCs and servers

Needed for the IoT	Standard IT Solutions	Dell Intelligent Gateways
Flexible I/O for sensors + controllers	Requires expensive and cumbersome dongles	Native wired and wireless I/O to minimize cost and simplify setup
Designed for wall and DIN mounting	VESA mount only, non-optimal I/O orientation	Optimized for wall and DIN-rail mounting including cable routing
Industrial-grade	Typically 0-40C maximum, designed for PC duty cycles	Designed for constant and long-term operation from -30C to 70C
Support for diverse data protocols	Ad-hoc software	Flexible data brokering SW to support legacy + modern sensor protocols
Edge analytics / optimized data flow	Ad-hoc data acquisition and analytics practices	Certified IoT-specific ISVs with domain-focused edge analytics to offload IT network
Security and manageability	Widely variable practices and specific to IT equipment	Gateway-oriented security and manageability with best practices from PC, server, and routers and new functionality for OT



Dell Edge Gateway 5000 Series



Dell Edge Gateway 5000

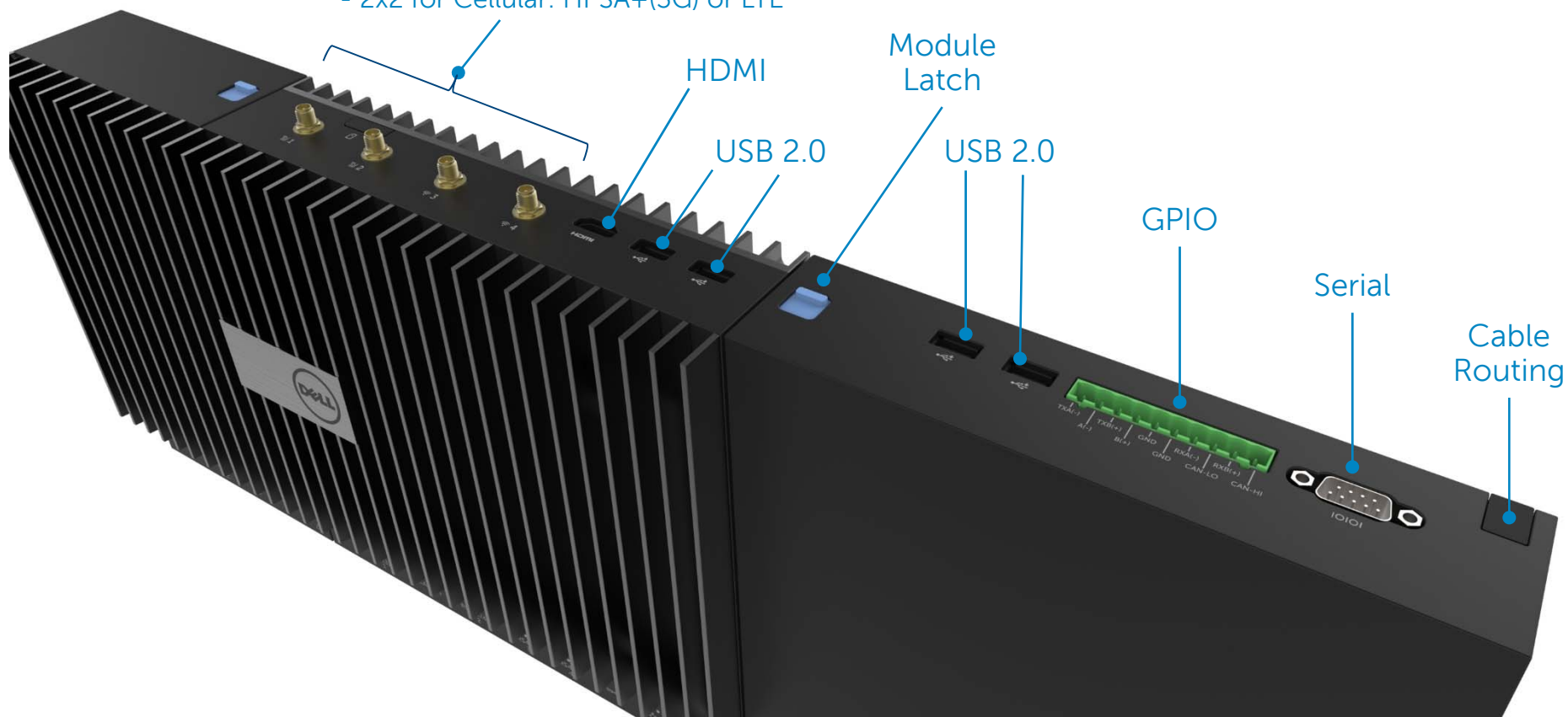


With optional I/O
module and
power module

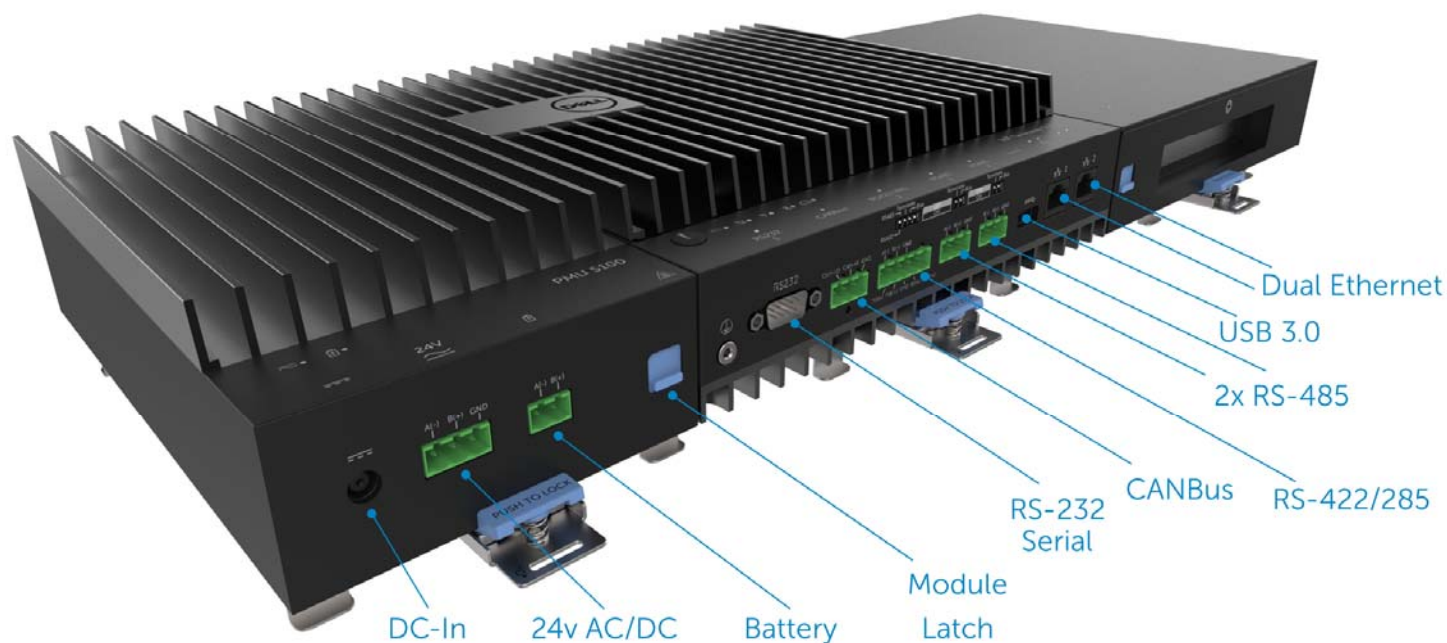
Dell Edge Gateway 5000 Series | Top I/O view with optional I/O expansion

4x External Antennas (Extendable)

- 2x2 for Wi-Fi: 802.11n+ Bluetooth LE (Low Energy)
- 2x2 for Cellular: HPSA+(3G) or LTE



Dell Edge Gateway 5000 Series | Bottom I/O with optional power module



Common Protocols supported via ISV software

- BACNet – usually over RS-485 or BACNet over IP (Ethernet port)
- ModBus – over RS-232 usually
- Serial communication for Modbus RTU and BACNet MSTP
- IP protocols Modbus TCP, BACnet IP, oBIX, and Haystack



■ Dell Edge Gateway 5000 Series



Available February 2016	Available April 2016
Dell Edge Gateway Model 5000	Dell Edge Gateway Model 5100
Commercial Specs: 0°C to 50°C	Industrial Specs: -30°C to 70°C

5000 Series Key Hardware Features

Purpose Built: Rugged, Industrial design, Intel Atom processor (Industrial)

Reliable: Fanless design, solid state drives, no moving parts

Optimized mounting: DIN rail mounts, Wall mount options

Native I/O: one RS-232, two RS-485, one RS-422/485 combo
one USB2.0, one USB3.0, two RJ-45 Gigabit Ethernet

Video: One HDMI port

Power: 24V AC/DC power (or 65W A/C adapter sold separately)

OS Choice: WindRiver Linux, Ubuntu Snappy (Windows 10 IoT in April)

Security: TPM 1.2 (2.0 future),, chassis intrusion alert on rugged enclosure

Manageability: CCM, DCM for Ubuntu; future support for Windows 10 LTSC (Helix Device Cloud for Wind River)

Wireless: Wi-Fi 802.11n+Bluetooth (optional)
Mobile Broadband 3G/LTE (optional)

OEM Ready: Rebranding and co-branding capable, "Built on Dell"

Services: 1-year HW Warranty w/ mail-in; optional ProSupport w/ on-site after remote diagnosis for 2, 3 or 5 years. IoT advisory consulting, configuration and application development services.



Edge Gateway 5000 Series accessories (avail April 2016)



Power Module

- Provides additional power for PCIe card in I/O expansion module
- Power conditioning for "dirty power"
- Additional ports for
 - battery backup (UPS)
 - 24V AC/DC for redundant power supplies
 - AC adapter
- Potential future modules

I/O Expansion

- For customer-provided standard PCIe cards to expand I/O
- 2 additional USB ports
- GPIO (General Purpose I/O) port for additional expansion
- 1 serial port
- Cable management
- Potential future modules



Rugged Enclosure

- Lockable hardened enclosure
- IP65-rated for inside and outside applications (protection from dust, oil, water, rain, snow, sleet from any direction)
- Chassis intrusion switch which will send alert for unauthorized access
- Optimized for Model 5100, but tested on Model 5000 too



Mesh Networking Dongle

- Supports mesh networking (low energy innovation)
- ZigBee/6LoWPAN (IEEE 802.15.4) via USB dongle
- Z-wave via USB dongle



CAN Bus Card

- CAN bus via daughter card (on motherboard)
- Usually for transportation but some Industrial
- Avail POS and APOS
- Note: APOS requires customers to open chassis to install



Flexible choice of OS and manageability tools



Intel's full Moon Island stack

What's on the Box?

- Moon Island 3.x stack incl.
- Wind River OS
- Development Kit License
- McAfee Embedded Control
- Helix Device Cloud Agent

APOS Manageability Options

- Helix Device Cloud purchased through Wind River APOS, only option for Moon Island
- Helix is a competitive offering to CCM



Ubuntu Snappy 15.04

What's on the Box?

- Ubuntu Snappy 15.04 OS

APOS Manageability Options

1. Purchase Cloud Client Manager (CCM) Service through Dell Wyse sales, download and install Ubuntu agent for gateway to enable service
2. Purchase agent for Dell Client Command Suite (DCCS) to enable 3rd party on-premise console of choice (e.g. Microsoft System Center)

Note: Ability to use Linux gateway with SCCM is Dell differentiation



Windows v10 IoT/LTSB

(April 2016)

What's on the Box?

- Windows 10 IoT Industry / LTSB

APOS Manageability Options

1. Purchase Cloud Client Manager (CCM) Service through Dell Wyse sales, download and install Windows agent for gateway to enable service
2. Purchase agent for Dell Client Command Suite (DCCS) to enable 3rd party on-premise console of choice (e.g. Microsoft System Center)

Mirdif Mall – Dubai (Dell Gateway Edge 5000)

Mirdif City Centre is a very important mall with over 430 stores, entertainment areas, theatres, indoor sky-diving, food outlets and more

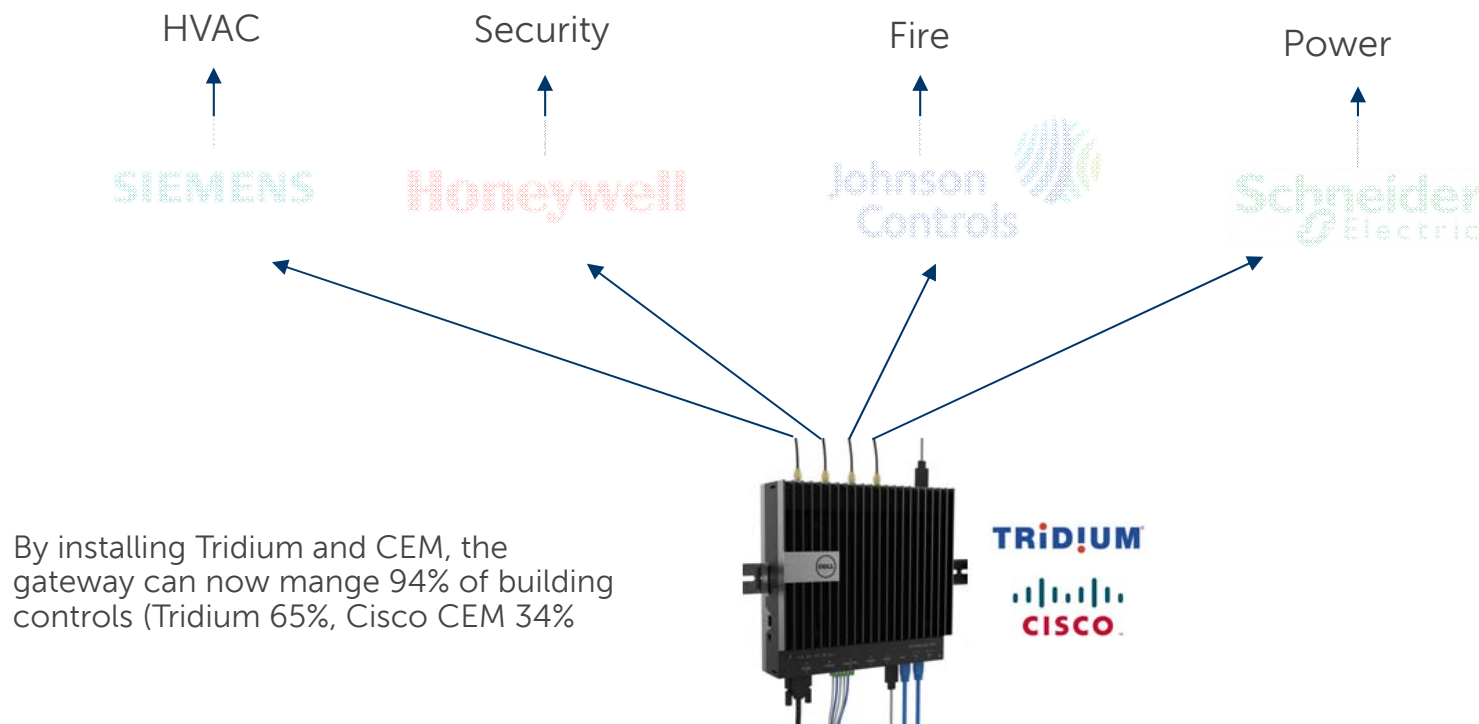


196,000 square meter mall
19.6 million visitors in 2011
7000 parking spaces

Dell - Internal Use - Confidential



How does the Edge 5000 disrupt the BMS Landscape



Reducing % of Rejects on the Production Line

Automotive Parts Manufacturer

Challenge

Reduce the number parts that get rejected at PaL (Paint and Lasering) stage at the end of production process.

Solution

A number of sensors in the PAL area will measure temperature, humidity, light, airflow and dust particles in the air. All this information will be fed into the Dell IoT gateway which will aggregate the Data and combine it with the Data coming from the Manufacturing Traceability System. Statistica will analyse this and recommend the optimum environmental conditions for minimal rejects.



Remote Asset Management

ATM's, Mobile Phone Towers, Electricity Substations, Unmanned Datacentres

Challenge

No unified solution to remotely manage security, access control, fire, CCTV, Tampering etc.

Solution

Working with one of our ISV Partners, Azeti, we can put in a Dell Gateway which (in conjunction with Azeti SW) will connect to sensors measuring vibration, temperature, humidity and will also connect to the Building Access Control, Fire System and CCTV allowing a fully remote managed solution.



Bee Hive in Dell
IoT Lab Limeric



Chitale Dairy case study

Dairy farming in India goes from cows to cloud with technology

"We've transformed our dairy operations using technology, and the feeding and breeding of animals is now monitored by computers. By automating the collection of data from each farm, we have improved animal health, leading to increased milk yield per animal."

Vishvas Chitale, Director, Chitale Dairy,

Results:

- **Animal management improves with increased access to information**
- **Innovative research and development driven by data captured at every level**



Security



Put security first

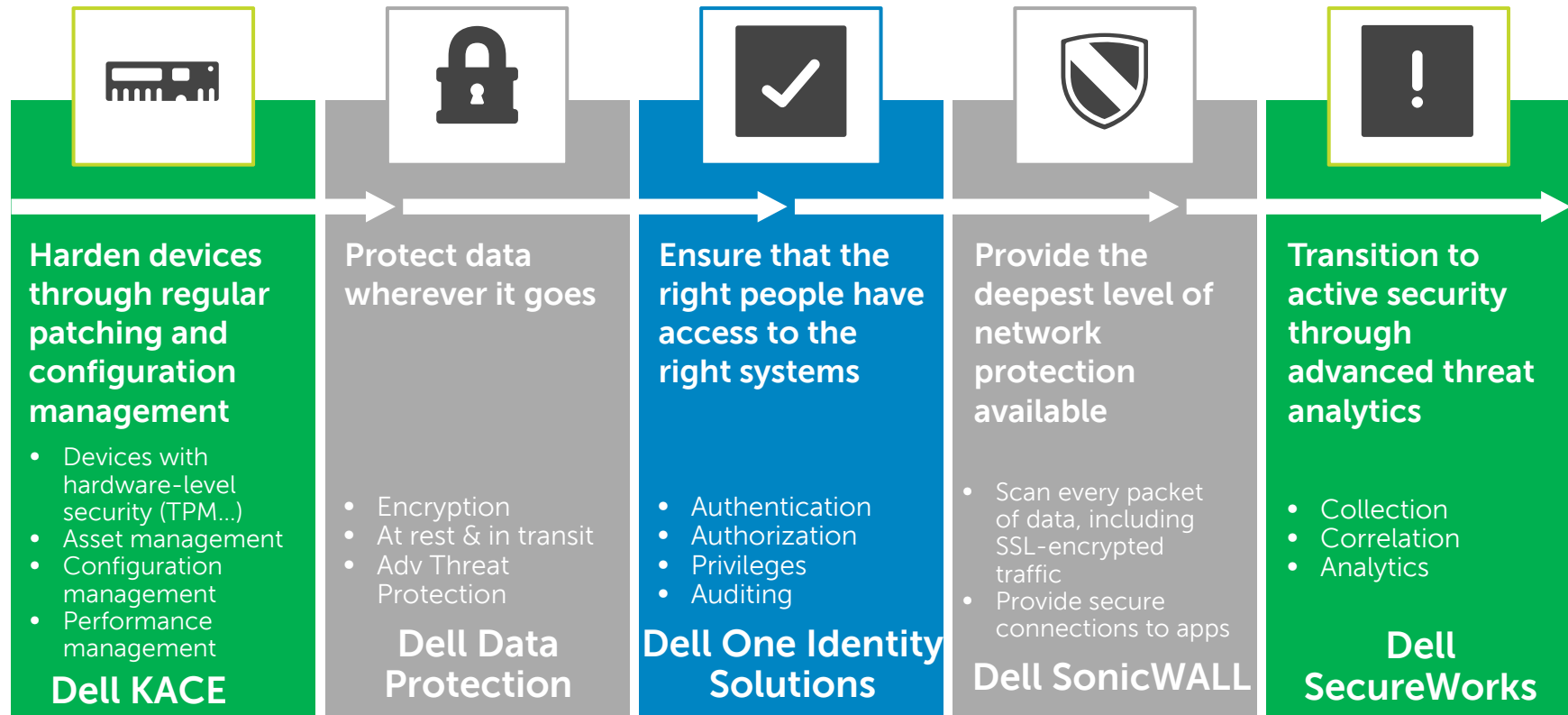
Review and strengthen current IT security and management practices to prepare for potential additional risk exposure.

Carefully select IoT hardware and software, understanding the in-built security posture of each element to realize, track, and manage their associated features and risks.

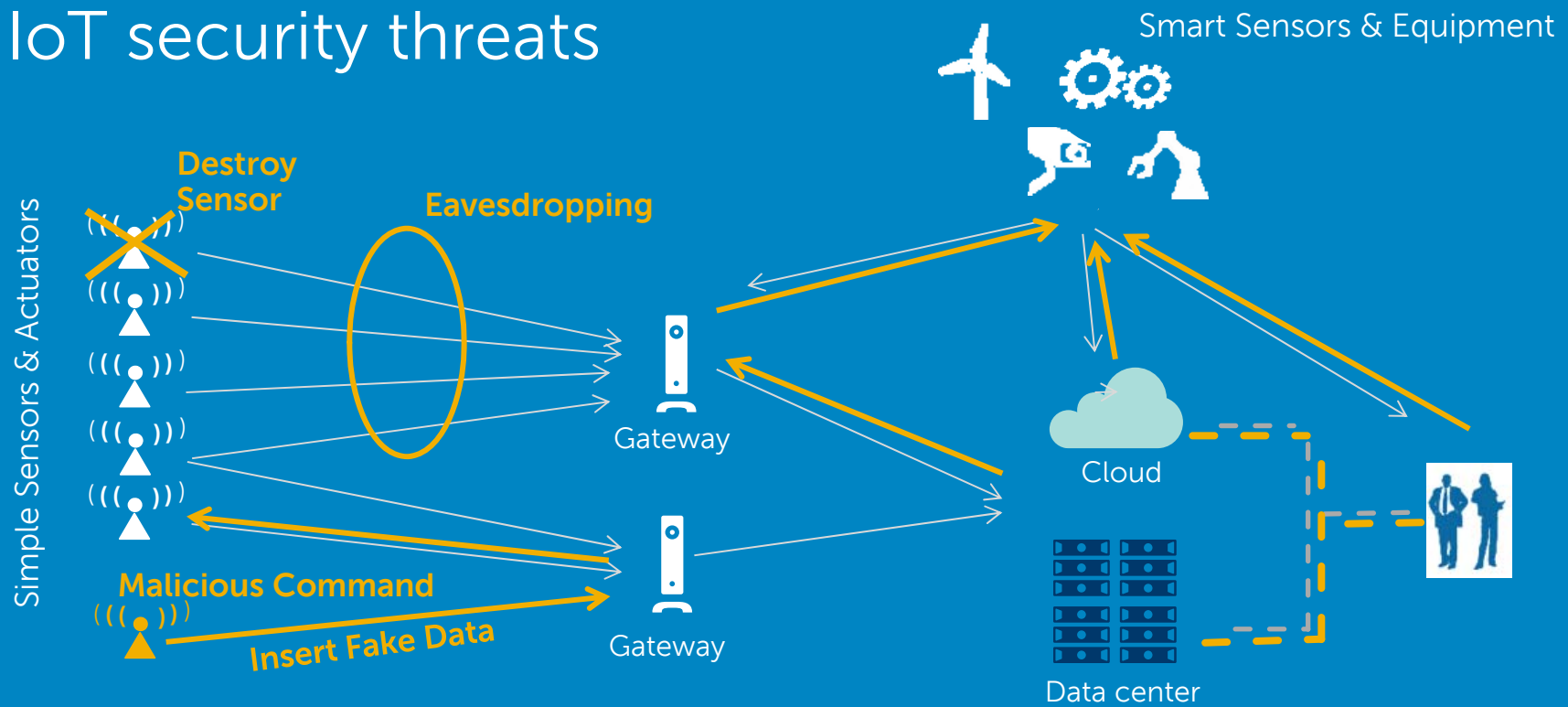
Establish and defend functional integrity at the edge with smarter edge architectural components, such as an IoT gateway and firewall, to enable protection from risks of less capable connected sensors and legacy equipment.



The IoT Needs End-to-End IT and OT Security



IoT security threats



IoT security considerations

Identity

Devices, like users, need an identity in line with business processes. Strong authentication is needed to prove identity and the identity needs to be protected.

Data

The data stored on any given device needs to be protected. Any data sent needs to be verifiable. Data should only be readable by the intended recipient. Ensure you know where your data is going and how access to it is governed.

Network

Threats can access IoT devices through the network and so protections need to be in place on the network in order to prevent malicious access.

Application

IoT refers not just to the hardware, but also to the applications running at all points in the infrastructure. These applications need to be secured.

End Point

The end points in an IoT system need to be protected at both the virtual level (e.g., from insertion of malicious code) to the physical level (e.g., insertion of malicious devices).



Security intelligence

Global Threat Intelligence

Leverage sources such as SecureWorks in order to understand the larger threat landscape and any IoT specific threats.

Threat Detection

Leverage analytics across all log file information and status messages being collected in order to detect potential threats and attacks.

Integrity Checking

Leverage analytics to check the integrity of data being received by correlating it with data being received by other sensors.

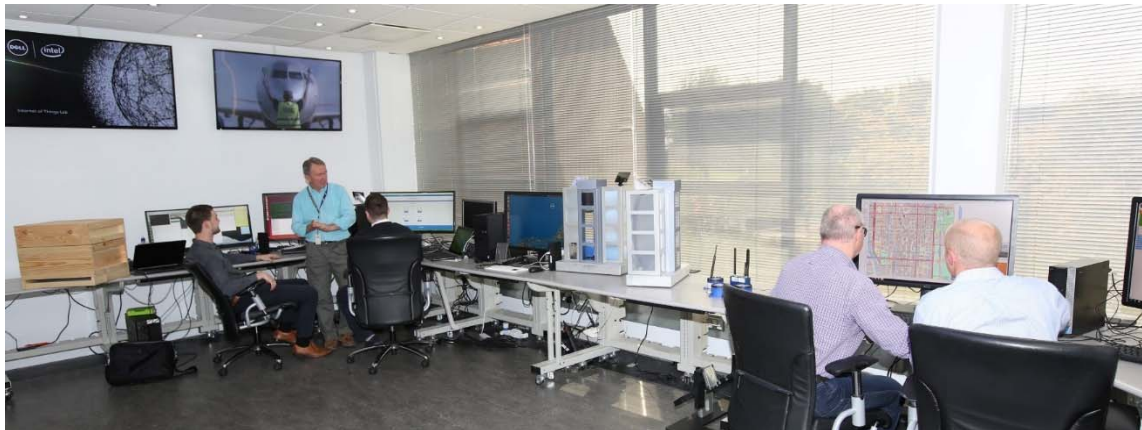
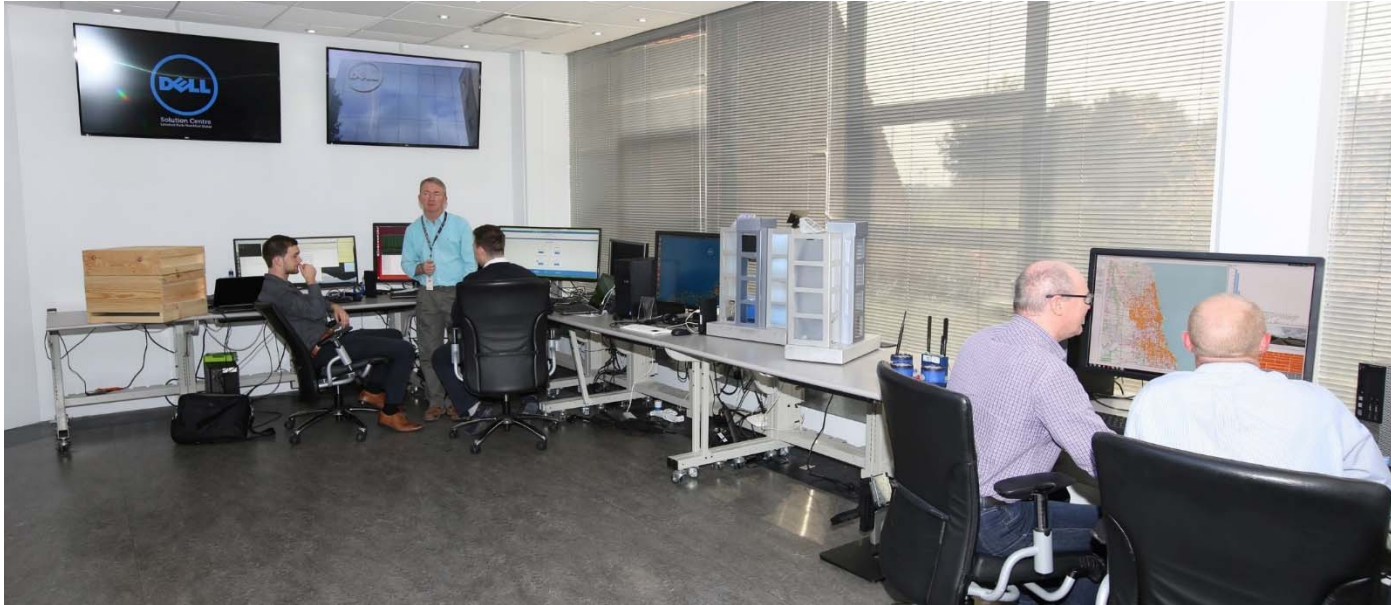
IoT Device and Data Integration

Share identified attacks and threats between devices in order to better protect sensitive data and prevent compromise.



End to end portfolio





Dell's broad portfolio of key IoT technologies

**Endpoints and
edge devices**



**Acquire,
aggregate and
analyze data**

Infrastructure



**Put the right data
in the right place
at the right time**

**Data
management and
integration**



**Improve data
platform
performance**

**Advanced
analytics & BI**



**Turn data into
insights for
better, faster
actions**





Manageability: Asset management and provisioning

Security: Data privacy, security and governance

**Dell Services: Ecosystem design, IT/business alignment,
application development, systems and partner integration**



Dell IoT Industry Consortium Focus

Industry Organization	Overview
<p>The Thread Group</p> 	<p>Dell has recently joined 'The Thread Group' – which today is primarily focused on the consumer market. With the recent release by Google/Next of the 'Brillo lightweight Android OS for IoT devices and applications, significant leverage and scalability can be realized using this new OS and the IoT 'weave' protocol as a foundation architecture for E2E IoT solutions</p>
<p>Open Interconnect Consortium</p> 	<p>The Open Interconnect Consortium is been founded by leading technology companies. This is a standards focused group, driving the development of IoT standards with the goal of defining the connectivity requirements and ensuring interoperability of the billions of devices that will make up the emerging Internet of Things (IoT).</p>
<p>Industrial Internet Consortium</p> 	<p>Through an independently-run consortium of technology innovators, industrial companies, academia and government, the goal of the IIC is to develop reference architectures for IoT systems. This organization does NOT develop IoT standards, and leverages existing standards from other Industry Alliances.</p>
<p>Intel Internet of Things Solution Alliance</p> 	<p>Members of the Intel Internet of Things Solutions Alliance provide the hardware, software, firmware, tools, and systems integration that developers need to take a leading role in the rise of the Internet of Things.</p>

Dell's pragmatic approach helps customers **get started today.**

Start with what you have

- Start small
- Use the devices and data you already have.
- Build on your current technology investments.
- Grow based on real-world success.

Architect for analytics

- Plan for analytics-driven action.
- Build on your terms with modular, architecture-agnostic solutions.
- Harness the power of advanced analytics.
- Prepare to scale quickly from pilot to production.

Put security first

- Secure from the data center to the farthest Dell endpoint and along the networks and clouds in between.
- Protect data wherever it goes.
- Secure for privacy and compliance.

