AVNET SILICA

IoTConnect and How to Get Started

Table of contents

The Internet of Things (IoT) is the evolution of machine-to-machine (M2M) technology that facilitates the interconnection of sensors, machines, IT systems and management platforms to enable the "smart world" around us. The leading technology behind this latest industrial revolution—Industry 4.0—IoT, is signalizing major changes and disruptions in both the internet and manufacturing industries. Wireless networks, sensor technology, and cloud-based and real-time computing make it possible to collate and analyze data across machines to make processes faster and more efficient. However, installing a system to monitor machines is only a first step. To capitalize on IoT, manufacturers need to make systemic changes across the organization.

CAPITALIZING ON IOT

The amount of data generated in manufacturing is growing twice as quickly as in any other industry. However, many enterprises are analyzing only a small fraction of their data to get meaning out of it. In order to gain meaningful information out of existing data and gain a competitive advantage, enterprises need to tap into the power of IoT with a software platform with the following characteristics:

- Interacts with machines
- Delivers an intuitive user experience
- Collects and analyzes heterogeneous data
- Features advanced predictive analytics for better decision-making
- Prioritizes data security

ANALYSTS EXPECT THE NUMBER OF IOT DEVICES TO GROW BY **12%** ANNUALLY, PUTTING THE TOTAL AT AN ESTIMATED **125 BILLION** BY 2030. -IHS

Source: https://technology.ihs.com/596542/number-of-connected-iot-devices-will-surge-to-125-billion-by-2030-ihs-markit-says

WHY AN IOT PLATFORM?

While most businesses are generating a great amount of data, it is only when that data is funneled back into the organization and analyzed that it can contribute to valuable operational and business innovations. An IoT platform gives you this ability, providing a standardized way to harness IoT so that your business can quickly build smart apps and solutions on the platform to make data-driven decisions and extend capabilities.

TOP CONSIDERATIONS IN AN IOT PLATFORM

There are several important aspects that enterprises must take into account when designing their IoT platform, so as to realize the full benefits of IoT. This includes IoT security and privacy, interoperability and standards, convergence of IT and OT, and the hosting model.

IoT security and privacy

Safeguarding data security and privacy throughout the organization's entire IoT ecosystem is critical to address potential risks and prevent breaches that may leak important or private data. Together with secure connectivity, enterprises must build a strategy to ensure compliance with privacy regulations.

Interoperability and standards

When building an IoT system, it is important to look for a platform that is operable, programmable and communicable across the widest range of devices and sensors in the ecosystem. Choose a system that conforms to widely-adopted, non-proprietary industry standards to ensure interoperability with the highest number of applications and hardware. This helps to future-proof your system and safeguards your investment against technology obsolescence.

Convergence of IT and OT

By carefully planning and integrating your IoT platform into your operation technology (OT), you will enable the efficient collection and analysis of a huge amount of data. An organization's machinery, facilities, devices and sensors throughout the organization make up its OT. Contrast this with an organization's information technology (IT), which includes all the necessary communication technologies used in the organization, such as for the enterprise resource planning (ERP) and customer relationship management (CRM) systems. The convergence of IT and OT is important to:

- Improve information security
- Increase control over distributed operations
- Eliminate redundant processes to reduce operating costs
- Fully extract value from data
- Improve overall plant safety
- Enhance performance and reduce time to market

Hosting model

The three major options for hosting your IoT system are on-premises, private cloud and hybrid. The right hosting model depends on the security, access and performance requirements needed for your system.

WHY MOVE TO IOT TODAY?

IoT goes beyond just M2M communications, bringing a new age of automation into manufacturing and other different sectors. The challenges enterprises face today include data and storage management, security concerns, unplanned downtime, productivity, and decision-making: all of which can be addressed with today's IoT platforms.

IoT spending hit **$745B** in **2019** across hardware and software. -IDC

https://www.lightreading.com/iot/global-iot-spending-to-hit-$745b-in-2019-andndash-idc/d/d-id/748593

IoT enables transparency on the shop floor by applying smart manufacturing solutions across the value chain, while enabling more practical decision-making through consistent, real-time key data. Implementing an IoT platform will help you get rid of unplanned downtime, reduce productivity loss and monitor your assets remotely. This all enables you to grow your organization to meet future requirements.

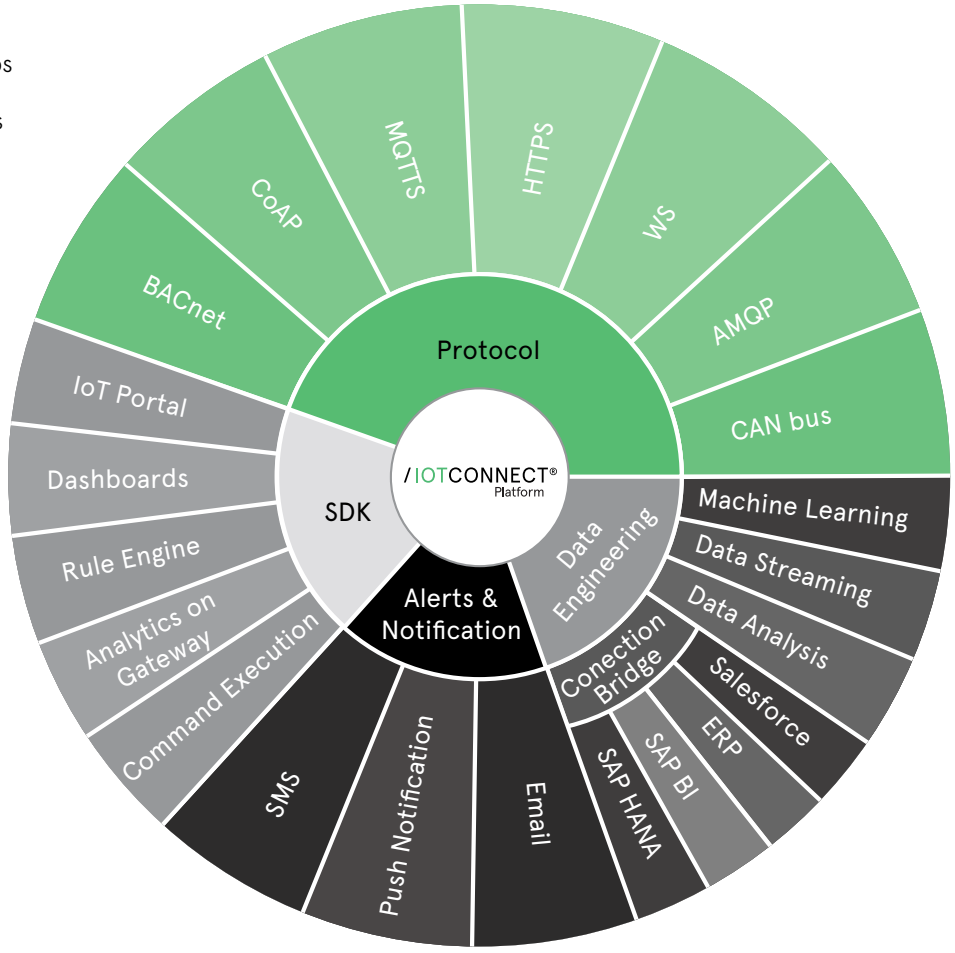
35% of US manufacturers are currently collecting and using data generated by smart sensors to enhance manufacturing/operating processes.

-PWC

INTRODUCING IOTCONNECT

IoTConnect is a smart IoT platform that helps boost efficiency, better manage assets and quickly adopt innovation. The platform helps enterprises build and deploy innovative applications and solutions that transform real-time operational data into insightful information to make smarter decisions.

IoTConnect supports many common protocols to connect your enterprise. It applies today's top data engineering processes to enable information extraction and to connect to existing systems, and it supports multiple types of alerts and notifications. IoTConnect includes a robust software development kit (SDK) that gives users unparalleled access to data, either with standardized process or by creating their own.



THE IOTCONNECT VALUE PROPOSITION

Enterprises have been collecting and archiving a huge amount of
data for many years, but few have been using it to its potential. When data is collected and processed using a sophisticated analytics tool, it becomes possible to find patterns to reveal meaningful information that improves decision-making practices.

The latest innovations in IoT deliver more productive use of the data, applying data science and predictive analytics to retrieve hidden insights. This turns simple data into meaningful information that will help enhance transparency, improve efficiency, increase system throughput, avoid sudden machine failure, and ultimately enhance customer experience.

IoTConnect provides businesses with the infrastructure required to connect their assets, collect data and analyze it in detail. This is achieved by facilitating device communication and management while adhering to industry-grade security protocols.

IOT PLATFORM OVERVIEW

IoTConnect is not just a system that allows enterprises to connect and manage their connected assets. It's a robust, high-performing IoT platform that helps companies to connect assets easily, transform them into data-driven companies, generate new insights, and drive actions.

With IoTConnect, organizations can configure an unlimited number of on-premises and remote devices, enable cross-device communication, access real-time and collected device information for analysis, set up systems and machinery to notify you when necessary, and deploy multi-layer security.

Easy device configuration

IoTConnect is easy to configure, helping you eliminate security risks and compatibility hurdles, and allowing you to easily register and pair your devices to the platform with no coding. Once devices are configured, features are made available to manage devices, assets, software, connections and the entire configuration.

Connecting unlimited things

You can connect an unlimited number of sensors, gadgets and other IoT equipment to the IoTConnect platform. And as there is no limit to the number of things that you can connect, you can scale up your IoT deployment as your requirements change with your growing business.

Cross-device communication

IoTConnect supports communication across multiple devices. Configure your sensors on the IoTConnect platform to access reports from anywhere using web services and APIs on your desktop or mobile device.

Connectors for data visualization

IoTConnect lets you build real-time, interactive dashboards to understand data to meet your needs. Our data connector allows you to collect, analyze and demonstrate your business data in the form of interactive graphs and charts to help you improve decision-making capabilities.

Real-time device monitoring

IoTConnect helps you see what's happening on your on-premises and remote devices at any point, from anywhere. It also allows you to perform extensive real-time analysis in the form of live graphical charts.

Smart rules for instant notifications

You can easily create smart rules for connected devices to send you notifications on your desktop or mobile devices. Through the real-time dashboard, IoTConnect also facilitates asset tracking and remote management and control.

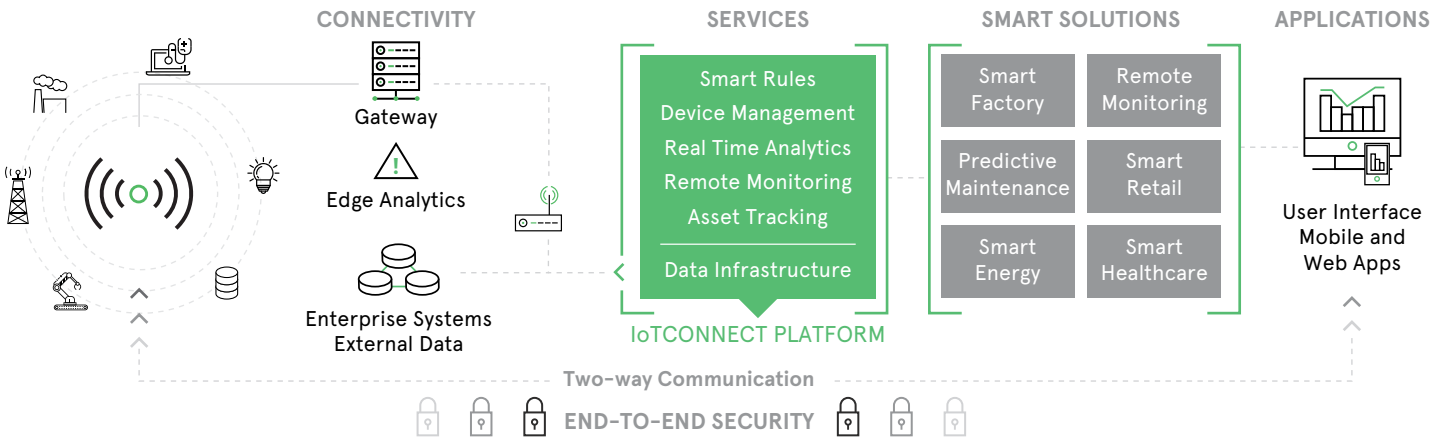
Multi-layer security

Network-related security risks are eliminated using the multi-layer security deployed across the IoT platform. This is achieved with device identity management and application security, including multi-factor authentication.

IOT PLATFORM ARCHITECTURE

Building a complete IoT ecosystem that enables the development of industry solutions can be a huge undertaking for even the most resourceful organizations. With IoTConnect, enterprises can kick-start their IoT journey as the platform enables them to rapidly build,
securely host, deploy and effectively operate industrial applications.

With the IoTConnect platform, you don't have to create a system from scratch. Start by interfacing with many of the tools required for an effective IoT deployment: from remote device management to prediction. Next, IoTConnect can connect almost any IoT device with the most powerful industry-based and other protocols which can communicate to the IoTConnect cloud. It also allows you to connect your existing enterprise CRM and ERP systems so you can generate greater intelligence.



IOTCONNECT FEATURES

The many features of IoTConnect can be divided into seven main categories: easy configuration, notifications, real-time monitoring and analytics, multi-layer security, integration, connectivity and interoperability, and edge software.

Easy configuration

- Device lifecycle
- Device identity management
- Asset management
- Connection and configuration management
- Remote troubleshooting
- Software management
- Multi-tenant architecture

Notifications

- Smart rules
- Data explorer
- Real-time dashboard builder
- Remote management and control
- Asset tracking

Real-time monitoring and analytics

- Live graphical charts
- Extensive real-time streaming analytics
- Analytics applications
- Connectors for DV

Multi-layer security

- Access security using Device Identity Management, OAuth 2.0
- Protocol transmission over TLS
- Application security including multi-factor authentication

Integration

- Integrated third-party services
- API developer portal
- Built-in API gateway
- Integration SDKs

Connectivity and Interoperability

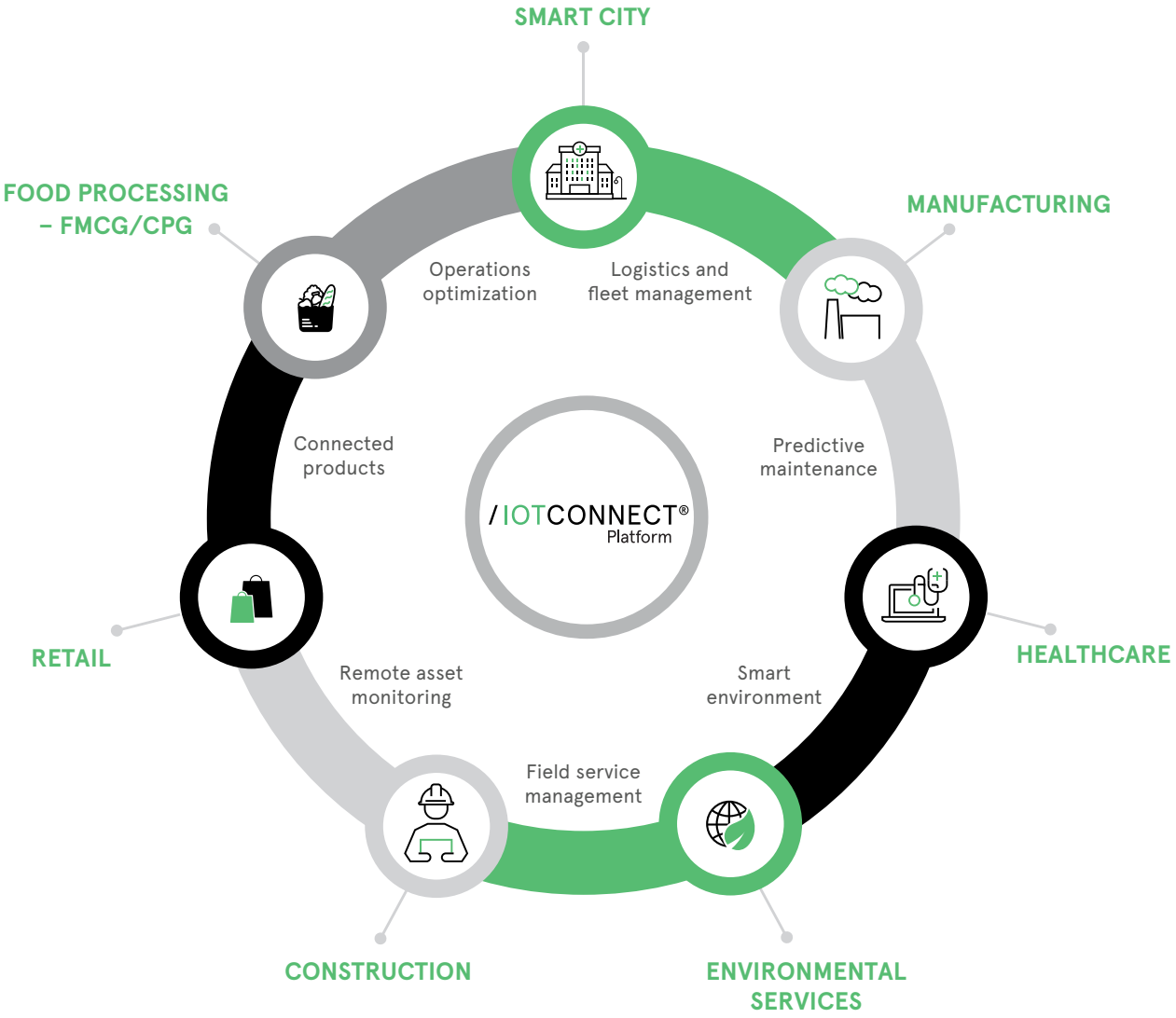
- Many certified devices
- Connectivity abstraction
- Protocol support
- Device SDKs
- Data modeling

Edge Software / Analytics

- Multilayer device group management
- Template management (Device attribute definiton)
- Cloud-to-device communication
- Trigger device communication on the basis of rule evaluation
- Virtual devices / data lakes / ERP system data ingestion
- Push notification certificates

SUPPORTING COMMON INDUSTRY NEEDS

Avnet has built smart solutions powered by IoTConnect that meet the unique needs of different industries:



Connected products

Move away from a break-then-fix approach to maintenance and instead go to a predictive maintenance (PdM) model by connecting your assets and applying data analytics to asset management. It not only improves performance and efficiency but also results in lower repair costs.

Predictive maintenance

Monitor your assets remotely and understand defect patterns to predict asset failure. This helps you make better decisions and boosts productivity.

Smart environment

Using sensors and beacon technologies, you can build smart solutions for buildings and cities to collect data and improve our lives.

Field service management

Equip your field technicians with the information they need to enable them to take incoming service calls more efficiently, improve service operations and boost customer service experiences.

Remote asset monitoring

Keep track of all your assets remotely and ensure optimum performance with prescriptive analytics.

Logistics and fleet management

Prevent accidents and address safety with real-time tracking information and gain complete visibility of each item throughout the supply chain to improve your logistics service.

Operations optimization

Gain key insights from the IoT ecosystem and use them to solve operational issues, increase efficiency and drive productivity.

DELIVERING RESULTS

IoTConnect delivers innovation powered by cutting-edge technology, helping enterprises to enhance operations while providing key insights to the plant manager, field operators, mobile staff and supervisors to meet challenges and generate outcomes that matter. IoTConnect is specifically designed to:

- Connect assets, users, partners and systems
- Capture and analyze huge amounts of data in terms of velocity, volume, variety and complexity
- Help enterprises to innovate faster and generate better business outcomes
- Increase business agility and eliminate roadblocks
- Improve asset utilization by eliminating situations like sudden equipment failures
- Solve business problems that prevent growth and market competitiveness
- Foster new capabilities through integrated hardware, software and services
- Meet security and compliance needs

INDUSTRY-GRADE CLOUD INFRASTRUCTURE

When planning an IoT deployment, it is important to consider the type of infrastructure your IoT system will require. For example, public or private cloud is typically set up to support IT data such as that used by CRM or ERP systems. However, the unstructured data generated by industrial equipment is often high in volume and throughput needs, which would require more sophisticated technology. Regardless of the type of infrastructure chosen, security and data privacy considerations must also be applied.

IoTConnect supports almost any type of infrastructure, giving you complete freedom to choose what is best for your needs and to help manage your customer SLAs, security and compliance, and more.

THE CONNECTIVITY PLATFORM FOR SECURE IOT

IoTConnect provides everything you need to build IoT solutions while meeting stringent security requirements, such as perimeter security, data visibility, data security and access control. The system includes support to meet various data governance needs, regulatory compliance and privacy needs.

Robust software- and hardware-level protection is critical for ensuring that data is safe from loss and secured against unauthorized access. A layered security approach offers industrial-grade data security, as every layer is scanned and monitored for vulnerabilities. Other security features include:

- Device identity and authentication
- Encryption
- Server unique ID authentication
- Certificate-based authentication
- Network-level security
- Logging
- Incident response services
- Continuous monitoring
- Secure communication channels
- Secure firmware delivery

AVNET-MANAGED CLOUD

Determining that data storage, security and other processes meet industry and your own strict standards is critical for businesses that use cloud storage or application-hosting services. Our cloud platform meets rigorous privacy and compliance standards to maintain security and data protection. No matter where you are running your business, we've got you covered. Our cloud platform is certified against four ISO standards:

- ISO 27001: Information Security Management Systems (ISMS)
- ISO 27017: Cloud-specific security control guidance
- ISO 27018: Protection of Personally Identifiable Information (PII) in public clouds
- ISO 9001: Quality management systems

THE SCALABILITY OF THE ENTERPRISE

IoTConnect uses a software-defined infrastructure (SDI), which means it is programmatically extensible and independent of any hardware-specific dependencies. This enables a smooth transition from one configuration to another with minimal disruption and also ensures that the IoT platform does not become a hindrance as your business grows and you add new applications or new devices over time. This makes our platform robust and ready for tomorrow's extensible deployment needs.

READY TO ADOPT ADVANCED METHODOLOGIES

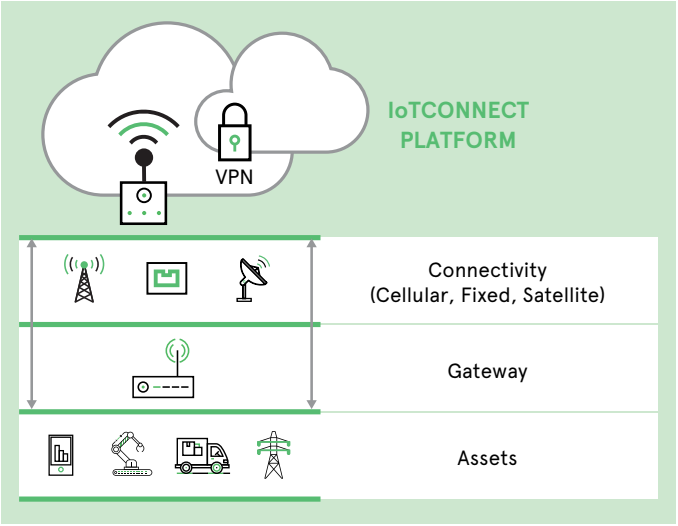
Enterprise expectations of cloud-based platforms are greater than those of classic IT architectures. A service-oriented architecture (SOA) is often insufficient in today's big data era, partly because the classic SOA can be too complicated when it comes to defining granularity. Our IoT platform allows enterprises to adopt the latest implementation approaches and practices like microservices and DevOps. The modern environment that IoTConnect offers allows developers to test and deploy apps more efficiently, and more importantly, it allows businesses to scale apps in just days instead of weeks or months.

SERVICES THAT SUPPORT BIG DATA

IoTConnect is an IoT platform that can capture and analyze huge amounts of data by enabling enterprises to securely connect a wide range of data sources, devices, sensors, equipment and control systems. Once all the resources are connected, data is aggregated, filtered, stored and analyzed. The data is then converted into easy-to-understand reports using data visualization tools and made available to the right people at the right time to improve decision-making.

CONNECTING SMART AND NON-SMART THINGS

IoTConnect works with a variety of infrastructure systems, meaning you can even connect legacy systems into your new IoT using gateways.



IoTConnect gateways support many interfaces, including Bluetooth, 802.15.4/ZigBee or 6LoWPAN, ModBus, CAN bus, BACnet and so on. In turn, businesses can reap the benefits of IoT by sharing data from edge devices to the cloud to reveal actionable insights that can transform business. This managed and end-to-end connectivity is made possible with:

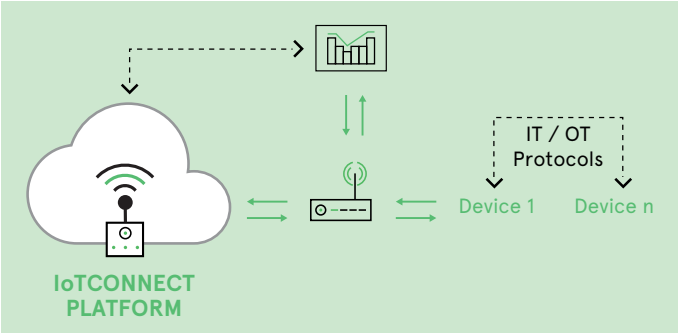
- Secure VPN between assets and IoTConnect cloud, ensuring safe and protected data
- SSH and HTTP for remote access
- SSL to secure information transmission

BRIDGING THE GAP BETWEEN OT AND IT

When it comes to connectivity, the OT/IT gap is typically the first barrier that companies face. If you identify existing systems that you want to connect, rather than purchasing new hardware, look for other ways to facilitate the connection. There are three main ways to bridge this gap: on gateways, from the machines and from sensors.

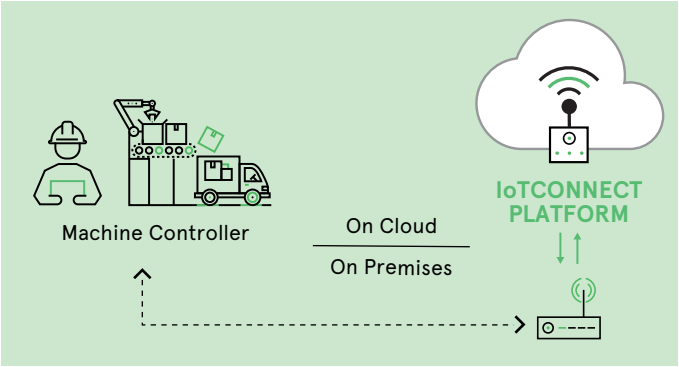
On gateways

Technologies like PC-based control and industry standard messaging protocols such as message queuing telemetry transport (MQTT) can be used to send data from legacy supervisory control and data acquisition (SCADA) devices to IoTConnect at a relatively low cost.



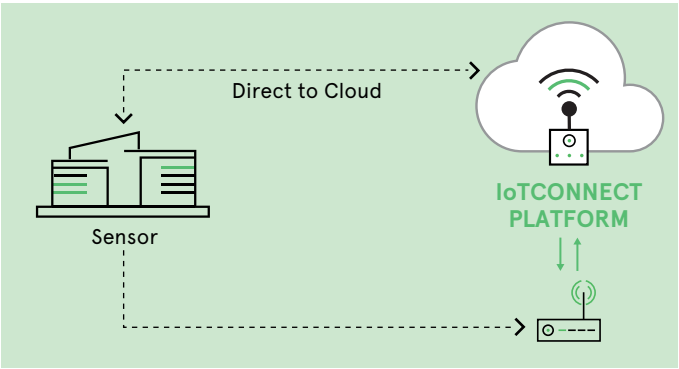
From machines

By using machine controllers, industrial assets can be connected to the cloud.



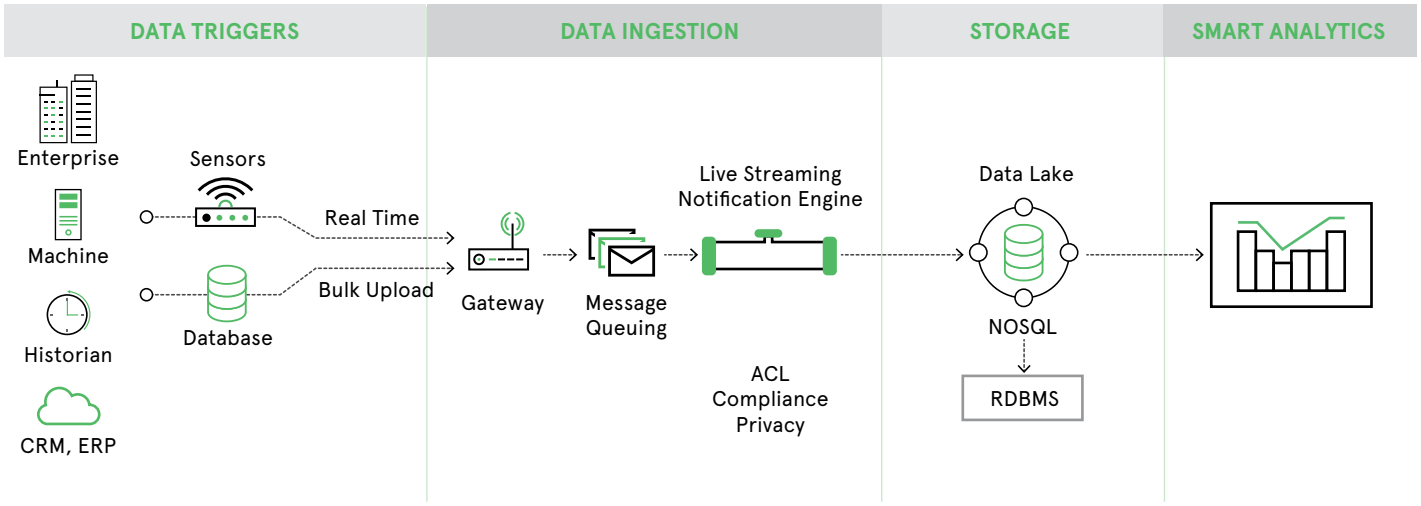
From sensors

Low-cost sensors can be deployed on devices to facilitate data transmission via gateways or directly to the cloud.



DATA COLLECTION, ANALYSIS AND MANAGEMENT

IoTConnect is designed with a multi-tenant, multi-user approach with encrypted-key-management capabilities. This offers quick access to data and timely analytics while reducing storage and computing costs. To extract greater value and add a visual context to understand data, enterprises can add analytics tools and languages to their system, such as R, Python, D3.js and Power BI.



Data capturing and analysis functionality can be divided into the following four stages:

Data ingestion

- Device sensors gather raw data from various on-premises and cloud sources.
- Big data technologies like NoSQL and Hadoop ingest and store massive amounts of structured and unstructured data.

Data processing and analysis

- This involves those datasets that need to be validated against business rules, aggregated and sorted out.
- Performs ETL (Extract, Transform, and Load) on big datasets and creates big data warehouses that are useful for data scientists to report and perform the analysis.

Data storage

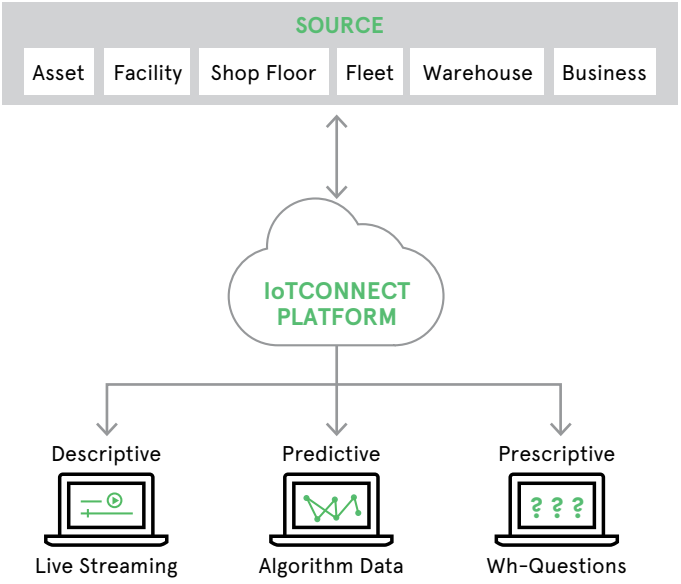
- Raw data is transformed into a finished dataset to be used in various analytics applications or BI tools.
- The filtered data is then sent to a cloud-based or on-premises service.

Data visualization

- The data can be monitored and visualized using advanced data visualization tools to detect issues and rectify them.
- Enterprises can also set up rules for connected devices to send real-time notifications.

VISUALIZE DATA TO UNCOVER INSIGHTS FOR BETTER OUTCOMES

Business are accumulating massive amounts of data, yet most are failing to analyzing it fully to retrieve valuable insights. IoTConnect works with businesses to help them collect, store and analyze their data—whatever the source or type—to gain actionable results.



Every day, we create **2.5 quintillion bytes of data** — so much that 90% of the data in the world today has been created within the past two years alone.

Businesses are creating (and usually storing) significant amounts and different types of data, but unfortunately most businesses are not able to make sense of the data, which results in information scarcity.

With smart analytics enabled by IoTConnect, companies can unlock significant opportunities lying in their data, which delivers insights that helps them make better decisions, enhance situation awareness and gain a competitive advantage. While many companies are making decisions solely based on their intuitions or market trends, smart analytics can help you transform from intuition-driven to insight-driven decision making

Intuition-driven decision making

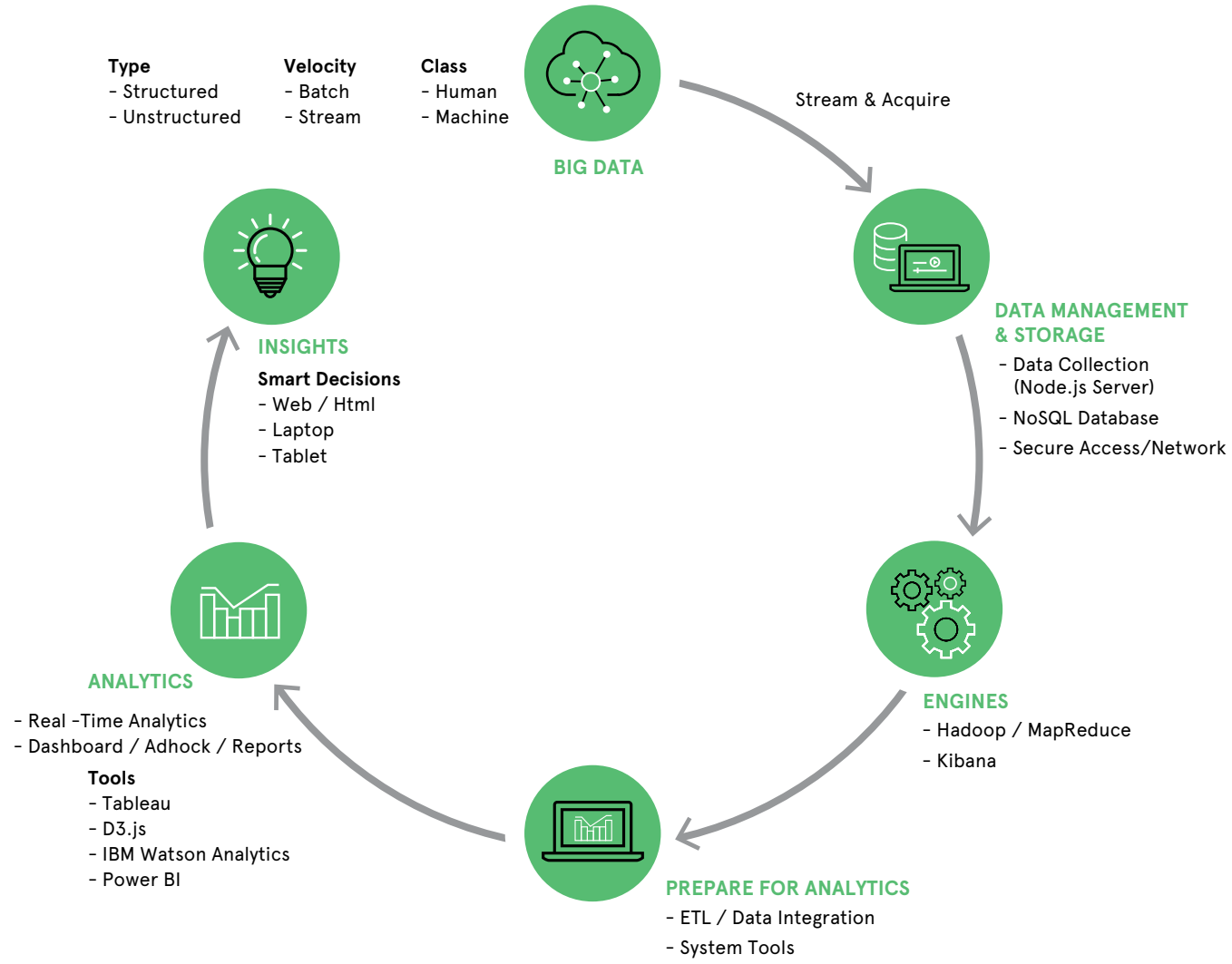
- Decisions biased by intuitions
- Based on experience or self-learning
- Depends on past records/reports

Insight-driven decision making

- Smart decisions based on data
- Minimum chances of errors
- Enabled by automated process

SMART ANALYTICS FROM IOTCONNECT: UNCOVER INSIGHTS AND IMPROVE DECISION-MAKING

Big data is much more than a buzzword. With the massive amounts and multiple types of data collected by enterprises today, big data and its processing needs are very much a reality. Big data reaps many rewards in the form of astute business insights, but you must account for its data management, storage and analytics needs.



INTERACTIVE VISUALIZATIONS FOR BETTER UNDERSTANDING OF DATA

Sophisticated reports and other types of visuals help enterprises drive decisions and actions. A suitable visual representation of collected data can effectively communicate the whole story.

IoTConnect consists of highly capable analytics tools that you can apply to both streaming and batch data to put hidden patterns and information in a visual context, as shown in the illustration above. Deploying interactive visualizations in the cloud ensures that complete information is available to the right people in your organization at the right time.

To provide interactive visualizations, IoTConnect performs two types of data analyses: historical and operational.

- **Historical analytics.** This involves the collection and analysis of a massive amount of historical industrial data. The past operational data helps to build a predictive model to generate insights and enhance operations on the shop floor or in the field.
- **Operational analytics.** IoTConnect has capabilities to perform real-time operational analytics that allows your business to detect problems in real-time, optimize performance and prevent sudden damage.

In addition to historical and operational analytics, IoTConnect also offers descriptive, predictive and prescriptive analytics, which offer a deeper understanding of the relationships in your data.

- **Descriptive analytics:** Provides simple summaries and observations about data to gain insights from the past. For example, knowing a manufacturing machine failed five times in a day and that preventative maintenance is required.
- **Predictive analytics:** This uses a forecasting model to predict what might happen next. For example, companies can cut down on emergency servicing by predicting which machines are more likely to break down, increasing overall production with proactive steps.
- **Prescriptive analytics:** Beyond prediction, prescriptive analytics suggests the best solution among different choices for a given situation that could have a greater impact on a company's bottom line.

With IoTConnect and the various types of analytics it offers, you can build responsive mobile, internet and embedded applications to visualize insights directly on your computer systems and mobile devices.

INTEGRATION WITH EXISTING INFRASTRUCTURE

To take full advantage of IoT in your organization, it's essential to connect an IoT platform with existing and future equipment and any other data sources. Because it interfaces with a wide array of widely accepted non-proprietary industry standards and tools, IoTConnect can be integrated with your existing data, assets, third party tools/languages, ERP/CRM systems and mobile devices.

Supported protocols: DDS, OPC-UA, and MODBUS, as well as TCP-based sockets communication

Supported programming languages/tools: Java, Python, C#, C, C++, GoLang, Node.js and Ruby

Supported analytics tools: R, Java, Matlab, Python, IBM Watson, D3, Splunk, Logi, Tableau and Power BI

EASIER INTEGRATION TO ENABLE INNOVATION

As industrial applications have very specific requirements, they usually cannot be built using a traditional approach. The innovative design of IoTConnect reflects the years of experience Avnet has in building industrial applications.

Typically, developers can spend very little time in innovation since most of their time is spent in integration and system upgrades. With the features and advanced tools and services in IoTConnect, developers no longer need to spend time in integration tasks like integrating and configuring products, scaling and securing infrastructure, managing SLAs, building software server stacks, etc.

MICROSERVICES: BUILDING NEXT-GENERATION, SCALABLE APPS

Unlike traditional monolithic architectures, enterprises can build and scale industrial applications more efficiently by leveraging different building blocks that are developed and delivered as discrete services within IoTConnect. The platform's standalone and reusable software modules provide a level of isolation that allows developers to work on specific services and facilitate continuous delivery and releases while keeping the rest of the application stable and available.

ACCELERATE THE DEVELOPMENT PROCESS WITH DEVOPS

IoTConnect provides a set of DevOps tools that tighten integration between functions that have traditionally been isolated, including IT, development and quality assurance. IoTConnect provides an iterative and more integrated environment that helps developers to shorten their development cycles and make the entire software delivery chain more efficient.

END-TO-END ENTERPRISE-GRADE SECURITY

The integrity of operating systems and data security is one of the biggest concerns when it comes to deploying and maintaining IoT systems. IoTConnect supports security at multiple points across software and hardware components, which provides end-to-end protection throughout the data lifecycle.

As described in more detail below, the IoT approach to security can be divided into four categories: governance and certification, platform hardening, security for industrial apps and continuous monitoring.

Governance and certification

We know how important it is to maintain a high level of trust when dealing with sensitive information. We have integrated governance and certification into IoTConnect's architecture to manage integrity and security of the data. Our IoT platform is built on a common infrastructure governance model based on ISO 27001/2, FIPS 140-2, and NIST 800-53.

Platform hardening

Connectivity greatly increases security risks to connected assets. To eliminate security risks and threats to data protection, Avnet has implemented platform hardening at every level in the application, operating system and network protocols. We have deployed manual and automated controls to identify and patch system vulnerabilities, which results in unified and clean
runtime environments.

Security for industrial applications

IoTConnect provides enterprises with a secure software development environment to handle the influx of big data properly, create secure workflows, dynamically test applications and APIs throughout the development process, and track the performance metrics of applications. This helps enterprises to detect suspicious behavior and identify all potential risks that could affect their project, which helps reduce the possibility of malware infections.

Continuous monitoring

IoTConnect delivers comprehensive visibility through continuous monitoring at every layer to maintain security. Real-time monitoring also helps companies to prevent data loss and detect abnormal activities. Our IoT platform also provides you with options to implement controls at application and data layers.

INDUSTRIAL USE CASE: PREDICTIVE MAINTENANCE

We stand on the brink of a technological revolution today, where almost everything is gradually becoming IoT-enabled—including computing devices, mechanical and digital machines, sensors or almost any object you can think of. With IoTConnect, manufacturers can build a predictive maintenance (PdM) solution and substantially increase operational performance, maximize asset productivity, improve product quality, reduce downtime and cut costs.

To maintain optimum productivity in a tremendously competitive market, no business can afford accidental breakdown or other unpredicted downtime of the machinery. The PdM solution powered by IoTConnect solves this problem by continuously monitoring assets and collecting usage and asset health information. This allows the system to determine fitness for continued operation and to predict when failure is likely to occur.

The PdM solution provides deep visibility into assets' health and performance and allows effective maintenance schedules to be planned before the failure occurs with the help of predictive analytics. By capturing and processing log, measurement, and failure information, PdM identifies key factors responsible for machine failure then determines the probability of predictive outcomes. This allows managers to make better decisions and maintenance plans.

SMART ASSET MONITORING

IoT-enabled smart asset monitoring provides companies with a set of tools and techniques to monitor their resources and translate raw data into meaningful and useful information. This helps them take preventive measures against uncertain machine breakdown, which in turn leads to greater uptime. Remote monitoring allows companies to monitor and diagnose their assets from virtually anywhere by accessing sensor-level data from a single place. Real-time monitoring from M2M takes remote operation and assessment as well as maintenance of equipment to a new level of accuracy and timeliness.

ANALYTICS FOR PREDICTIVE MAINTENANCE

Data-driven technologies such as IoT deliver descriptive analytics to help assess equipment performance and gain insights into maintenance activities. In addition to predictive analytics for predicting sudden machines failures, IoTConnect can perform prescriptive analytics for recommending machine operating conditions and future actions. Predictive and prescriptive analytics result in increased asset availability, optimum productivity, reduced maintenance and lower operational costs.

PERFORMANCE MODELING AND ANALYTICS FOR PREDICTIVE MAINTENANCE

Modeling and analyzing machine performance helps companies to detect possible degradation in performance at an early stage and plan an effective maintenance plan. One approach is to measure key performance indicators over time which is then compared to the ideal performance. Another approach is to measure the effectiveness of maintenance activities carried out over a period of time and then assess the changes in performance for better maintenance planning.

FAILURE PREDICTION FOR PREDICTIVE MAINTENANCE

Based on the information collected from current data as well as past events, companies can avoid sudden breakdowns, increase equipment availability, and reduce repair and maintenance costs. This can help companies make event-based and sensor-based machine failure predictions. event-based failure prediction depends on the past events and machine performance, whereas sensor-based failure prediction is based on the information delivered by sensors in real-time.

GET STARTED WITH YOUR IOT PLATFORM

Deploying an IoT platform in your organization requires a specialized set of skills, a network-enabled infrastructure and much more—starting with choosing the best approach to take. As technologies, compatibilities, and protocols are continuously evolving, it is a challenge to plan and deploy a major system while maintaining your core business. While some large enterprises have or can hire in-house expertise to do this, many organizations choose to partner with someone who has the experience of building IoT products and services.

QUICK-START PROGRAM

Our quick-start program is a four step process that helps us work together to develop an IoT proof of concept for your business.

Step 1: Requirements gathering

First, we understand your requirements, discuss use cases, and study the business problems that you are looking to solve with IoT. Our IoT consultants will discuss your IoT adoption goals and suggest changes you would need to make in your internal processes to meet them. Understanding your business processes and vision will allow us to put together an actionable plan to quickly launch your IoT project.

Step 2: On-site workshop

The next step is to visit your facility to assess your existing infrastructure and data sources. This will help us understand your in-house capabilities and identify the technical requirements for your IoT implementation including applications, sensors, platforms and devices. Our experts will advise you on the use cases that can possibly be built and how they will add value to your business. We will also review potential roadblocks and define a realistic timeline for execution while establishing proof of concept (POC) success criteria.

Step3: Build an IoT Proof of Concept

POC or pilot development is a critical stage of the IoT deployment process. After the readiness assessment of your existing setup, we will identify technology challenges and plan to mitigate potential hazards to ensure a smooth launch of the IoT pilot project. Our technical team will work with your staff to completely plan and document a POC to validate the technological feasibility of the IoT solution at your company. Once approved, the POC will be deployed and will include the integration of devices, sensors and platforms with your infrastructure, as well as data aggregation, exploratory analysis, data engineering, predictive model building, data visualization, evaluation and validation

Step 4: Launch an IoT pilot and measure results

In this phase we will measure the impact of the pilot deployment. At this point, you will be able to see the direct benefits of having an IoT-enabled infrastructure in place, and we will show you insightful reports on the data that has been collected and analyzed. The data is collected from all the deployed sources, which will be analyzed in consideration of the stated goals to determine the outcome and potential impact of the IoT solution. We will then prepare a long-term strategy for a full-scale implementation.

ABOUT AVNET SILICA

Avnet Silica is the European semiconductor specialist division of Avnet, Inc., one of the leading global technology distributors and acts as the smart connection between customers and suppliers. The distributor simplifies complexity by providing creative solutions, technology and logistics support. Avnet Silica is a partner of leading semiconductor manufacturers and innovative solution providers over many years. With a team of more than 200 application engineers and technical specialists, Avnet Silica supports projects all the way from the idea to the concept to production.

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