Key Trends for the Industrial IoT in 2022

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making connectivity simple...

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The Industrial Internet of Things (IIoT) is transforming traditional, linear manufacturing into dynamic, interconnected systems, helping factories unleash their potential to run more efficiently, productively, and proactively. By interconnecting legacy machines, sensors, and edge devices, and deploying those technologies directly on the manufacturing floor, the IIoT is able to stream lucrative data, driving operational intelligence, situational awareness, and predictive analytics. As a result, front-line managers are empowered to take informed action, whether it is predictive maintenance of plant equipment or identifying supply chain problems before they occur.

Although it is often thought that the IIoT is an offshoot of consumer connectivity, like home automation and wireless communications, the industrial space embraced this disruptive technology first. Today, IIoT is growing even faster than the consumer segment, with the global market for IIoT products and services estimated at $263 billion (USD) in 2021. The market is expected to continue in this trajectory in the coming years, reaching $1.1 trillion (USD) by 2028.[1]

At Antaira, we stand at the forefront of the IIoT. By supplying advanced networking hardware, software, and services, Antaira resolves the complexity that can prevent forward-thinking managers from fully leveraging the power of Industry 4.0. Unlike others in our industry that simply re-brand technologies, Antaira is an Original Equipment Manager (OEM) that researches, patents, designs, and produces solutions in-house. This unique position gives Antaira the flexibility to create custom specifications for its customers so they can successfully apply the IIoT to build their businesses.

In this whitepaper, Antaira identifies eight key trends making their way through networked factories that have embraced the principles of IIoT. Evolution is the natural course for technology, and the IIoT is no exception. Emerging trends today will be established business practices tomorrow.

Before we begin, however, we want to stress that the right path in every manufacturer's IIoT journey is to start with the business problem and understand what data you need for strategic decision-making. Once you know what problem you are solving and how you will measure the benefits, the next step is to make

a comprehensive plan with clearly defined goals and objectives that will allow you to track progress and resolutions to your business objectives. From there, the next step would be the investment in sensors, connectivity, applications, and people. Throughout this journey, Antaira is available with the knowledge, resources, and underlying technologies that make it easier for you to harness the power of the IIoT regardless of the development stage your organization finds itself at.

Top Trends in IIoT for 2022

Many developments are shaping the IIoT in 2022, ranging from innovations in connectivity, software, and hardware to enhancing human sensory capabilities, all of which have the potential to influence production systems and processes with improved data-driven intelligence. While this list is not exhaustive, it does reveal the key enablers advancing the IIoT across industries and functional areas.

1. **Artificial Intelligence (AI):** AI is the simulation of human intelligence processes by computers to analyze data for correlations and patterns, and use these patterns to make accurate predictions about future states. Companies are increasingly deploying AI to analyze IIoT data to track equipment usage, improve workflows, streamline logistics, increase safety, and achieve higher overall efficiency across every aspect of operations. In particular, preventive maintenance systems using IIoT data plus AI to predict and prevent equipment problems before they happen are saving millions of dollars in unplanned downtime costs. The global AI in the IoT market is expected to grow at an annual rate of 27% from today through 2026.[2]

2. **Human Augmentation & Extended Reality**: These revolutionary technologies are used in the IIoT to enhance the environment by superimposing a computer-generated image onto the user's view in the real world. By blending the two worlds, they provide more information about the actual environment either by enhancing the senses or to create completely artificial experiences. Use case adoption is found in three primary capabilities: 1. *Visual/interactive* for product design, space management, and employee training; 2. *Diagnosis* of equipment and inspections; and 3. *Action* for product line optimization and order picking.

3. **Fog Computing:** Considering the massive amounts of data captured by IIoT networks, cloud computing is now considered invaluable in that it allows companies to exceed normally available storage without hosting extra servers on-site. However, the large distance between the cloud and IIoT devices can cause propagation and transmission delays. Large computation loads on a single cloud server can also bring about processing and queuing delays. In addition, relying solely on the cloud for the enormous and growing number of smart devices involved in the IIoT can be hindered by limited bandwidth, as well as problematic scalability, speed, and computation issues. In contrast, fog decentralized computing pushes both data and intelligence to analytic platforms that are situated either on (or close to) where the data originated. A form of edge computing, fog pushes intelligence to the edge of the network for real-time device control, security, and management. It is part of an overall shift away from a centralized approach to IIoT networks and toward a decentralized, edge-driven yet centrally manageable design.

4. **Big Data Analytics:** As the volume of IIoT-generated data gathered by devices continues to grow at an exponentially high rate, big data storage and analytics are helping make sense of it and providing invaluable insights. Big Data Analytics (BDA) takes vast unstructured data and organizes it into smaller data sets for improved decision-making. BDA will provide different types of IIOT insights, namely, descriptive,

diagnostic, predictive, and prescriptive analytics. Recent BDA innovations and new machine learning algorithms are making real-time analysis solutions possible to compare historical trends with forward-looking projections so front-line managers can more accurately predict future performance.

5. **Digital Twins:** Applied to the IIoT, the digital twin concept refers to the digital replication or representation of physical machines and processes in cyberspace. By acting as a proxy to the physical system, the digital twin gives users access to the structure, context, and behavior of machinery and processes, therefore providing a window into the past, present, and potential future states and conditions. For example, Chevron expects to save millions of dollars using digital twins to predict maintenance problems more quickly.[3] According to Gartner, 75% of organizations implementing IoT technology already use digital twins as part of their system, or are planning to do so within a year.[4]

6. **Network Connectivity:** Without reliable connectivity, the IIoT becomes unproductive, and your supply chain is negatively impacted. Problems may be isolated to a specific sensor or machine. However, if the same error is widespread in the same factory, then a network connectivity issue is likely the cause. For example, Antaira has a unique diagnostic feature named "VeriPHy" on its industrial switches that can help locate possible faults in cabling. These types of diagnostic tools help troubleshoot connectivity problems customers may be experiencing. Antaira NMS, our web-based network management suite, gives administrators the ability to remotely monitor and manage connected devices on the LAN, including lists with logs and topology images. Antaira NMS will locate device connectivity issues and troubleshoot each in real-time to reduce unplanned network downtime.

7. **Industrial Internet of Everything:** Industrial Internet of Everything (IIoT) is a conceptualized, broader, more holistic Internet of Things (IoT). It's defined as a "networked connection of people, process, data, and things" in one vastly distributed ecosystem, whereas the IoT only refers to physical objects or devices on a more centralized platform. For example, the IoT includes Machine-to-Machine (M2M) communication. The IIoT takes this further by encompassing M2M as well as People-to-Machine (P2M) and People-to-People (P2P). Still, in its infancy to its application in the industrial sector, the IIoT will require a high level of standardization and interoperability to move forward.

8. **Device Cybersecurity**: Increased wireless connectivity in industrial facilities has expanded the attack surface for cyber threats. In addition, IIoT components and devices, such as industrial routers and industrial Ethernet switches, are not usually safeguarded for cybersecurity like other network tools, leaving them open to attack. Another ongoing concern is the convergence of IT and OT environments that may allow an attacker to enter through IT infrastructure into the OT. While "industrial-grade" network devices are designed to withstand moisture, vibration, shock, corrosion, and high EMI, they often don't feature built-in security. Antaira's ruggedized devices are strengthened to endure both industrial environments and cyber threats. For instance, the Antaira ARS-7235-AC WAP/router offers advanced encryption, temporal key integrity protocol, multiple wireless security options, network authentication, passphrase, and more.

Industries from petrochemicals to pharmaceuticals are leveraging IIoT solutions to enhance their visibility, productivity, and profitability. Antaira is here to help you in your IIoT journey with the tools and resources you need to be successful. To learn more about Antaira's industrial wireless devices or industrial Ethernet switches, visit www.antaira.com.

1. Industrial IoT - market size worldwide 2020-2028, Statista, March 2022

2. AI in IoT Market, Growth, Trends, COVID-19 Impact and Forecasts, Mordor Intelligence, 2022

3. Why Accenture lists 'digital twins' as a top-five technology trend, VentureBeat, March 2021

4. Gartner Survey Reveals Digital Twins Are Entering Mainstream Use. February 2019