

Wi-SUN Alliance and FAN

Secure large-scale IoT networking for today and tomorrow

Contents

- 2 Wi-SUN Alliance and FAN: Large-scale IoT networking for today and tomorrow
- 2 A range of concerns
- 2 Enter Wi-SUN Alliance
- 3 Building a secure network
- 3 The FAN: Bringing it all together
- 4 Growing the Wi-SUN ecosystem
- 4 A solid platform for the future

Wi-SUN Alliance and FAN: Secure large-scale IoT networking for today and tomorrow

The Internet of Things (IoT) has already transformed our homes with digital speakers, smart TVs and connected home lighting. In the future, though, it will have far more profound and wide-ranging effects. City-level IoT will change everything from our transportation and traffic systems to the way that our energy networks operate. Connected sensors and controllers are finding their way into our street lights and parking meters. They will coordinate to help save electricity, improve water quality and fight crime.

For this revolution to happen, though, we need a modern communications infrastructure built into the fabric of our cities and utilities. Technology experts already see this need. According to a Wi-SUN Alliance 2017 survey of 350 global IT decision-makers, enabling the IoT in organizations was an IT priority for two-thirds (67%) of respondents in the next 12 months.

A range of concerns

These wireless networks must be secure, fast, scalable and energy-efficient. As cities and municipalities plan for them, they are grappling with a range of concerns. One of these is security, with 59% of respondents highlighting it as a barrier to adopting IoT networks. Municipalities and utilities alike are asking themselves: “How can we implement highly scalable networks while keeping them secure?”

Another worry for those developing and deploying smart networks is future-proofing. We are at the beginning of a technology revolution that will change the face of tomorrow’s cities. Organizations are already using wireless networks for applications that would have seemed like science fiction just a decade ago.

Today, cities are creating smart street lights that can detect motion in the immediate area and dynamically adjust their lighting to suit, introducing cost savings while keeping citizens safe. Expect to see more smart parking areas being deployed, with sensors that can tell which spaces are free and make life easier for busy drivers, reducing traffic congestion and pollution.

City councils face an unenviable job as they try to anticipate these changes and build networks that can grow and adapt with them. They must build wireless networks with the technical capabilities to communicate data for many different applications in challenging and ever-changing urban landscapes.

Enter Wi-SUN Alliance

There are standards to help support these technologies, but they are academic documents. Like a shopping list, they are the ingredients that will go into these networks, but it takes a recipe to explain how they will all work together. The Wi-SUN Alliance was founded to create that set of instructions for a powerful, secure wireless mesh network.

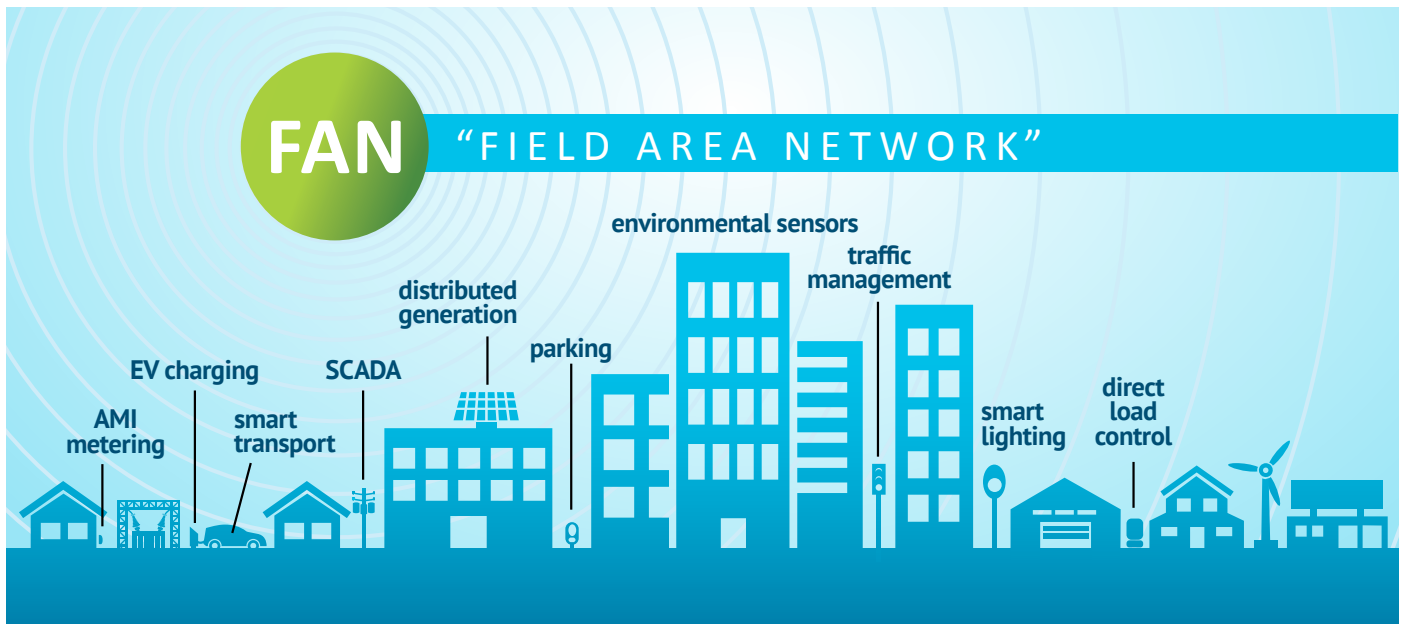
There are a variety of other networks protocols on the market, which attempt to address the communication requirements of Industrial IoT sensor and control networks. Collectively these are known as Low Power Wide Area Networks (LPWANs).

There are differences between them, but they have one thing in common: they use a central tower to communicate with devices nearby. All communications go to that central hub, like spokes converging in a wheel. This creates a single point of failure for devices in an area. It can also lead to communication problems if something interferes with a device’s line of sight to the tower.

Some, like NB-IoT, rely on mobile network operators or other third party network operators for coverage and does not allow organizations to run their own private networks. This can be a problem for utilities or municipalities who, for commercial or regulatory reasons, must own their infrastructure, and leaves

Through FAN Certification, the Wi-SUN Alliance certifies products based on their compliance to a communications profile derived from **open standards** and their ability to **interoperate** with other Wi-SUN certified products.





them depending on mobile operators for support at the edge of a city or in more remote or rural areas.

A Wi-SUN Field Area Network (FAN) is based on a mesh network, which enables devices to have multiple connections to those around them. This enables network equipment to relay data via multiple redundant links and improves reliability. If a device loses contact with another, it can simply send its data a different way. It also features lower latency and higher bandwidth than its competitors, making it a solid choice for large-scale wireless IoT networks.

Building a secure network

Another area where the Wi-SUN FAN specification excels is in security. Each low-powered, small-footprint wireless IoT device in a Wi-SUN network is protected to the same level as the equipment in a heavily-secured enterprise Wi-Fi network. This means securing the device from a range of attacks, including digital compromise, and can also mitigate the effects of physical tampering.

Not only does Wi-SUN's FAN require message encryption and integrity checking, but it also requires that each device's identity is verified before it can join the network. A device must prove that it is not a rogue unit inserted onto the network by an attacker, or that it has not been physically tampered with and malicious software installed.

This level of protection requires a different level of security: certificate-based authentication. A trusted cryptographically-protected digital certificate that cannot be copied is stored in

each device. The device then uses that certificate to prove that it is truly authorized to communicate with others on the network.

Managing a Certificate Authority is not easy and Wi-SUN Alliance works with GlobalSign, a global certificate authority, to produce and manage certificates for its Member companies who do not have the resources or infrastructure to manage their own CA. GlobalSign operates on a global basis, meaning that it can provide certificates to equipment vendors wherever they are in the world.

The FAN: Bringing it all together

These are great features, but equipment vendors need an agreed way to build them into their devices so that they all work together. To support that, Wi-SUN Alliance has created a profile that dictates how wireless network products should operate in the real world.

The Field Area Network or FAN profile explains how equipment on these networks should communicate with each other. As long as a vendor's equipment complies with this profile, it will be able to communicate with other devices carrying the Wi-SUN Certified logo. Any application that a smart city or utility builds can run on them.

To get Wi-SUN certification, network equipment must undergo a strict set of tests to ensure that it meets the requirements. Wi-SUN Alliance developed this certification process to be rigorous.

Wi-SUN Alliance uses an extensive network of third party laboratories for its testing programme. At the end of the process, the lab produces a report that says whether the device has passed all of its tests. Only if the report is positive can the product vendor apply for certification and get the digital certificate for their equipment.

This certification provides more than just technical assurance that devices will work together. It is an endorsement for vendors and a form of reassurance for customers. It can drastically reduce the field testing and approval cycle that a vendor might otherwise have to go through with a customer to prove the quality of their equipment.

Growing the Wi-SUN ecosystem

Wi-SUN Alliance has spent the past few years working behind the scenes with companies in the industry to build a global ecosystem of Members. These include product vendors, utilities, government, academia, wireless network experts and semiconductor manufacturers. This ecosystem puts Wi-SUN Alliance ahead of any other wireless networking specification for several reasons:



- **Added value.** When a customer buys a Wi-SUN FAN Certified device, they are buying not just one vendor's commitment to the product, but many. Certified devices encourage a larger community of confident users, and this large community entices those who wish to develop feature-rich applications for a platform with a large addressable market.



- **Choice.** A large array of solutions, all guaranteed to be interoperable, gives the buyer a choice of product manufacturers that can fit their commercial and technical requirements. Vendor lock-in is a thing of the past.



- **Cost.** An extended community brings with it economies of scale because vendors are able to sell more equipment at a lower cost.



- **Flexibility.** A broad community of vendors brings a wealth of experience, making it easier and cheaper to build a diverse array of applications for smart city and utility networks. This supports the customer's need for a future-proofed network that will support use cases both known and unknown.



- **Longevity.** A large number of invested end-device, module and silicon manufacturers ensures that Wi-SUN Alliance will be around for a long time. That means that municipalities, utilities and service providers can buy into the Wi-SUN world with confidence.



- **Reliability.** Not only is Wi-SUN equipment certified to a common profile, but it is also tried and tested in the field. Wi-SUN's large-scale deployments prove the long-term reliability of these solutions.



- **A global ecosystem.** The Wi-SUN Alliance has a global network, spanning Asia, Europe, North America and South America. This global ecosystem helps develop international standards, and allows vendors to build global products, hence reaping the benefits of mass production and a global market. A global network of test labs is needed to support global applicability and to certify common global standards.

A solid platform for the future

Wi-SUN FAN is a highly functional, secure and efficient large-scale mesh networking protocol that is here to stay. As smart utility networks and smart cities progress, its broad array of products from an extensive family of stakeholders will continue to evolve.

To find out more about Wi-SUN Alliance, visit www.wi-sun.org and learn more about our technology and our Members.