ENABLING THE
IoT TRANSFORMATION
INTRODUCING STARFISH™

It's clear to even the casual observer that the introduction of near ubiquitous connectivity between *people* has, in only the last 20 years, transformed every aspect of how we live. Every industry and community has undergone massive realignment, initially from the introduction of cellular phones, then the internet and finally through their marriage in the form of mobile computing on smart phones. These platforms changed the way we live and work, created entirely new industries and rendered others obsolete and made the world a much smaller place, all within a generation.

The coming availability of ubiquitous *thing* connectivity will have an equal, if not greater, impact in the years to come.

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Innovation is the life-blood of industries, communities and economies. The Internet of Things (IoT), and the projected 50 billion connected devices (by 2020) it will enable, represents arguably the single greatest innovation opportunity in the world today. By connecting an ever-increasing universe of intelligent, distributed devices, we will operate a smarter, safer and more productive society, eliminating waste and creating new businesses from the great urban centers to the most remote of villages.

Imagine a world where people and their surroundings are completely interactive, and optimized with little or no cost. Where public lighting is aware of someone walking beneath and adaptively brightens the path; where the traffic patterns are adjusted real-time due to congestion or pollution levels; or where buildings and homes adjust their behavior based upon signals sent from the buildings next door. In this new world, physical devices will become 'smart' to their surroundings and their existence – was the shipment dropped in transit? Was the food exposed to heat and spoiled? Are the roads and bridges on the verge of collapse?

This new connectivity and awareness will create massive efficiencies in what we build, how we use and what we do, creating new business opportunities at all levels of the economy. Cities will spend their capital more judiciously, tiny start-ups will create new devices and applications, communities will shift their limited resources from repair to prevention.

As with the creation of the Internet, technology matters. The core technology choices made in defining this new world can make or break this brave new world. In this case, details matter. If you get the key underlying technology choices wrong and place the wrong bets, the implications will hinder your business, community and local economy. History is filled with cautionary tales. Remember Betamax? Token Ring? WiMAX? The companies that bet on these technology 'losers' never recovered, losing out on the revolution that followed. As a society we suffer too, because fragmentation increases risk and delays the eventual wide adoption.

Connecting *things* at scale is the beginning of the IoT revolution. Choosing the right network for the right *things* is a foundational decision. Luckily, there is now an open IoT networking solution that makes this decision easy – it incorporates the lessons of yesterday, meets the broad technical and commercial requirements of today with a proven track record, and is inherently extensible and scalable for tomorrow's needs. From individuals deploying a handful of devices to communities implementing millions of connected sensors, everyone can now participate in the IoT revolution.

Introducing Starfish

Starfish is the first truly robust, scalable and secure IoT networking solution, designed to meet the robust requirements for any application where performance really matters. Built on widely adopted, open-standards technology, Starfish provides ubiquitous public-cloud access for all users or developers, and ensures the same networking quality and performance already enjoyed by tens of millions of devices in private cloud infrastructure. Already available in North America, Europe and parts of Asia, the coverage footprint of Starfish is expected to grow rapidly over the coming months and years.

Starfish is built using the core platform technologies proven to deliver long-lived results in some of the most rigorous industrial IoT applications operating today. IPv6 networking using a combination of carrier technologies, including the IEEE 802.15.4g wireless meshing technology supported by the Wi-SUN Alliance ensures users open technology access, easy interoperability and unmatched performance in the field over years to come.

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Creating the right technology platform for IoT has many considerations, but the 'Three S's' provide a good start to understanding the technology choice:

Standards are critical to the development of IoT. Can you think of a major technology adoption in recent years that has relied on proprietary technology from a single vendor? Yet in IoT, that is exactly what is being offered by most vendors today. SigFox, LoRa and other technologies are developed and owned by a single company. Announcing a limited number of developers or a generic, non-certifying user 'alliance' group masks the risk of single-vendor control over the underlying technology. Starfish is committed to IPv6 (and future iterations thereof) as THE networking standards that, as history has proven, consumes all others. By partnering with the WiSun Alliance, we are supporting an independent certification body to ensure that the promise of open standards is realized through industry coordination and interoperability testing.

Security may be the single greatest operational risk when implementing your IoT strategy. Cyber threats, particularly when considering millions of distributed devices with no assurance of physical security, require serious consideration and must be designed into the solution from day one. Starfish's technology was designed from the beginning to address the needs of a 40-year threat model against all known cyber threats. AES-256 encryption, PKI infrastructure with single-device keys, rigorous key rotation and hardware security modules ensure that every device on the network is afforded the same high security capabilities as the most critical device. Other IoT solutions today offer limited, if any, cyber security protection on the network. Bandwidth limitations of these solutions have forced these providers to forego the protection mechanisms required to ensure proper security, sending their messages 'in the clear' or relying on 'security through obscurity', which is demonstrated to fail over time. In these solutions, the compromise of a single device can open entire groups of devices or the entire network globally to cyber risk, all with limited, if any, means of corrective action due to bandwidth limitations or processing capabilities. Starfish avoids these issues with robust security tools and operational support to ensure that any cyber attack is contained to individual devices. Starfish's technology has been subjected to annual third-party 'white box' and 'black box' security audits for the last 10 years, ensuring that its security strategy is more than hope, it is demonstrated and certified by leading, global cyber security firms.

Scalability is the most fundamental of design issues with any networking infrastructure. History shows that successful solutions will always be used more than originally thought and when successful, the number of devices supported will grow exponentially. Starfish delivers networking capacity and scalability that is hundreds, if not thousands, of times greater than alternative solutions. Individual devices support up to 2.4 Mbps of speed and a networking topology that can be scaled to near unlimited size. Due to the device meshing capabilities of the IEEE 802.15.4g technology, the network will actually become stronger as more devices are connected, creating greater path diversity and increased parallel processing capability. Can you imagine if the cellular network or LPWA networks would actually improve performance as more users made calls or got on-line? Unfortunately, these technologies generally utilize a 'hub and spoke" networking topology, which inherently creates issues of congestion and network contention. As devices are added to their networks, you simply get more things contending for capacity with a base station. As they struggle to connect, they may send more messages, increasing the competition for bandwidth and creating interference with other devices. The network will be weighed down by its own success, eventually needing massive increases in networking infrastructure at great costs to the network operators, and ultimately to the end users.

The "Three S's" are only a sample of the critical design requirements of a robust IoT infrastructure. As we move to a world of increasing distributed processing, these design requirements will become of even greater importance. Moore's Law tells us the cost of computing power continues to fall over time. This will create new devices with ever-greater capabilities, allowing even more distributed processing at the edge of the network. It is intuitive. If you want the opening of a door to activate a light switch, it makes far more sense for the two devices to coordinate directly, versus giving each a SIM card, a cell phone plan, and forcing them to communicate all the way up to the cloud and back. Edge computing is a unique advantage of a mesh network and Starfish does this today, supporting remote device scripting and delivering the bandwidth and software to allow mass device programming and upgrades over the network in minutes.

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Technical Comparison

	STARFISH	ALTERNATIVES
Speed	Up to 2.4 Mbps	<100 kbps
Latency	<20 milliseconds	Up to 15 minutes; some even higher latency
Messages limit per day	Nearly unlimited	Limited; some capped at as low as 140
Demonstrated Scale	Tens of millions	Few hundreds
Battery Life	Up to 20 years	3-5 years in most cases
Security	End to end encryption; PKI	"Security by obscurity"

Networking is likely not the core competency of your organization. Although you may appreciate the growing importance of connectivity to your business strategy, you likely just want things to plug-in and always connect. With Starfish, you can rely on over a decade of experience serving some of the most demanding industries – utilities, cities and governments – to provide the technology sure to perform for years to come.

Why Silver Spring?

Silver Spring Networks developed Starfish to address the growing needs of the market in a new, more open way. With over a decade of proven performance in delivering private cloud infrastructure to a variety of highly demanding critical infrastructure applications, it became apparent that a much larger audience of industries, developers and application providers required the same high performance in a public cloud environment.

In consultation with a number of parties and industry analysts, it was clear that Silver Spring was uniquely well suited to meet this need. Combining our proven technical capabilities and years of operational success with a new business model could enable the most robust IoT networking solution on earth.

"Silver Spring Networks is uniquely positioned as a pure play networking infrastructure provider with demonstrated ability to deliver robust/mission-critical IoT (Internet of Things) connectivity over unlicensed spectrum and blend it with licensed spectrum."

— Matthew S. Robison, Wunderlich Securities

Alternatives tend to provide only parts and pieces of a comprehensive solution portfolio and none deliver a proven track record of performance at scale. Purchasing a LoRa module or a device integrated with LoRa communications does not deliver a solution. It is left to the user or other third party to build and operate the network, monitor the device performance and perform upgrades and maintenance. None of the available solutions offer a Service Level Agreement (SLA) that ensures 99%+ availability. Is your device not connecting regularly? 'With other providers, you are out of luck, as no one will stand by the commitment that everything will just work, together. With Starfish, this is not the case.

Beyond technology, the commercial models matter too. Alternatives offer a 'one size fits all' approach, limiting the connectivity options and typically offering only a single type of communications module. Starfish offers a wide range of connectivity and pricing plans and 4 varieties of communications modules, from the extremely low-cost, battery-operated module called Milli to the advanced programmable IoT Edge Router, capable of retrofitting existing devices.

Finally, no IoT platform will create much value without a vibrant ecosystem of development partners. Starfish already boasts the largest ecosystem of developers, proven at scale. This unlocks hundreds of millions of dollars of R&D, all leveraging the huge investments being made in IP networking globally. These partners sell their devices and solutions directly to the user, ensuring multi-vendor support and vigorous competition, lowering prices and spurring innovation.

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A clear choice

The IoT revolution has begun. Tens of millions of devices are deployed today and 50 billion are expected before the decade is over. Every organization – be it a commercial enterprise, city or technology developer – must create an IoT strategy to exploit the benefits of this transformation or risk being left behind.

The IoT Data Utility

Networking has become an essential service, just like roads, electricity and water. Existing utility and city service providers are uniquely positioned to extend their existing offerings using Starfish, including IoT 'dial tone' and integrated solution offerings for public lighting, traffic and environment and a variety of other applications.

By offering shared services, you can improve quality of service, lower operating costs and generate new revenues all while providing a critical service to the communities you serve.

If your organization is interested in joining leading global utilities and cities offering these services using Starfish, please contact Silver Spring Networks.

Any comprehensive strategy will identify the need to choose a platform capable of accelerating innovation within your organization, all while mitigating risk and delivering financial performance. That platform must be proven to deliver the Three S's of Standards, Security and Scalability for years to come.

The stakes are high. Your IoT applications will be critical to your organization. We may not know everything, but history has taught us that building on limited bandwidth, propriety and insecure technologies is a recipe for failure. Consider the impact that IP networking has had versus the proprietary, closed solutions such as Minitel. Never heard of Minitel? We didn't think so.