QUICK START GUIDE

Quick Start Guide to the Internet of Things

Beyond Hype: It's Time for MSPs to Get Serious about The Internet of Things

CompTIA

The Internet of Things describes a new era of connectivity, and a new ability to inexpensively monitor and collect data from just about anything, and anywhere. The Internet of Things also represents a challenging puzzle of regulation, security, hardware and knowledge. As a solution provider, you can profit by creating smart solutions that deliver value to your customers. This new era of connectivity can be woven into a lot of different strategic goals.

IoT offers a strong possibility of profitability for two reasons:

1. **The complexity of connecting data collection devices to a secure network and molding that information into something of use is beyond what many companies can handle internally. Your customers, especially small and midsized businesses, want results without building out entire solutions on their own.**
2. **IoT might sound like new technology, but you don't have to step far out of the solutions zone to get involved. Many areas of IoT can be seen as extensions to skills or lines of business that solution providers already provide. In the end, you're offering essentially the same thing: practical solutions to your customers' problems.**

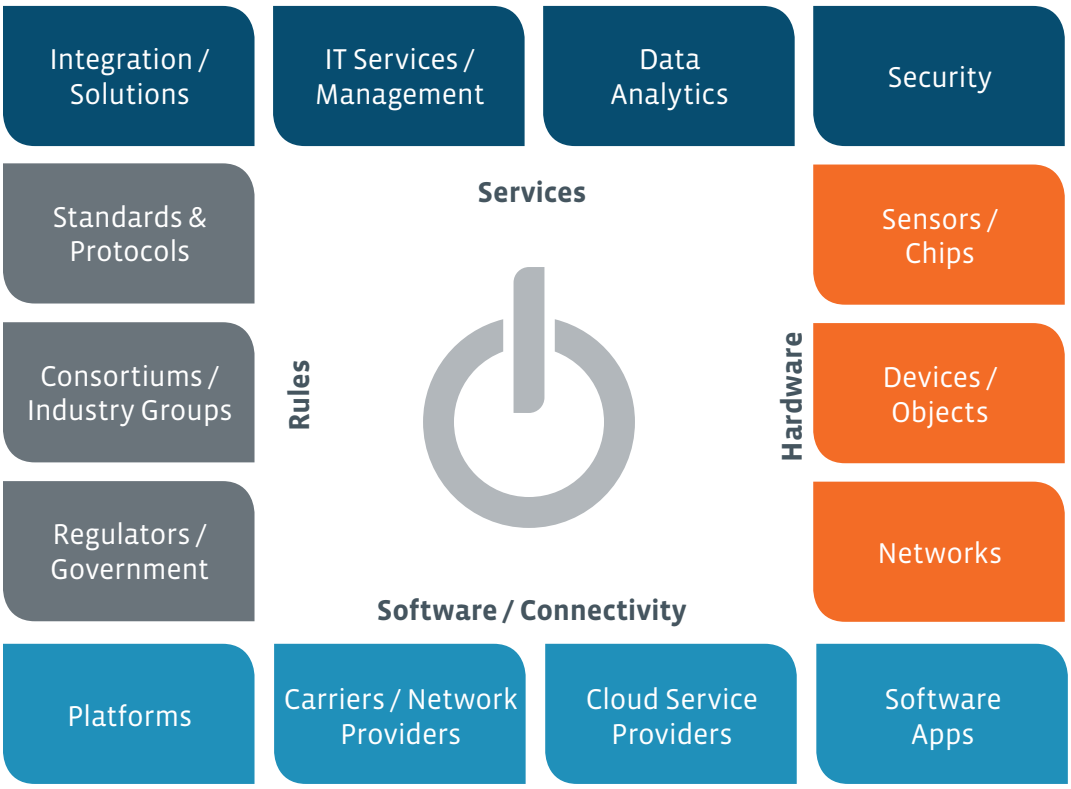
There are areas that will cause you to stretch, though. IoT requires some startup capital, good planning, familiarity with networking and a staff of creative, talented thinkers. But once you've built out a solution for one client, the IoT architecture can be standardized and repeatable across multiple vertical markets.

IoT is also a new concept, like the internet once was. Early on, small businesses couldn't understand why they would need a website, let alone a dynamic web presence (unfortunately, some still don't). IoT providers will climb uphill to get customers to understand how to harness the power of connectivity and data analysis. You might say, "My clients aren't asking for this," but this stage of IoT development requires introducing clients to new ideas rather than responding to existing demands. Prove your role as a trusted expert and introduce IoT ideas that customers might not have considered by themselves.

Jumping in also means being honest about your strengths and weaknesses, and a willingness to play one role while trusted partners play their own parts. IoT solutions practically require partnership, so find your place in the complex ecosystem and assign the other pieces to trusted partners.

Despite the hurdles, there's plenty of low-hanging fruit here, especially if you emerge as an expert. IoT lets you indulge your customers' interest in the abstract and creative side of technology and invent real solutions to their pressing needs. Use the *Quick Start Guide to the Internet of Things* to assess the important components of IoT, consider the customers you might help and decide what roles your team can play.

The Evolving Internet of Things Ecosystem



Six Ways IoT Is A Different Kind of Animal

Born around a dramatic reduction in size and cost of sensors and dramatic increase in desire to connect hardware and collect data, IoT is about digitizing commonplace physical items and connecting them with an intelligent network. The concept has been around long enough for people to imagine interesting possibilities, like using sound sensors for predictive analytics, and the excitement has trickled down to small and medium sized businesses. These potential customers are ready to take advantage of IoT, but need the help of a competent solution provider.

Like cloud and mobility, IoT treads on a new way of doing IT, a factor that held people back from capitalizing on cloud computing — at least for awhile. Avoid that pitfall by jumping into areas that feel familiar, like general business process and device repair and upkeep. To maximize the full potential of IoT, you must address these six challenges before making promises to customers:

1. Complexity – *Solutions will take time to develop and execute*

IoT solutions touch all parts of a complex ecosystem that includes hardware, software, networking, connectivity, data and analytics, security and services, in addition to rules and regulations. Formulating and executing the system-of-system that makes up an IoT solution can sometimes take months of discussion, discovery and solution building, plus coordination of programmers, hardware technicians, and security experts.

2. Upfront cost – *Your ROI may not be immediate*

Getting into IoT comes with a price tag. Like moving into cloud and mobility, there's new hardware, networking and skills to add. New hires and hardware also figure into ongoing and maintenance costs. Though you may make a return on the investment, it's hard to quantify how quickly that will happen when you're talking about emerging technology practices.

3. Cybersecurity – *New connectivity means room for hackers*

Security is another red flag for MSPs nervous about getting into this work. As IT systems grow more complex and the number of players involved in the overall architecture goes up, potential liability is on the rise.

4. Skills Gap – *Hire or train the right people*

The technology skills gap affects a majority of solution providers in the field, no matter what area they specialize in. SPs will likely have to do some hiring to find skilled workers who can handle IoT solutions.

5. Execution – *Seamless solutions required*

The science-fiction feel of IoT has customers expecting flawless solutions, but the reality requires mounting sensors on new turf, with the ability to withstand lots of conditions, plus lots of devices talking at once and software ready to spit out detailed results. If interoperability makes your palms sweat, be doubly sure your solutions work on command.

6. Partnership – *IoT's complexity requires outside help*

Hardware companies provide modern connected devices, software companies deliver applications for controlling and monitoring, and service companies tie everything together and analyze the data. Even if you have a good handle on sensors, data and feedback loops, you also need to guarantee your customers reliable network management, bandwidth, BC/DR, break/fix and security. Decide what roles you can take on and find trusted partners to help with the rest.

A New Age of Connectivity

If you can get past the hurdles, you'll find a surprising amount of power in interconnected sensors, software and electronics. This new architectural framework allows for integration and data exchange between the physical world and computer networks. Whether your customers want to reduce operational expenditures by making inventory monitoring more efficient, improve cross-functional collaboration across the supply chain or use beacons to ping shoppers with in-store deals, IoT can collect, calculate and exchange data to make these solutions a reality.

CompTIA research shows companies believe IoT will benefit customers and employees in the long run: More data means better-informed decisions, and when machines and equipment work efficiently, employees do, too. Most want to use IoT in three important ways:

1. Visibility of the company's people and assets

2. Data collection

3. Efficiency

There are no out-of-the-box solutions for IoT, so those who dig in first will plow the trail. It's possible to make a lot of great things happen for your customers through IoT, it will just take a little attention, some flexibility and an understanding of your role in the complex ecosystem.

How Different Industries Are Capitalizing On IoT

Retail giants are willing to invest in any technology that improves their razor-thin margins, and they're leading the way in IoT adoption. Beacon technology offers location-based, real-time discounts to customers, and the use of facial-recognition technology and big data is helping retailers understand customer traffic patterns and how they react to different displays. Digital signage offers engaging in-store experiences and drones are being used for package delivery.

Some of these ideas have been experimented with for years, but you can bet retailers will continue to use IoT to seek out new revenue opportunities with a vengeance. Different industries are approaching IoT differently, but with common goals: cost-savings, new data streams, productivity gains and new sources of revenue. Here's how IoT is popping up in some other areas:

Agriculture
Established industries like agriculture aren't thought of to be cutting edge, but many have been using IoT for years. Farmers use sensors and connected devices to track rainfall, fuel usage and moisture for harvesting, and can even monitor crop nutrients using carbon nanotube-based sensors. Along the same lines, florists can plan watering and peak harvest time by monitoring humidity, air temperature and soil quality using remote sensors.

Building Management
Companies are reducing energy consumption in their buildings by connecting lights to sensors, IP addresses and smartphone applications. Analytics software can determine which conference rooms have the most traffic, for example, and which ones should simply be powered down for sustained cost savings. Sensors in the ceilings can determine whether someone is present and turn the lights up or down automatically.

Government
The government sector has an especially strong interest in data, considering the layers, agencies, jurisdictions and constituencies government workers must navigate, but has been slow to jump in because it's heavily regulated. Even small improvements in empowering government workers with the right data at the right time can pay dividends.

Healthcare
Distance medicine helps doctors track vital signs from anywhere, giving people in remote parts of the world better healthcare access.

Manufacturing
IoT tools can sense weight, density and other variables, so manufacturers can determine the quality of their materials. Product makers are using networked cameras and sensors to watch their people engage and interact with their prototypes. Big data and IoT systems also allow manufacturers to improve speed to market. Big data can be brought in to spot and track statistical variations, and be used to determine which products may run into problems over the short term and long term. From there, the company can adjust designs to further improve quality.

Transportation
Bus riders used to stand in the street squinting for the oncoming bus, but now they check their smartphones for bus-related GPS data. School districts manage bus fleets with IoT, installing routers, APIs and wireless technology to track idling time, vehicle health and rates of speed. Encrypted analysis can also tell which kids are riding the bus every day, and buses are now integrated with first responder networks for help in emergencies.

Transportation companies are using IoT to manage fleets and schedule maintenance proactively, and taxi services like Uber connect drivers to customers with a touch of a button. For car drivers, smartphone apps tied to municipal parking lots can help locate available parking spaces.

Sports
Featherweight sensors have been used to track Tour de France riders through all stages of the 23-day event. As a result, fans now have access to millions of data points in real time, from top speeds to team positions.

In the pool, robots powered by wireless electricity or the sun are replacing lifeguards. Devices like E.M.I.L.Y. (the Emergency Integrated Lifesaving Lanyard) cruise around the bottom of the pool, monitoring and navigating the surroundings using sonar and cameras, delivering data to through smartphone apps.

Find Your Place in the IoT Ecosystem

Many parts work to make up the IoT ecosystem: hardware, rules and regulations, software and connectivity. Overlaying all of that is the element of security and, of course, services. To succeed in IoT, you'll need to find your place in the ecosystem and find trusted partners to help you with the rest.

Hardware

Computing components have miniaturized dramatically, offering computing and connectivity capabilities never possible before now. And they're becoming more affordable, which means inexpensive sensors can measure everything from the quality of poured concrete to the nutrition level of corn.

Working in IoT hardware means dealing with processing, data storage and wireless communications — sometimes all packed into a cubic millimeter. The vast majority of sensors, antennas and batteries will come from vendors that have not traditionally been part of a technology solution, and with the absence of a universal technology language, it's inevitable that some parts won't work with others. Work closely with reliable vendors to build solutions with complementary hardware and develop overall IoT strategies. The extra work looks like a good bet for you and your vendors: The IoT chip market is estimated to be worth $10.78 billion by 2022.

Software

Software is required to tie everything together or make the data usable, and connectivity provides a way to share information or communicate with the entire system. To work in this area, you'll have to become familiar with new platforms, use cloud judiciously and decide what firmware is required to make your IoT solutions successful.

Different groups are expanding to fit into this piece of the puzzle: Vendors are expanding their operating systems into wearables, homes and cars, and cloud providers are constructing their own solutions to find a home in the overall IoT solutions. Application programming interfaces (APIs) are making software available to other parties, dependent on both the cloud software and the access a cloud provider is willing to grant.

Rules

Connecting an estimated 50.1 billion devices by 2020 opens up a wide variety of security and privacy implications. Standards and regulations will play a major role in how IoT develops, and it will likely be a long, complicated discussion with a possibility to evolve along with the technology.

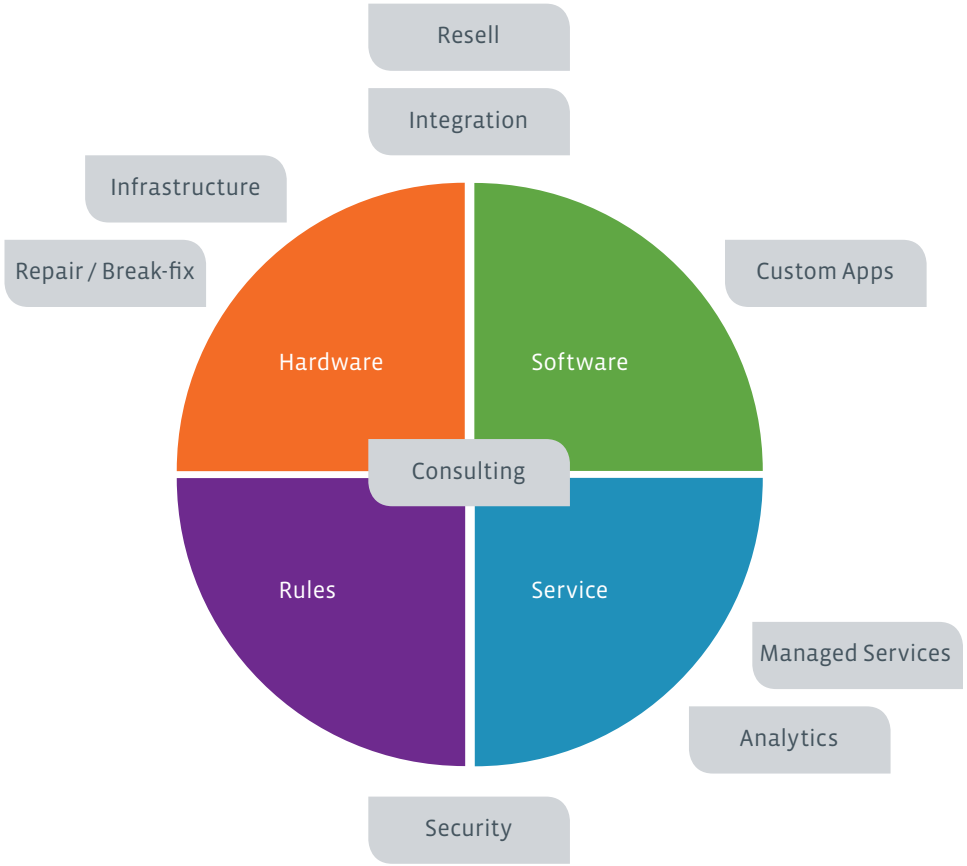
If you're not familiar with financial and healthcare regulations related to data, consider partnering for projects related to banks or hospitals. Companies that deal in rules and regulations might be able to transfer some of their knowledge to your projects, whether you're working with a hospital monitoring hemoglobin production or with a bank tracking encrypted digital files.

Services

Once data is generated and captured, it doesn't hold much value without added services to analyze it. To work in services, you'll have to, for example, connect HVAC, lighting and home entertainment to a central control system that's

available on different platforms, like PCs, tablets and smartphones. Even with standards in place, creating this comprehensive system is a complicated task — especially when you consider that data needs to be as readily available as it is secure. Make good use of the foundational pieces, whether you deal with data and integration or infrastructure. By adding services that perform the analysis and present findings or insights in a useable way, you're tapping into the IoT analytics market, estimated to be worth $16.35 billion by 2020.

Opportunities Across the Ecosystem



Other Areas of Opportunity

Plenty of work lies outside the IoT ecosystem, too. If you specialize in network or security, you can find a valuable place for yourself in those areas.

Network

When you use hundreds of sensors to measure hundreds of thousands of data points, communicating all the data requires a robust network for information exchange. Producers of networking equipment have backed IoT because their tools are an essential piece to this connected technology, and many companies that have traditionally operated as telecom carriers are looking into providing related cloud solutions.

The main hurdle here is the network upgrade required to handle the surge of connected devices, which can show up as a hidden cost later on. When you're scoping out IoT ideas for customers, be sure to quote the real cost required for a successful implementation.

Security

IoT pushes us to the next level of interconnectivity, exposing new risks and vulnerabilities. For end-users, security tops the list of challenges end-users foresee for their clients and the challenges they expect for themselves. Those dealing in IoT should focus on vulnerabilities left open by device manufacturers and unencrypted data as data transmission becomes a critical part of business operations.

Security is likely to be a litigious area, so take these steps to protect yourself:

1. **Refuse business without agreement to strict conditions in a contract that define liability or describe client responsibilities.**
2. **Strongly advise clients on best practices rather than leaving tangential technology decisions up to the customer.**
3. **Educate clients on the best approach, then carefully define expectations and obligations.**

If you're comfortable with security and privacy issues, it might do you well to keep it in-house, where you can respond to issues on the fly. If your security system is spotty, it's a great opportunity to partner.

Tip

Vendors hear from end users first-hand about their IoT desires. Cozy up with those who hear from your customers directly and use the relationships to find real solutions to their needs.

4-Step IoT Assessment

Before you can start offering IoT services, assess your staff, resources and tools and consider what you'll need to add to participate in IoT.

STEP 1: RATE YOUR CAPABILITIES

Rate yourself on what can be done in-house and what must be partnered out based on your existing client-base, project portfolio, employees, availability and skills.

	Expert: Can handle everything in-house	Mid-Level: With advice, can handle it in-house	Greenhorn: Must find outside partners
	✓	✓	✓
Internet of Things Components			
Sensors			
Software			
Connectivity			
Data			
Regulations			
Business Opportunities			
Infrastructure			
Custom Apps			
Repair, Break-Fix			
Security			
Analytics			
Managed Services			
Resell			
Integration			

STEP 2: FIND THE RIGHT PARTNERS

Building your own IoT implementations is an ambitious goal, but you can scale it back by starting in areas that play to your strengths and finding partnerships for the rest. No matter your expertise, there's bound to be an area where a trusted partner could lend a hand. Use the chart in Step 1 for an at-a-glance understanding of where you can help and CompTIA Quick Start Guide to Profitable Partnering to find the right collaborators. You can't do everything yourself, so consider all the different avenues for partnership.

STEP 3: DECIDE IF IOT IS RIGHT FOR YOU

Once you've assessed your IoT capabilities, compare the reality to your vision for the future. IoT solutions for the most part will be an ongoing process with recurring revenue, so the business model must account for these things. There will need to be incremental learning for the familiar technical areas and deeper learning or partnering for non-familiar technical areas.

Do you have the skills and experiences you need to successfully target your desired market? If your skills, resources and knowledge are aligned to accelerate your step into IoT, then leverage your existing expertise to tap into new IoT opportunities. If not, determine where gaps exist and decide how you want fill them.

If you're feeling unsure, take advantage of available information, guidance and support from vendors, distributors, mentor and industry trade associations. Start with CompTIA's comprehensive research on how the industry is responding in Internet of Things: Insights and Opportunities.

STEP 4: START DREAMING

If you're serious about getting into IoT, you'll need to carve out dedicated time to focus on emerging areas. Allocate a few hours a week to explore new technologies, business models and partnerships.

Selling your clients on IoT solutions will require some conceptualization. Act as the trusted expert and scope out some IoT ideas that match your customers' needs. Include details on the pieces of hardware you might bring in and what kind of software customization, security and data analysis you can provide, either yourself or through trusted partners. Show clients you can dream with them, and that you have friends in the industry who can help you bring those big ideas to life. The right approach depends on your business.

IoT Standards Are Coming — Slowly

Standards, regulations and best practices will shape the way projects are executed, and a number of organizations have formed in an attempt to define standards for IoT. Items currently up for early debate include security, data privacy, spectrum and standards, commerce rules and regulations and public-private partnerships.

The IoT market seems to be moving faster than the regulatory bodies can act, and it's likely the government will intervene and build on regulations related to private data sharing, like the current electronic health records system or how banks collect and distribute financial information. What's understood so far is that it will be a long process. Standards are needed from end-to-end in IoT, from applications and services to network and access.

Expedite Your Return on Investment

There are upfront costs to getting in the IoT game, but it's possible to make money by expanding on what you know. Think of it as IoT Lite. Throw your full support behind a single endeavor or participate in multiple areas so you can be well-positioned as the landscape shifts. If you'd rather have help pulling off impressive IoT initiatives, offer your specialization to companies looking for the right partners.

1. Consulting

IoT is in its early stages and has broad applications, allowing solution providers to capitalize on consultation services. Once you understand the ecosystem and figure out how to sell your customers on the benefits of IoT, you can start making money. According to CompTIA research, consulting is the main source of ROI for solution providers right now.

2. Security

If you're already offering security services to customers, consider it as a revenue stream for IoT. Sell your services to companies that need your help redefining their security approaches in the face of new connectivity.

3. Integration

Some end-user companies are testing out the space by tying their IoT implementations back into the legacy parts of their architecture. This might be okay for now, but full integration will need to happen for real IoT benefits to be realized.

4. Simple Expansions

Introduce simple solutions, like automatic office plant watering, to get your IoT offerings started. Small-scale ideas might not boost a company's bottom line, but they will introduce customers to the concept of IoT and get them to start thinking bigger.

5. Break/Fix and Device Management

Most break/fix or device management efforts today are focused on office equipment such as PCs or printers, but the same skills and considerations can apply to new devices and sensors. There will be some new areas to consider, such as power usage, security and network protocols, but you can capitalize on your experience with general business processes for device repair, upkeep and monitoring of connected devices. Any IoT project you take on will require ongoing maintenance, so make sure your customers understand the budget associated with their long term goals.

6. Legal Advice

Finding the proper legal expertise to navigate the IoT regulatory landscape is a concern for a lot of businesses, so much so that some think it could slow down the advancement of IoT, according to CompTIA research. If you can advise companies on legalities related to IoT, this could be a turnkey revenue stream.

7. Integration

As with data analytics, many channel firms are already providing integration services. These firms recognize that integration typically constitutes the bulk of the effort for a new IT product and have built the planning practices necessary for integrating complex systems. The new skills required for IoT integration will be the APIs that

connect various devices and services, especially as standards are in flux.

8. Data Analytics

While the data streams generated by IoT devices will require new data warehousing techniques and new analytics tools, these new functions are often complementary to existing techniques and require a strong foundation in data management. CompTIA research has found that many companies, especially in the small business space, do not have this foundation. These companies can benefit from data audits along with more traditional tools such as SQL or relational databases before moving into new areas.

IoT also offers work in analytics, custom apps, reselling, infrastructure and any full-solution implementation you can dream up. There are several options, but they don't deviate far from traditional solution provider responsibilities.

Don't Let the Skills Gap Be Your Achilles' Heel

Jumping into IoT requires creative and clever people who can astutely look at a problem and build a real solution. The need for a skilled IoT workforce is imperative to your success.

Across all the sectors and verticals, the lack of skilled workers is hampering businesses, and the skills gap is one of the major factors companies fear could slow down the growth, according to CompTIA research. When you're assessing your group's ability to take on IoT, know your internal skillset and where the gaps are. You can get started on hiring, get your own people certified in new skills, like security, or look for partners you can use until you have the capacity to add new employee roles.

Conclusion

IoT is typically not represented by a single product or project, but signals a new operational model. Find your place in the puzzle and create partnerships with companies that can fill in the rest.

Success in IoT is possible as long as you dedicate yourself to the following principles:

1. Be honest about your abilities and what needs to be partnered out
2. Target groups willing to imagine (and budget for) real IoT solutions
3. Scope out ideas that differentiate yourself from others
4. Work in industries that match your abilities and know-how
5. Hire and train the right IoT specialists
6. Investigate new ideas and be flexible in execution
7. Don't be afraid to ask for help

Additional Resources

- **Internet of Things Ecosystem**
  https://www.comptia.org/resources/internet-of-things-ecosystem
- **Internet of Things Insights and Opportunities**
  https://www.comptia.org/resources/internet-of-things-insights-and-opportunities
- **CompTIA Quick Start Guide to Profitable Partnering**
  https://www.comptia.org/resources/comptia-quick-start-guide-to-profitable-partnering
- **CompTIA Quick Start Guide to Easing into Big Data**
  https://www.comptia.org/resources/comptia-quick-start-guide-to-easing-into-big-data
- **CompTIA's Sizing Up The Internet of Things**
  https://www.comptia.org/resources/sizing-up-the-internet-of-things
- **Master the Internet of Things: Case Studies**
  https://www.comptia.org/resources/master-the-internet-of-things-case-studies

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