

State of the Network:

An Introduction to the Sunset



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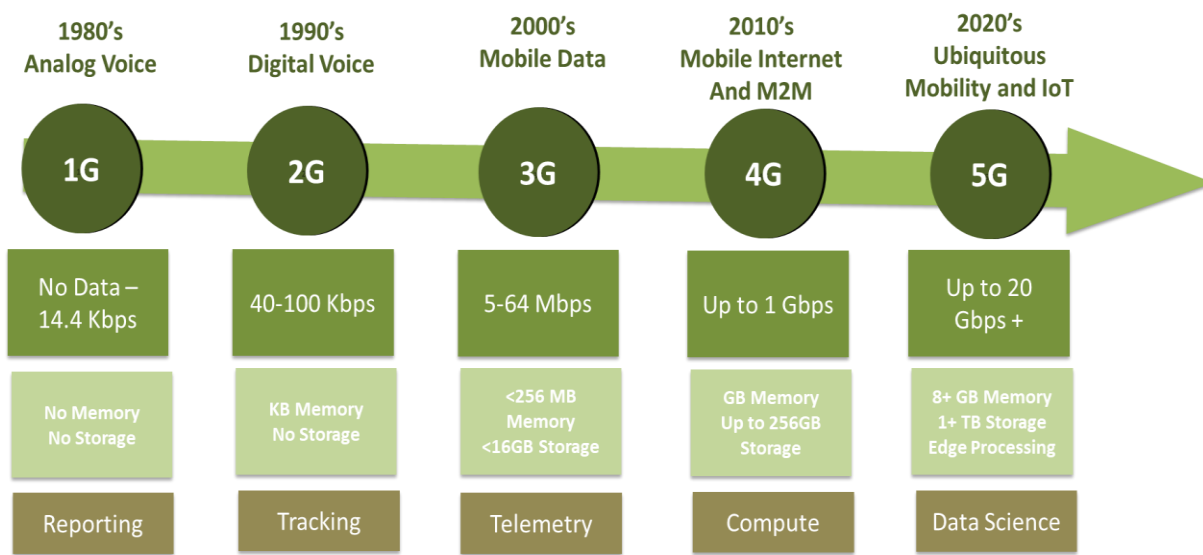
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Introduction

2G and 3G cellular network sunset plans are affecting companies in the United States and all over the world, with several deadlines approaching rapidly as service providers roll out new LTE and 5G networks.

As shown in Figure 1 below, networks evolve to provide better capabilities, faster speeds, more storage, and advanced applications.

Figure 1: Evolution of IoT Access Technology and Mobility



60+ million out of 125 million IoT devices in the U.S. are 2G or 3G

In networking, a sunset means a complete shutdown of older generations of networks, as new technologies replace them. Network sunsets can be dark, confusing, and frightening times for enterprises relying on the networks being shuttered.

According to research conducted by James Brehm & Associatesⁱⁱ, approximately 60 million of the 125 million current Internet of Things (IoT) devices in the United States are 2G and 3G devicesⁱⁱⁱ. These devices are used for a variety of purposes, such as home security, remote monitoring, personal emergency response systems (PERS), fleet management and others. Just imagine what would happen to these devices if they are no longer supported or if they would not migrate properly?

What does it mean for the IoT devices you currently have deployed, where most of them still rely on 2G or 3G connectivity? All devices that are currently connected to 2G or 3G networks must move to new network technologies to continue operating. And this is no easy task. It requires modifying the device in the field, so it has

a 4G chip, or completely swapping out the device with a newer 4G version. The change is inevitable, and now it is time to act!

State of the Industry

While the industry is in flux today, many enterprises are confused and have not planned for the impact of the carrier shut down of 2G and 3G networks. Adding to enterprise confusion is the lack of communication from services providers who while talking about new solutions like 5G, have not explained that older technology will no longer be supported. This could be a major breaking point for the enterprise. If enterprises don't plan new IoT solutions now, they will experience a disruption of service. It takes time to design the replacement, source new equipment, and understand the economics of the replacement to see if business models need to be changed.

In surveys conducted by James Brehm & Associates^{iv}, continuity of service was the most critical concern in the enterprise. Continuity of service led the list because the enterprise is exposed to risks such as lost revenue, productivity, customer dissatisfaction, and brand and corporate reputation damage. Replacing IoT solutions has financial concerns, as hardware is an unplanned capital investment and software upgrades can be unknown and incalculable. Security risks were also mentioned as the replacement is a window of opportunity for hackers to bypass normally security procedures as IoT solutions are tested and put online.

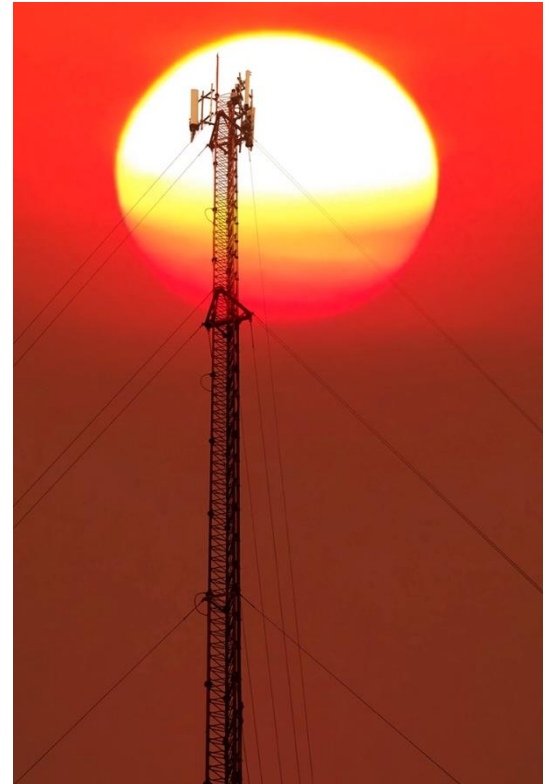
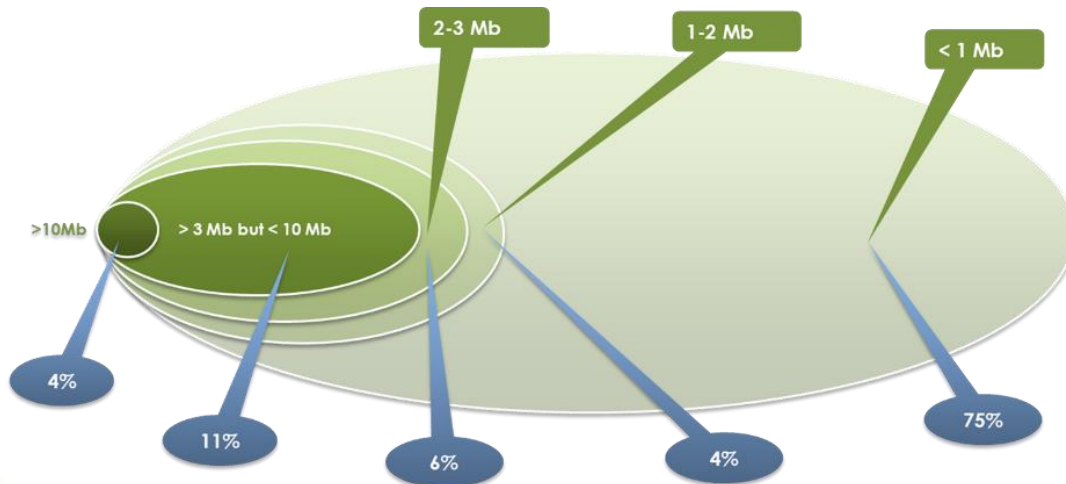


Figure 2: Cellular IoT Data Usage Today ^v



Is there such a thing as 5G, and should I wait for it?

Is there such a thing as 5G, and should I wait for it? The answer is yes and no. Yes, there is something called 5G. And no, you should not wait for 5G because 4G is available now, deployed by 791 MNOs globally with another 140 operators that have stated plans to invest or are actively investing in LTE for public networks as of February 2020^{vi}. While 5G is the heir-apparent to 4G, 5G is still under development by the working groups of 3GPP – the standards body that develops protocols and sets the standards for the mobile and wireless industry.

NB-IoT or LTE M is the path to 5G.

As the natural evolutionary path for IoT and as MNOs shut down 2G and 3G networks, standards bodies are doing their best to ensure that LTE will be in place for years to come. LTE M and NB-IoT, specifically designed low power IoT technologies developed as a part of the 4G LTE standard have also been grandfathered into 5G and made a part of that standard, too. What’s more, many 2G /3G IoT solutions being sunset now have similar characteristics and bandwidth usage and should be replaced by NB-IoT or LTE-M.

Figure 2 below shows the data usage of IoT cellular devices today. 75% of cellular devices transmit 1 MB or less. LTE M and NB-IoT devices are replacements for the low transmission devices that will be sunset on 2G and 3G networks.

Table 1: LTE M and NB-IoT Attributes^{vii}

Parameter	LTE-M	NB-IoT
Range	<11km	<15km
Maximum coupling loss	160dB	164dB
Max peak rate	1Mbps	250Kbps
Spectrum	LTE bands	LTE in-band, guard bands, stand-alone
Bandwidth	1.08MHz	180KHz
Radio Technology	OFDM	OFDM
Bidirectional models	Yes	Yes
Voice (Ericsson)	Yes	No
Device max transmitted power	20, 23dBm	23dBm
Autonomy	>10 years	>10 years
Re-use existing cellular networks	Yes	Yes
Link adaptation	Yes	Yes
Device categories	Yes	Yes
Operational mode	Public	Public
Handover	Yes	Not seamless
Data confidentiality	Yes (EEAx)	Yes (EEAx)
Network authentication	LTE AKA	LTE AKA
Typical module cost	Medium	Low
Technology availability	Now	Now

As Table 1 displays, the attributes for LTE M and NB-IoT are designed for IoT needs. LTE M and NB-IOT are Low Power Wide Area (LPWA) services with the ability to use less power and still have a strong enough signal to penetrate buildings and cover a wide area. LTE M and NB-IoT are part of the 4G LTE standard and have also been included in 5G standards. Most 2G/3G IoT devices being sunset will be replaced by LTE M or NB-IoT.

The Five Steps Essential to Prepare for Change

Step 1: Conduct a census!

Conduct a census! Often an enterprise does not know how many connected devices it has. An internal audit can clear up many of these questions. What are they being used for? Are you using different devices for different applications? Are your devices mobile, stationary, or mixed? Do you have a primary service provider? Are you using a Mobile Network Operators (MNOs) and/or Mobile Virtual Network Operators (MVNOs)? At the end of your census, you should have a profile of your IoT populace.

Often companies struggle with knowing how many devices they have deployed because they do not have adequate asset tracking. There are multiple reasons for inadequate asset tracking such as having different people responsible for record-keeping or having devices shipped outside of the company but not being properly documented first. What happens to replacement devices? With these thoughts in mind, it is not surprising that companies' documentation of their existing networks and devices is not up to date.

Conducting the census may require reconciliation of internal billing, data transmission, and truck rolls to have a comprehensive view of inventory.

Step 2: Talk to your service provider(s).

Many companies have a mix of networks deployed because of geographic diversity, optimized pricing, and general availability of networks. This means that beyond the internal inventory, there is a reconciliation that needs to occur with the MNOs/MVNOs. Service providers can provide answers to many questions. How many devices are you being billed for? Do you know their locations? When will the sunset occur? If your service provider is AT&T your 2G devices have already been migrated, AT&T can further assist you in planning for other migrations you need to make.

Step 3: How do you collect your data?

Understanding the amount of data produced and transmitted by your IoT devices is important in order to control costs associated with migration.

How much data are you transmitting? Where is the data being sent? Is all the data being used? How often is the data being transmitted?

The type of application dictates the amount of data transmitted. For example, a simple exception-based monitoring solution only sends messages when an alarm sounds, while a cold chain monitoring solution may gather data on conditions like temperature, humidity, and location and continuously forward the data for a higher degree of analysis.

If you understand the way your traffic works, you can determine the benefit of some network's services designed for IoT and what kind of custom pricing you may require.

Step 4: Can you improve your solution(s)?

Are there ways to use analytics with the information today that weren't possible when you first released your current connected device? Is it possible to use the sunset as a time to rethink the purpose of your device or your business model?

How can you get more information from a new device? Will it improve your solution? Will there be an incremental price increase or a major price consideration?

Technology changes so fast that it's time to think about how your solution can be improved.

Step 5: Determining the skills gap?

By taking the steps discussed above, you can better prepare for the sunset. Moving from preparation to execution requires companies to consider how to maintain continuity of service while replacing legacy devices.

Using a professional service gives you access to their expertise and may help you reduce costs while minimizing risks associated with this critical transition.

AT&T
Certification
Lab has
certified over
2600 IoT
devices.

Working with AT&T

AT&T is the leading IoT service provider in the U.S, with a total of over 65 million IoT cellular connections. Worldwide AT&T operates a global network, working with over 500 carriers providing service in 200+ countries^{viii}.

The AT&T Foundry organization is a group of vertically and technologically focused innovation centers that operate in six different cities around the world^x. The personnel offer strategy, technology recommendations, rapid prototyping, and other advanced services that can shortcut the time it takes to bring applications to life.

Working hand in glove with the Foundry system, the AT&T Certification Labs has certified over 2600 devices^x and can help ensure that enterprise deployments run smoothly on the robust AT&T network.

AT&T Professional Services carries the experience and skill set needed to provide strategy, business planning, and IoT technology roadmaps for the successful implementation of IoT solutions. With a team of more than 50 engineers and developers, not only can they help you with network sunseting issues, but they can also assist your team with integrating IoT into your legacy products and services. Whether an enterprise needs support in truck roll deployments or requires a managed service for a more robust solution, AT&T Professional Services can help.

Having migrated millions of their enterprise 2G devices in 2016, AT&T is the only major carrier in the U.S. to date to have successfully and fully migrated all of its 2G devices off of the 2G network.^{xi} What other telecommunications company can boast having managed to move over 80,000 asset tracking, remote monitoring, smart building, and fleet devices in less than 6 months? With the experience of managing their transition as well as their 2G migration of their customers under its belt, AT&T is more than capable of taking on the problems and requirements you face in your deployment.

Conclusion

Enterprises measure the success of their IoT endeavors in many ways; by increasing top-line revenues, the reduction of costs and operational expenses, developing new products or services, streamlining operations, and/or improvement of the customer experience.

The 2G and 3G network shutdown by US MNOs is imminent and a direct threat to the IoT industry. Delays by enterprises in making network decisions and migrating their legacy IoT devices must be avoided at all costs.

AT&T is ready to assist you through this critical transition and is well-positioned to lead you to success. Given the timelines publicly stated and the tasks necessary to navigate a successful transition, there is no time to waste. It's time to seek the experts at AT&T.

ⁱ James Brehm & Associates “NB-IoT and LTE M”

ⁱⁱ James Brehm & Associates “IoT Results & News Roundup thru Q3 2019”

ⁱⁱⁱ James Brehm & Associates “IoT Results & News Roundup thru Q3 2019”

^{iv} James Brehm & Associates “The 2G and 3G Sunset Survey” (2019) and State of the Market (2019)

^v James Brehm & Associates “NB-IoT and LTE M”

^{vi} <https://gsacom.com/paper/lte-to-5g-market-status-feb-2020/>

^{vii} James Brehm & Associates “NB-IoT and LTE M”

^{viii} https://www.wireless.att.com/businesscenter/en_US/pdf/enterprise-on-demand-att-m2m-business-solution-product-brief-050715.pdf

^{ix} <https://foundry.att.com/>

^x <https://www.business.att.com/content/dam/attbusiness/briefs/att-global-device-certification-brief.pdf>

^{xi} https://www.gsmarena.com/at_t_has_officially_shut_down_its_2g_network-blog-22811.php