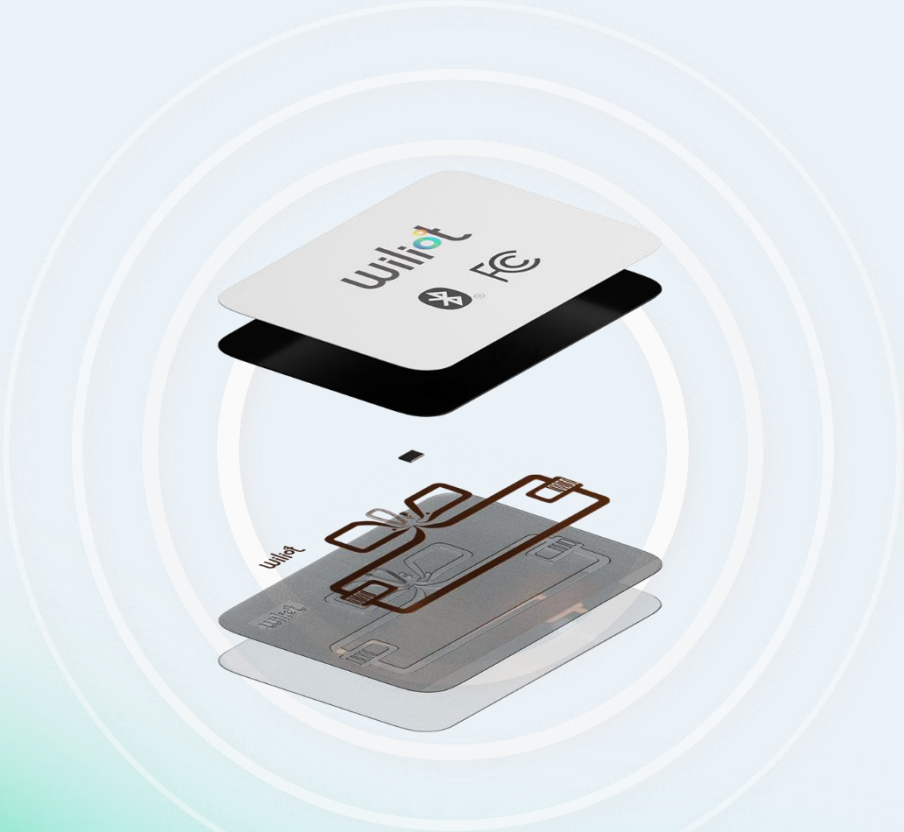
How linking our things and their supply chain to AI will change the Telco business forever

What is ambient IoT?

About Wiliot

Where deep technology meets supply chain intelligence



The 3rd generation Wiliot Pixel

250+ Employees Globally

2 of the **Fortune 3** Retailers

USA x3
Israel x2
UK
Portugal
Australia
Ukraine

Over **50** **Patents**

THE WALL STREET JOURNAL.
MONDAY, OCTOBER 31, 2022

Computing's Future Is Ambient

Continued from page R1

automatically. In the kitchen, coffee starts brewing. As you pad into the bathroom to brush your teeth, a display projected onto the mirror above the sink shows your calendar for the day. It highlights what time you'll have to leave to get to your office for the in-person meeting you scheduled for 8:30.

Returning to your bedroom, you find your stowaway robotic bed has retracted into the ceiling, and your collapsible walk-in closet has expanded to reveal your clothes and a full-length mirror. The mirror suggests, based on your schedule and the weather, an outfit it displays as an augmented-reality overlay that moves with your body as you inspect yourself. You aren't fond of the first option, so you make a swipe-left gesture in the air. The mirror responds by suggesting another outfit. You signal assent, and the two drawers containing the items you want glow around their edges, so you don't have to waste time hunting for them.

As you dress, a newscast starts playing from the nearest speaker. When you walk into the kitchen, the sound follows you from a speaker in that room as well. You decide that's enough, and ask for silence, and a moment later all you can hear are the last burbles of the coffee maker.

Slippery definition

If this morning sounds fanciful to our present-day ears, it's only because so few of us have experienced its individual elements, all of which are possible today or likely to be so in the very near future. What will make such a morning possible, even mundane, is what tech companies call ambient computing.

As in the early days of the cloud, the definition of ambient computing is slippery, subject to revision, and more than a little aspirational. In general, ambient computing is the idea that we'll interact with the world through a growing assortment of gadgets and sensors, many of which will be physically embedded in our environments. And we'll interact with this technology in a growing variety of ways—from voice and gestures to simply existing in a space full of sensors that track our every action.

If this sounds reminiscent of previous ideas about the Internet of Things or the smart home, that's because it's an evolution of those concepts. But ambient computing is something bigger and, at least in theory, more unable. The smart home of today is largely transaction- and device-focused. We tell our connected thermostat to raise the temperature, and it does. We tell Alexa to play a song, and it does. We tell our wearable heart monitor to let us know when our heart rate goes awry, and it does.

By contrast, in the ambient world, the technology is all around us—unseeable and untouchable. Sensors know when we wake up, set the heat at what we always want, play the songs we like, get the autonomous car ready for the meeting they know we have and suggest clothes appropriate for that meeting. There are a lot of steps between where we are today and this ambient world, but most tech leaders think we're well on our way to this destination.

Amazon's timetable

Today, for instance, Alexa can already do many things that we may somesday think of as being part of ambient computing, from controlling the lights in our homes to waking us through a meditation routine before bedtime, says Dave Limp, senior vice president of devices and services at **Amazon.com** Inc. "But is this easy enough for consumers?" he asks. "The answer is no. That's why we believe this ambient intelligence revolution is five to 10 years out."

Amazon's recent spate of device announcements—including an update of its home-monitoring Astro robot, the debut of its Halo Rise bedside sleep-tracking device, and new TVs that detect a person's presence in a room—all point to its long-term ambitions to be everywhere in our homes, sensing and responding to everything.

And Amazon is hardly alone. **Alphabet** Inc.'s Google also recently announced new devices to bring its computing everywhere we are, from the home—with a new Pixel tablet designed to double as a smart-home control hub—to everyplace else we go, in the form of its new Pixel smartphones and smartwatch. Since 2019, Google executives have been talking about how ambient computing is core to the company's vision of the future, and how they think the company's custom, AI-focused chips, which now appear in its phones and tablet, will be central to that.

Google's array of devices—headphones, phones, smart-home hubs and the like—is meant to create a "personal, intelligent, cohesive computing experience," wrote Rick Osterloh, Google senior vice president of devices and services, in a recent blog post. This vision, he said, is "what we have been building up to for a while."

> A huge amount of work still needs to be done behind the scenes to enable the connections that will make ambient computing work for the masses.

Wiliot recently unveiled a combination sensor and tiny computer that requires no batteries to operate and could some day be manufactured for pennies apiece. These tags are essentially stickers that get slapped onto things in supply chains that retailers want to track.

A new infrastructure

One of the biggest challenges to making ambient computing work for the masses is that no matter how good our voice-based assistants and other sensors are at understanding our desires, a huge amount of work still needs to be done behind the scenes to enable all that hardware and software to act on them.

"I dream of a world where I can walk through my house and say 'What time is my flight tomorrow?' or 'When is my next credit-card payment due?' But to do that you need to connect all the plumbing," says Mark Webster, who works on audio and voice products at **Adobe** Inc..

Some of that "plumbing" already exists—such as that built by companies that want to make their services available through the dominant smart assistants. But for now, at least, this leads to a transactional, task-based mode of interaction with smart assistants.

"Google and Amazon talk about this assistant that's always available to you to do actions, take requests and have some anticipation of your needs," says Ben Bajarin, chief executive and principal analyst at consumer-tech research firm Creative Strategies Inc. "But I don't think that's how consumers view it—it's more like, I can turn my lights on, play music, do a search. For consumers, there's no 'always' around sentient AI."

Going further, making our smart assistants capable of more than the most straightforward interactions, will require connecting those assistants not just to various services but to each other, says Mr. Limp. That is, our smart assistants have to be able to talk to any smart-home or smart-building gadget, no matter which smart assistant we own or brand of gadget we buy.

A new standard, called Matter—which **Apple** Inc., Google and Amazon have all signed on to—promises to do just that. There's a lot going on under the hood, but what it amounts to is that we will no longer have to check the back of a new smart light or smart lock to see if it's compatible with our smart assistant. Devices that support Matter will start arriving by the end of this year, and eventually the standard could supersede the proprietary communications standards that have so far held back smart-home adoption.

Thousands of points

Matter is in many ways just the beginning of the rollout of new ways to wirelessly connect all the smart things in our world—in homes, offices and industrial facilities. Other standards in the works could allow the connection of not just dozens of objects to a single wireless access point, but hundreds or even thousands. These standards will be necessary for realizing the part of ambient computing that is all about peppering our world with sensors and then handling all the data that results.

Now wireless communications networks like these will be needed as the number of connected devices continues to grow, says Steve Statler, senior vice president of marketing at **Wiliot**, a supply-chain technology company based in Israel. His company recently unveiled a combination sensor and tiny computer that requires no batteries to operate and could some day be manufactured for pennies apiece. These tags are essentially stickers that get slapped onto things in supply chains that retailers want to track, like crates of goods.

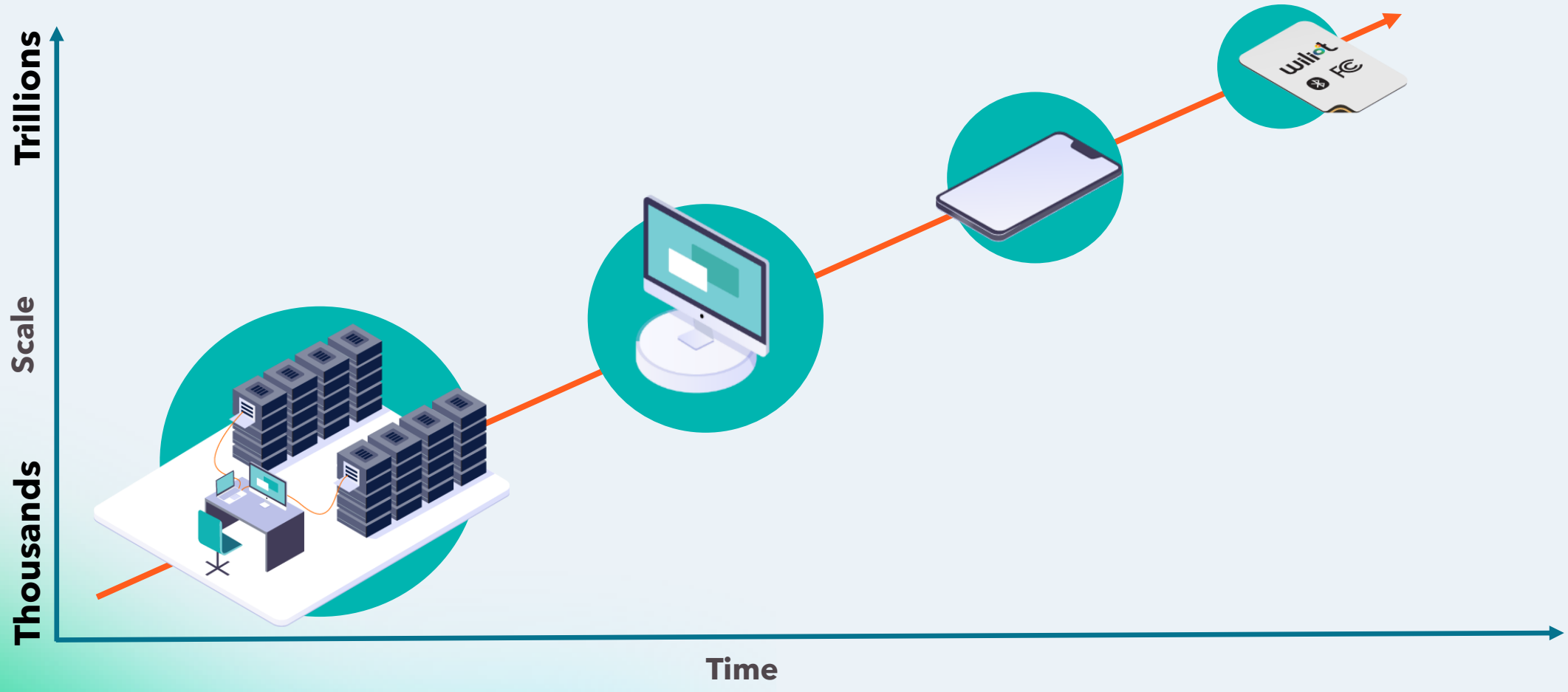
Now imagine, for instance, that every item in your refrigerator has a similar smart tag on it, and the moment you run out of something, like

Smart locks like this one from Yale are among the early steps toward the ambient-computing future.

22
connected devices are in the average American household.

52%
of American consumers are worried about the security vulnerability of their smart-home devices.
Source: Deloitte

Connectivity and computing commoditized



Standards Trajectory

Standards

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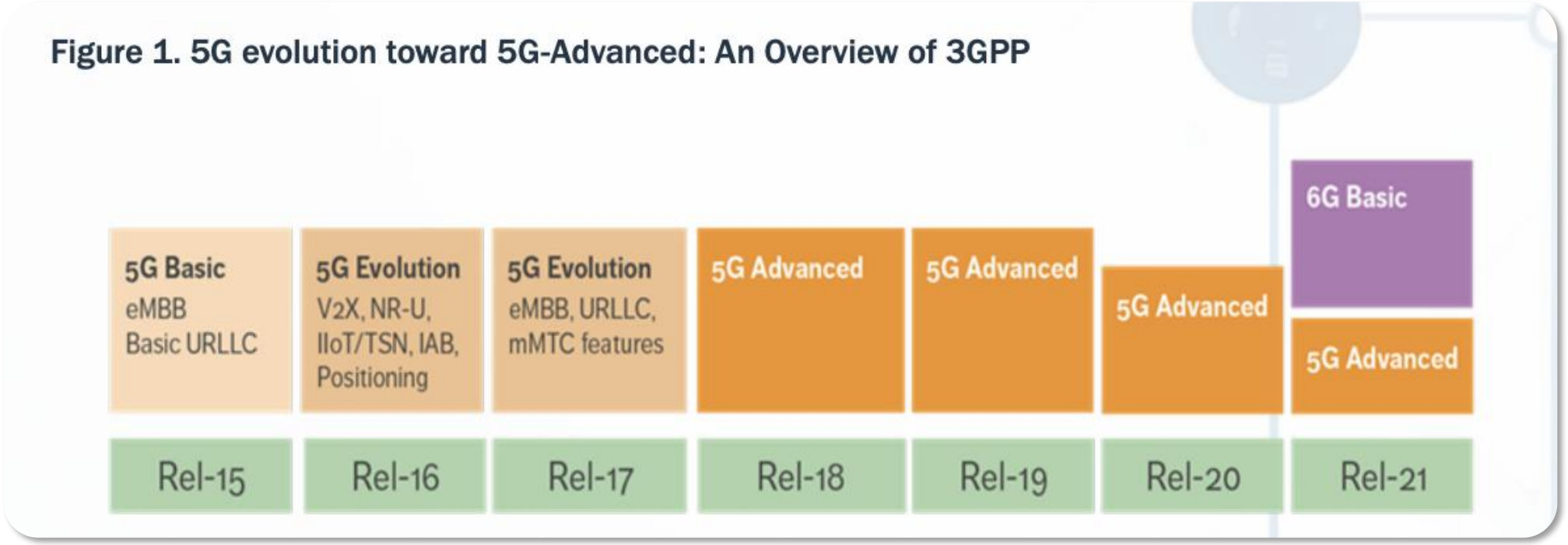
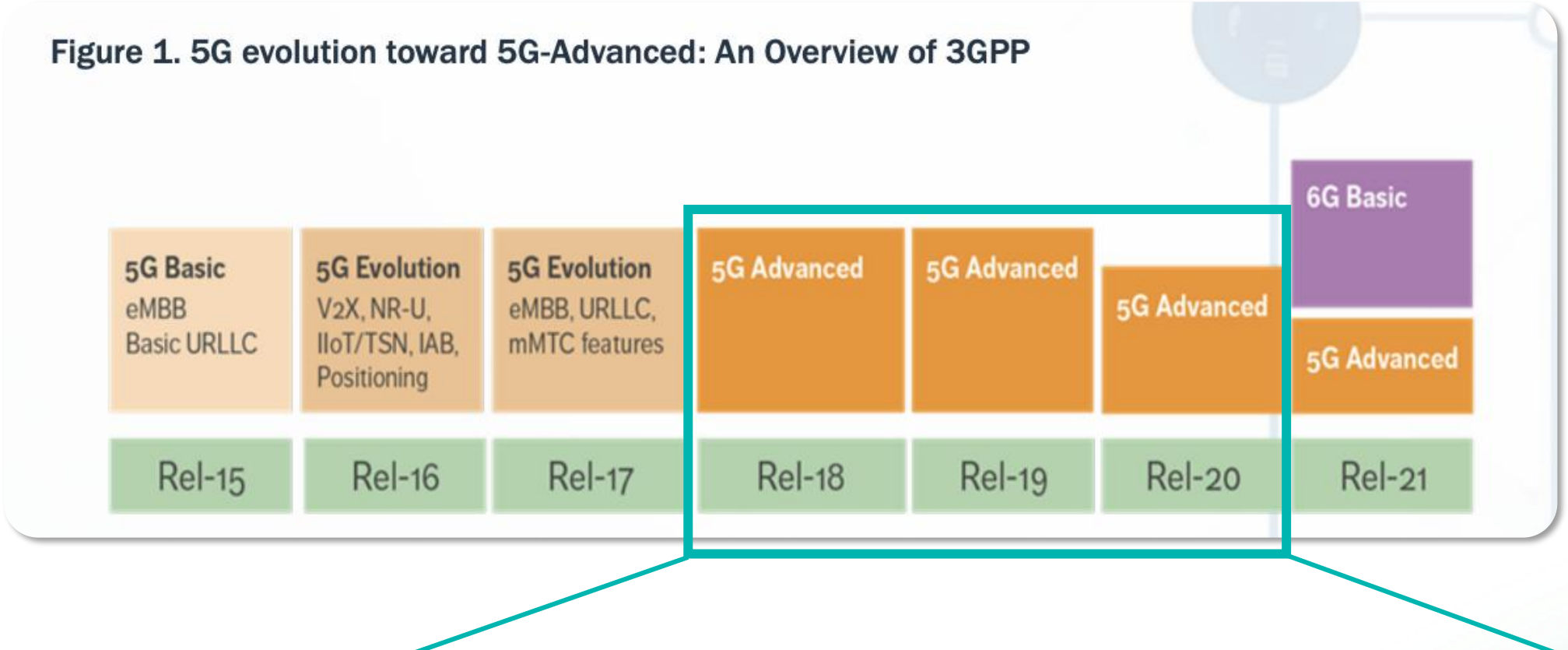
Ambient IoT – Standards Direction



Ambient IoT – Standards Direction



Release 18 (Q2 '24)	Release 19 (Q4 '25)	Release 20 ('27-'28)
Initial study of Ambient IoT	Ambient IoT Technical Specification	Commercial Availability

Two classes of Ambient IoT

Feature	Type 1 (Passive, Backscatter)	Type 2 (Active, RF-Harvesting, Ultra-low Power)
Sensor Support	Limited (low-power sensors)	More capable (higher power, longer active times, active sensing + processing)
Range	10-15 M	20+ M
Power Source	Reader energy only	Energy harvesting or Small battery
Example Use	Close range inventory counts	Supply chain monitoring, smart logistics

Intel, Qualcomm, PepsiCo, Infineon, Wiliot Form Ambient IoT Alliance

The ambient Internet of Things Alliance is working to usher in a battery-free, scalable era of IoT, powered by ambient energy

Liz Hughes, Editor, IoT World Today
February 20, 2025

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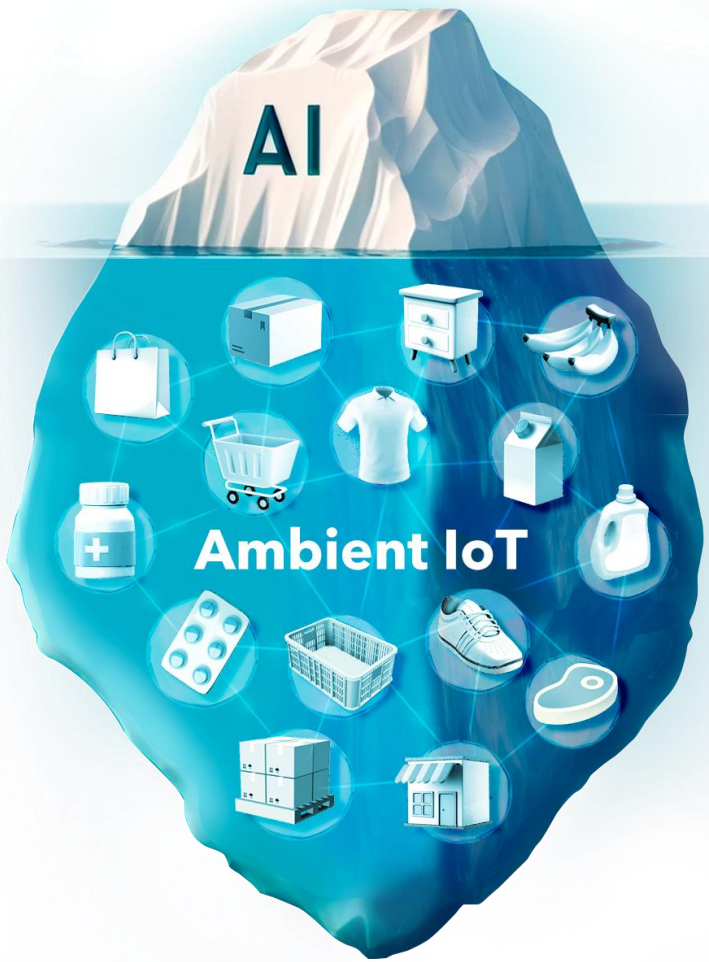

Central Nervous System for AI

Thank You!

Eric Casavant
Director of Technical Marketing @ Wiliot