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Low Power 5G And The Enterprise

By Greg Ferro

This post is excerpted from a forthcoming whitepaper on 5G to be published at ignition.packetpushers.net.

Low power 5G is a group of technologies intended to enable low-power, battery-operated devices to connect directly to 5G networks instead of using short-range wireless (e.g. Bluetooth/WiFi).

These technologies are hyped as enabling the future of IoT. Most IoT communication will be machine-to-machine, such as probes, sensors and devices communicating with a central application to collect data or take action.

5G could possibly be used in IoT, but it's too early to call. The primary drawback is the cost of 5G service in licensed spectrum compared to a private WiFi network.

Another limiting factor may be the confusing mishmash of 5G standards in this space, including NB-IoT, LTE-M, and LoRa. NB-IOT is an open standard, LTE-M is part of the 4G standard, and LoRa is proprietary.

Key Aspects

Low frequency - Lower frequencies propagate further and use less power to transmit a signal. Expect to see allocators in the sub-1Ghz range, likely 700khz where older television spectrum has been reclaimed.

Low bandwidth - Devices are expected to be simple, single-function, and unlikely to transfer large volumes of data.

Long distance - Low power 5G should provide sufficient coverage over long distances, and penetrate buildings where sensors will be located.

Low data rate - Devices are likely quiescent for long periods of time to save battery. When active, they could transmit just a few hundred bytes before shutting down. There is limited capacity to handle user authentication, such as 3G/4G does for mobile phones.

Long battery life - Standards are targeting 10 years of operation on a single battery (such as a CR22 button battery). It is possible that some devices could draw power from ambient radio signals, but this is likely several years away.

These features will have substantial impact on device management and load predictions because devices are effectively 'always off', unlike the 'mostly on' status of existing 3G/4G devices.

What Low Power Means For Enterprises

There is a lot of change happening in enterprise WiFi. New standards such as 802.11ax promise gigabit performance. New hardware and software platforms offer better features for identity management, automation, and so on.

When planning for future density, consider that many devices may not connect to the WiFi network but directly to 5G.

For example, a building management company may deploy sensors throughout a building to offer a service for cooling and heating. For some companies, these sensors could connect directly to the 5G network, require no power for up to 10 years, and require very little administration.

Technologies such Bluetooth Low Energy (BLE), Sigfox, and Zigbee are being promoted as solutions for location tracking and beacons that use unlicensed spectrum. 5G has proposed standards for these services and may offer alternatives.

Don't over-invest in WiFi on the premise that a massive growth in IoT devices will use your WiFi network to connect to off-site management software.

Tech Blogs: How To

Exploring the GPU Architecture - NielsHagoort.com

<https://nielshagoort.com/2019/03/12/exploring-the-gpu-architecture/>

Niels Hagoort compares basic general purpose CPU--keeping memory latency low-- and GPU architectures--keeping lots of cores busy with computation. He concludes with how ESXi can use GPUs, including dedicating GPU resources to a specific VM with DirectPath I/O. Not a long post, but Niels links to more GPU articles if you want to go deeper. - Ethan

Amazon Transit VPCs and Transit Gateway - NetCraftsmen Blog

<https://www.netcraftsmen.com/amazon-transit-vpcs-and-transit-gateway/>

Pete Welcher talks through why you'd want to create a transit VPC, and follows up with a mention of AWS' new Transit Gateway offering. It's all about control. BTW, in addition to the resources Pete links to, [Heavy Networking 433](#) with Amazon's own Nick Matthews covers Transit Gateway and a few other new AWS features. - Ethan

Tech Blogs: Opinion

Level Up Your NetOps with Apstra - Network Phil

<https://networkphil.com/2019/03/15/level-up-your-n...>

Phil Gervasi provides an overview of Apstra's Intent-Based Networking (IBN) product, and analyzes the four levels of IBN as described by Apstra. - Drew

The State of DNSSEC Validation - potaroo.net

<https://www.potaroo.net/ispcol/2019-03/dnssec.html>

Geoff Huston offers a data-driven analysis of DNSSEC adoption by global region. Then he ponders, “Is DNSSEC validation a good idea? Or is it a whole lot of effort with little in the way of tangible benefit?” His lengthy answer contrasts two perspectives in “The Case for ‘No!’” and “The Case for ‘Yes!’” Geoff’s case against DNSSEC is quite strong, yet he concludes in favor of DNSSEC deployment. He points out that DNSSEC isn’t perfect, but it’s the best we’ve got for now. Plus, DNSSEC is being improved. And we really, really need a secure, trustable Internet name infrastructure. - Ethan

QoS Is Dead. Long Live QoS! - Networking Nerd

<https://networkingnerd.net/2019/03/14/qos-is-dead-long-live-qos/>

Tom Hollingsworth argues that QoS is dead. In his opinion, the public cloud killed QoS, since the Internet doesn’t care about your QoS schemes. Not that there’s no longer a need for differentiated services. That need still exists, but we’re delivering on SLAs in a different way now. Tom cites SD-WAN as one example. - Ethan

Certification Exam Questions That I Hate - Data Center Overlords

<https://datacenteroverlords.com/2019/03/12/certification-exam-questions-that-i-hate/>

Tony Bourke critiques certain kinds of certification exam questions that are just silly. I found myself often nodding in agreement while reading this. Even more, Tony offers up his idea of the sorts of questions that are worthwhile. He’s not just here to whine. He’s bringing solutions! - Ethan

Networking Events in Europe - ipSpace.net

<http://blog.ipspace.net/2019/03/networking-events-in-europe.html>

Ivan Pepelnjak has a few recommendations for networking events worth attending in Europe. Got more? Let him know. - Ethan

Opinion: The DNS-over-HTTPS (DoH) dilemma - APNIC Blog

<https://blog.apnic.net/2019/03/07/opinion-the-doh-dilemma/>

DoH seems tied to the browser. If your browser determines which DoH-based DNS resolver you use (say 8.8.8.8), then we’re playing into the hands of large companies like Google who can use our DNS requests to further mine our data, diminish our privacy, and dehumanize us. “This is a complex discussion that mixes technical, policy and legal aspects, and some politics too; it is neither easy nor immediate. But this is the discussion that we need to have.” - Ethan

The Springtime of 802.11ax Is Absolutely Here - Lee Badman

<https://it.toolbox.com/blogs/leebadman/the-springtime-of-80211ax-is-absolutely-here-030719>

One reason I enjoy Lee Badman's blogs is because he takes a verbal flamethrower to tech marketing BS like Kurt Russell roasting monsters in "The Thing." In this post, he recommends that wireless and network engineers start educating themselves on 802.11ax because the marketing machine is ramping up hard, and it's essential for buyers and advisors to be armed with knowledge, not PR. He also provides links for where folks can start learning. - Drew

The Lulz

🔒 smbc-comics.com



Thanks to machine-learning algorithms,
the robot apocalypse was short-lived.

<https://smbc-comics.com/comic/rise-of-the-machines>

IT News

Intel, Linux Foundation Launch Open Source Silicon Groups - SDxCentral

<https://www.sdxcentral.com/articles/news/intel-linux-foundation-launch-open-source-silicon-groups/2019/03/>

The Linux Foundation has launched the CHIPS (Common Hardware for Interfaces, Processors and Systems) Alliance with Google, Western Digital, Esperanto Technologies, and SiFive. Intel has launched the Compute Express Link (CXL) Consortium along with Google and others. “CHIPS Alliance scope is more limited to CPU and system-on-chip (SoC) designs. And CXL is a specific interface standard.” - Ethan

Rancher Labs Submariner Project Links Kubernetes Clusters - SDxCentral

<https://www.sdxcentral.com/articles/news/rancher-labs-submariner-project-links-kubernetes-clusters/2019/03/>

“Submariner creates the necessary tunnels and routes between Kubernetes clusters that allow for direct connections regardless of their location. It can be deployed into existing Kubernetes clusters with the addition of Layer-3 network connectivity between pods in different clusters. ... Submariner is designed to work with existing Kubernetes Container Network Interface (CNI) plugins like Calico, Weave, and Flannel.” - Ethan

The Gazillion-Dollar Standoff Over Two High-Frequency Trading Towers - Bloomberg

<https://www.bloomberg.com/news/features/2019-03-08/the-gazillion-dollar-standoff-over-two-high-frequency-trading-towers>

Two things about this article. First is how many technology mistakes Bloomberg fit into a single article: “in less than 7 milliseconds (a millisecond is one-thousandth of a second). In other words, the data line moved information at about two-thirds the speed of light.” Pffffttttt, two thirds speed of what the heck?

It's always fun watching money in motion and the networking messes that are created by algorithmic traders. I did some work in this area for awhile and the money is just insane. The idea that these people would spend years in the courts to put up a tower is all kinds of crazy. - Greg

Reinventing our data center network with F16, Minipack - Facebook Code

<https://code.fb.com/data-center-engineering/f16-minipack/>

Facebook returns to the OCP with a new switch design, and it's ready for enterprise use this time since Cumulus Linux runs on this switch. - Greg

Facial recognition's 'dirty little secret': Millions of online photos scraped without consent - NBC

<https://www.nbcnews.com/tech/internet/facial-recognition-s-dirty-little-secret-millions-online-photos-scraped-n981921>

This is a good piece about IBM researchers grabbing almost a million photos from Flickr to use as a training dataset for facial recognition software. According to the story, IBM explicitly sought out photos of people of color with the aim of reducing bias in its algorithms. I applaud IBM being aware of algorithmic bias and trying to train it out. At the same time, facial recognition is fraught with creepy surveillance and civil liberty issues as the technology gets adopted by law enforcement, government agencies, and for marketing and consumer tracking purposes (such as IBM's Watson Visual Recognition product). IBM argues that the photos were made available under a Creative Commons license. I presume this puts IBM in the clear legally, but it's unlikely that people who uploaded their photos understood the scope of the license or what it would allow. Beware of what you share! - Drew

IHS: SD-WAN Market Reaches \$359M, VMware Dominates Over Cisco and Aryaka - SDXCentral

<https://www.sdxcentral.com/articles/news/ihs-sd-wan-market-reaches-359m-vmware-dominates-over-cisco-and-aryaka/2019/03/>

The short version is that companies are buying SD-WAN. Every SD-WAN vendor except one listed is growing substantially in revenue. VMware's SD-WAN is VeloCloud, and my gut says that the high sales number is due to big spending service providers as SPs build out their SD-WAN offerings. - Ethan

F5 Acquires NGINX - NGINX Press & Blog

<https://www.nginx.com/press/f5-acquires-nginx-to-bridge-netops-and-devops/>

<https://www.nginx.com/blog/nginx-joins-f5/>

The actual press release title was, "F5 Acquires NGINX to Bridge NetOps & DevOps, Providing Customers with Consistent Application Services Across Every Environment."

Impressively long title that obfuscates the real message--behemoth ADC folks F5 just bought open source darling NGINX for \$670M. NGINX gets a bigger potential customer base for their commercial offering where all the interesting features go first, and F5 gets a more relevant future. We'll see how this plays out in the next couple of years. Big companies with entrenched bureaucracies have a way of clubbing their nimble acquisitions to death. - Ethan

YANG Catalog Transition to the IETF LLC - Benoît Claise

<https://www.claise.be/2019/03/yang-catalog-transition-to-the-ietf-llc/>

Benoit Claise, [who has appeared on Packet Pushers](#), discusses the significance of the global YANG catalog transitioning to the care and feeding of the IETF. Benoit has been deeply involved with YANG for years, and his efforts have helped keep YANG from devolving into an existential nightmare. - Ethan

New Products & Industry Takes

Cumulus Networks is Excited to Announce being the First to Power Facebook's Next Generation, Open Modular Platform, Minipack - Cumulus Blog

<https://cumulusnetworks.com/blog/first-power-facebooks-minipack/>

The piece is a good overview of the Minipack platform hardware and performance, as well as being self-congratulatory for being FIRST. WE WERE FIRST. US. WE DID IT FIRST. 🧐 “Minipack will be offered through Cumulus Networks as a Cumulus Express option. All Cumulus Express options come pre-loaded with Cumulus Linux.” - Ethan

Comparing Service Meshes: Linkerd vs. Istio - Glasnostic Blog

<https://glasnostic.com/blog/comparing-service-meshes-linkerd-vs-istio>

This piece scared me. With all the media hoopla about service meshes about to take over the world for delivering microservices, we're still at that frighteningly fractured and complex stage. Consider such quotes as, “Deploying a service mesh adds considerable complexity.” Or how about, “Routing traffic through a series of proxies can get painfully slow as the mesh grows and routing tables balloon in size.” All in all, a worthwhile read to understand how Istio, Envoy, Linkerd 1.x, Linkerd 2.x, Kubernetes

and several other open source projects fit together. Even so...I'm running away now. - Ethan

Marvell Revolutionizes Edge Data Center Switching - Marvell

<https://www.marvell.com/company/news/pressDetail.do?releaseID=10677>

Marvell has announced the Prestera CX 8500 Ethernet chipset family. The company says the portfolio will range from 2 to 12.8Tbytes per second, and targets edge and private data center use cases. The company says the chip is currently sampling. - Drew

New Wireless Frontiers for the Enterprise: 5G, Wi-Fi 6, and CBRS - Cisco Blogs

<https://blogs.cisco.com/news/new-wireless-frontiers>

This article caught my attention as I'm heading to Silicon Valley to participate in a panel discussion for an upcoming Cisco TV launch event. The topic? Wi-Fi 6 (802.11ax) and why you should care, pretty much. Should you care? This blog post is trying to make the case that you should. However, the trick will be mapping specific advantages of Wi-Fi 6 onto your business requirements. For some of you, that will be easy. For others, your 802.11n is still working fine. AC? Never got there. AX? Nah... - Ethan

Men & Mice Suite version 9.2 released with AWS multi-account management, DNS Workflow, advanced Reporting and Azure Marketplace availability - Men & Mice

<https://info.menandmice.com/blog/aws-azure-dns-workflow-v-9-2>

Men & Mice sells an overlay solution for managing DNS, DHCP, and IPAM. The oddly-named vendor has released a new version of its software platform with new features including a new module to generate custom reports, support for multiple accounts on AWS, and the software's availability in Azure. - Drew

The End Bit

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Human Infrastructure is bi-weekly newsletter with view, perspectives, and opinions. It is edited and published by Greg Ferro and Drew Conry-Murray from PacketPushers.net. If you'd like to contribute, email Drew at drew.conrymurray@packetpushers.net.

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