

USER FRIENDLY

How connectivity is advancing health care

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Hanish Patel:

I'm Hanish Patel, and this is User Friendly. The show where we explore emerging trends in tech, media, and telecom, and how they impact business operations and the world around you. Both the use of wearable fitness trackers and virtual medical appointments have risen over the past few years, due to the accessibility and convenience of virtual care. Consumers rely on their devices to share health data, and care providers for remote patient monitoring, and smart hospitals powered by 5G are ushering in the future of health care.

But all of these technological innovations require stronger and more secure connectivity solutions to power them. Today, I'm joined by Joe Cutrell, director of strategy and innovation with a focus on health care industry solutions at AT&T Business, and Jack Fritz, advanced connectivity market activation leader at the intersection of our Tech, Media & Telecom and Health Care industries at Deloitte.

In this episode of *User Friendly*, we'll discuss how connectivity is enabling the future of health care and how advances in technology can improve health access, equity, and the

patient experience. Joe, Jack, welcome to the show.

Joe Cutrell:

Thanks, it's good to be here.

Jack Fritz:

Thanks, looking forward to it.

Hanish Patel:

Alright, this is going to be a really cool episode by the nature of knowing the two of you and where you spend your time in the industry. So, when I think about everything that's going on in technology, what's taking

place in the advancements of connectivity over the years, I really would love to get a high-level picture of where you see how that's really impacting the health care industry, and the key role that it's also playing in the evolution of that industry.

Jack Fritz:

Sure. I think, you know, as we look at the role of technology in the health care industry, there has already been a few different trends here. One that we're seeing is this evolution or ongoing shift from sick care to an increased focus on prevention and wellness. And that's further empowering consumers, and it's also pushing providers outside of the traditional four walls. As we look at consumers or patients, you know, they're also looking at their experiences all around them, right?

As they interact with banks, auto insurance, shopping, just kind of everything around them from these other kind of tech platforms. And they're increasingly digital, and they're creating this expectation that's really causing the consumers to then bring that same expectation over into the health care space. So they're looking for more interactivity, more seamless experience, from their health care like they're getting from these other areas.

Then they're also wanting to take ownership of their health. They have all this personal data, they're leveraging a number of consumer devices to further their health objectives. And then they're trying to also drive towards better outcomes for themselves. And so, a lot of this is also leading to a pretty rapid rise that I think we're all seeing in the amount of data that's generated, how much of it's usable, and understanding the customer's really unique situation. And then there's this increased emphasis on their ability to collect, analyze, and act on that data for the providers.

And so, lastly, I'd say that a lot of it is also driving towards virtual care, which was accelerated by the pandemic—I think we have all heard a lot about that. It's remained a top priority for providers and customers alike. You know, with telehealth and remote patient monitoring solutions, whether that's

for chronic conditions or acute recovery at home, all of these are on the rise, and we're really seeing connectivity as playing a critical role within these areas especially.

Joe Cutrell:

Let me add onto that too, Jack. I think some of the point you brought up as far as the digital enabling, all of this rise in the data generated, the health care data—the key role is that digitization and that those modern devices have to be connected. And so it's the connectivity that is going to enable a lot of those “take ownership” kind of virtual care use cases. And improving that care is really what this technology is intended to do when it comes to impacting health care.

So, these advances in connectivity are supporting these remote patient use cases, but also they're supporting operational efficiency within the health care organizations as well. So, we get that double effect within health care, which is really important these days, given the workforce crisis in some of these provider entities. We're able to take advantage of this digital enabling to help with things like equipment scheduling, modifying workflows, dealing with patient intake.

So in addition to that improving health, we also are seeing an improvement in the operation of health care, which, in turn, also brings about an improvement in outcome. One of the other things that we're seeing in this digital enabling of devices is that first responders are now able to do more out in the field.

So whether it's a pop-up that's in a particular place, or whether it's an ambulance that has to go to many different places, there is this ability now to do either treatment in place, or to be able to pass data back and forth to the hospital and take advantage of that for things like subject-matter experts over video, whether it's something like a telestroke, where making sure that that patient does get delivered to the right hospital is very, very important based off of some early diagnostics. So all of these things are made possible through 5G networks that have been deployed recently, and we'll get in a little bit deeper into the 5G technology as we continue.



Hanish Patel:

So, actually, Joe, let's go there, right, in terms of that 5G, that technology. What are those key communication technologies that are really driving and enabling the future of health?

Joe Cutrell:

5G really starts with a use case; it's not merely the next generation of access protocol for these mobile devices. So, 5G networks these days, whether they're private or public, they do provide faster data speeds and lower latency. They also provide higher capacity. And that's just because they're newer networks. But they're specifically designed to take into account a lot of these use cases. And many of these use cases are there because of the explosion of connected devices.

So one of the big things that's different about 5G is it can support up to 500 times the connection density of 4G networks. And much, much more than something like a Wi-Fi network, where maybe 25 to 50 devices is considered high density for an access point on Wi-Fi. So, the ability to handle the bulk of all of these connected devices is really where 5G starts to shine. And it brings that traffic in in a very deterministic and reliable manner, which helps with anything that's interactive, like maybe language processing or voice.

And it also helps with being able to roam or be nomadic within a facility and leaving the facility. So, 5G enables a lot of that seamless connectivity, and it does it with the use case in mind. When we see deployments, we always make sure we start with the use case. And sometimes it's bold and interesting like an automated guided vehicle, or sometimes it's a little more straightforward, like tablets that need to be connected.

But essentially these days, every device needs that connectivity.

Jack Fritz:

Maybe just to add quickly to that, Joe, you know, one of the things that I think we've heard a lot about in this space, right, is people view 5G as potentially a competing or displacement technology for other solutions that hospitals have. And I think what we're talking about here is the role that 5G can play in really helping hospitals kind of take

what they have to the next level. It's there to augment a lot of these use cases, enable new use cases, right?

Because we talk about device density, as you just said, 25 to 50 for an access point on Wi-Fi. We could easily get to a place—I think we're at almost 25 potentially connected devices in a patient room today, right, on average—so we could easily exhaust single Wi-Fi capacity in one patient room today without even bringing in all the extra connected devices that we're talking about. So I think we're really, we're looking at ways that 5G and other technologies can help augment what's there today, and really I think just help with the continued evolution of patient care and, you know, care delivery.

Hanish Patel:

So Jack, I want to stick with where you talked about evolution. So, when we think about organizations and they're kind of modernizing their communications and network—you know, just about where they are today to enable health care of the present, should I say, but really health care of the future. And as they think about that, what are some of the challenges that you see are involved for them as they look to build their network, build their communications to serve for the future as well?

Jack Fritz:

Sure. So, as we look at care facilities today, some of the things that we hear about is a lot of the fiber that runs through a provider hospital is really in the ceilings, right (laughs), of these buildings, above those ceiling tiles that we're all kind of walking under. And if you look above those ceiling tiles, it's just dozens and dozens, if not hundreds, of cables running through there.

We've heard from a number of providers that those ceiling tiles, that space above the patient floor, is getting full. There's no room for more fibers. The ports and the routers—they're running out of ports, right? So, in terms of kind of running things in the traditional way, which has relied heavily on ethernet cables, without massive infrastructure upgrade, there really isn't a lot of extra capacity that could be brought using that traditional model.

And then we also see things that, I think, were really highlighted through the pandemic around the need to create kind of flexible spaces where the purpose of a particular room or space in the facility would need to get re-envisioned, right, and enabled to do new things. And if everything's wired, you can't do that in the traditional way. So, I think that that's where we're seeing some of these challenges.

An example is if you're ever in a hospital as well, you see the carts kind of out in the halls or things kind of left in different places going with what is in the public's consciousness right now.

Hanish Patel:

Mm-hmmm.

Jack Fritz:

A lot of times that's because that's where the connection falls off. You can't actually bring some of the equipment into a patient room, right? And so, if we're trying to enable providers to really leverage the capabilities associated with all these technologies. And that's just in today's terms we're seeing it left out there, right? To say nothing of what are the types of solutions and tools that providers will be looking to use in the future. We need to really provide that not only ubiquity of coverage but also the ubiquity of the performance that's needed in order to deliver that.

Joe Cutrell:

Yeah. Completely agree, Jack. We're also seeing a desire for business continuity use cases that could also take advantage of some alternate paths. You mentioned the ceilings being full (laughs), so maybe the alternate path for many of these devices could be that cellular or that private 5G link just for business continuity. When something bad happens, you're able to have certain devices that are connected.

One of the great things about choosing those devices that need that type of connectivity to go over something like a cellular network is that they also work when they leave the building. So, we get back to that set of nomadic use cases that can also take advantage of that type of design in a facility.

And there also are new ways with a lot of these 5G standards that are being implemented now where we can support that transfer of large data files, getting that data rate to not just be really low jitter and really persistent and deterministic, like is the hallmark of a cellular data connection, but also the ability to send lots of data down through some of these new 5G types of implementations.

So, that's one of the trends that we're beginning to see. It took off more in health care manufacturing to start with, and now we're seeing every new hospital that's built or any new health care facility that's large to take advantage of this type of internal connectivity

Hanish Patel:

So, Joe, you mentioned around trends, and certainly I, myself, have seen a trend over the last couple years, which is around digital-first interactions with your health care provider or your primary care physician. And if I think about that digital-first view, and how do you kind of see those digital-first care options improving, say, the patient's overall health care journey and, in some way, helping drive more equitable care for all?

Joe Cutrell:

We're seeing trends specifically in digital care around wearables. And all of these devices need connectivity, but they also generate data, and that data has to go somewhere. These devices also are typically worn by patients from chronic disease or whether from some acute procedure—or it could be that they're just wellness type of trackers. All of this health data is now being collected and it's definitely on a trend up. Health care is responsible for more data than any other industry right now, and it's also growing faster than any other industry when we take a look at the data that's going across our networks.

So getting that data is very important, and to your point of equity of access, we've really seen that a lot of these systems that connect patients and consumers—depending on where you are in the care journey, you may be considered a consumer or a member or a patient—but getting all of this data from urban areas or from rural areas, it all can be done now with cellular connectivity.

Last year we [AT&T Business] added 100,000 square miles of connectivity, and these types of networks now have this expectation of being able to carry enterprise-grade traffic flows. So, whether that's in an underserved community that's in an urban area or rural area, the cellular type of connection back to the data storage is really allowing for that equity of access, whether it's something like a pharmaceutical trial or whether it's something like remote patient monitoring or telehealth. A lot of those things really popped up during the pandemic, but to start with, the only patients that could take advantage of it were the ones that had good residential broadband and the ability to either use a good smartphone or pair their devices up properly.

So, we want it to work right out of the box, and that way it can take advantage of these cellular networks and capacity that's been deployed to handle that.

Hanish Patel:

Jack, any thoughts on that side as well?

Jack Fritz:

Yeah. Just to maybe build on some of it, as we look at coverage that AT&T Business and others are building out, this is a critical role of providing remote and rural connectivity to those who maybe have struggled to access a lot of this care in the past. And so, as we look at it, roughly a third of all Americans today live in health care deserts, which, you know, is areas that are basically lacking adequate access to their primary care providers, hospitals, trauma centers—and a lot of them also lack the digital infrastructure needed to even consider some of the remote care.

And so, you know, to Joe's point, things working right out of the box is always going to be absolutely critical not only for consumers or patients to be able to set things up—you know, the access to having in-home tech support is probably fairly limited in some of these areas—but same goes for the providers, right? Like, how many additional staff would a provider need to bring on if everything was bespoke and tailored, whereas if it's able to work out of the box then that creates a lot of efficiencies both for the providers and a lot more likelihood,

I would say, for patients and consumers to be able to implement a lot of these things in their house.

And so, when we talk about these solutions, I think we're all just really excited about the opportunity in front of us to provide some of this equitable health care access regardless of where you live.

Hanish Patel:

Makes total sense.

I want to go back to a term that you used, Joe: wearables. And obviously a lot of our listeners and people out there are used to that term. They probably may even have a wearable themselves, be that on their wrist or on a finger or around their neck. But when we think about wearables, in this case, around patients and providers, how is that connectivity the both of you talked about earlier and 5G really enabling the use of those type of wearables.

Joe Cutrell:

Yeah. So, as these wearables are collecting this patient health data, we really need to get that in real time, and it's a lot more data than you would typically see in a traditional EHR [electronic health record], which may not be interested in your body temperature every 60 seconds, right? But there is interest when things change. So, by collecting this data from all of these wearables in real time, sometimes even the slope of that change now becomes interesting. And as this data gets fed into more modern systems that maybe can deal with machine learning or correlations, then that's when a lot of these platforms start to make sense out of this health data that's coming from all of these wearables.

We've worked with monitoring devices and RPM [remote patient monitoring] devices that need private data networks. We can do those kinds of things over this new 5G architecture. We can make sure that the data from wearables, or "nearables"—things that are just near to the patient—can enter either into an IoT [Internet of Things]-type database or a care platform or directly to the payer or the provider systems. But that access to the network is really what 5G is able to provide for these types of devices.

It's interesting that when we talk about IoT, we tend to think about small devices that send small amounts of data, but in fact, we're able to use these types of networks to also connect to large devices. It could be durable medical equipment that goes out for portable imaging systems, or things that now support care at home. Being able to move these pieces of equipment into a home and still have it be connected without trouble and take advantage of these new networks is really a benefit for virtual care scenarios of all types. And as well as those devices being connected, we're connecting the clinicians. If there's a nurse that is traveling outside of the facility, these 5G networks allow for the clinicians, the patient data, the patients themselves, and the equipment to take advantage of the network that's provided for these enterprise data flows that go back to the health care entities. And we're seeing a real big trend in all things that are connected working in a neighborhood like that.

Jack Fritz:

As we look at the role of wearables, I think a lot of what we're seeing is also the empowerment of the consumer, right. So, as you get more wearables in the hands of consumers and they have, you know, phones and watches and rings and sleep monitors and all these things, right, that we're really seeing this rise in not only ownership of one's kind of health and wellness, but also in outcomes. So the Deloitte 2022 Connectivity and Mobile Trends Survey actually highlighted [that] 70% of the respondents agreed that their smart watches and fitness trackers have improved their health. And so as we think about outcomes-based and moving from really care and treating issues to now moving

more towards prevention and wellness, I think that these devices with increasing connectivity and interoperability are just going to play a huge role in that. And, I think, that's where 5G can really play a critical role in bringing it all together

Hanish Patel:

I want to stay with what you mentioned around ownership. But a quick question back to you, Joe—and I want to make sure that I'm tracking on this one—you mentioned IoT a couple of times. Am I right in thinking Internet of Things and, you know, as you were talking about, various devices and how they're much more chatty, different data, passing information back and forth—want to make sure I'm tracking with that one.

Joe Cutrell:

The acronym IoT means Internet of Things and refers to devices and systems using what is called machine-type communications over a network. These use cases may need to have long battery life or be small and low cost, but not always.

Hanish Patel:

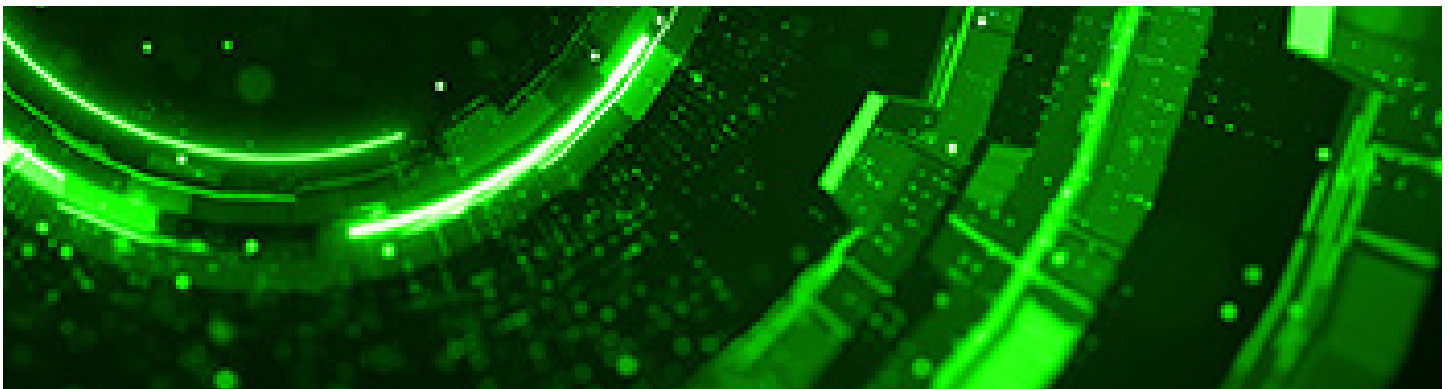
Got it. Appreciate that. So then, that kind of begs the question, in my mind, as you talk about these devices, and you mentioned kind of data. And then Jack, you talked about ownership of these devices and wearables. It brings me to, what does that mean from a perspective of the security of that data, the privacy of that data, ownership of that data? So, where does that all play into it—the advancement that you both have talked about in connectivity in health care overall—where does cybersecurity play into that?

Jack Fritz:

You know, as I think about cybersecurity, absolutely critical. As we think about the data that is getting transferred and stored in different places, obviously there are entire systems set up beyond even anything financial to protect and secure our health data and our personal data. And so, cyber is really thought about throughout this system, I think, you know, before use cases are implemented, as use cases are designed, and then as they're rolled out really continuously, right. So it becomes a critical topic throughout the entire evolution, from planning to implementation and operation. And so, you know, as we think about all of these devices, how do we secure the devices and not only the device itself, but then where the data is stored, how things are transferred back and forth? And so, just increasingly, increasingly critical there. And as we think about the number of devices in the home as well, are there other points of entry that might be outside of the care device, right? So, you might be wearing something for remote monitoring that maybe there's other things in your home which could create vulnerabilities in that remote monitoring solution. And so it's beyond just the care that's beyond provided and really thinking about everything that is around and connected to that same network as well.

Joe Cutrell:

Yeah. Uh, Jack, I agree. And to maybe add onto that, from a device and network perspective, we see a lot of devices that get purpose built, or at least purpose configured, to play a role in things like remote patient monitoring. And while some of these devices



may look like a smartphone, they're actually performing certain functions that could be relaying critical patient-generated health data that needs support on compliance. And those things can get locked down with software that runs on the device, they can get locked down on the network as well, they can be put on private networks, and all of this is supported over these cellular networks.

And cellular networks, in general, have been built with security in mind. Specifically, it was one of the primary considerations in 5G development—to make sure that security was baked in to the architecture and to the design. And they even had these specific properties around resilience and identity management and those kinds of things. And so one of the ways that that data stays secure on a 5G network is that there are levels of encryption that are separate for every device so that your particular connection is shielded from other connections that may be on the network at the same time. All of these things have been built into the protocol, and there are also ways to make sure that other devices cannot gratuitously make connections into your device.

But without getting overly technical and (laughs) “math-y” about what’s going on there, we know that the security of that data path is a very important part of the business value to these types of rollouts. So it’s baked in, it’s also built into any deployment and implementation so that we can keep these devices secure and keep the data on those connections secure.

Hanish Patel:

It strikes me that there’s been an incredible amount of innovation and progression over the years, particularly using that technology, using the evolution of connectivity and how that’s impacted health care, both from what you’ve described. But if I was to fast-forward us all a couple of years, even from where we are today, how do you envision that continued convergence between health care and how that’s advancing based on in-parallel technology continuing to evolve in those next few years? And specifically, what technological innovations can we expect to see with the continued advancement of connectivity and probably beyond that as well?

Joe Cutrell:

One of the things that we’ve really been seeing is the rise of data; it’s skyrocketing. And so the network supporting that data is really what we have been deploying, as we build this from the inside out, and powering those connections to assist with health care outcomes and in general wellness.

I think if we were to look maybe two or three years down, we’re going to see not only a shift in the way that patients and clinicians work—maybe even paper forms going away, those kind of things—but in general, we’re going to see health start to improve as a result of catching illnesses earlier, and I think that’s the near-term future promise right now is to be able to discover heart issues or blood glucose issues and some of these things that are much easier to treat when we have the data that show that a problem is starting to show up. And this is coming about through wearables and patient data and the connections that all of those require. So, the improvement of wellness as a result of that is something that’s coming soon. And I would also say that maybe in another branch, what all of this data is going to help power is machine learning and AI discovering new and better ways to maybe deal with both common and rare illnesses as we collect more data about things we don’t know, and perhaps that even lends us into more personalized treatments and personalized medicine. And the results of dealing with rare illnesses and personalized treatments also sends us on a trajectory to better overall wellness.

Jack Fritz:

I totally agree. I think as we look out a few years, I think we’re going to see this continued trend towards the consumerization of health care. There’s going to be more ownership of the data. I think we’re going to see a lot more of a push towards prevention.

I think when we talk about rare illnesses, or even illnesses in which the survival rate or the effective time to treat it is very early in the detection period, I think because of the data and the rise of the data availability, we’re going to start to see some improved early detection of some of these diseases, which will hopefully lead to much more favorable outcomes.

Given some of those opportunities, I think we’re going to probably see some evolution of business models, as we think of payers and providers potentially being able to work together in a more seamless way in the patient’s interest a little bit better.

I also think that, you know, as we talk about devices—and Joe hit the nail on the head with AI—that’s obviously a very big topic right now. I think there’s AI on data for patients to identify potentially rarer diseases or things that people may not be noticing, getting to some earlier diagnoses or more effective treatments with tailored medicine. But I also think we can bring AI into patient interaction, where either for preliminary consults or even while a clinician or physician is attending and meeting with a patient, I think there’s an opportunity for AI to play a bigger role through connectivity by bringing these devices and all the data associated with the patient into that interaction.

I really think that there’s an opportunity to have a more meaningful interaction versus, you know, “Let’s take some tests. Let’s have you come back in a week or two.” (laughs)

Joe Cutrell:

Mm-hmm.

Jack Fritz:

And that sequence that, I think, as patients, as consumers, we’ve started becoming used to in our current health system.

I think we’re going to be able to see a lot of that happen more quickly and some of it even in real time, given the improved connectivity and compute that’ll be part of these solutions.

Obviously these things are not without challenges. There’s financing (laughs) of them. There’s finding, you know, sustainable business models. Obviously a lot of privacy and cybersecurity concerns, but the benefits seem incredibly real based on the conversations that we’ve been having, and the stakeholders certainly seem more motivated and interested than ever.

So, excited to see where the future takes us.

Joe Cutrell:

Right, Jack. I like the way that you spelled that out. It's not just the better health, it's the better patient experience in general, and these digital technologies are allowing for that better experience, which has got the health as well.

One of the other cool things that we're starting to see when it comes to experience are not just maybe more digital therapeutics or digital companions, or those type of adjuncts, but also virtual reality and extended reality as forms of pain distraction therapies.

All of these types of new ways to deliver health care are becoming practical now as we have these modern technological devices that are connected to the rest of the world.

Hanish Patel:

It really strikes me that... I mean, health care has progressed immensely in recent years, and that's not just through breakthroughs in knowledge and science around health overall but just everything that you both, you're describing, and where it's going around technology.

You mentioned machine learning, artificial intelligence, virtual reality, augmented reality, and, you know, how all of that's being brought together for enabling virtual care and all these technology-enabled devices, and clearly at the core of that is the connectivity of all of this. And you talked about 5G and the important role that connectivity has to play in that evolution, and I think it's incredibly exciting, in terms

of where this goes from here for the health care industry. But it certainly seems it's going to be a future of continued connectivity, more and more security around the data share and the ownership of that data, and how that's all going to work together to make for, as the both of you put, a better experience overall for the individual when it comes to health care.

And in summation to that, I do want to say, first and foremost, to the both of you, Joe and Jack, thank you for joining me today on this incredibly engaging topic around just where technology and connectivity has really progressed the health care industry. And then to our listeners, until next time, happy listening.

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