

# DFW: The airport of the future, enabled by a private 5G network

A conversation between Paul Puopolo, Executive VP of Innovation, Dallas Fort Worth International Airport, and Monica Paolini, Principal, Senza Fili



# DFW: The airport of the future, enabled by a private 5G network

A conversation between Paul Puopolo, Executive VP of Innovation, Dallas Fort Worth International Airport, and Monica Paolini, Principal, Senza Fili

**Innovation is crucial for airports to improve their operations and to meet the needs and expectations of passengers, partners and tenants. Innovation also requires a lot of work, a supportive partner ecosystem, and the adoption of new technologies.**

**In this conversation with Paul Puopolo, Executive VP of Innovation, Dallas Fort Worth International (DFW) Airport, we talked about the vision and the plans for the digital transformation at DFW using 5G private networks to connect everybody and everything within the 27 square-mile footprint of the airport. We also talked about the hard work, lessons learned, and results achieved during the initial proof of concept (POC).**

**Monica:** Paul, it is great to hear about your work at DFW to improve wireless connectivity. Can you give us an introduction about your role and the team you are heading at DFW to start?

**Paul:** I am the Executive Vice President of Innovation at DFW, and I have been here for three

years. I lead an innovation program where our responsibility is to design new services, solutions and products, to operationalize them, and to build a culture of innovation for the airport.

We also spend a lot of time assessing new technologies. And that is why we got into 5G and private networks.

**Monica:** As I was preparing for this interview, I learned that 55,000 people work at DFW. I know the airport pretty well, but I would have never thought there were so many people, and all of them need connectivity. And this does not even include all the things you have in the airport that need to be connected – it is not just planes. So getting connectivity to all of these people and things is not a trivial task. And managing this connectivity requires a transformation that is not trivial either.

This does not consider the connectivity needs of the passengers – and there are many of them going through DFW daily.

**Paul:** You are right, and we are quite large. We have five terminals, and the airport itself is 27 square miles. There are a lot of people, a lot of partners, a lot of tenants, a lot of passengers that use and need connectivity.

**Monica:** What is your vision for innovation in wireless connectivity in an airport setting?

**Paul:** My vision is to build an integrated innovation program. And that means that we need to have a clear strategy, a clear process, a clear focus on what we are doing for the airport, as well as building a culture of innovation across all the airport divisions.

Technology is moving too fast. Companies or organizations that do not spend the time or the effort to put resources into the future will find themselves less competitive. Innovation is hard to do because the operational challenges of today always get in the way of tomorrow's opportunities. So it is easy for us to kick the can down the road. But when that happens, you end

[Download the Deep Dive report "Private 5G in airports: Ready for takeoff", watch the conversation](#)



up missing a competitive advantage, or you end up missing being a leader in your industry.

An organization that does not spend time thinking about innovation or figuring out what the company's role is 3-5 years down the road could find itself to be irrelevant.

5G private networks are an emerging technology. We are working very closely with our IT group to figure out how this new technology applies to what we do. That is the role of rapid learning in our innovation program. And that is why we ended up with this project in our portfolio.

**Monica:** How will 5G help you realize this vision?

**Paul:** The airport of the future is going to be highly connected. And that means it is going to need a very flexible network strategy, one that meets the needs of our business partners and the expectations of the traveler.

From an efficiency standpoint, we know that IoT is going to grow. We know that autonomous vehicles will be a future mode of transportation, and we know that robotics, AR and VR are going to take a more active role in the future. Automation will be used below the wing and above the wing and in the terminals and to move packages around for our cargo business or people through the airport. These new technologies require better connectivity – and this means more bandwidth, lower latency, and appropriate security.

This is why we started to look at what private 5G networks can do for the airport. 5G provides the level of flexibility and customization we need. It opens opportunities that the airport would not have had in the past because the technology was not available.



Source: DFW

We are trying to get better coverage and better control over the infrastructure and how the network operates. We are also looking at lower costs and higher efficiency.

**Monica:** Can you give examples of things that do not work quite well or areas where you see scope for improvement?

**Paul:** Every airport is different. But we have horseshoe-type terminals, and we have five of those. We have large, concrete support structures. Connectivity on the ramp can be challenging for our partner airlines, particularly when they move between inside and outside.

We want to make sure we can manage and provide continuous connectivity, for example, for bags moving from outside to inside. We want workers on the ramp to stay connected. Autonomous ground-support equipment that goes in and out of tunnels and around terminals between gates cannot lose connectivity.

**Monica:** How urgent is the need to change? And what happens if you do not change? What are the risks?

**Paul:** The first downside is that we would not meet our partners' expectations, whether it is a concessionaire or an airline, to provide the right

amount of connectivity so that they can support their business.

The second downside is that if passengers do not have the right connectivity, this can reduce customer satisfaction.

Travelers expect things to happen immediately, just like we all do. When we buy things or interact online, we expect things to happen fast, and we do not like to wait. Passengers have this expectation too, and we need to provide the right level of connectivity and latency in the terminal.

**Monica:** Once you have all the connectivity you need, what does the airport of the future look like?

**Paul:** When I say future, I am not being a futurist – I think about the next three to five years. Much of the work that we are doing with biometrics and digital ID, for example, will require a network. Sensors tracking passenger flow and trying to understand the movement of people and things through the airport require a certain amount of connectivity. Again, autonomous vehicles, whether they are ours or somebody else's, will need low latency and reliable connectivity.

That is where we see mobility going. That is where we see technology going.

The pace of technology will not get any slower than it is today. During the pandemic, we have seen how digital transformation has accelerated.

To support all that technology requires a very flexible network strategy. And that is what we are working on at DFW Airport with our IT group.

**Monica:** Technology is an essential ingredient, but you also need to embed it into your

ecosystem – employees, tenants, airlines, passengers. How are you going to do this?

**Paul:** It is a journey, and we are all trying to understand emerging technologies. People might say 5G is not that new. Well, it is new when you are trying to implement an unfamiliar technology or a different network model.

It all works well when you have good partners – whether it is a partner who is going to help you roll out the technology, or who is going to work with you on a POC.

**Monica:** How is this working out in your private network POC?

**Paul:** We are partnering with American Airlines. And it is great that they are working together with us to understand how this POC should work. We have to understand the technology. We have to make sure that whatever we put in will work for us in our environment.

Putting a 5G network in a building is one thing, but putting it in five terminals and across 27 square miles is a big decision.

We want to make sure we understand the technology – we want to understand the good and the bad. We want to make sure we design it the right way for our environment – in a way that works for us. We are not the experts, so having technology partners helps us understand how to leverage the technology.

In the airport, we are asking people to disrupt their operational environment to test something. That requires a lot of good collaboration and a lot of good discussions. And you have to have an innovation mindset to get that done. That is our approach. And I think we have been pretty

successful at it with the POCs we are doing right now.

**Monica:** Before we dive into the POC, let me ask you about security and privacy. When you start tracking people, things or events, questions about privacy and security arise. How do you address them?

**Paul:** 5G is more secure than other wireless technologies. So if you are going to pay for something with our concessionaires, 5G will provide the level of security required for that transaction.

From the airport's standpoint, we do not hold or capture any personal information. But we want to facilitate the exchange of information between, let's say, the airline and the passenger, or the passenger and the concession. We believe that is our role. And providing a secure environment to have that happen is essential.

The decision to share that information is up to the passenger. The network has to be secure so that we can protect the flow of information.

As far as the operational environment goes, the airport would not necessarily have access to information that belongs to partners and tenants. But we need to make sure we provide a secure network for our airline partners, for instance, to transfer information to and from their devices to support their operations and their customers.

**Monica:** You mentioned that the POC is key to understanding the technology before rolling out a network covering the entire airport. You want to make sure that the network will work for you. How is the POC helping you get the information you need?



**Paul:** We are doing three POCs that include ramp, cargo and airline in-terminal applications. The first two are ongoing, and the third one is still in the planning stage.

For the first POC, we put 5G at one ramp location. We are working with American Airlines to test out the connectivity for bag handling – tracking bags as they move from the plane underneath the structure and into the baggage system – and the effectiveness of American Airlines' devices. One of the challenges we face as you move around the ramp is the loss of connectivity because of the physical infrastructure. But the beauty of 5G is that it provides low latency and great coverage. We see coverage across seven gates, with one access point – which is great.

And we are learning. For instance, how many of these access points do we need per gate? Because again, in our horseshoe environment, we need to think through how much hardware will be required. We are also learning a lot about whether the network we plan to build will meet the needs of American Airlines – will it do what they want it to do?

We are also learning how to install a network. A POC is different than an operational rollout. Some of the things we are putting in place for the POC may be temporary. We are putting in hardware to test something, and it may or may not stay after the POC is over. During these six months when the POC is running, we are learning how much we need to do, whether we have the right hardware to cover the right areas, and whether our users and clients are getting what they need.

Once we get all that done, we will know how to multiply this approach across 35 gates per terminal. That is a big decision, and this is why it



Source: DFW

is so important for us to understand the requirements, the implementation issues, and the implementation costs. Will the network do what we said it was going to do? This is a big investment for us to move forward.

**Monica:** It is a big investment and a big change in how you and your partners will be using wireless connectivity in your operations with a private network.

**Paul:** It is a major change. Managing a private network is completely different from what we have done before. 5G is positioning us to do things we normally would not have done in the past. We will be working with partners we have

never worked with before because the technology is different. And those partners are helping us understand what we can and cannot do, and what their expertise is. New business models are created from a new approach that we hope will be more cost-effective for us in the long run.

**Monica:** Other than being cost-effective, what are the other benefits of a private network? Why do you think you need a private network?

**Paul:** A private network gives us more control over connectivity. Having control over the network alleviates the bandwidth challenges we have had in the past.

And it gives us more flexibility to have different types of connectivity for the airport. Just because we have a private network does not mean we are giving up on other connectivity strategies. It is just one element of our overall connectivity strategy.

The private network can do a lot for our partners. And having access to licensed and unlicensed spectrum that we normally would not have had before is a great benefit.

Now we can work with somebody to help us slice that network. We could not slice networks before. We are moving away from a one-size-fits-all approach to making sure we provide the right connectivity and the right latency to support use cases that a business partner or passengers may have. We never had that flexibility.

This is why I go back to flexibility and control. This is why we are exploring private networks: 5G allows us to have the flexibility and control we need.

**Monica:** With network slicing, not only do you control the network, but you also control the network in a much more granular way than you could have done a few years ago.

**Paul:** Correct, and that is exciting for us. But again, this is going to require many partners, many discussions.

**Monica:** How will your private network coexist with your existing Wi-Fi network? Will you still use it?

**Paul:** Yes, we will still have our public Wi-Fi network already available to the public. The private network will augment our public Wi-Fi network.

Today, everybody is using the same network. And with a private network, we will be able to separate users and traffic among networks. This means that the public will have more bandwidth, and that will help us on public Wi-Fi. And we will be able to push more of the operational traffic to the private network.

**Monica:** What do you plan to do once you complete the POC?

**Paul:** These three POCs will help us understand what we need. We will run these POCs for about another four months to make sure we get good data. After that, we have to put a business case together that recommends how we want to roll this out.

At the same time, we have to make sure that our airline partners and our tenants are interested and have access to the network. We also need our partners to help us execute it, and this all has to come together in a business case.

So that is the plan. And we are committed to doing it. We know that IoT will only get bigger, and we know autonomous vehicles are coming within the next three years. We need a phased approach to implement a comprehensive private network across our entire ecosystem.

**Monica:** And you will need both indoor and outdoor coverage, right?

**Paul:** Correct. And that is part of the discussion we need to have. What makes sense now? What makes sense next year? What makes sense the year after? This will depend on the results and learnings from the POCs.

**Monica:** The POC is still ongoing, so you will keep learning more from it. But to date, is there

something that you learned that you did not expect and that surprised you?

**Paul:** On the tactical level, it was the coverage and the quality of that coverage. I was not expecting that with a single access point we could cover seven to nine gates. And the people who did the implementation made this possible.

I am also learning, though, that, on the other side, it is tough to implement in an operational environment, particularly when you introduce a new network. So the POC itself is teaching us how to get better at moving quickly to do a test and not overthink things. But there are rules and regulations we have to follow. So testing something in an operational environment has been eye-opening, particularly for the implementation team.

**Monica:** How do you see this changing your relationship with the ecosystem – employees, tenants, airlines, contractors?

**Paul:** As with any new technology, relationships are going to change. No matter what technology we put in place, it enables the roles to change and allows people to do things they would not have done in the past. That is why the discussions we are having are good.

It is a big change for us as an airport to manage our network. While we may manage it through partners, we will be taking a more active role in our ecosystem than in the past. Both technology and customer expectations are forcing us to do that. And that makes it a fun and challenging space to be in.



## About Betacom



Betacom offers the first fully managed private 5G network, building on its long history as a wireless infrastructure provider to AT&T, T-Mobile, and Verizon. Founded in 1991 and headquartered in Bellevue, Washington, the company has regional offices throughout the country. Having completed more than 800 large-scale design and deployment projects, Betacom inspires confidence among their customers who have worked closely with them to meet their pressing high-performance connectivity needs. Its private 5G wireless service is the first managed service of its kind in the United States. For more information, visit <http://www.betacom.com>.

## About DFW



Dallas Fort Worth International (DFW) Airport is the most connected airport in the world. Centered between owner cities Dallas and Fort Worth, Texas, DFW Airport also serves as a major job generator for the North Texas region by connecting people through business and leisure travel. For more information, visit the [DFW website](#) or download the DFW Mobile App for [iOS](#) and [Android](#) devices. Follow @dfwairport on [Facebook](#), [Twitter](#), [Instagram](#), and [LinkedIn](#).

## About Paul Puopolo



Paul Puopolo serves as Executive Vice President of Innovation at Dallas/Fort Worth International Airport. He leads DFW's Innovation function to identify, assess, and drive the collaborative development of new solutions and business models to create new growth and competitive advantage. Mr. Puopolo joined the DFW staff in August 2018. Mr. Puopolo is an experienced "intrapreneur" with multi-industry innovation, emerging technology, and direct to consumer background. Throughout his career, he has built and led corporate innovation teams within large, complex organizations. Prior to DFW, he served as the VP of Innovation at MetLife Inc., VP of Business Innovation & Development at Highmark Inc., and Director of Consumer Innovation at Humana Inc.. In these roles, he was accountable for developing business innovation strategies and portfolios and their strategic implementation to increase profitable growth, improve the consumer experience, and champion an innovative culture. Mr. Puopolo served as an active-duty officer and pilot in the U.S. Navy (retiring after 22 years of service) and holds a Bachelor of Science in Comprehensive Science from Villanova University and a Masters degree in National Security Affairs from the Naval Postgraduate School.

[Download the Deep Dive report "Private 5G in airports: Ready for takeoff", watch the conversation](#)

## About Senza Fili



Senza Fili provides advisory support on wireless technologies and services. At Senza Fili we have in-depth expertise in financial modeling, market forecasts and research, strategy, business plan support, and due diligence. Our client base is international and spans the entire value chain: clients include wireline, fixed wireless, and mobile operators, enterprises and other vertical players, vendors, system integrators, investors, regulators, and industry associations. We provide a bridge between technologies and services, helping our clients assess established and emerging technologies, use these technologies to support new or existing services, and build solid, profitable business models. Independent advice, a strong quantitative orientation, and an international perspective are the hallmarks of our work. For additional information, visit [www.senzafili.com](http://www.senzafili.com).

## About Monica Paolini



Monica Paolini, PhD, founded Senza Fili in 2003. She is an expert in wireless technologies, and has helped clients worldwide to understand technology and customer requirements, evaluate business plan opportunities, market their services and products, and estimate the market size and revenue opportunity of new and established wireless technologies. She frequently gives presentations at conferences, and she has written many reports and articles on wireless technologies and services. She has a PhD in cognitive science from the University of California, San Diego (US), an MBA from the University of Oxford (UK), and a BA/MA in philosophy from the University of Bologna (Italy).