SPECIAL REPORT:

SEAMLESS TRAVEL AND DELIVERY IN THE SMART CITY OF THE FUTURE

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AIR TAXIS AND AUTOMATED PACKAGE DELIVERY HAVE THE POWER TO ELIMINATE EVERYDAY MOBILITY STRUGGLES FOR CITY DWELLERS WITHIN THE NEXT DECADE.

Living in a busy city environment with nearly everything you need at your fingertips can be exhilarating – but for many, the struggles of urban life can also be oppressive. In some cities today, people spend more time in traffic than they do on vacation. The maddening challenge of getting from point A to point B, whether for work, grocery shopping or taking a child to school, saps precious time and heightens stress.

Add to that the effects of air and noise pollution and it's clear that the current transportation model is unsustainable.

LOOKING (UP) TO A BETTER FUTURE

The vast majority of travel today is done via personal vehicles, ride services, buses and trains. What these all have in common is that they occupy an ever-expanding surface and underground footprint. Adding to that footprint has merely attracted more individual vehicles, affirming the maxim, "If you build it, they will come." For example, a study in Houston, TX showed rush-hour commute times from one suburb increased 51% after the Katy Freeway was expanded to a whopping 23 lanes.[1]

Bell, an 85-year leader in flight innovation, believes that we need to think beyond two-dimensional space for solutions to our most vexing transportation challenges. Dreams of flying cars have largely been just that – dreams. Flights of fancy.

That is about to change.

In the smart city of the future, artificial intelligence, GPS and 5G capability will marry our transportation and wireless communication networks in an interconnected system. That makes our next great innovation possible: the successful implementation of on-demand air mobility. With the right infrastructure in place, air taxis and autonomous pod transport (APT) vehicles will make us less and less reliant on cars and roads, leading to a better quality of life for all by the middle of the next decade.

We're calling this new family of vehicles, and the infrastructure that will support them, Mobility as a Service.

Unlike new roads, subways or light rail systems, Mobility as a Service can be incorporated into an urban area with relatively little space and physical infrastructure. Spaces that would have been swallowed up by roads and parking areas can be leveraged for other uses. Development of these new mobility options will put a premium on safety, quiet operation and accessibility for the average consumer.

MY NEXUS IS HERE.

When consumers interact with technology, they develop a sense of ownership. We don't purchase the light-rail train or city bus we take to work, and yet it's supported by our tax dollars and woven into the life of the community. That makes it ours. We say, "I need to catch my train." Or, "My bus was late today."

In the next decade, we – everyday consumers, not just the wealthy – will feel this ownership of APT delivery vehicles and air taxis.

"I'll see you later," we'll say, as we wave goodbye to the coffee shop barista. "My Nexus is here."

[1] http://www.milkenreview.org/articles/a-real-fix-for-traffic

TRANSIT HUBS – AND MUCH MORE

Mobility centers of today consist of airports, train stations and bus stations, many featuring a range of amenities, from restaurants and bars to nail salons and shops. Those options are there for the traveler's convenience, however; without the necessity of catching a flight or picking up a friend, the average person would have no reason to visit the hub.

But in the future smart city, "mobility centers will be living spaces," said Scott Drennan, Vice President of Innovation at Bell. "They're places that you'll want to go to naturally – even if you don't have to move from there to another location."

These multi-modal mobility centers will offer transit options of all types, from scooters to electric bikes to cars to air taxis, along with almost everything else an urbanite could need on the go or on the way home.

WHAT WILL THAT LOOK LIKE FOR THE AVERAGE PERSON?

THE BUSINESS TRAVELER.

Upon arrival via commercial jet from another city, the business traveler walks a short distance within the airport to a vertiport, where he will board a Bell Nexus air taxi en route to a client meeting downtown. Similarly, the outbound traveler enjoys a stress-free air taxi ride from his suburban office to the airport, where he connects with his international flight.

THE RESIDENT.

An apartment dweller living within the center picks up a package sent to a kiosk via the APT delivery vehicle, then goes to a bar downstairs to meet a friend for an early evening glass of wine. The next day, she ascends to the vertiport on the roof of her apartment to catch an air taxi for a visit with her grandparents across town.

THE COMMUTER.

When she's ready to leave for work, the commuter uses an app to summon the Bell Nexus air taxi. She boards at a location near her suburban home and settles back to enjoy a 50-mile trip that takes only 20 minutes. She walks back to the mobility center for lunch or to buy a cake for an office birthday party.

THE STUDENT.

A college student gets to the center via electric scooter, grabbing a coffee from his favorite barista before heading to class on a bus he catches upstairs. Even in rush hour, congestion on the roads is light enough that his commute feels largely stress-free.

CONGESTION RELIEF WITHIN OUR SIGHT

Like the helicopters that established Bell as a leader in its field, air taxis and APT vehicles are enabled by vertical takeoff and landing (VTOL) technology, as well as Bell's own tiltrotor innovation. These technologies will facilitate safe, quiet, efficient and affordable urban air operations at scale.

The vehicles consist of small, heavily automated electric and hybrid vertical lift aircraft.

AIR TAXIS.

The Bell Nexus air taxi will feature five seats, including one to be occupied by a pilot during the early stages of implementation. The vehicle will, however, be fully autonomous. Additional features include:

- Quiet operation through electric VTOL technology, which eliminates traditional noise sources (turbines, hydraulic pumps, anti-torque systems), and the introduction of ducted fans
- Battery electric power that can access energy from non-carbon sources such as wind, solar and hydroelectric
- Significantly reduced energy required to perform on-demand mobility through its ability to convert to horizontal flight
- High-performance batteries that can be repurposed or recycled; when no longer able to support aircraft, they can be used for city (energy storage), commercial (automotive) and industrial applications

AUTONOMOUS POD TRANSPORT (APT) VEHICLES.

Bell's on-demand package delivery system will feature:

- Scalable, autonomous, tail-sitting biplane design
- Speeds three times faster than a ground vehicle
- The ability to carry as much as 70 pounds in its larger version
- Customizable pod based on customer requirements

This technology is powerful on a large scale only when it is accessible to the vast majority of the population. Bell is committed to bringing on-demand mobility – by the mid- to late-2020s – to the teachers, the construction workers and the retail clerks of the world. This new system will make their days easier and give them the freedom to enjoy the best of life: time for dinner with the family, a movie out with friends, a visit to a park.

As with any technology, early versions of the air taxi and APT will be more expensive. But as time goes on and the system is built to scale, the accessibility goal will be reached. Getting to the right price point for the average consumer will be made possible for the Nexus by the ride-sharing aspect, by the manufacture of a greater number of taxis through more efficient methods, and by improvements in the technology, especially electric propulsion. Even those who do not personally use either service will benefit from the changes they bring to the urban environment in the form of fewer personal and delivery vehicles on the road.

MOBILITY AS A SERVICE: ELEVATING CONNECTION

Dropping in one or two pillars of advanced equipment does not make for a smart city. The technology is only as good as its ability to connect and interact with its users. Paramount in the Mobility as a Service vision is a commitment to understanding what people will want and need as they go about their daily lives.

The freedom and ease afforded by on-demand package delivery and transportation is only part of the picture. Residents of the smart city will insist that any mobility company consider the entire ecosystem in which its new technology will live – and how its vehicles will impact their community.

Breakthrough reductions in vehicle noise for VTOL are a must. Bell is building on a 40-plus-year legacy of acoustic analysis and testing of its equipment. It is focused on advanced proprotor modeling for both external and internal noise created by on-demand mobility vehicles. This keen attention to noise – a vital quality of life measure – will help ensure the company exemplifies good citizenship.

Bell places an emphasis on safety, for both individuals and the community. As it has done with its helicopters and tiltrotors, it is building specific internal processes and procedures into the Nexus air taxi that go above and beyond the minimum expectations in the aerospace industry. The Nexus features built-in redundancy with back-up propulsion systems and energy supplies.

And instead of managing risk within silos, Bell envisions a holistic approach that ensures safety throughout the system.

"With government, academic centers and private enterprise working together, accessible air taxis and APT delivery vehicles will take their place in the smart city of the near future – for the good of all", Thacker said. "In the end, this is about making people's lives better."

"ABOVE ALL, BELL IS FOCUSED ON ADVANCING VERTICAL LIFT TECHNOLOGY TO CREATE A SAFE, ENJOYABLE EXPERIENCE FOR PASSENGERS."

– Michael Thacker
Executive Vice President
Technology & Innovation, Bell

ABOUT BELL

Thinking above and beyond is what we do. For more than 80 years, we've been reimagining the experience of flight – and where it can take us.

We are pioneers. We were the first to break the sound barrier and to certify a commercial helicopter. We were a part of NASA's first lunar mission and brought advanced tiltrotor systems to market. Today, we're defining the future of on-demand mobility.

Headquartered in Fort Worth, Texas – as a wholly-owned subsidiary of Textron Inc., – we have strategic locations around the globe. And with nearly one quarter of our workforce having served, helping our military achieve their missions is a passion of ours.

Above all, our breakthrough innovations deliver exceptional experiences to our customers. Efficiently. Reliably. And always, with safety at the forefront.