

HOW WILL AIRPORTS MANAGE THE NEW LANDSIDE MOBILITY?

NORTHEAST CHAPTER
NEC
AAAE



2019 NEC/AAAE Airports Conference

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Purpose & Learning Objectives

This session will address the potential impacts on airports from Transportation Network Companies (TNCs such as Uber and Lyft) and autonomous (driverless) vehicles (AVs). TNCs impact curbside congestion and ease of movement as well as landside revenue. In the near future, autonomous vehicles (AVs) will also impact airport landside activities and revenue.

The participants will learn:

- What are the latest trends in TNCs and AVs?
- How will these trends impact landside management, parking behavior, and revenue?
- How are airports dealing with curbside congestion and reduced parking revenues due to TNCs and AVs?
- What can airports do to prepare for these ongoing and upcoming trends?

The Latest on TNCs

Who are They?

- Uber (69%) and Lyft (29%)...and everyone else (2%)
- A new trend line in January 2019 shows global drop in weekly TNC usage between 2017 and 2019

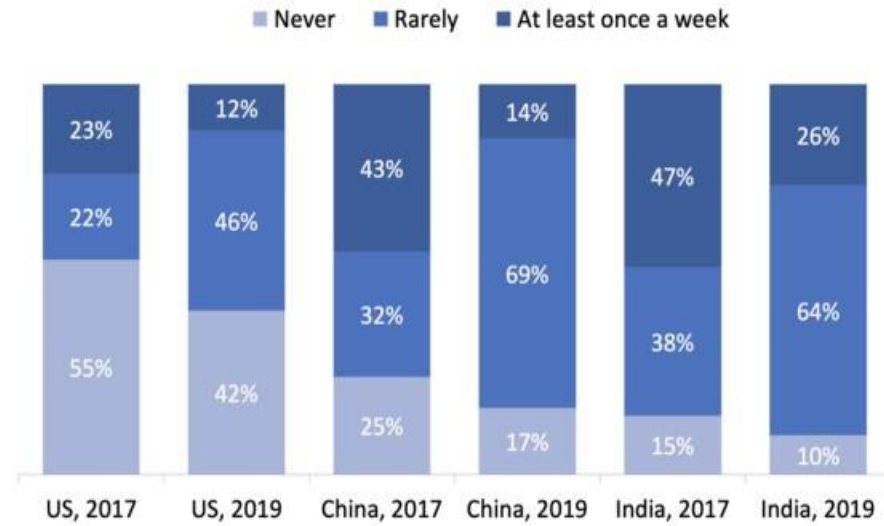


Source: Second Measure



Global Consumers Are Using Ride-Hailing Services With Less Regularity

Q: How often do you use ride-hailing services?



Source: Deloitte Insights, 2019



The Latest on TNCs

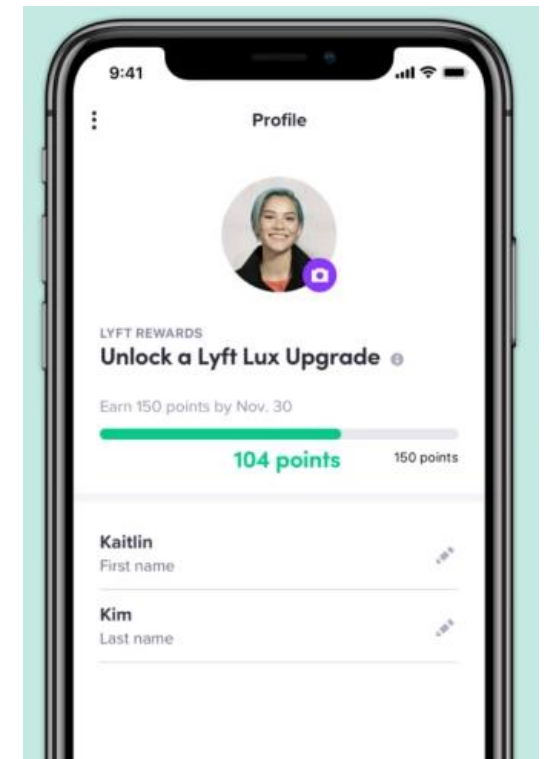
Loyalty Programs

- Uber Rewards – rolled out in January 2019
- Lyft Rewards – was announced in December 2018 but is not yet active

Uber Rewards	Blue	Gold	Platinum	Diamond
	0 pts	500 pts	2,500 pts	7,500 pts
Earn points with every eligible ride or Uber Eats order	🚗 🍴	🚗 🍴	🚗 🍴	🚗 🍴
\$5 Uber Cash rewards for every 500 points you earn	🚗 🍴	🚗 🍴	🚗 🍴	🚗 🍴
Flexible cancellations		🚗	🚗	🚗
Priority support		🚗 🍴	🚗 🍴	🚗 🍴
Price protection between your 2 favorite places			🚗	🚗
Priority pickups at airports			🚗	🚗
Complimentary upgrades				🚗
Special access to highly rated drivers				🚗
Premium support				🚗 🍴
Free delivery (\$0 fee) on 3 Uber Eats orders				🚗

How you earn points

- 1 point for every \$1 spent on POOL and Uber Eats
- 2 points for every \$1 spent on UberX
- 3 points for every \$1 spent on Premium



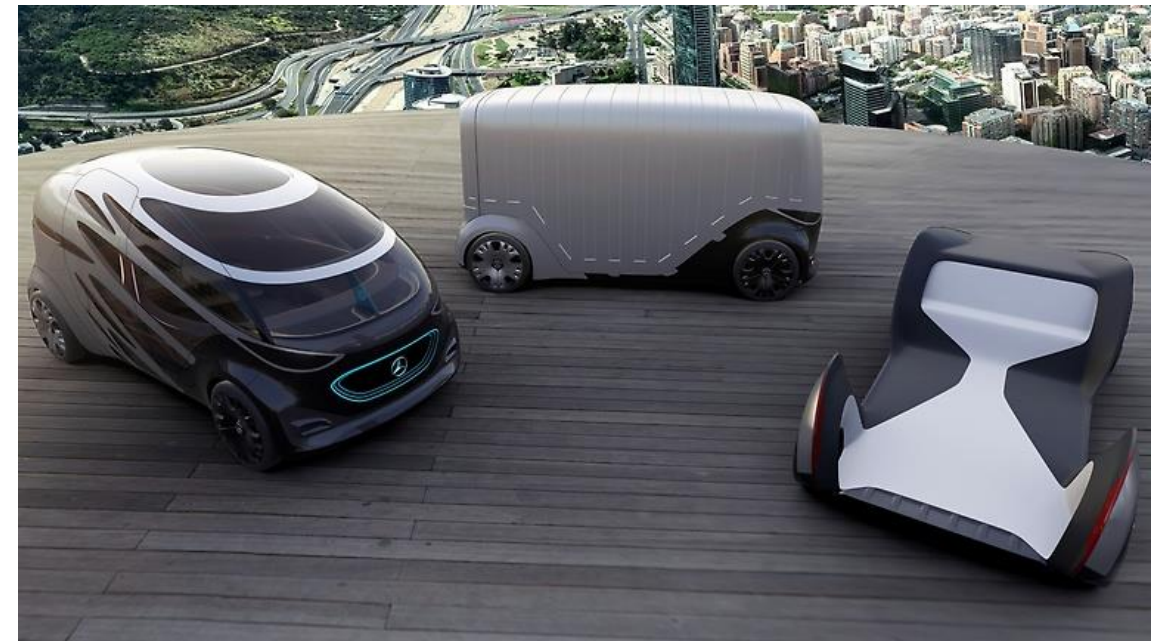
The Latest on AVs

Who's Leading the Pack on AV Testing?

- Waymo, Uber and GM – claim they will deploy fleets of AVs within 2-4 years
- Toyota and Uber's E-Palette – eAV pilot test fleets promised by 2021
- Daimler's "Vision URBANETIC" – eAVs for people and cargo promised by mid-2020s



Toyota and Uber's E-Palette Concept Vehicle



Mercedes-Benz's AV On-Demand Platform with Switchable Bodies

The Latest on AVs

“Connected” AVs (CAVs) – V2X

- V2P – vehicle to pedestrian
- V2N – vehicle to network
- V2V – vehicle to vehicle
- V2I – vehicle to infrastructure

CAVs are able to rely on multiple sensors to provide 360-degree awareness beyond line-of-sight...such as a blind intersection.

Vehicle-to-Pedestrian
(V2P)



e.g. pedestrian in
walkway ahead

Vehicle-to-Network
(V2N)



e.g. traffic queue five
kilometers ahead

Vehicle-to-Vehicle
(V2V)



e.g. emergency
vehicle approaching



Vehicle-to-Infrastructure
(V2I)



e.g. traffic signal ahead
turning red

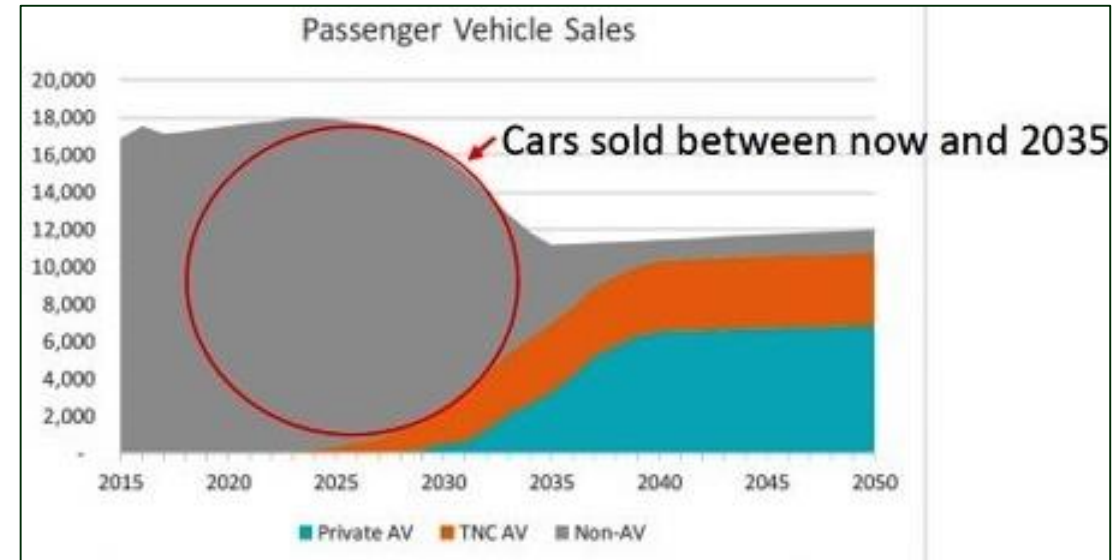
Qualcomm Technologies, Inc.



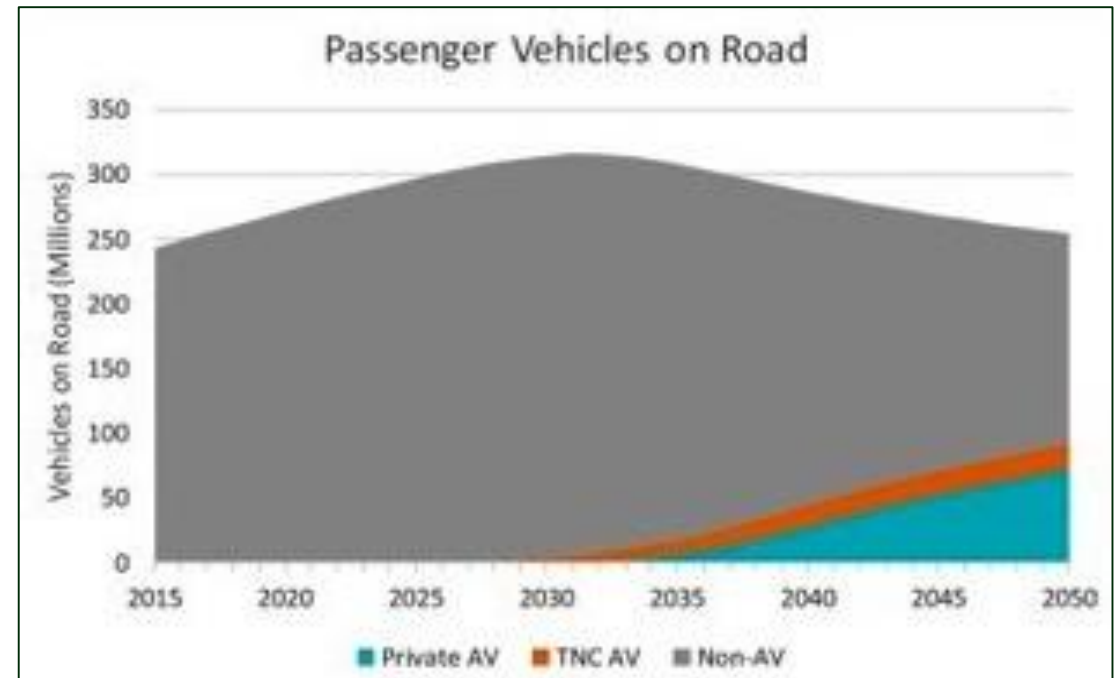
The Latest on AVs

What is the Latest Estimate of AV Market Penetration?

- By 2030 – 15% of new cars sold, with 12% owned by TNCs
- By 2040 – 90% of new cars sold, with 33% owned by TNCs
- By 2050 – 40% of vehicles on the road



Walker Parking Consultants





Boeing NeXT's prototype autonomous air taxi



FedEx "SameDay Bot" Delivery



Starship AV Delivery Robots

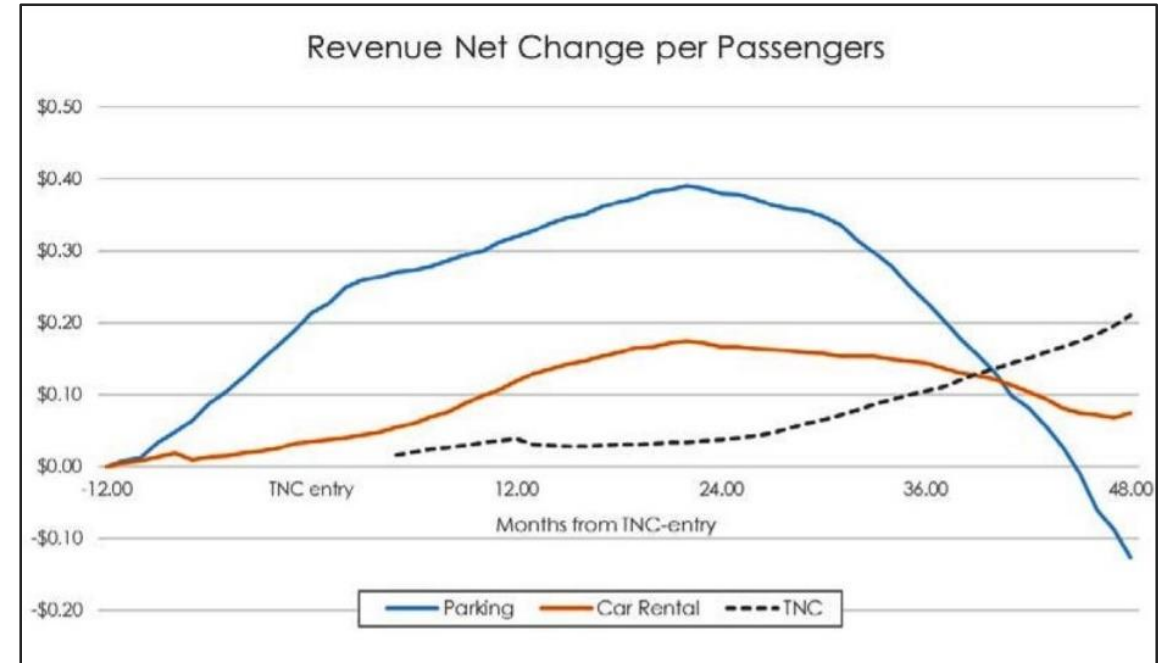
The Latest AV and TNC Technology

- Uber's Unmanned Electric Flying Taxi or eVTOL – being tested now
- FedEx's "SameDay Bot" – being tested in several cities
- Starship's "Delivery Bot" Startup – delivering food to college campuses

How TNCs Impact Airports

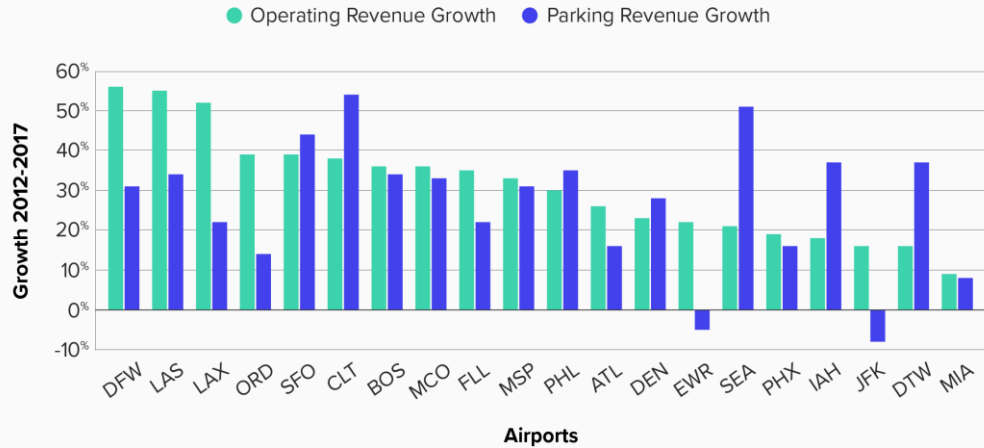
The relationship between airport passenger growth and parking revenue growth has changed

- Parking revenue no longer grows in tandem with passenger growth
- Real life data show that:
 - Parking revenue per passenger peaks 24 months from TNC entry
 - Parking revenue then drops 3-7% annually after the peak
 - TNC revenue per passenger surpasses parking and RAC revenue 37 months from TNC entry



Source: Airport Analyses Informing New Mobility Shifts, NREL, October 2018

Uneven Parking Revenue Growth Around the Country



MORNING CONSULT

Annual reports for airports and annual reports for airport authorities.

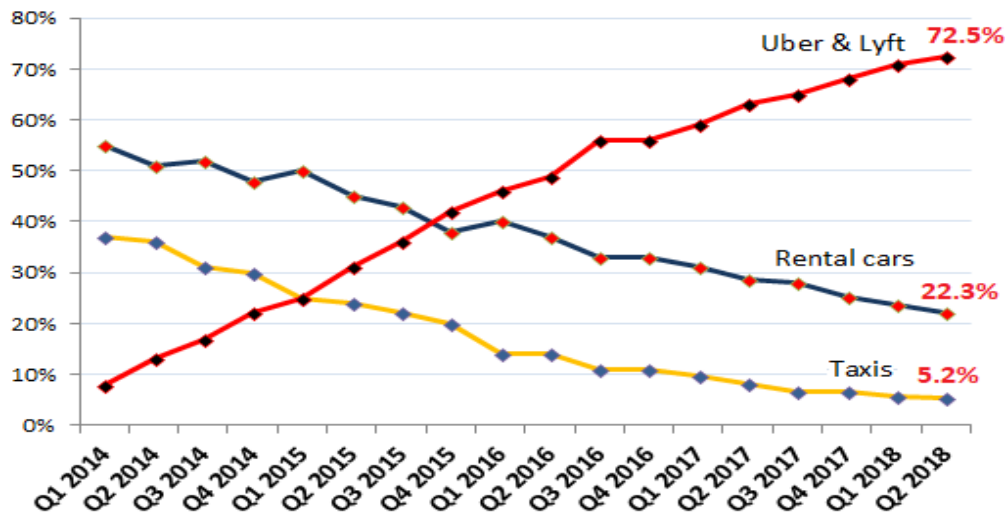
How TNCs & AVs Impact Airports

Parking revenue statistics and strategies:

- Parking revenue growth lags operating revenue growth at 12 of the top 20 US airports (NREL)
- Every TNC vehicle displaces 8-10 parked vehicles at any given airport (L.E.K. Consulting)
- 2018 airport parking transactions per enplanement were down 5-20 percent (Walker Parking Consultants)
- 2017 car rentals were down 12 percent from 2016 (Certify)

Uber & Lyft Crush Taxis and Rental Cars

% of Ground Transportation Travel Reimbursements



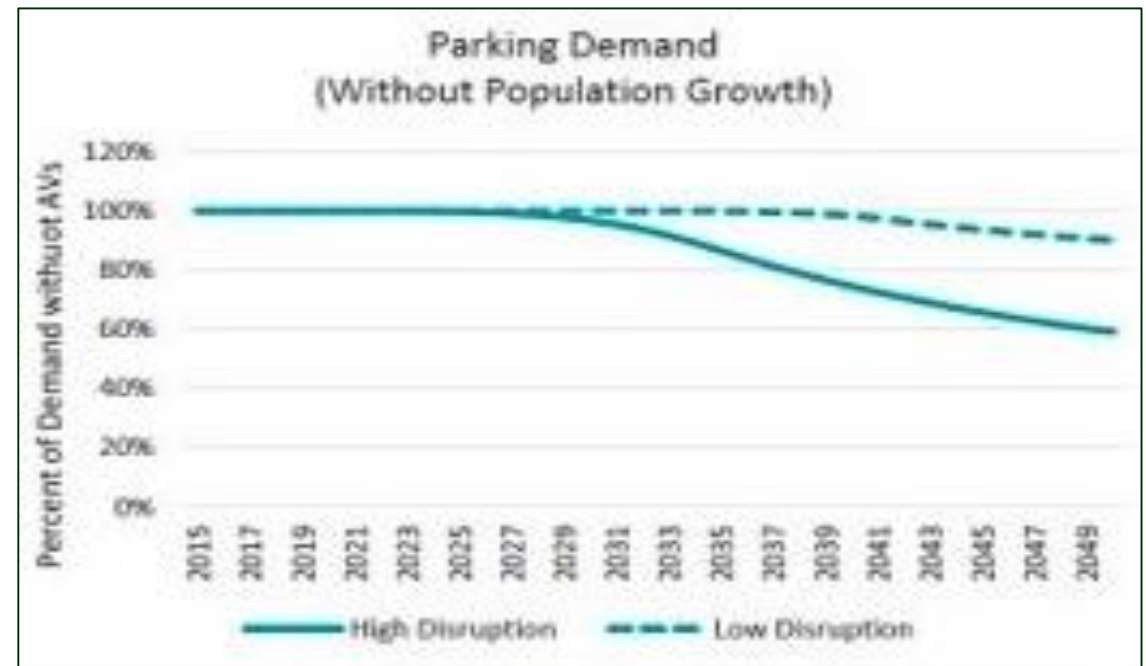
Source of data: Certify

WOLFSTREET.com

How TNCs & AVs Impact Airports

Airport parking demand will peak in 2030

- Parking demand at airports will peak around 2030 and then shrink through 2050 (Walker Parking Consultants)
- Capacity of existing airport parking goes up as demand converts to AVs

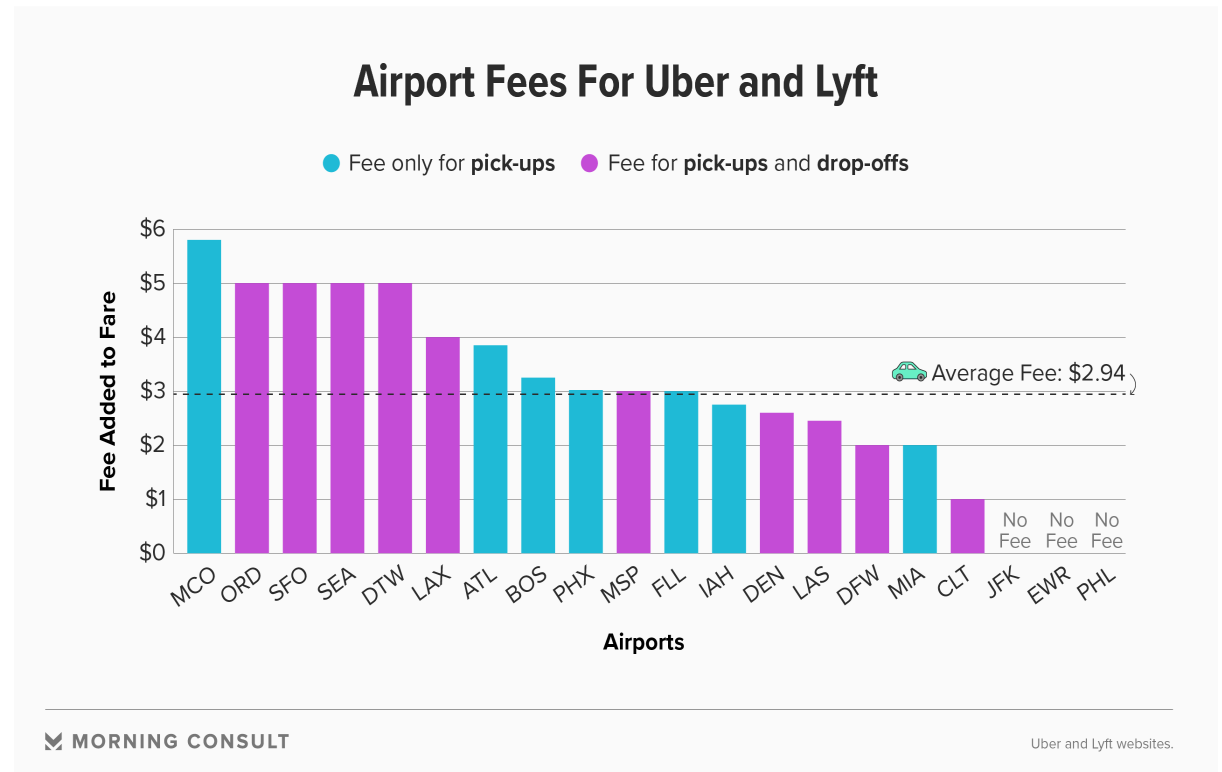


Embracing TNCs – Now

- Airports are launching online discounted, pre-paid parking or frequent parker programs
 - OAK, DFW, PHX, BOS, SLC, PHL, BUF, YVR, YOW, DCA, IAD, and more coming
- Airports are keeping landside revenue on track through TNC fees which average $\pm\$3.00$



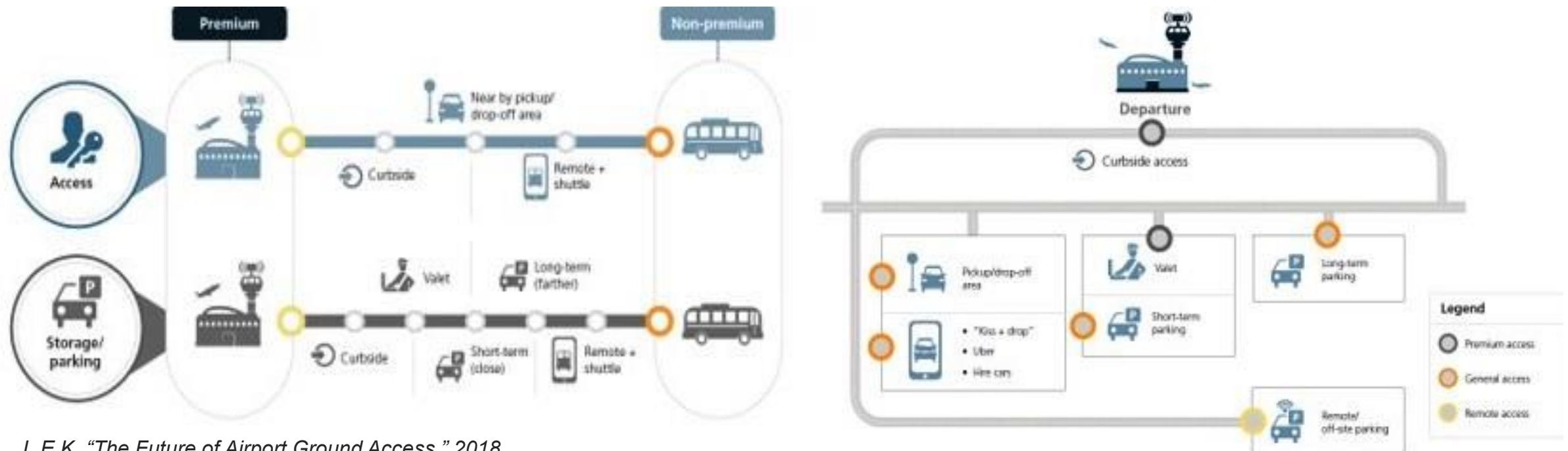
Airport Improvement Magazine, April 2018



Embracing TNCs – Between Now and 2030

Curbside demand is now the key landside growth constraint

- The new landside mobility is an opportunity to improve customer service and financial performance
- Control your curbside demand through effective branding and pricing – premium / non-premium zones
- Starting now, move premium TNC pickup zones away from the curbside and into alternate areas, like garages
- Before 2030, dedicate specific areas for AV parking and AV / TNC loading zones





Molotok's AV Pushback Tug



Perimeter security AV at YEG



IAG Cargo's AV "CargoPod" at LHW

Embracing AVs – Now

Plan to Deploy Autonomous GSE

- AV Pushback Tugs at Heathrow
- Airport Perimeter Fence AV Security at Edmonton
- IAG Cargo and Oxbotica's AV "CargoPod" at Heathrow

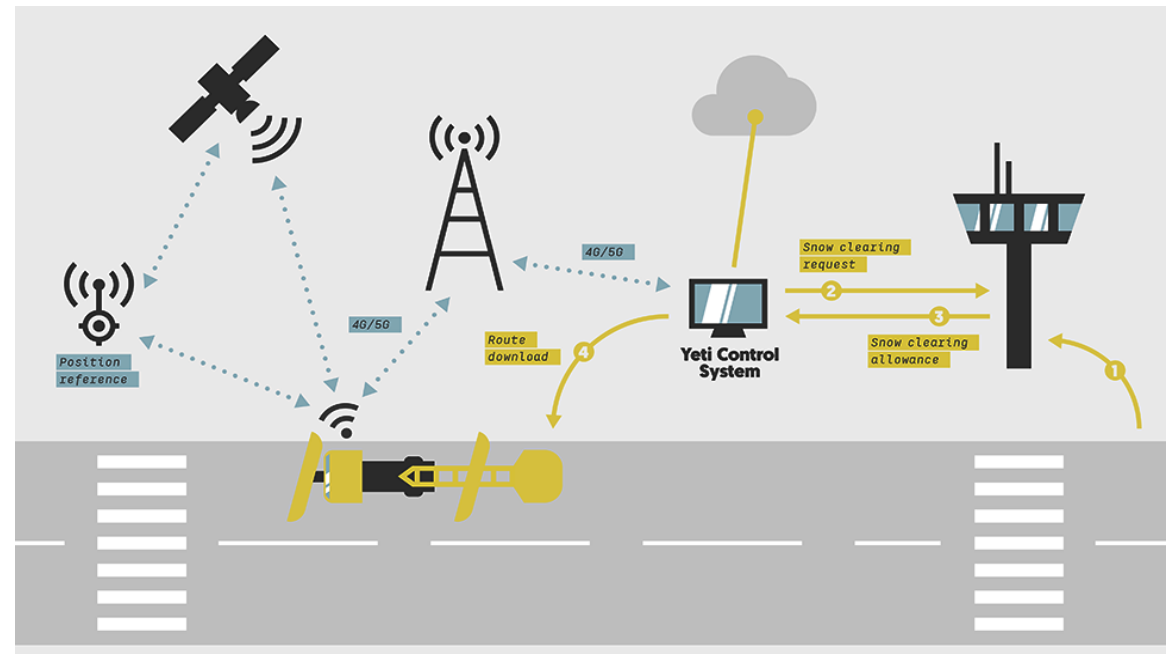
Embracing AVs – Now

Plan to Deploy Autonomous GSE

- Yeti Snow Technology and Semcon AV snow plows
- Tested in Norway and Finland in 2018
- Yeti is finalizing their “Four Step” solution to AV plowing
 1. Tower coordination
 2. Yeti control center – snow clearing request to tower
 3. Tower – snow clearing time allowance
 4. Yeti control center – route download and begin



Yeti-Semcon AV Plows – Mercedes Chassis



Yeti Four-Step System

Embracing AVs – 2020-2025

Plan for Autonomous Shuttle Buses

- Hino Motors tested their AV bus at Tokyo's Haneda Airport in 2018
- Softbank Group and All Nippon Airways intend to commercialize these buses at airports by 2020
- Softbank Group and Toyota will be investing \$1 billion into Uber's AV TNC program



Recent Test Achieved Level 4 Autonomy



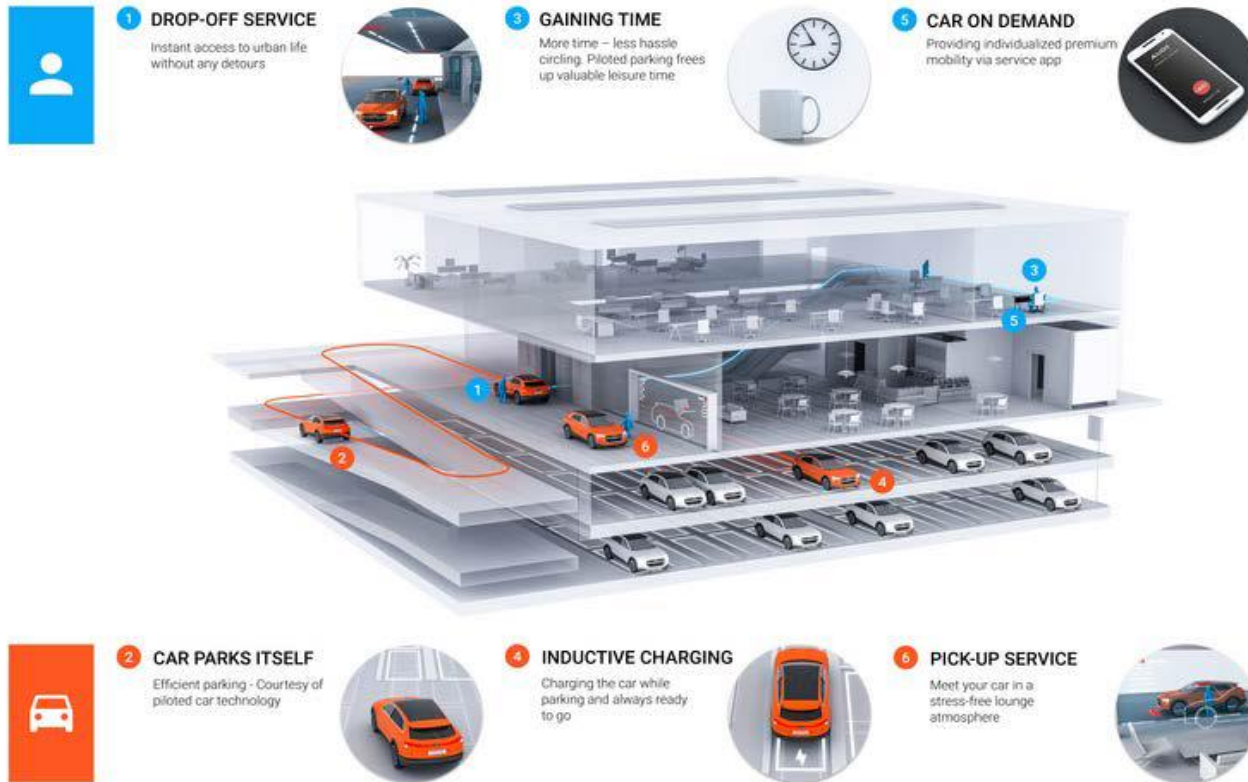
Source: Softbank Group and All Nippon Airways

Embracing AVs – 2030

Develop Adaptive Reuse Plans for Your Parking Facilities

- Aside from pick-up / drop-off zones, convert garages to multi-use facilities
- Examine conversions from an “urban design” perspective – what land uses want to be near airports?

URBANIZING PARKING



LMN Architects

Embracing AVs – 2035

Plan to Accommodate Autonomous Flying Taxis at Your Airport

- Fraport AG and Volocopter are developing electric air taxi services to bring people to / from Frankfurt International Airport (FRA)
- The European Safety Agency is developing certification standards



Volocopter 2X, 2019



Volocopter Rendering over FRA, 2019

Embracing AVs – Beyond 2035

“Future-Proof” Your Airport – look into Autonomous BHS

- The Hague Airport in Rotterdam and Vanderlande joint innovation project – autonomous bag handling...“FLEET”
- A-BHS will ultimately replace fixed conveyors and sortation systems
- A-BHS will use 50% less energy and will be 100% more flexible



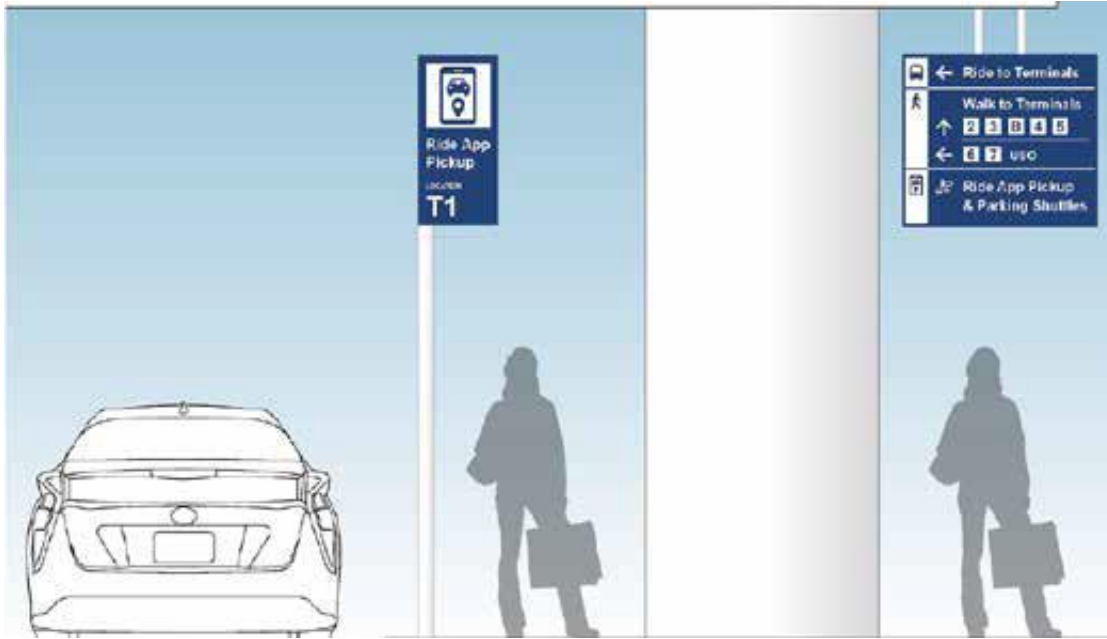
Vanderlande Autonomous BHS Unit



Vanderlande FLEET Test Site

Summary – TNCs

- TNCs now account for 73% of air passenger landside access expenses to/from airports (Certify)
- That is why passenger growth no longer equates to parking revenue growth (NREL)
- Airports need to implement TNC pickup / drop off fees to offset the loss (Morning Consult)
- Airports must implement curbside congestion management: (L.E.K.)
 - Offer and market discounted and prepaid parking
 - Establish “premium zone” access charges
 - Move TNC pick-up and drop off zones into alternate areas, like garages



Source: *Establishing A Common Standard for TNC Wayfinding at Airports*, AAAE, August 2018



TLD's "Track Easy" Driverless Tugs



Air Taxi Testing in Dubai, Photo: Reuters



Vanderlande

Summary – AVs

- 90% of new cars sold by 2040 will be AVs (Walker Parking Consultants)
- 40% of vehicles on the road by 2050 will be AVs (Walker Parking Consultants)
- As a result, airport garage parking demand will peak before 2035 – start planning for adaptive reuse
- Embrace autonomous buses, tugs, and other GSE – starting now
- Prepare for AV flying taxis – within 15 years
- Research automated BHS now – prepare for it within 20 years