Droneports – Redefining the UAS Industry

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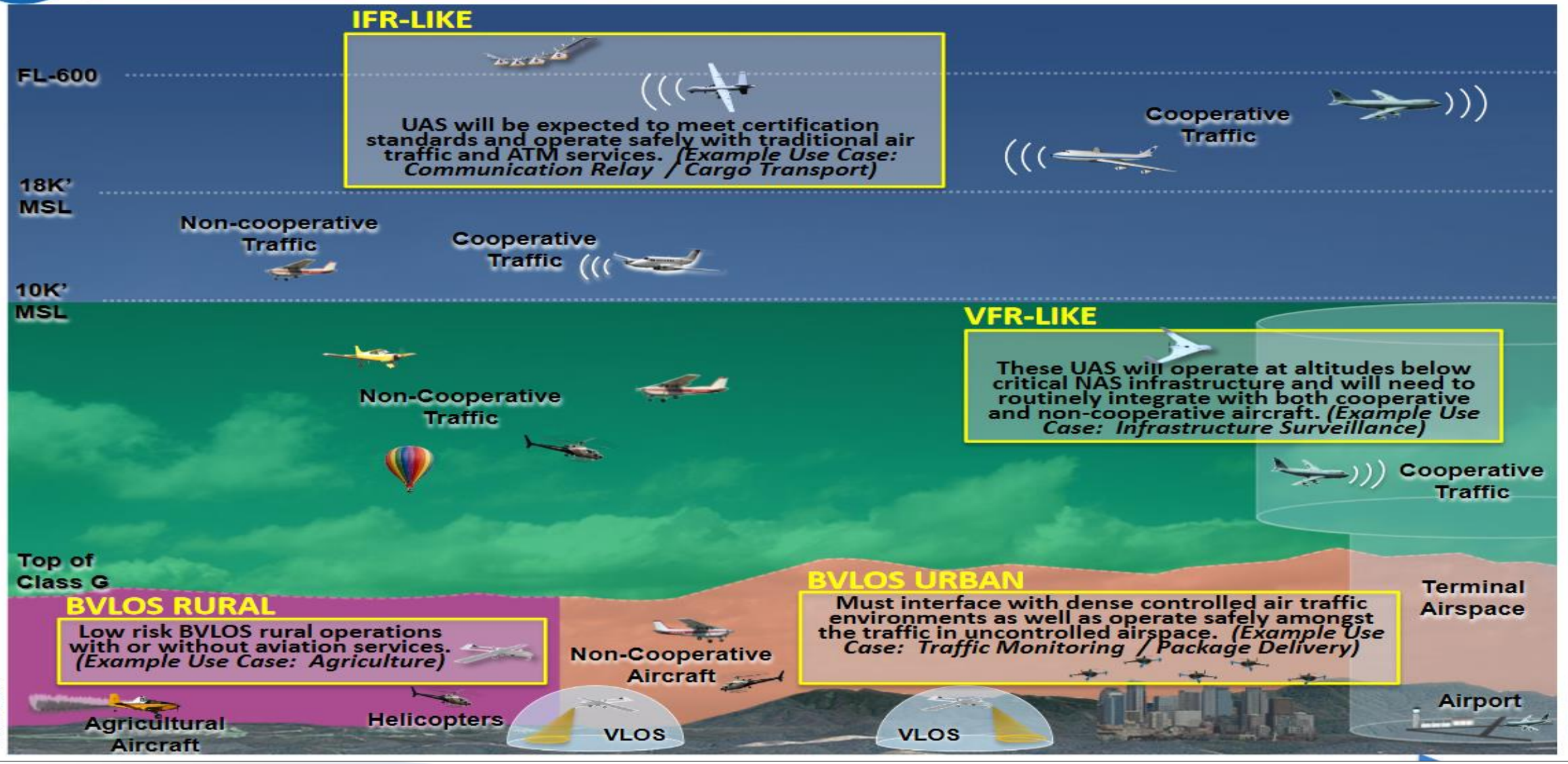
Emerging Commercial UAS Operating Environments (OE)



NASA May 2017, https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20170006091.pdf

Drone Services Forecast

Examples from NASA (July 2019) representing 790,000 missions per day by 2024.
High risk - Flights in unsegregated airspace below 10,000 ft over rural and populated areas.
Low risk - Flights in Class G airspace and other low-risk rural locations.
Very low risk - Flights within Visual Line of Sight, below 400 ft, partially extended by Far Part 107 waivers.

Use case	Missions per day at saturation	Safety Risk
Construction	47,000	Very low
Wind Turbines	140	Very low
Power Lines	270	Low
Insurance Inspection	13,800	Low
Pipeline	3,900	Low
Surveying, Mapping	15,900	Low
Agricultural Survey and Inspection	2,000,000	Very low
Fence Line Security	30,000	Very low
Rapid Aerial Communications	790	Very low
Rail	1,500	Low
Tornado Watching, Flood Damage	1,900	Low
Weather Monitoring	620	High
Disaster and Forest Fire Response	560	High
Rural Package Delivery	5,800,000	Low

Values rounded. Source: ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20190007020.pdf

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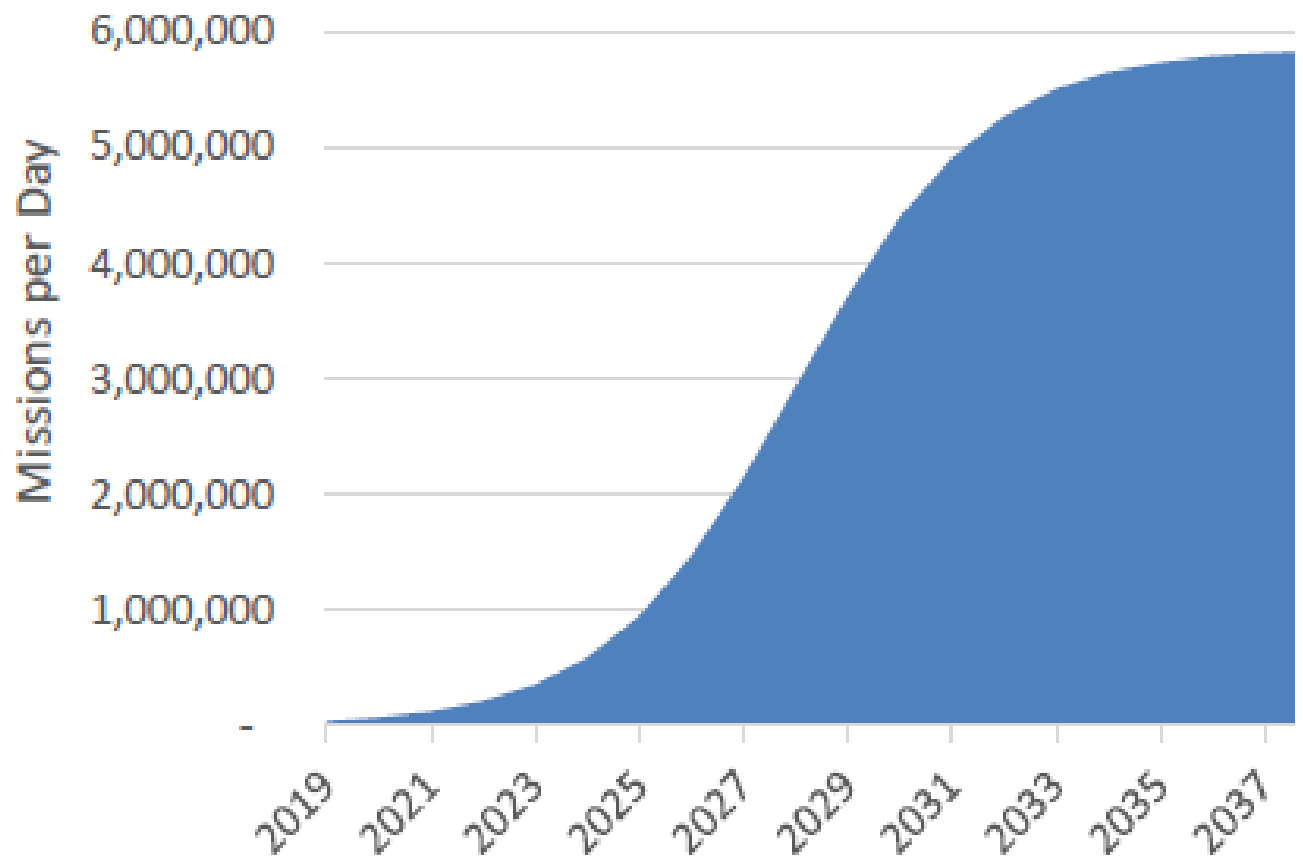
Use case	10% of market	90% of market	Missions per day at saturation	Safety Risk
Construction	**2017**	**2020**	47,000	Very low
Wind Turbines		**2025**	140	Very low
Power Lines	**2018**	**2022**	270	Low
Insurance Inspection		**2023**	13,800	Low
Pipeline	**2019**	**2022**	3,900	Low
Surveying, Mapping		**2022**	15,900	Low
Agricultural Survey and Inspection		**2022**	2,000,000	Very low
Fence Line Security		**2025**	30,000	Very low
Rapid Aerial Communications	**2020**	**2024**	790	Very low
Rail		**2025**	1,500	Low
Tornado Watching, Flood Damage		**2026**	1,900	Low
Weather Monitoring	**2022**	**2030**	620	High
Disaster and Forest Fire Response	**2023**	**2028**	560	High
Rural Package Delivery	**2024**	**2032**	5,800,000	Low

Values rounded. Source: ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20190007020.pdf

Rural Package Delivery

UAS Demand:

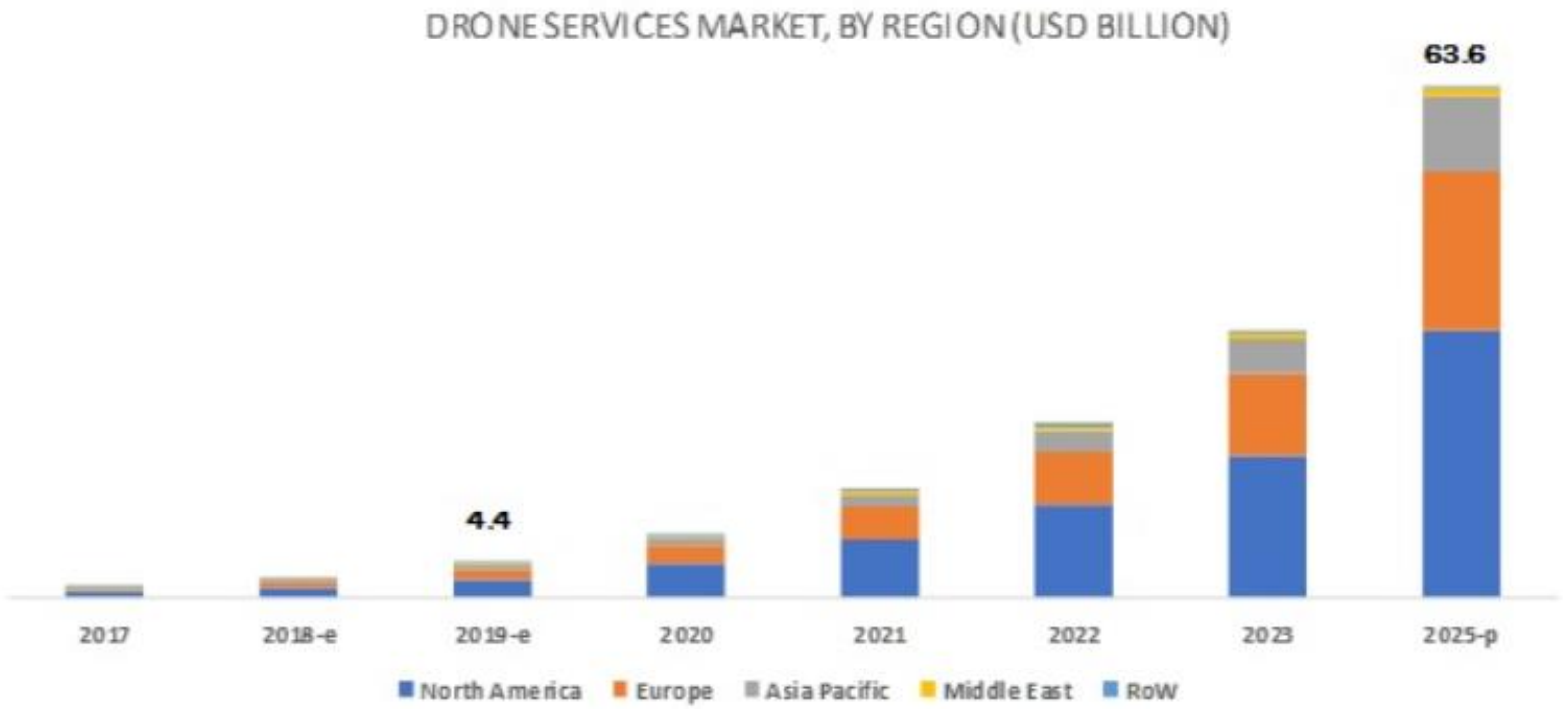


Droneport estimates, Oklahoma

Method	Estimate, 2022
MSAs, microSAs, and noncore counties	21
Uniformly distributed drone services demand	24
FAA drone use by sector	29
Basic and Unclassified General Aviation Airports	8

Drone Services Value Growth

- Drone services market estimated at $4.4 billion in 2019
- Forecast to reach $63.6 billion by 2025 at a CAGR of 55.9% from 2019 to 2025



https://www.marketsandmarkets.com/Market-Reports/drone-services-market-80726041.html

How will drones impact business?

Predicted commercial applications and market value by industry

Infrastructure

Investment monitoring, maintenance, asset inventory

$45.2bn

Agriculture

Analysis of soils and drainage, crop health assessment

$32.4bn

Transport

Delivery of goods, medical logistics

$13.0bn

Security

Monitoring lines and sites, proactive response

$10.5bn

Entertainment & Media

Advertising, entertainment, aerial photography, shows and special effects

$8.8bn

Insurance

Support in claims settlement process, fraud detection

$6.8bn

Telecommunication

Tower maintenance, signal broadcasting

$6.3bn

Mining

Planning, exploration, environmental impact assessment

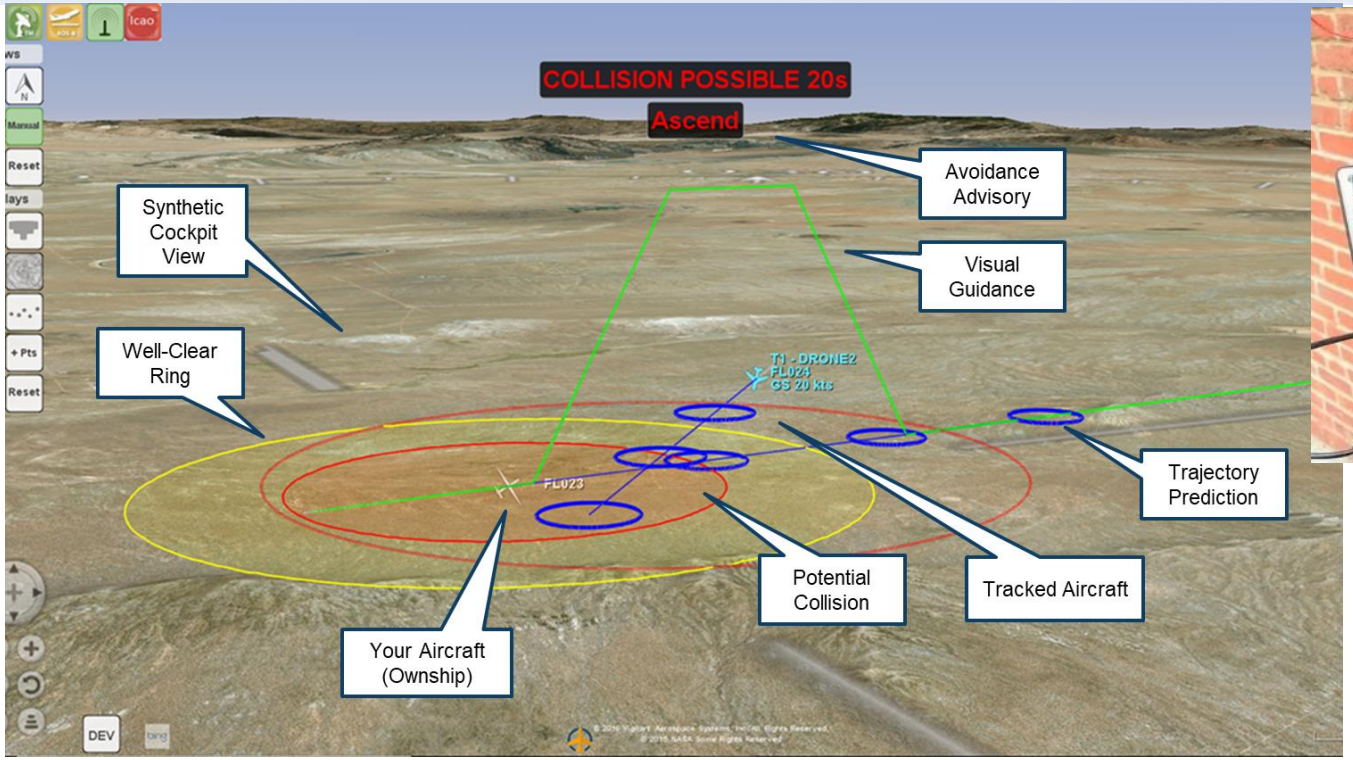
$4.3bn

Source: https://www.pwc.pl/pl/pdf/clarity-from-above-pwc.pdf

The Basic Questions

- What do I need to think about to enable BVLOS flights from my new droneport?
- Who are the fliers? What industry are we serving? How do we enable our customers?
- What does safety mean for us? What will it mean to the FAA in our context?
- What risks do I need to mitigate and what problems do I need to solve?
- What is a good, step-by-step plan for my droneport to get this done?

What is FlightHorizon?



- Air safety system based on exclusively-licensed NASA patent
- Software solution for individual unmanned aircraft pilots or airspace managers
- Situational awareness and active avoidance of other aircraft
- Integrates with essential hardware and data sources

Presented by:

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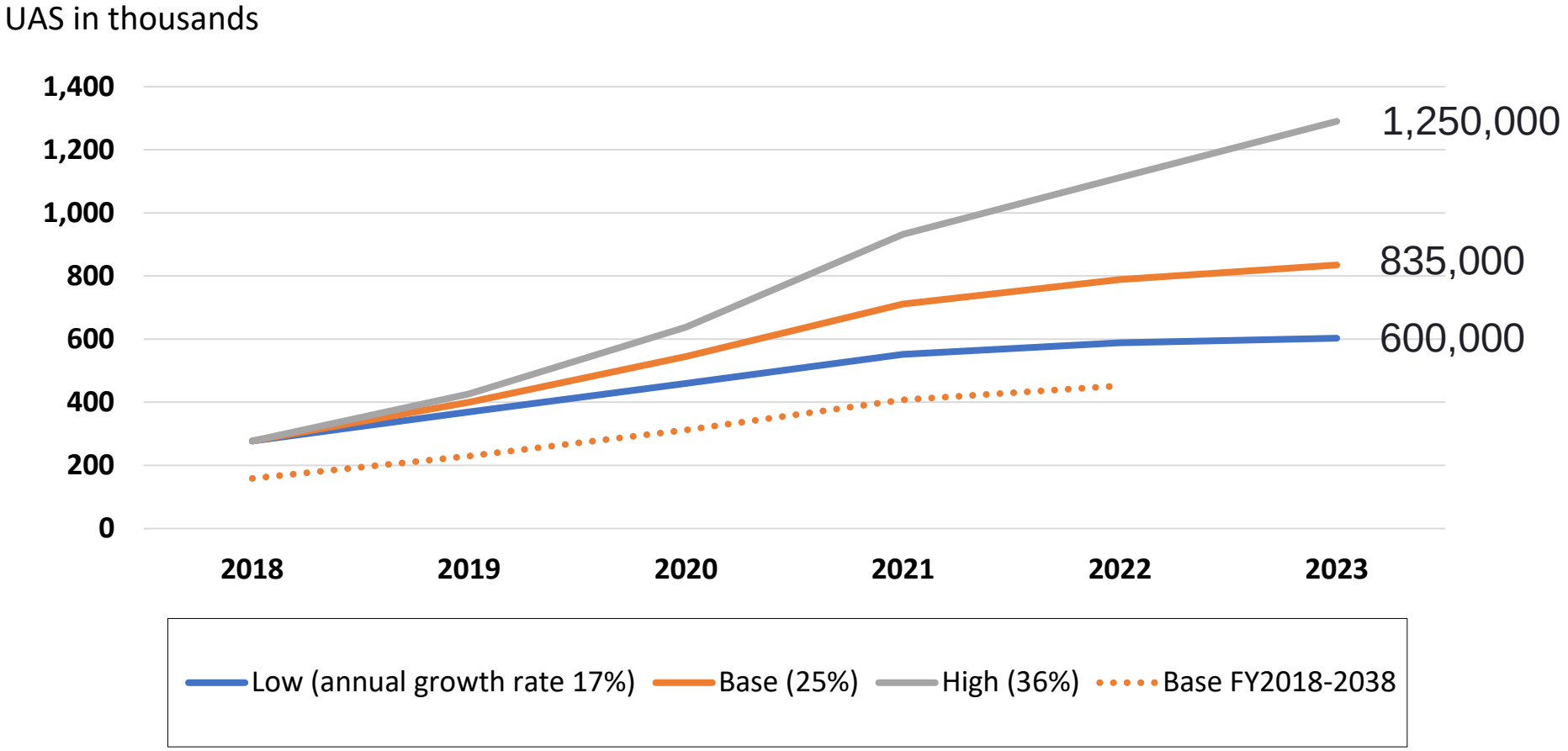
U.S. Non-Model Fleet Forecast



FAA Aerospace Forecast, FY 2019-2039

RL-1 Rural Package Delivery
Remote Town Package Delivery

Key Assumptions:

- MISSION: 1 Completed Delivery (1-2 TO/Land)
- Preliminary testing begins in 2017
- Future Markets that cannot yet be quantified: Prescription delivery, Letters/General Mail
- UAS weighing under 55 lbs. will have a faster growth because of both FAA regulations and battery life of the UAS.
- Due to greater distances between delivery locations, assume 50% of deliveries by UAS

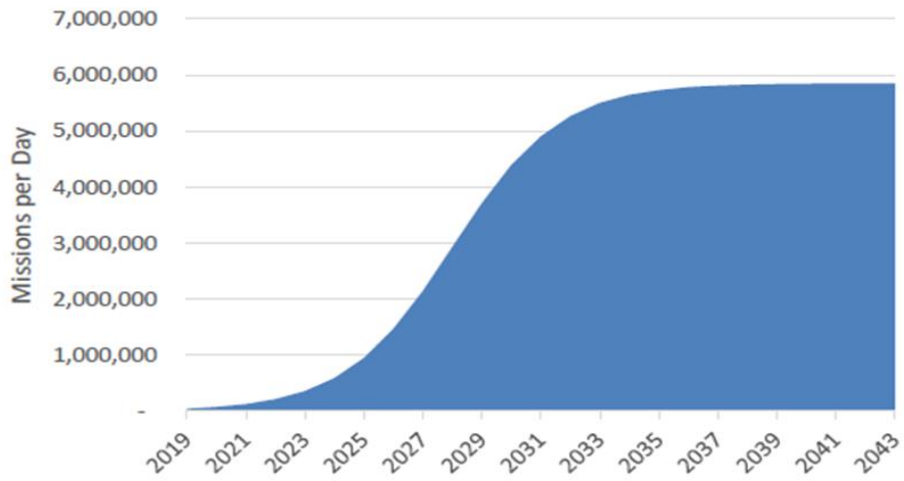
Cumulative Future Total per Day: D

Sub Use Cases	Calculated Estimates
Parcels	10,797,656
Prepared Food	840,764
Groceries	46,484
Flowers	23,035
% of UAS deliveries	50%
Total missions/day	**5,853,970**

Date Projections:

Start year A	2019 (Initial ops, trial cases)
10% Growth Year B	2024 (Regs/Infrastructure finalized)
90% Growth Year C	2032 (Country-wide ops)
Total Saturation D	5,853,970

UAS Demand:



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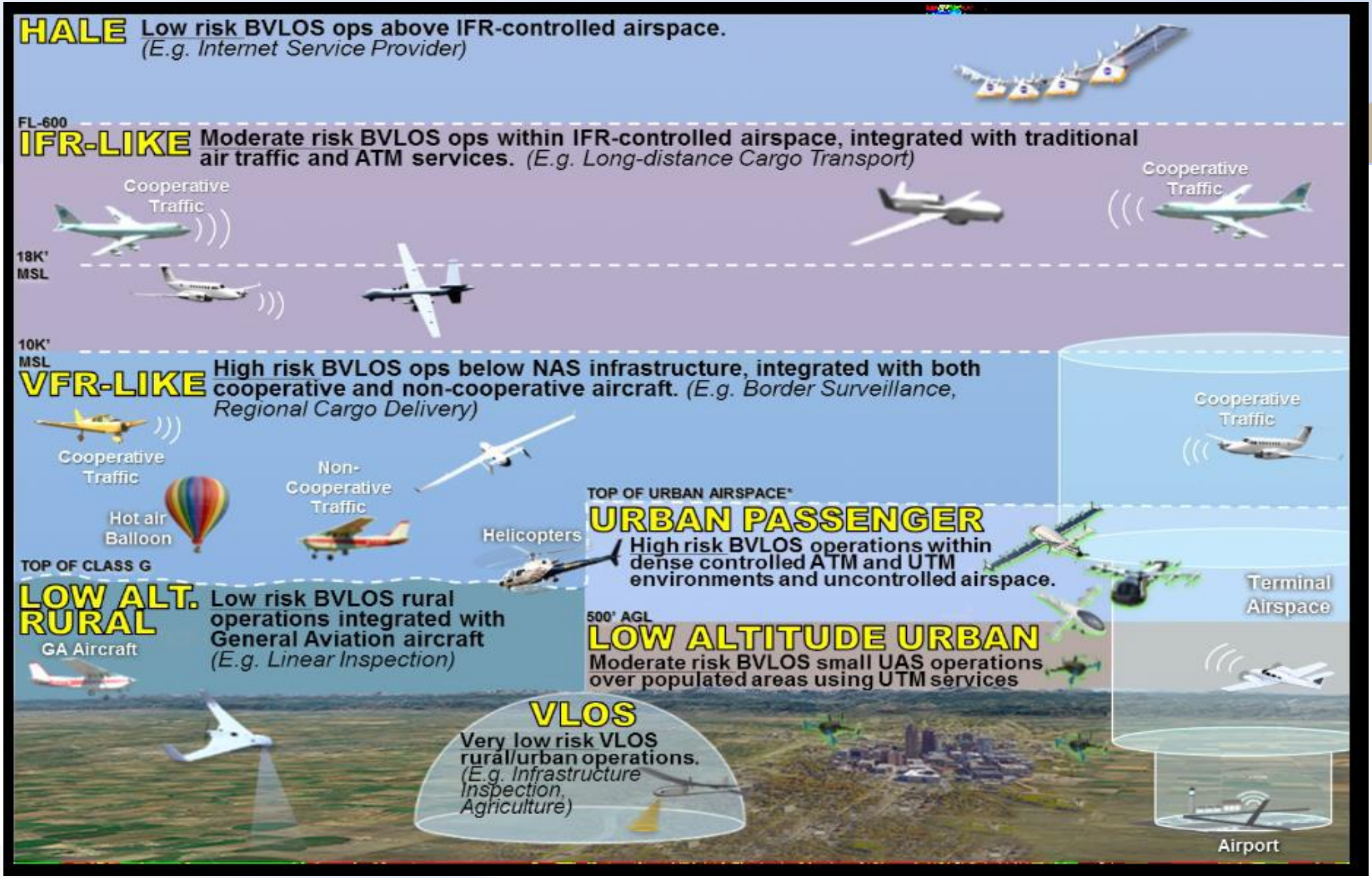

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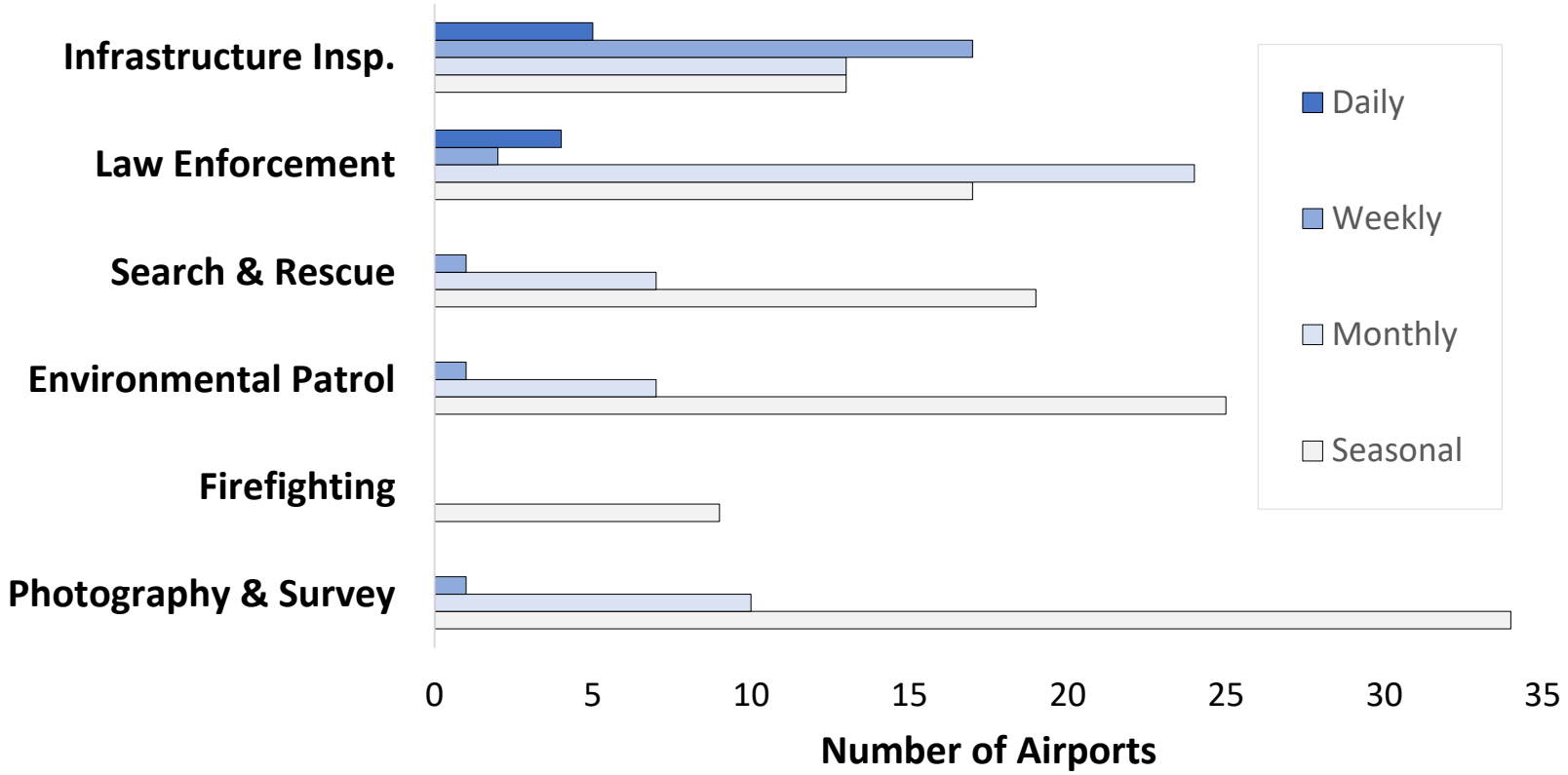
Markets	Examples
Visual Line of Sight	Construction
Rural Low Altitude	Rural Package Delivery
VFR-like	Disaster Response
Urban Low Altitude	Urban Package Delivery
Urban Passenger	Air Taxi
IFR-like	Thin/Short Haul Commuter
High Altitude - Long Endurance	Internet Service
Traditional Markets	Cargo

Uses of General Aviation Airports in Kansas, KDOT 2016



Data from 73 airports, Kansas Aviation Economic Impact Study, KDOT 2016