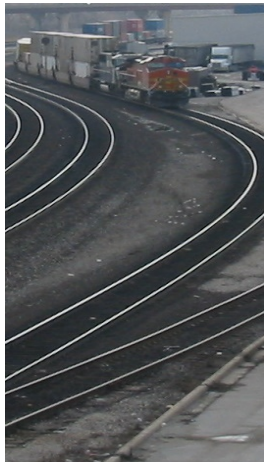




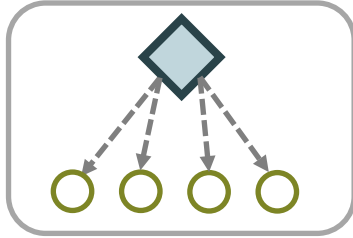
The Distribution Networks of E-commerce: Emergence of a Geography of City Logistics



Jean-Paul Rodrigue

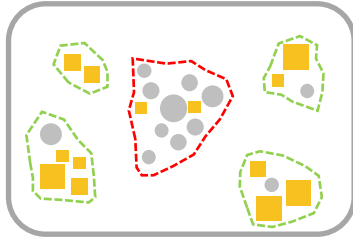
Dept. of Global Studies & Geography, Hofstra University, New York, USA

The Impacts of E-commerce on Freight Distribution



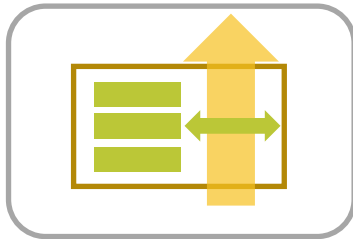
Distribution Pattern

Growth in home deliveries.
Changes in last mile logistics (parcels).



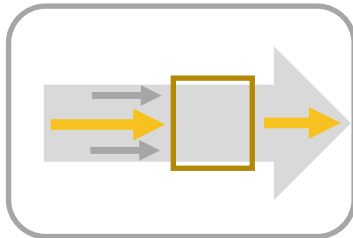
Real Estate Footprint

Reduction of the real estate footprint of retail.
Growth of the real estate footprint of distribution.



Logistical Facilities

New types of logistical facilities (E-fulfillment, Sortation center, Delivery station).
Automation of fulfilment and inventory management.

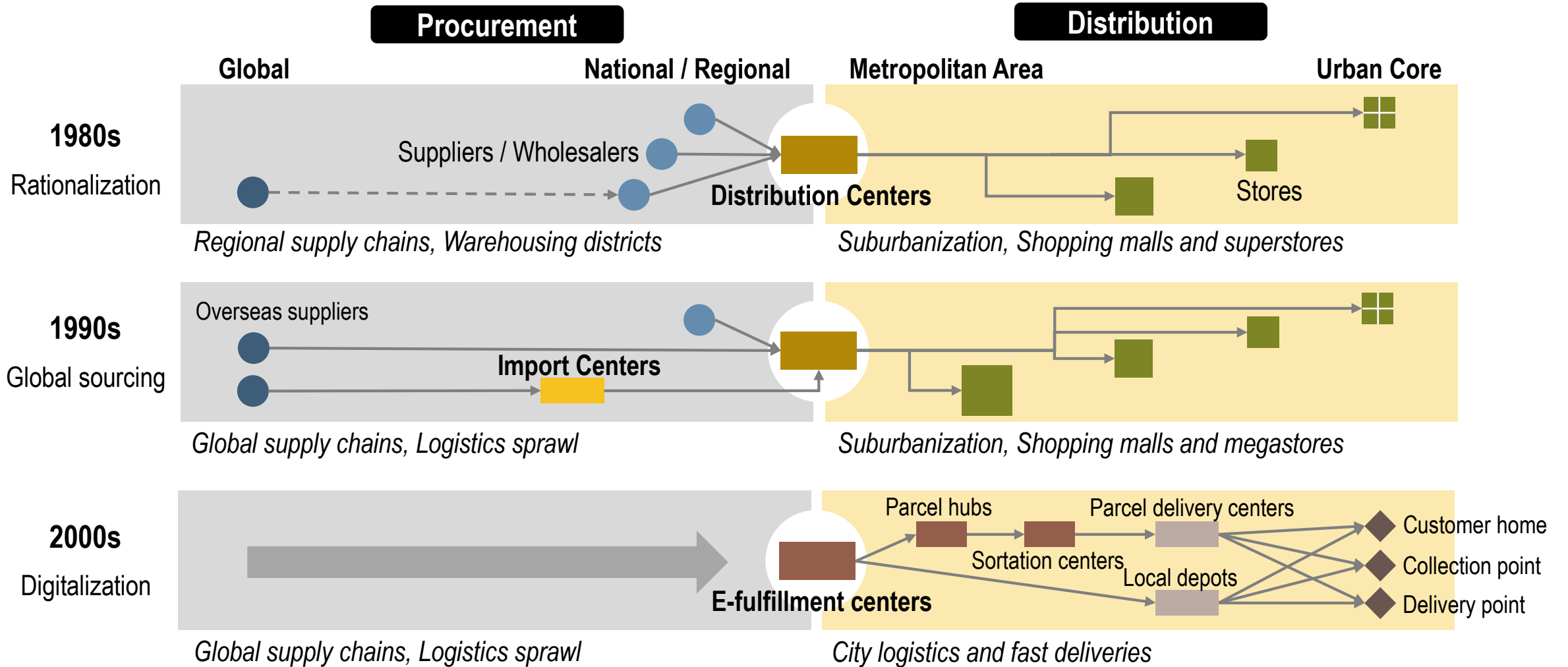


Vertical Integration

Development of 3PL and 4PL services.
Continuity of distribution with higher fluidity and velocity.



The Evolution of Retail Logistics

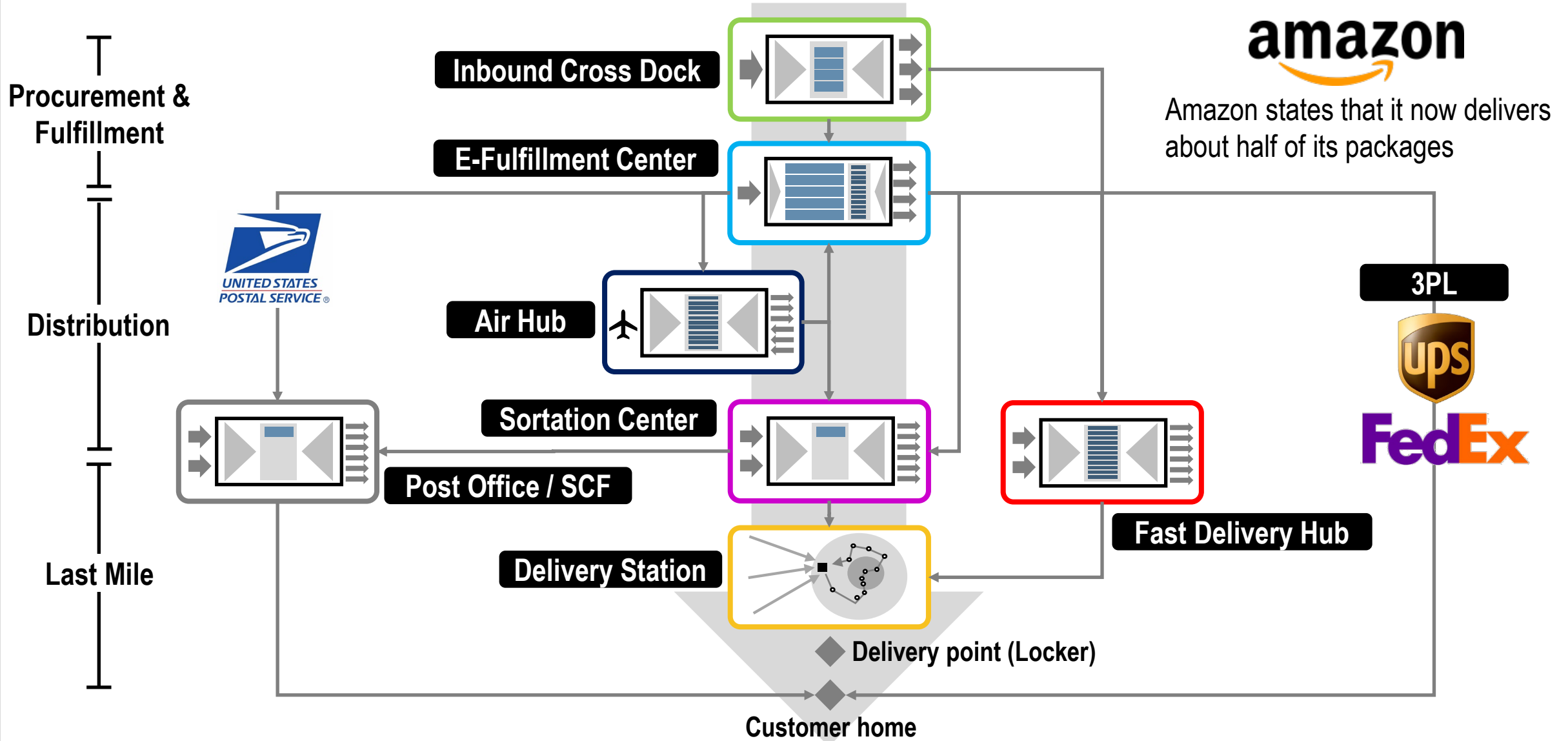


The Data

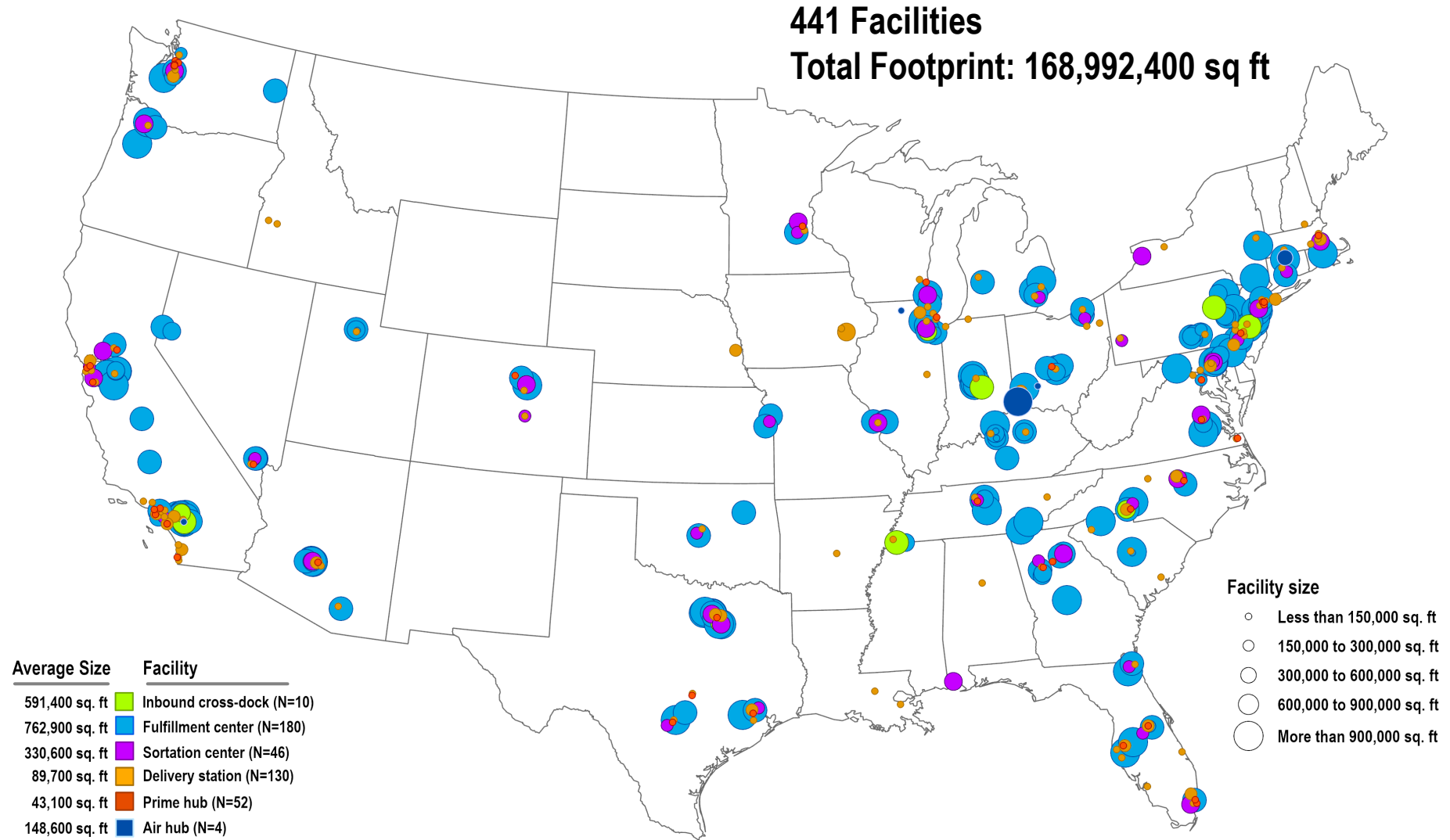


- Inventory of all the Amazon facilities in the United States:
 - Excludes Pantry Fresh and Whole Food.
- MWPVL International Inc:
 - Provides a list of facilities.
 - Function.
 - Year introduced.
 - Square footage.
 - Address.
- Addresses geocoded into latitudes and longitudes in a GIS.
- 441 facilities (including planned) with 6 functions.
- 11 co-located facilities.

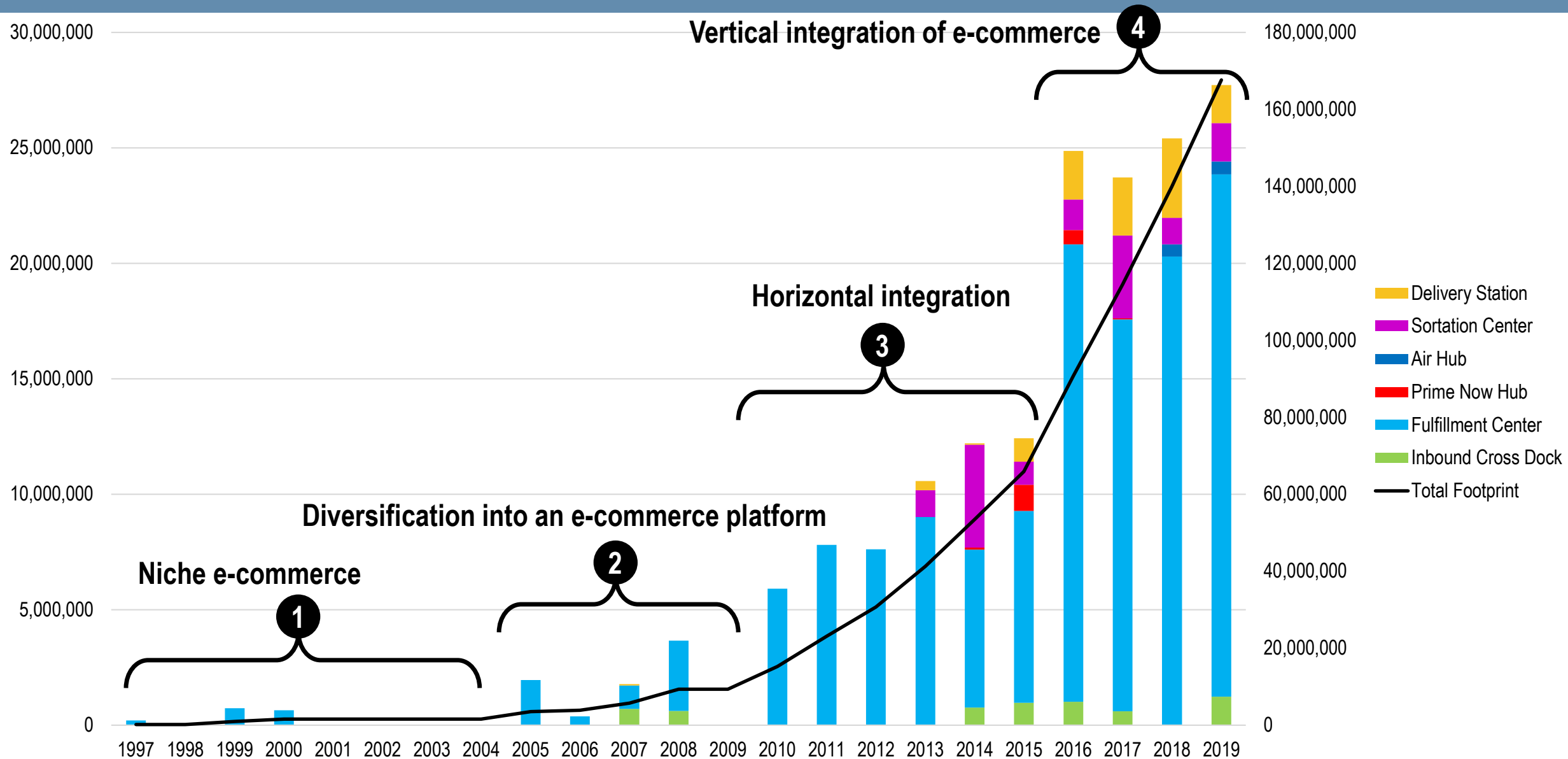
Amazon E-Commerce Logistics Facilities: Internalizing Parcel Deliveries



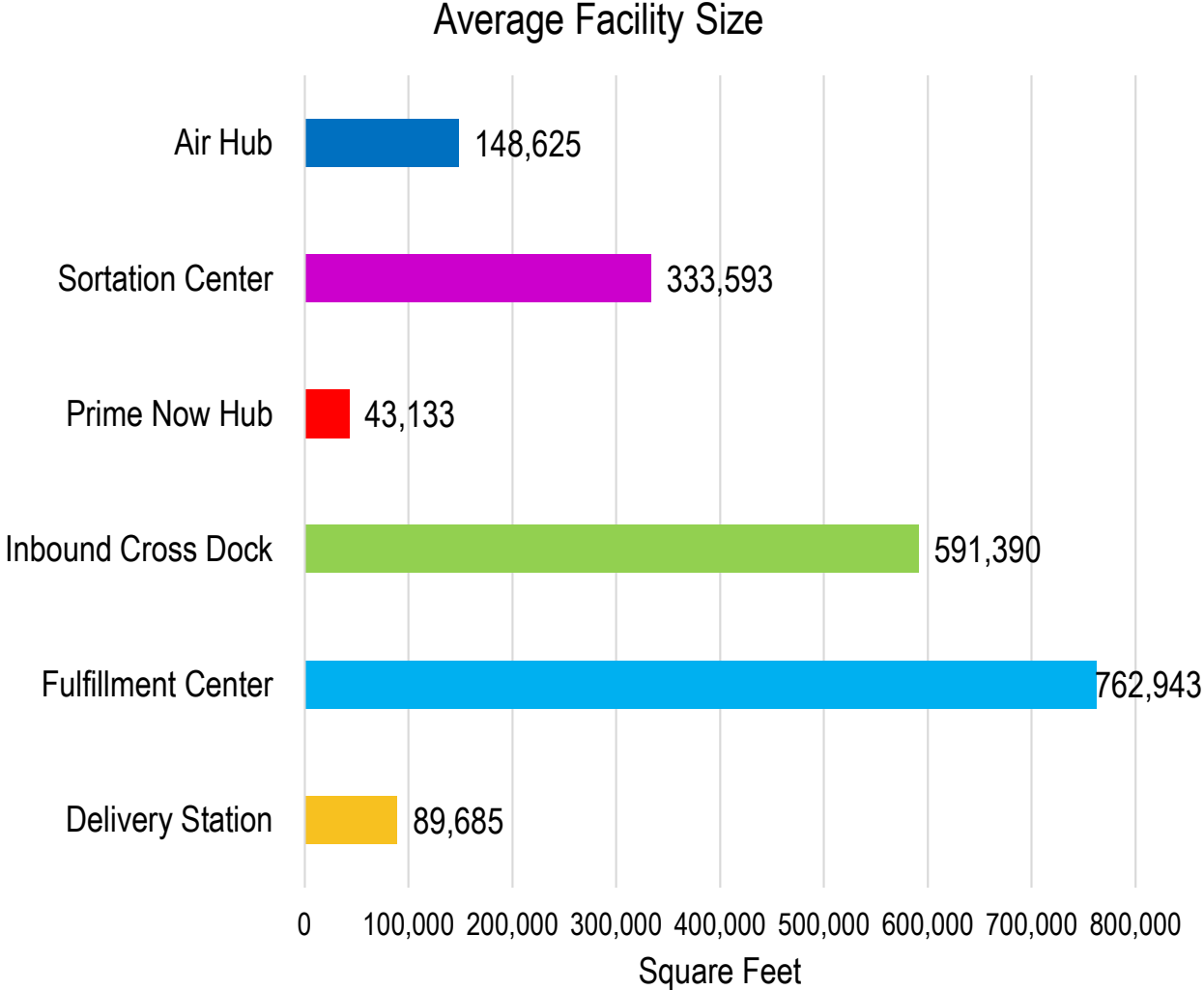
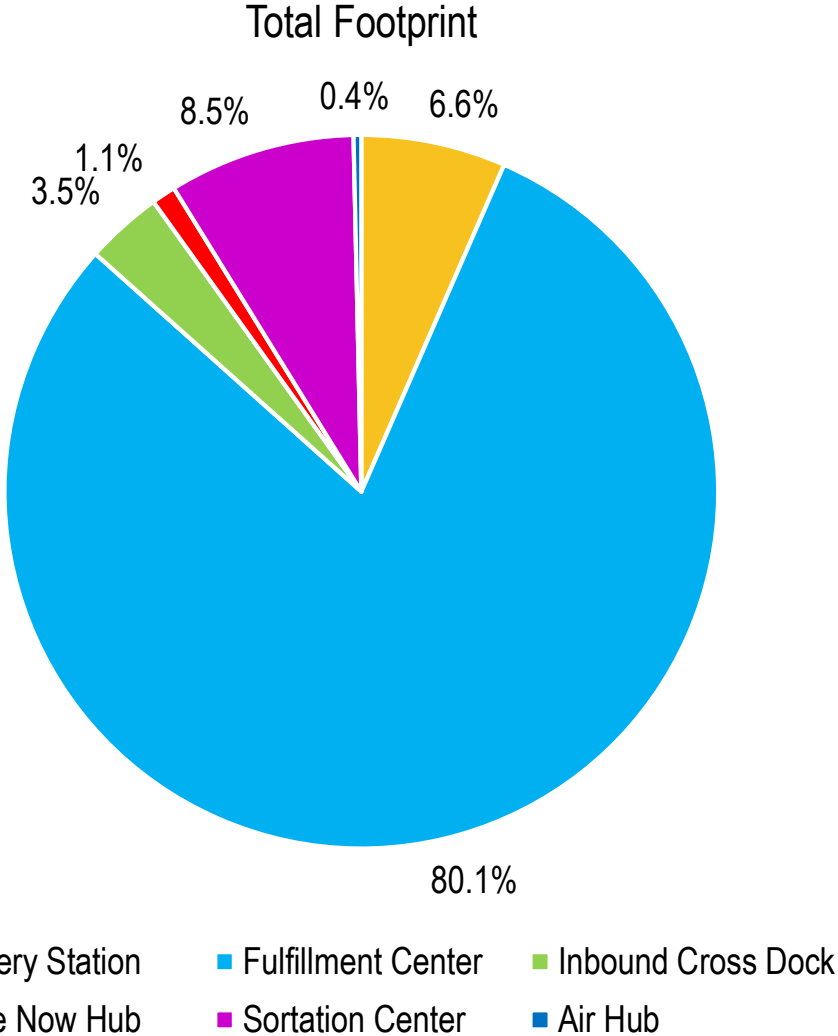
Amazon E-commerce Facilities, 2019



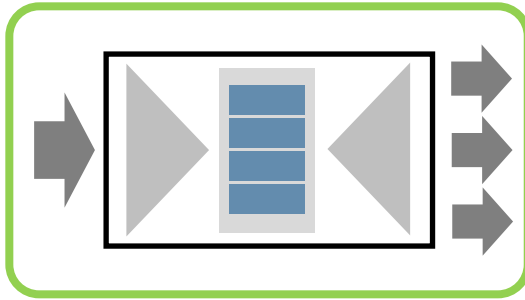
Annual Footprint added in Amazon Distribution Facilities



Footprint and Average Size of Amazon Distribution Facilities



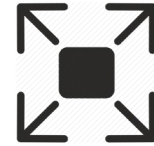
Inbound Cross Dock Facility



Cross-docking configuration for loading trucks.



Florence, NJ (613,900 sq ft)



- Large-sized (avg 591,390 sq ft).

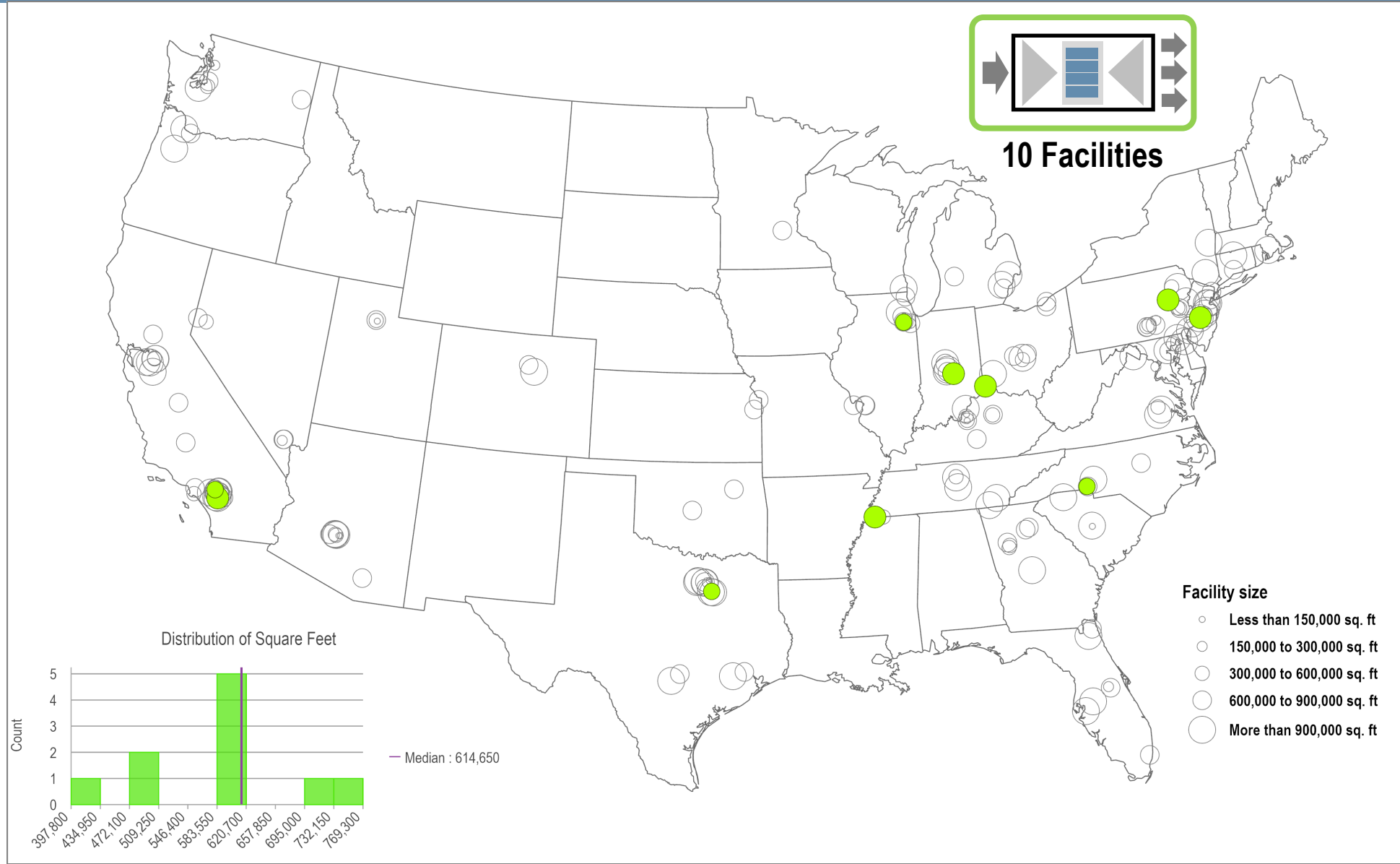


- Close to major intermodal terminals.

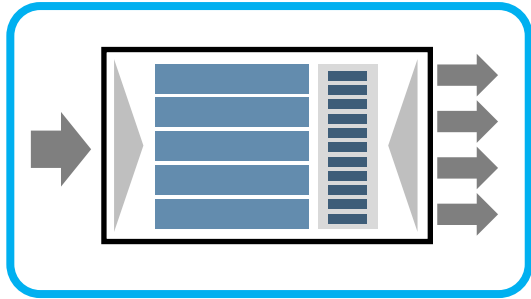


- Like conventional retail import centers.
- Receiving (destuffing) foreign containers and holding inventory.
- Also receives domestic deliveries (FTL/LTL).

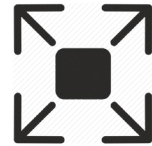
Amazon Inbound Cross Dock Facilities Network



E-Fulfillment Center



Single side cross-docking configuration common.



- Large-sized (avg 782,943 sq ft).



- Suburban locations with highway accessibility.
- Access to a major parcel hub.

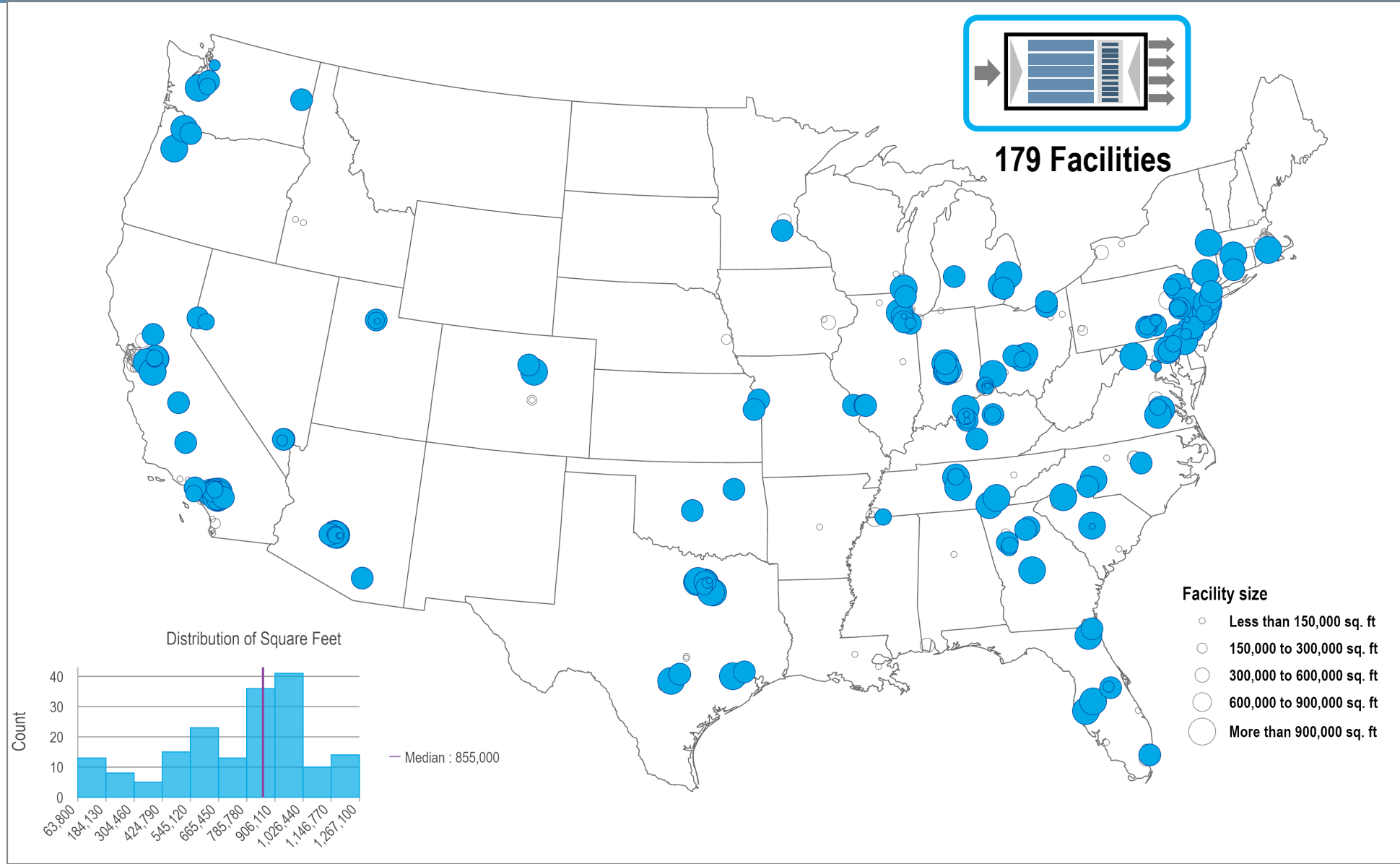


- Item specialization (electronics, apparel, jewelry, perishables).
- Item size specialization:
 - Small sortable (items fit in a small box; < 10 kg).
 - Large sortable (items fit in a large box; <25 kg).
 - Large non-sortable (items too large for a box; e.g. furniture, tv, printers).

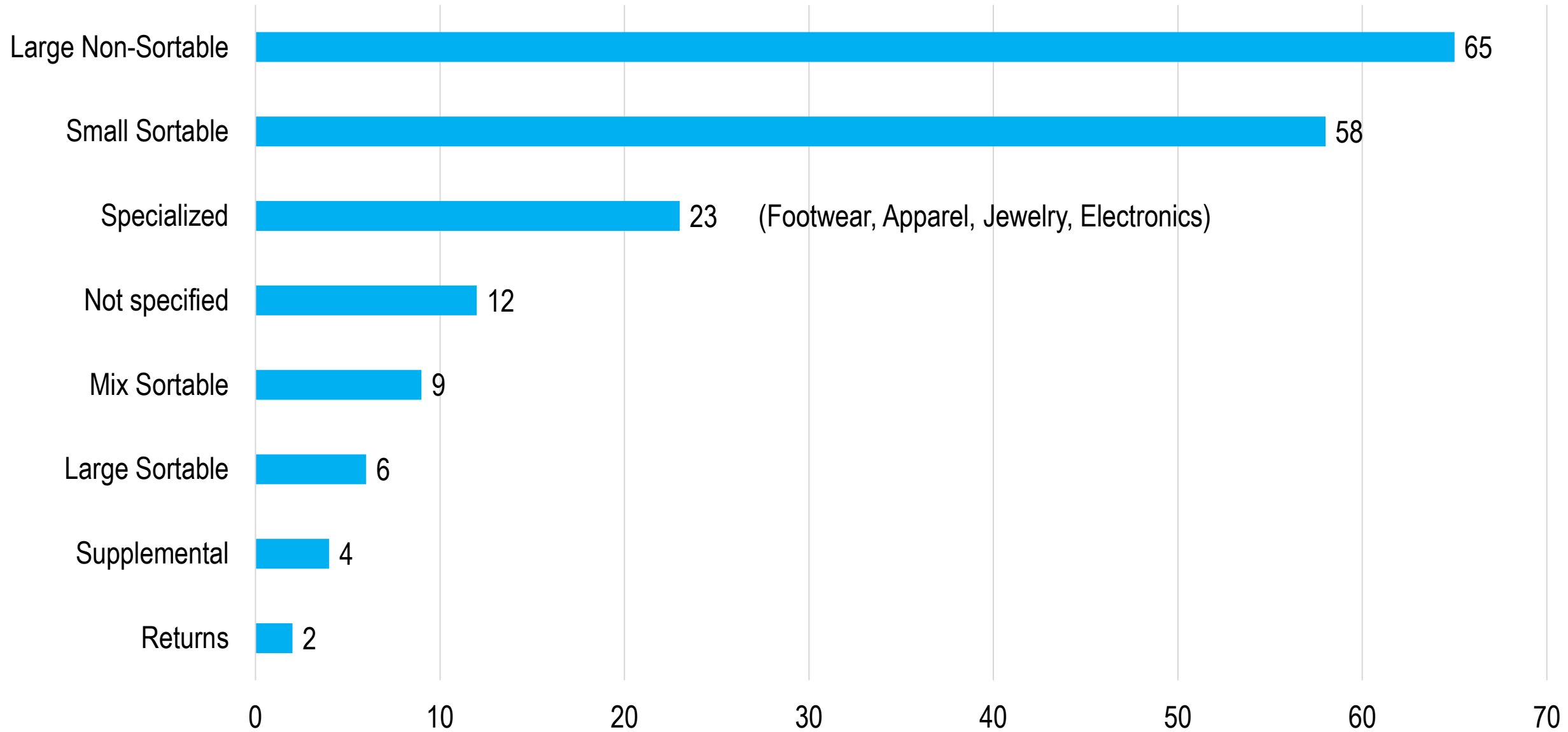


San Marcos, TX (855,000 sq ft)

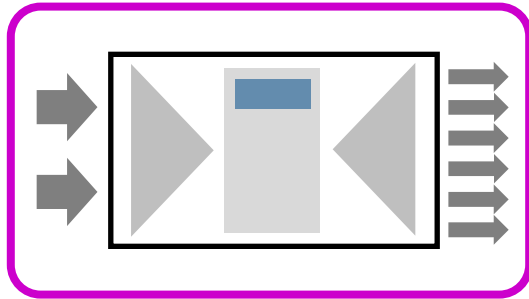
Amazon Fulfillment Centers Network



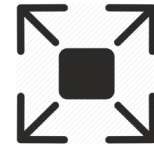
Amazon E-Fulfillment Centers by Item (N=179)



Sortation Center



Cross-docking configuration for loading trucks.



- Large-sized (avg 333,593 sq ft).



- Accessibility to regional distribution.
- First layer in city logistics.

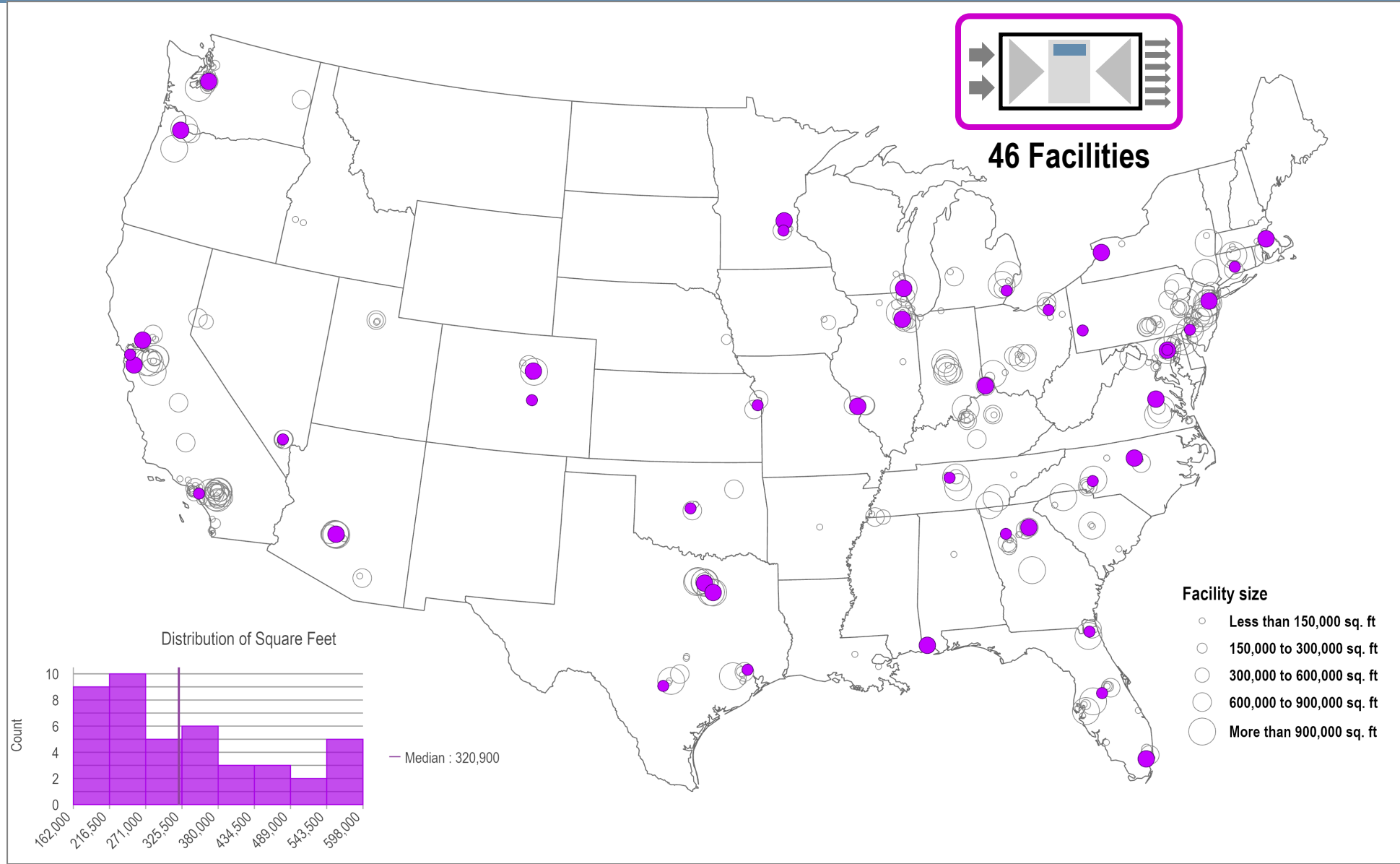


- Automated and semi-automated sortation.
- Sorted by ZIP code.
- Sent to local postal offices, delivery stations or third-party delivery companies.

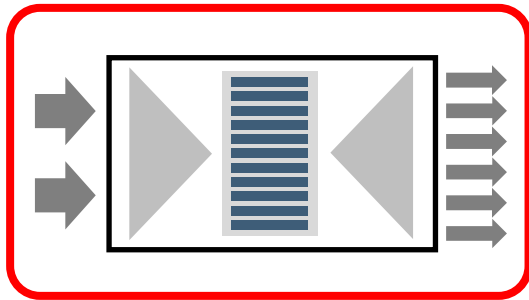


Oklahoma City, OK (300,000 sq ft)

Amazon Sortation Centers Network



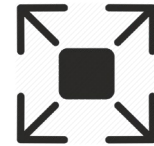
Fast Delivery Hub (Prime Now Hub)



Direct to delivery vans, sortation centers or delivery stations.



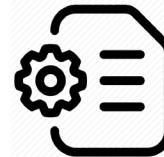
Kirkland, WA (38,300 sq ft)



- Small to medium-sized (avg 43,133 sq ft.)

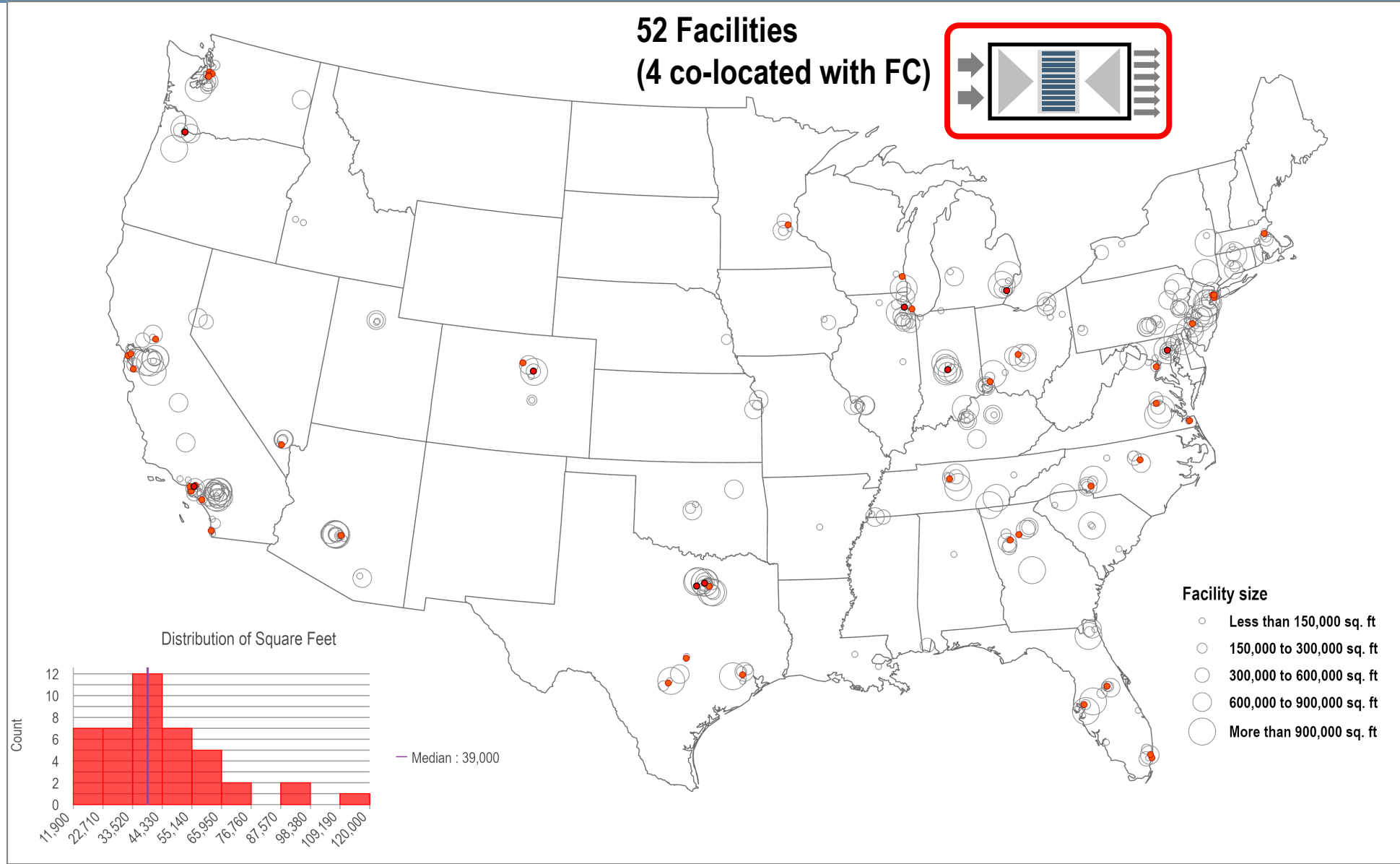


- Within large metropolitan areas.
- 4/46 facilities co-located with e-fulfillment centers (8%).
- First layer in city logistics.

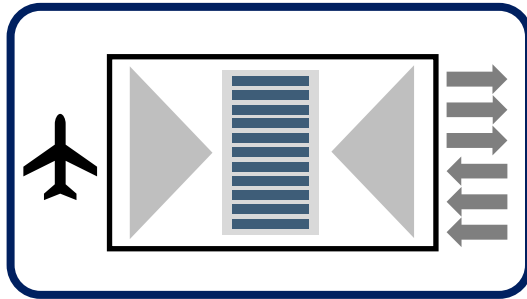


- Intersection between fulfillment, distribution and last mile logistics.
- Limited inventory of high demand items.

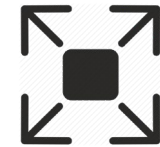
Amazon Fast Delivery Hubs Network



Air Hubs



Transfer parcels to and from air cargo services with regional fulfillment and sortation centers.



- Small-sized facilities (70,000 sq ft).
- Setting of two mega hubs of 3.5 M sq ft.



- Adjacent (co-located) to airports.
- Services organized as a hub-and-spoke network.

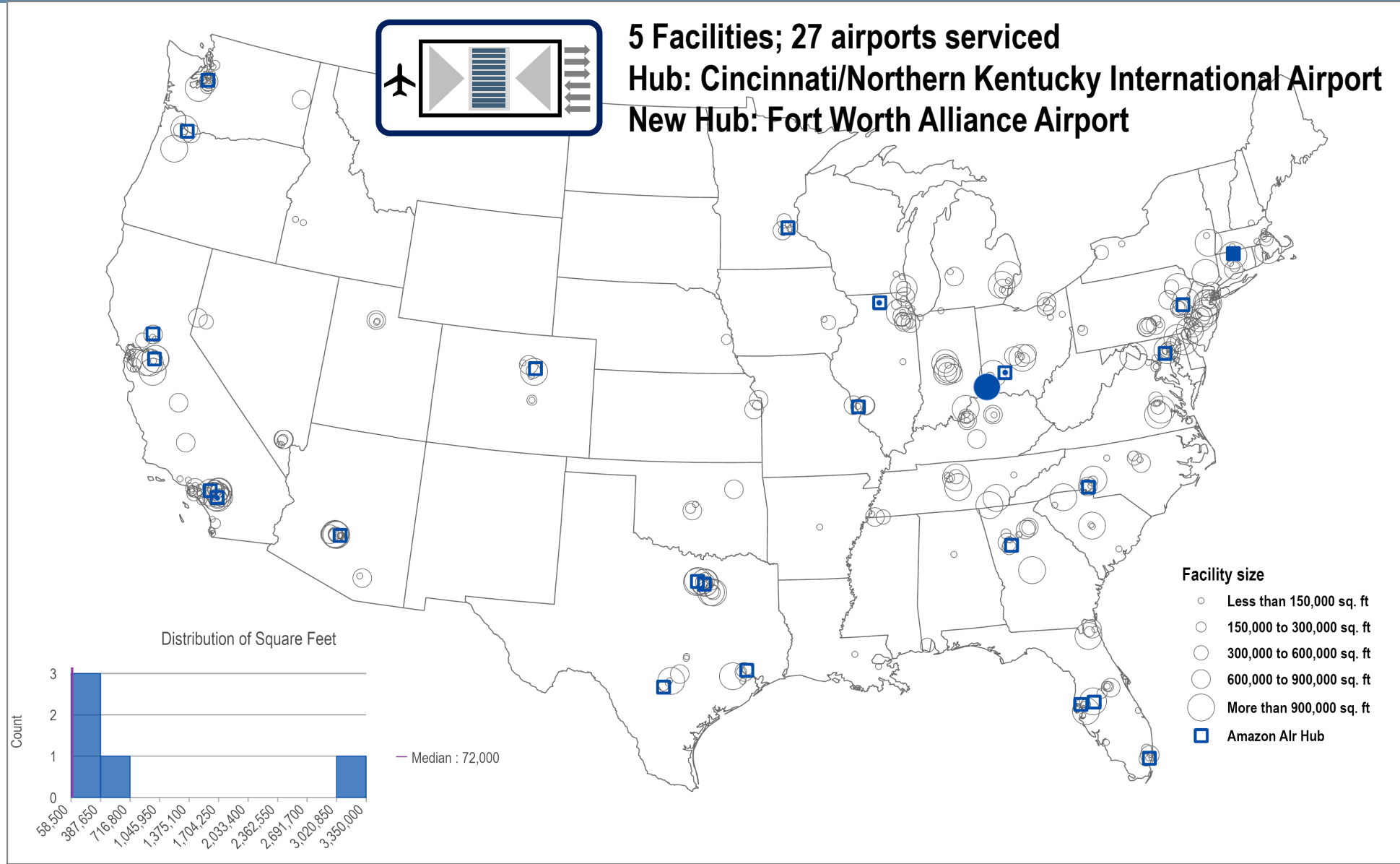


- Third-party logistics service providers (Fedex, UPS or DHL) usually providing air cargo services.
- Amazon starting in 2018 to take control of domestic air cargo (Amazon Air).

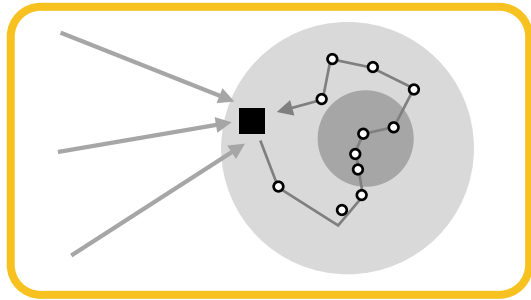


Wilmington Air Park, OH (58,500 sq ft)

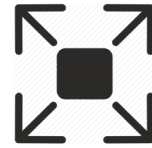
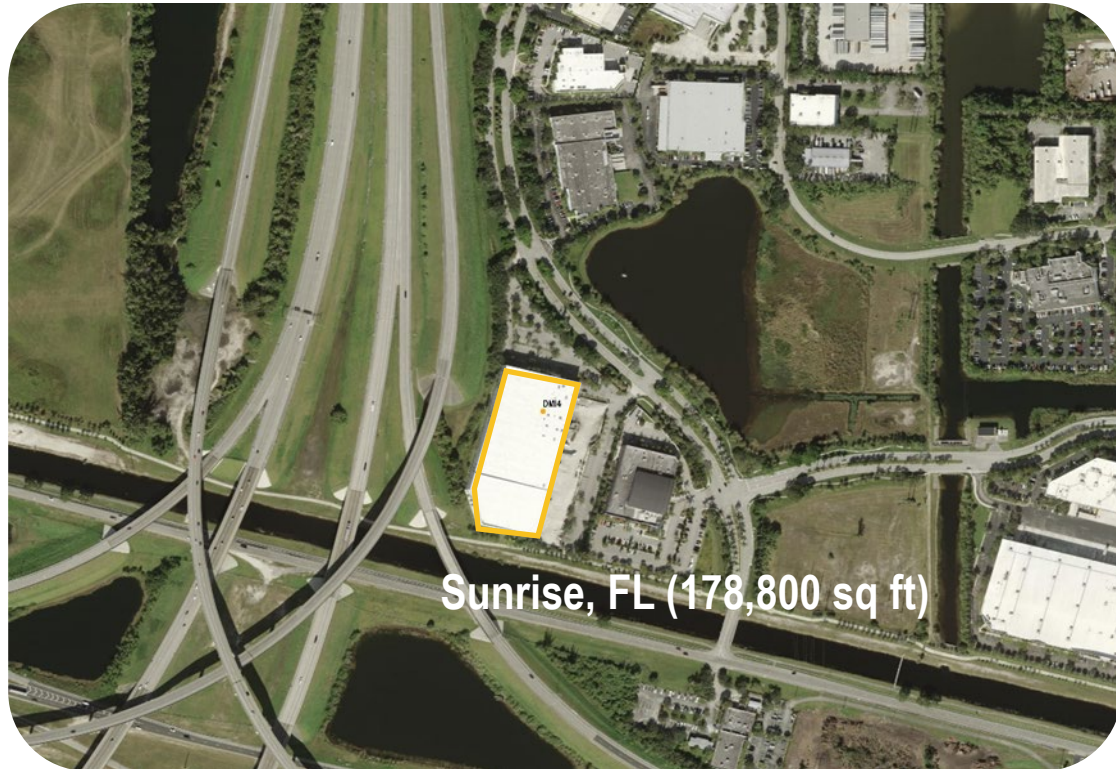
Amazon Air Hubs Network



Delivery Station



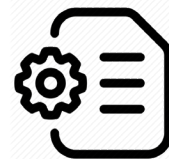
Cross-docking configuration for loading delivery vans.



- Medium to small-sized (avg 89,685 sq ft).

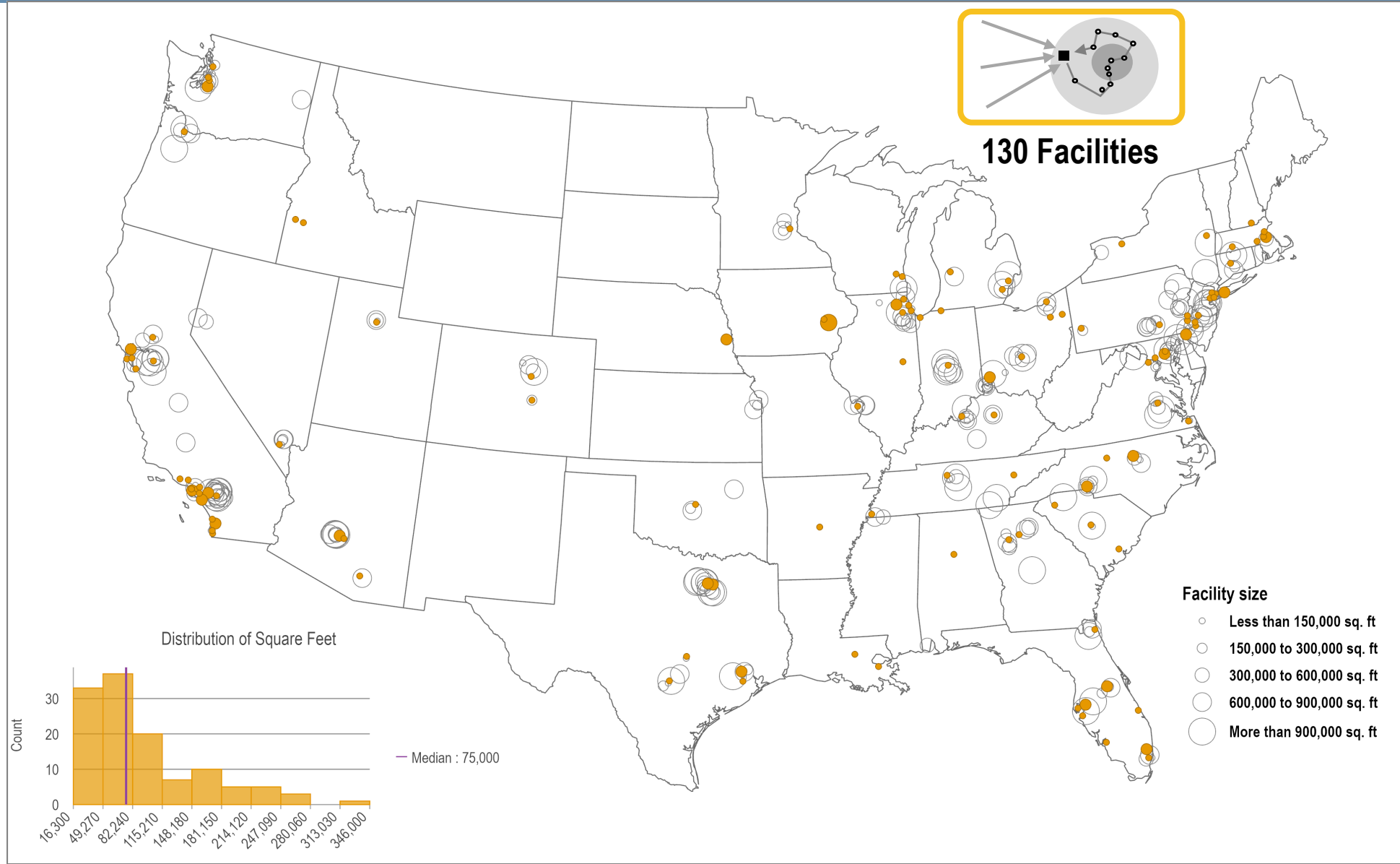


- Periphery of metropolitan areas.
- 8/130 facilities co-located with e-fulfilment centers (6%).
- Second layer in city logistics.

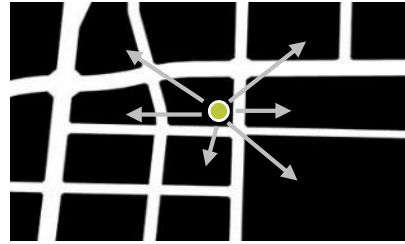


- Supplied by sortation centers and fast distribution hubs.
- Organizing last-mile deliveries.
- Parcels placed on delivery routes.

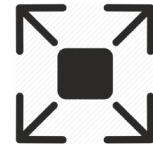
Amazon Delivery Stations Network



Local Freight Station



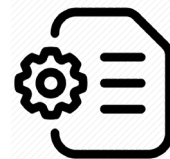
Store-like facility
(pickup location).



- Small or micro-sized.



- High density neighborhood locations.
- Third layer in city logistics.



- Locker banks (freight station; 2011).
- Amazon Lockers:
 - 900 cities in the United States.
 - More than 3,000 lockers.
- Amazon Hubs:
 - Available to property managers.
 - Accept all parcels.

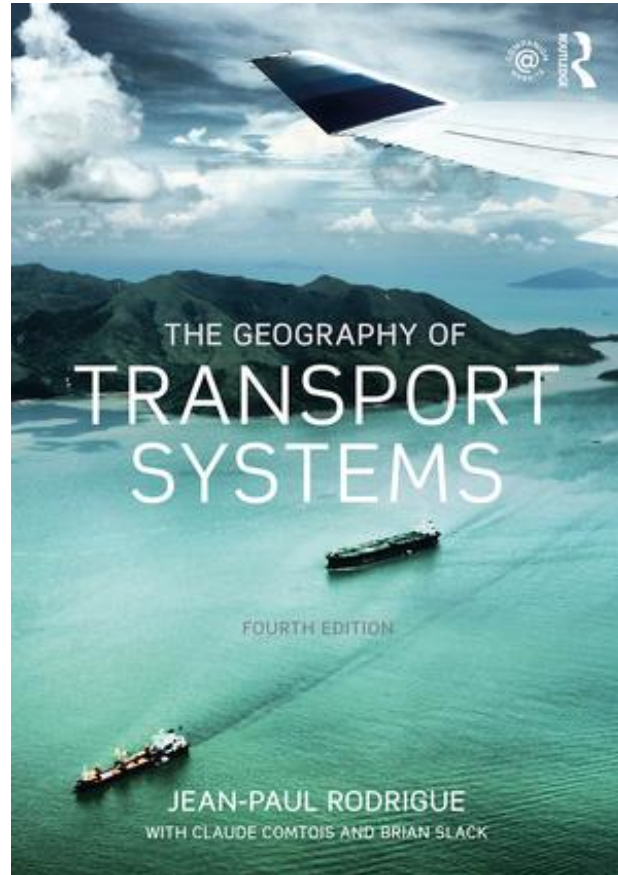


Conclusion: An Emerging Geography of E-commerce



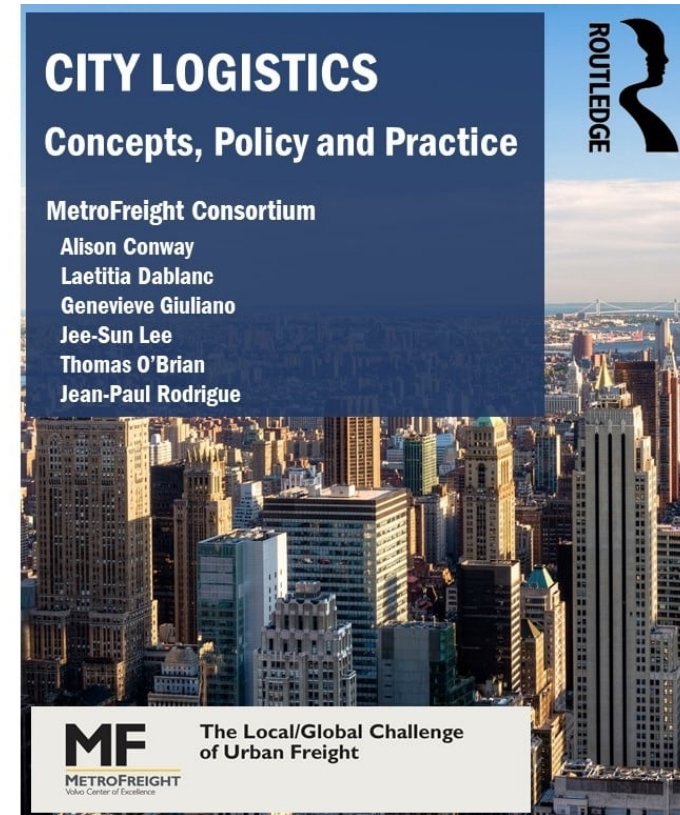
- **Logistical facilities**
 - Emergence of specialized facilities.
 - Each fulfilling a role along the e-commerce supply chain.
 - Function related to size.
 - Functional specialization for e-fulfilment centers (e.g. sortables, non-sortables).
 - Three layers of city logistics facilities:
 - Sortation Center / Fast Hub.
 - Delivery Station.
 - Local Freight Station.
- **Horizontal and vertical integration**
 - Horizontal integration: using logistical facilities to expand market coverage and lead time.
 - Vertical integration: using logistical facilities to control flows and channels.
 - Currently setting air hubs to improve connectivity.

Further Reading



<https://transportgeography.org/>

5th Edition coming soon...



<https://globalcitylogistics.org/>

Under development