Data Session U.S.:
T-100 and O&D Survey Data

ACI NORTH AMERICA AIRPORTS COUNCIL INTERNATIONAL

THE *VOICE* OF AIRPORTS®
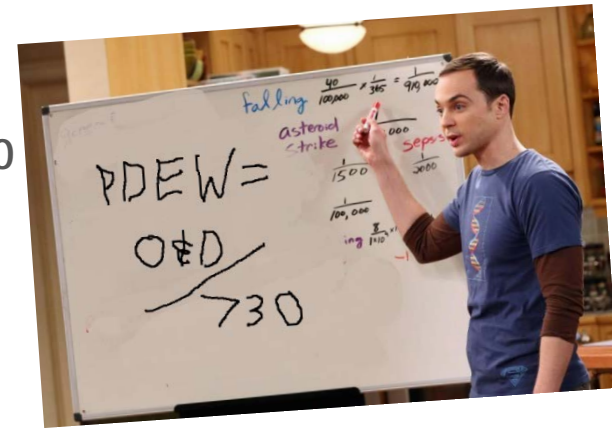
AIR SERVICE DATA SEMINAR
January 8 – 10, 2018 // _San Antonio, TX_

Presented by: Tom Reich

What are Doing Here?

✓ **Learn how to use T100 & O&D (DB1A/DB1B) to:**

    ✓ Enhance your air service presentations

    ✓ Identify opportunities for new air service

    ✓ Understand what the changes and trends in T-100

    ✓ Become more fluent in airlinese

    ✓ Sound Really Smart!

Where Did This Data Come From?

✓ Prior to 1978 all airfares were set by the Civil Aeronautics Board (CAB) and airlines could not add flights or enter new markets without CAB approval

✓ The CAB needed airlines to report O&D and T-100 data to:
   ✓ Ensure airlines were charging the correct fares
   ✓ Monitor market performance in response to new entrant requests
   ✓ Ensure a completely transparent market place for all players

✓ After de-regulation airlines were still required to report the data

✓ These databases represent the most detailed airline traffic reporting in the world

METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

T-100 Data

✓ **Aliases Include:**
- ✓ **Form 41 Traffic Data**
- ✓ **Form 41 Schedule T-100 Data**
- ✓ **Airline Market & Segment Data**
- ✓ **Onboard and/or Onflight Data**

✓ **Must be reported by all carriers that operate flights to, from, or within the United States**
- ✓ **Major & National Airlines**
- ✓ **Regional Airlines (required as of October 2002)**
- ✓ **Foreign Flag Airlines (required as of July 1990)**
- ✓ **Cargo Airlines**
- ✓ **Charter Airlines**

T-100 Data

✓ **Reporting Periods**
- ✓ All Data is Reported on a Monthly Basis
- ✓ There is No "Official" Breakdown of T-100 by Week, or Day of Week
- ✓ Domestic T-100 is Reported on a "Three Month Lag"
- ✓ International T-100 is Reported on a "Six Month Lag"

✓ **Passenger & Cargo Data is Reported**
- ✓ Passenger Seating & Total Cargo Capacity is Reported
- ✓ Onboard/Onflight Passengers & Cargo Tons are Reported

✓ **All Data is Reported by Operating Carrier**
- ✓ You Need to Figure Out Who is Flying for Who

T-100 Data

✓ **Limitations**

  ✓ **Related to Single-Plane Flights ONLY**

  ✓ **Does Not Include Revenue Data**

  ✓ **Regional Airline History is Spotty prior to October 2002**

✓ **T-100 is NOT INTENDED to be an O&D Source**

T-100 Data

✓ **Exists in Four Major Formats**

   ✓ **Domestic Segment:**
Represents all passengers and/or cargo onboard domestic nonstop flights for each specific city pair. (Example: UA ORD-DCA)

   ✓ **Domestic Market:**
Represents all passengers and/or cargo onboard domestic same-plane one-stop flights for each specific city pair. (Example: WN DCA-AUS-SAN)

   ✓ **International Segment:**
Same format as domestic, but only for international flights

   ✓ **International Market:**
Same format as domestic, but only for international flights

T-100 Data

✓ **Relevant Data Fields**

- ✓ Departures Scheduled
- ✓ Departures Performed
- ✓ Available Cargo Payload (pounds)
- ✓ Available Seats
- ✓ SEGMENT Onboard Passengers
- ✓ SEGMENT Onboard Freight (pounds)
- ✓ SEGMENT Onboard Mail (pounds)
- ✓ MARKET Onflight Passengers
- ✓ MARKET Onflight Freight (pounds)
- ✓ MARKET Onflight Mail (pounds)
- ✓ Flight Distance
- ✓ Operating Carrier

- ✓ Origin Airport
- ✓ Destination Airport
- ✓ Aircraft Type
- ✓ Year
- ✓ Quarter
- ✓ Month
- ✓ Class

# T-100 Data

Example: United Airlines @ DCA
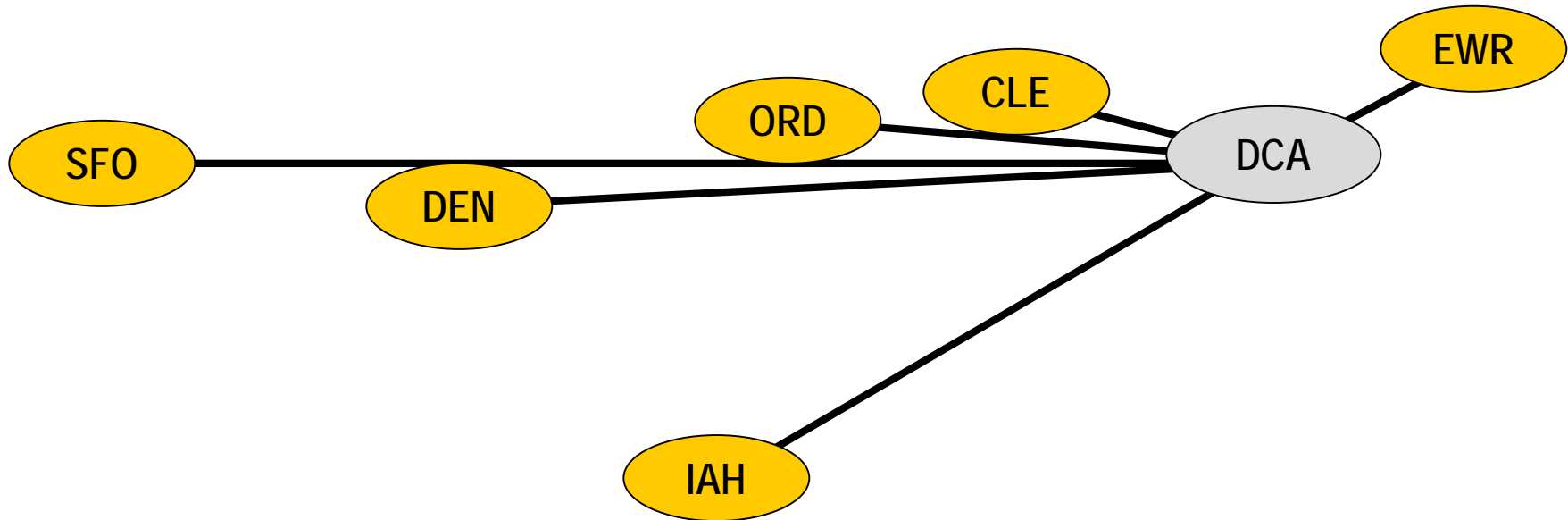
T-100 Data

✓ T-100 Based Statistics You Can Calculate

- ✓ Enplanements & Deplanements
- ✓ Number of actual flight operations
- ✓ Completion Factor
- ✓ Load Factor
- ✓ Revenue Passenger Miles
- ✓ Available Seats & Seat Miles
- ✓ Thru Passenger Ratios

T-100 Data

✓ **Common Questions T-100 Data Will Answer** (Provided the event happened after October, 2002)

  - ✓ When did a carrier start/end nonstop service in a market?
  - ✓ When did service levels increase/decrease?
  - ✓ When were aircraft types changed in a market?
  - ✓ How do your airport's load factors compare to other airports?

Where Do You Get T-100 Data?
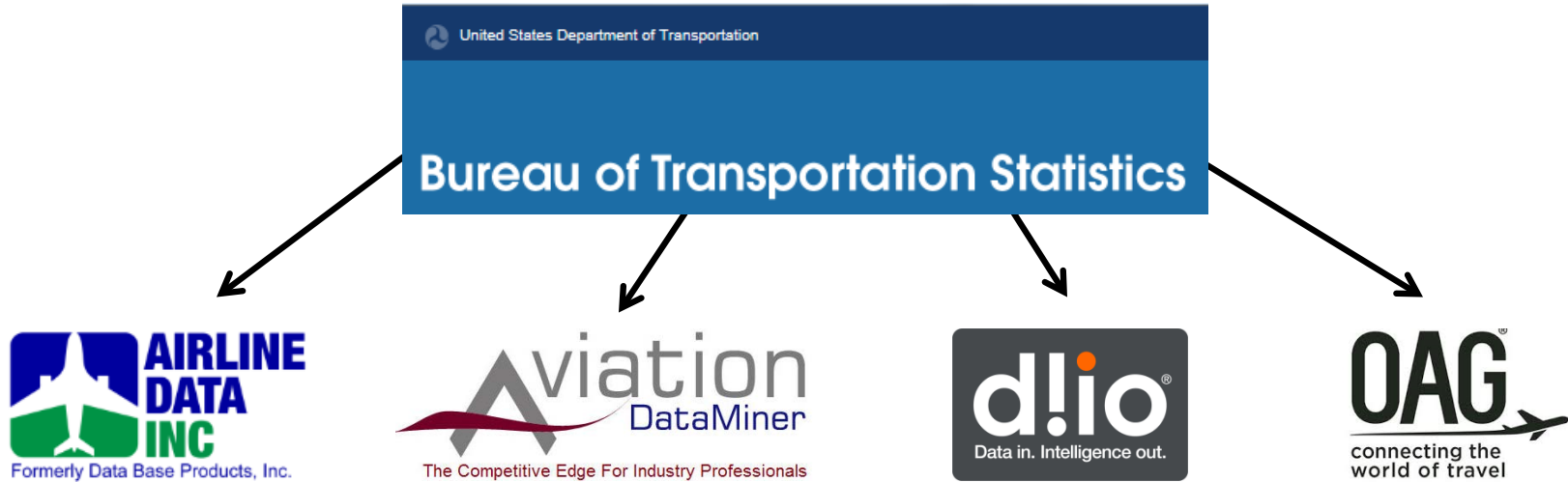
Capacity Share by Marketing Carrier
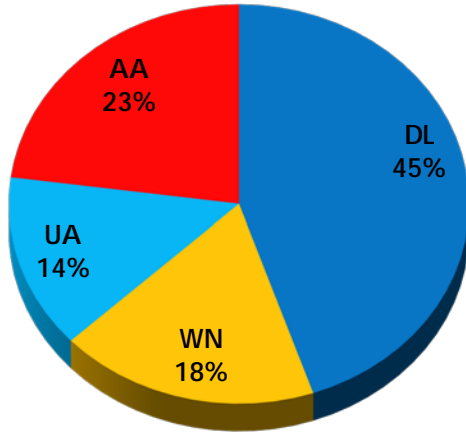
Onboard Passenger Market Share

- DL 45%
- AA 23%
- UA 14%
- WN 18%

More Current Data Available via Airline Schedule Data

Seat Capacity Share

- DL 42%
- AA 24%
- UA 14%
- WN 20%

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
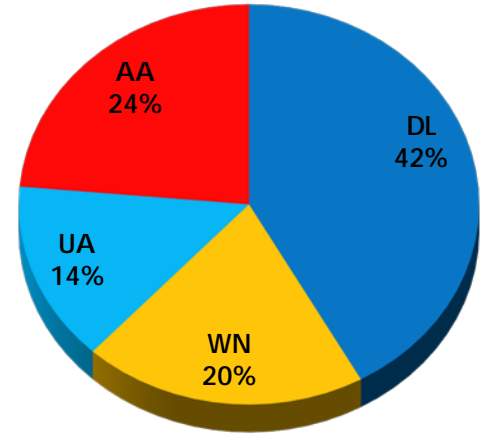
Capacity Share by Operating Carrier
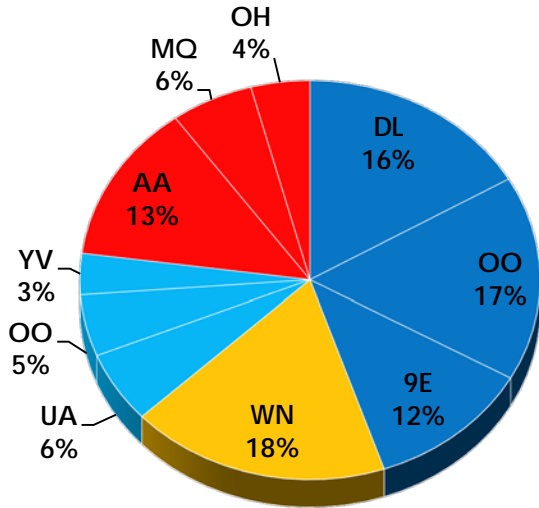
Onboard Passenger Market Share

- OH 4%
- MQ 6%
- DL 16%
- AA 13%
- OO 17%
- YV 3%
- 9E 12%
- OO 5%
- WN 18%
- UA 6%

More Current Data Available via Airline Schedule Data

Seat Capacity Share

- OH 5%
- MQ 6%
- DL 15%
- AA 13%
- OO 15%
- YV 4%
- 9E 11%
- OO 5%
- WN 20%
- UA 6%

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
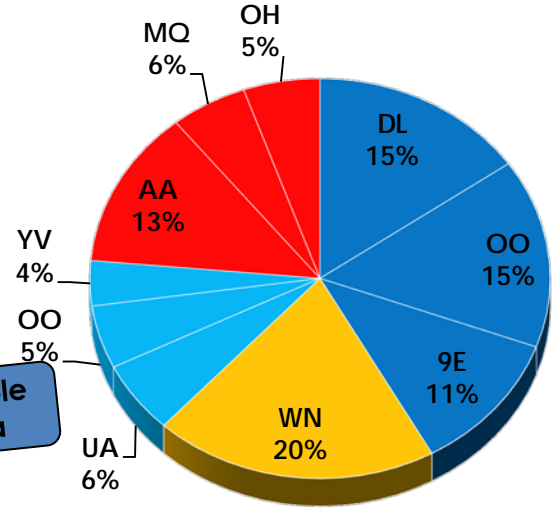
Capacity Share Time Comparison

Legacy Carriers Vs. LCCs

Left pie chart — Seat Capacity Share (YE Sep-2007):
- US 4%
- AA 6%
- CO 7%
- UA 14%
- FL 12%
- WN 18%
- NW 16%
- DL 23%
- Legacy Carriers 70%
- LCCs 30%

Seat Capacity Share (YE Sep-2007)

More Current Data Available via Airline Schedule Data

Right pie chart — Seat Capacity Share (YE Sep-2017):
- AA 24%
- DL 42%
- UA 14%
- WN 20%
- Legacy Carriers 80%
- LCCs 20%

Seat Capacity Share (YE Sep-2017)
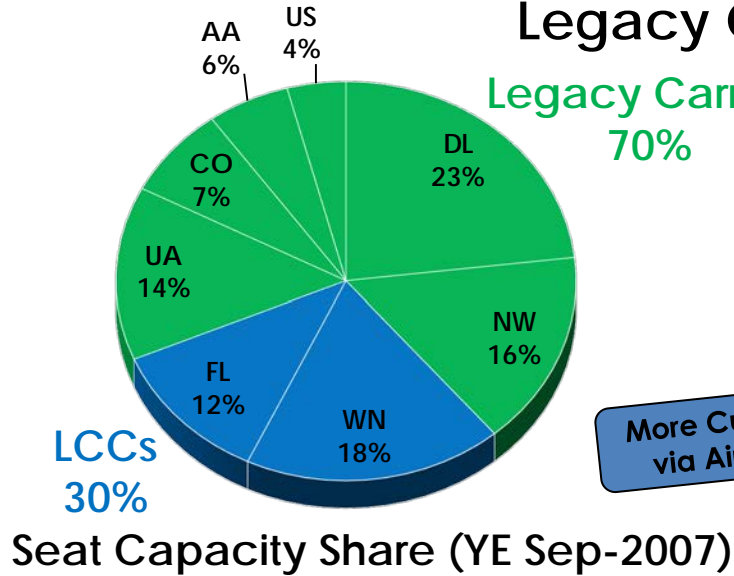
Source: U.S.DOT T-100 Onboard Passenger Data
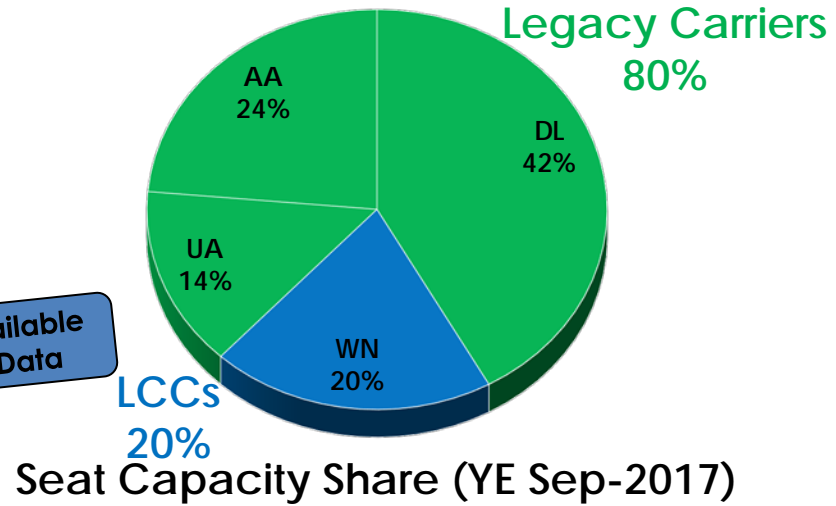
Load Factor Comparison

Load Factor (YE Sep 2017)

Awesome Airways – IAD Hub Markets

Types of Comparisons:
- ✓ Similar Hub Markets
- ✓ Multiple Routes from Your Airport
- ✓ Different Carriers at Your Airport
- ✓ Competing Airports
- ✓ Etc…

Airport	Load Factor
HVN	95%
YNG	93%
DAB	92%
AVP	91%
SWF	89%
ABE	87%
HPN	74%
BGM	69%
ISP	65%
TTN	63%

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
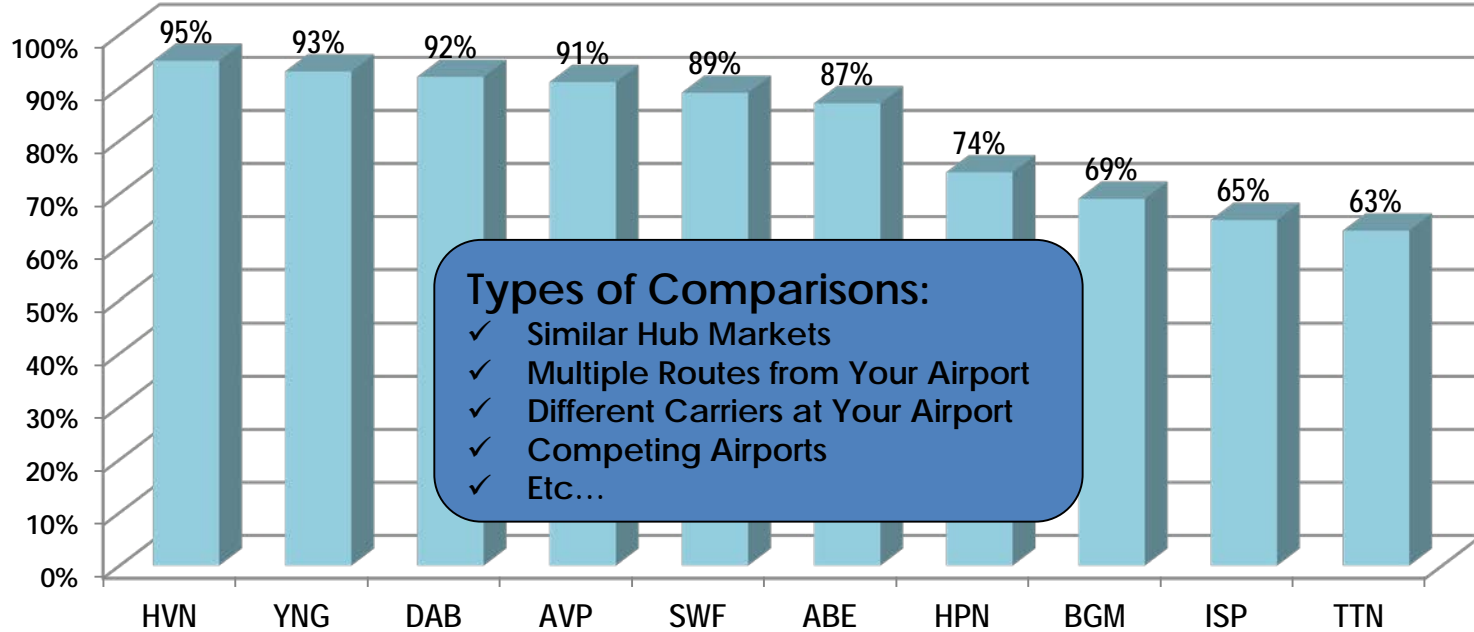
Load Factor Comparison

Load Factor by Airline – Airport XYZ

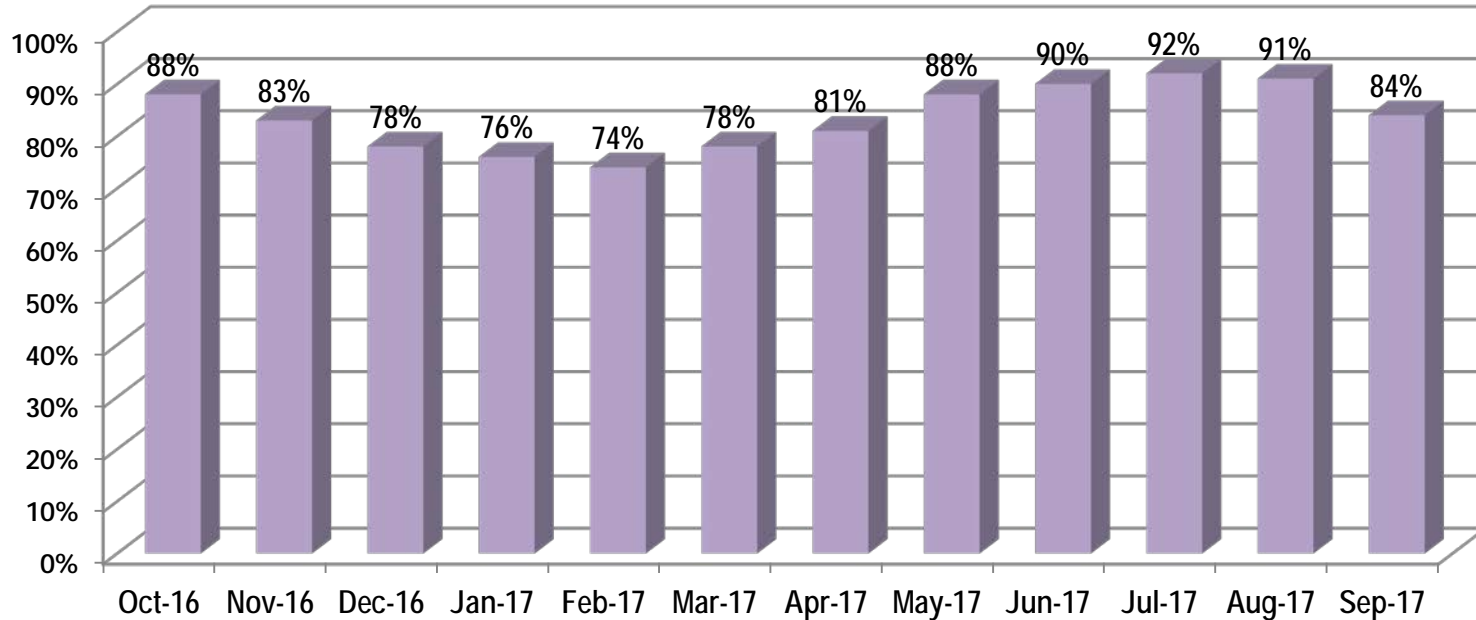| Carrier	Load Factor (YE Sep 2017)
Allegiant	95%
United	91%
Delta	88%
American	86%
Southwest	82%
Average	89%

Types of Comparisons:
- ✓ Similar Hub Markets
- ✓ Multiple Routes from Your Airport
- ✓ Different Carriers at Your Airport
- ✓ Competing Airports
- ✓ Etc…

Load Factor Time Series

Awesome Airways
IAD-HVN Load Factor by Month

Load Factor

Month	Load Factor
Oct-16	88%
Nov-16	83%
Dec-16	78%
Jan-17	76%
Feb-17	74%
Mar-17	78%
Apr-17	81%
May-17	88%
Jun-17	90%
Jul-17	92%
Aug-17	91%
Sep-17	84%

Passenger Time Series

**Awesome Airways
IAD-HVN Total Onboard Passengers by Month**

Onboard Passengers

Month	Passengers
Oct-16	46,912
Nov-16	33,661
Dec-16	29,843
Jan-17	28,562
Feb-17	30,101
Mar-17	37,987
Apr-17	50,668
May-17	57,590
Jun-17	64,442
Jul-17	65,378
Aug-17	63,878
Sep-17	51,644

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)

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Airport (ABC) Needs More West Coast Service

Year Ended Sep-2014

SFO — 74% — ABC
LAS — 78% — ABC
LAX — 77% — ABC
PHX — 72% — ABC

Year Ended Sep-2017

SFO — 88% — ABC
LAS — 93% — ABC
LAX — 91% — ABC
PHX — 87% — ABC
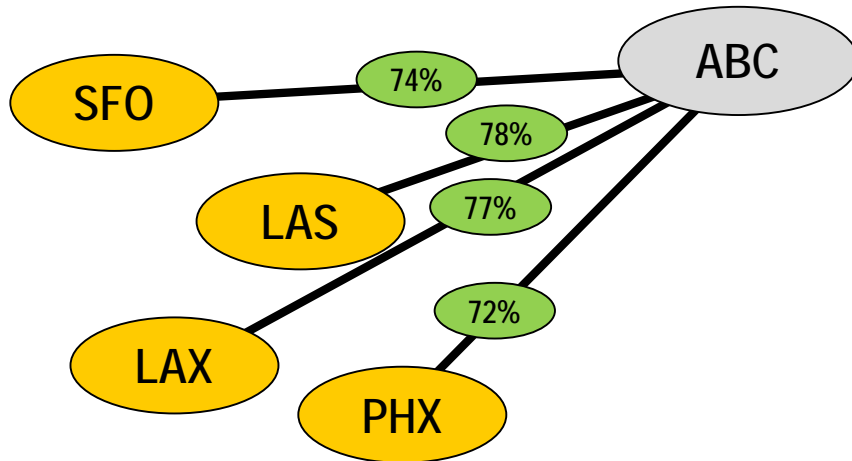
Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
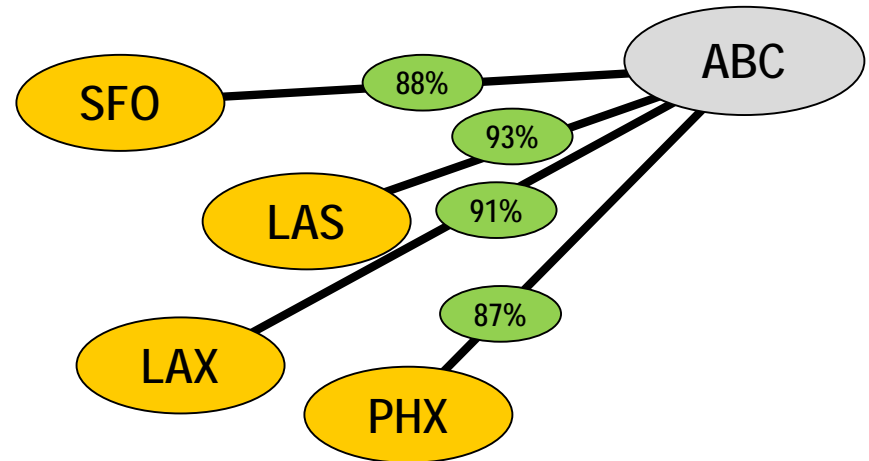
Connections Between Two Airports Are Full

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
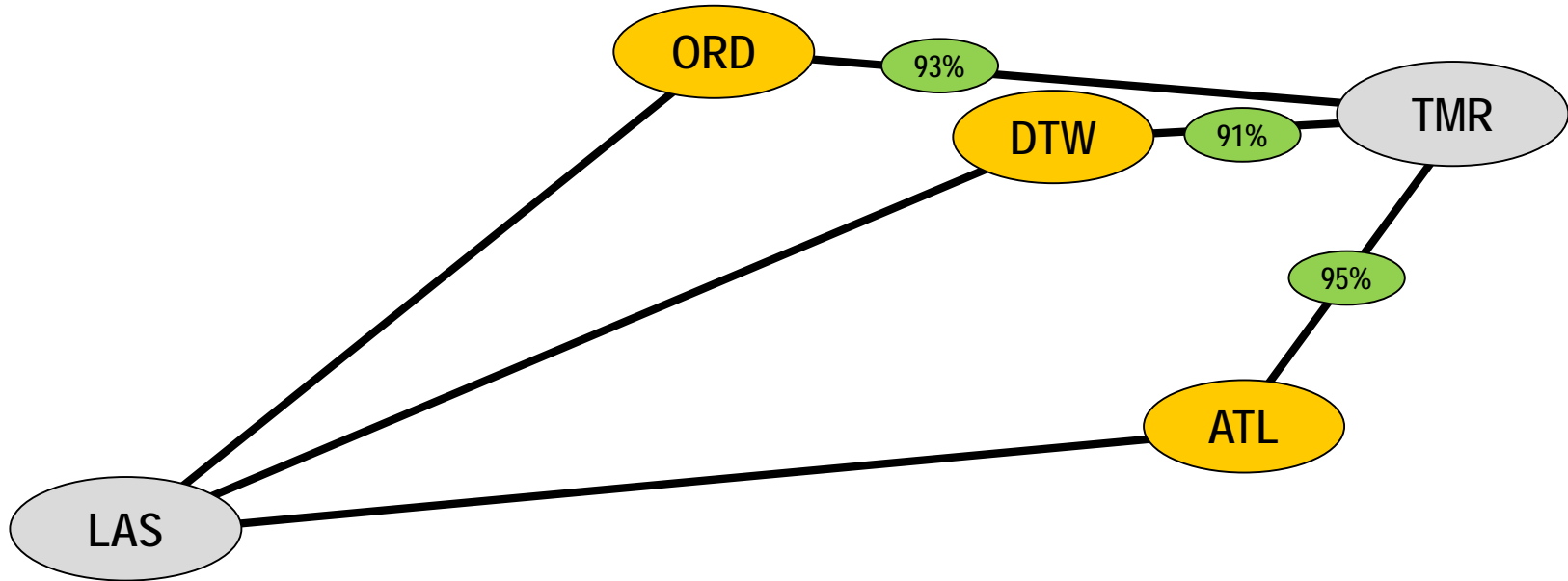
Using T-100 with Other Data

Capacity Share by Equipment Type
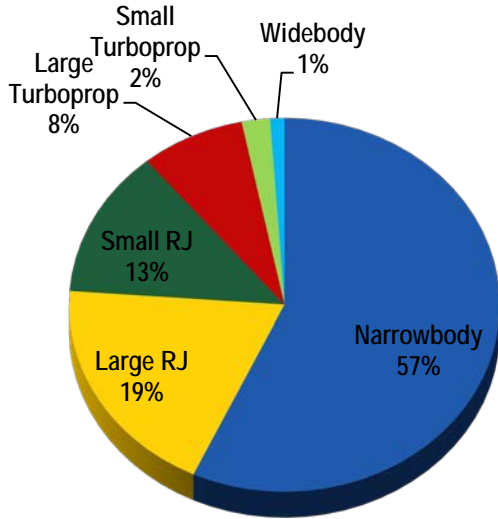
Available Flights Share (Jun-18)
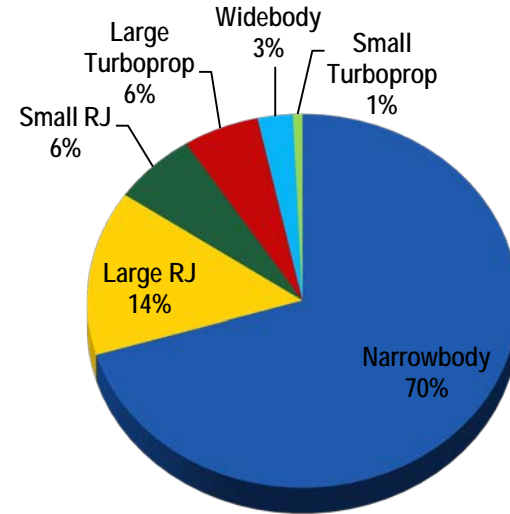(From Current Published Airline Schedules)
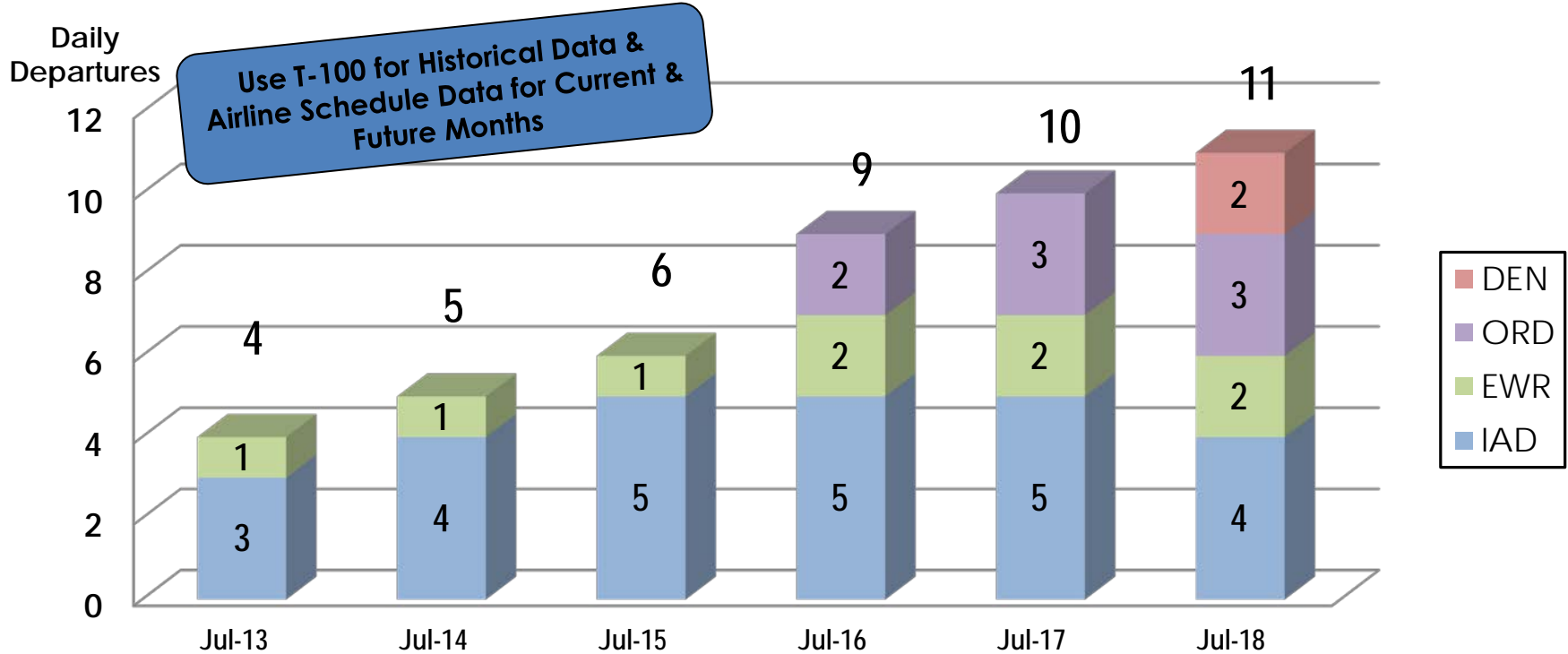
Large Turboprop 8%
Small Turboprop 2%
Widebody 1%
Small RJ 13%
Large RJ 19%
Narrowbody 57%

Seat Capacity Share (Jun-17)
(From T-100)

Large Turboprop 6%
Widebody 3%
Small Turboprop 1%
Small RJ 6%
Large RJ 14%
Narrowbody 70%

Average Aircraft Size

**Average Aircraft
Seat Capacity**

**Use T-100 for Historical Data &
Airline Schedule Data for Current &
Future Months**

Month	Value
Sep-15	144
Oct-15	143
Nov-15	141
Dec-15	138
Jan-16	134
Feb-16	130
Mar-16	132
Apr-16	133
May-16	134
Jun-16	136
Jul-16	138
Aug-16	139
Sep-16	133
Oct-16	131
Nov-16	130
Dec-16	129
Jan-17	126
Feb-17	124
Mar-17	122
Apr-17	119
May-17	120
Jun-17	122
Jul-17	123
Aug-17	125
Sep-17	128
Oct-17	129
Nov-17	131
Dec-17	132
Jan-18	133
Feb-18	132

Source: U.S.DOT T-100 Onboard Passenger Data

Airline Air Service Growth

Use T-100 for Historical Data & Airline Schedule Data for Current & Future Months

Daily Departures

	Jul-13	Jul-14	Jul-15	Jul-16	Jul-17	Jul-18
Total	4	5	6	9	10	11
DEN						2
ORD			2	3	3
EWR	1	1	1	2	2	2
IAD	3	4	5	5	5	4

Legend: DEN, ORD, EWR, IAD

Source: U.S.DOT T-100 Onboard Passenger Data

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Year Over Year Changes in Seat Capacity

Jun-2018 Vs. Jun-2017

Use T-100 for Historical Data & Airline Schedule Data for Current & Future Months

Airport	Change
LAX	100%
DEN	34%
IAD	32%
MCO	21%
LAS	18%
ORD	17%
FLL	13%
DFW	11%
MSP	9%
DTW	6%
DCA	5%
CLT	4%
JFK	2%
EWR	1%
IAH	-7%
LGA	-7%
PHL	-11%
ATL	-16%
BWI	-47%

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)

28
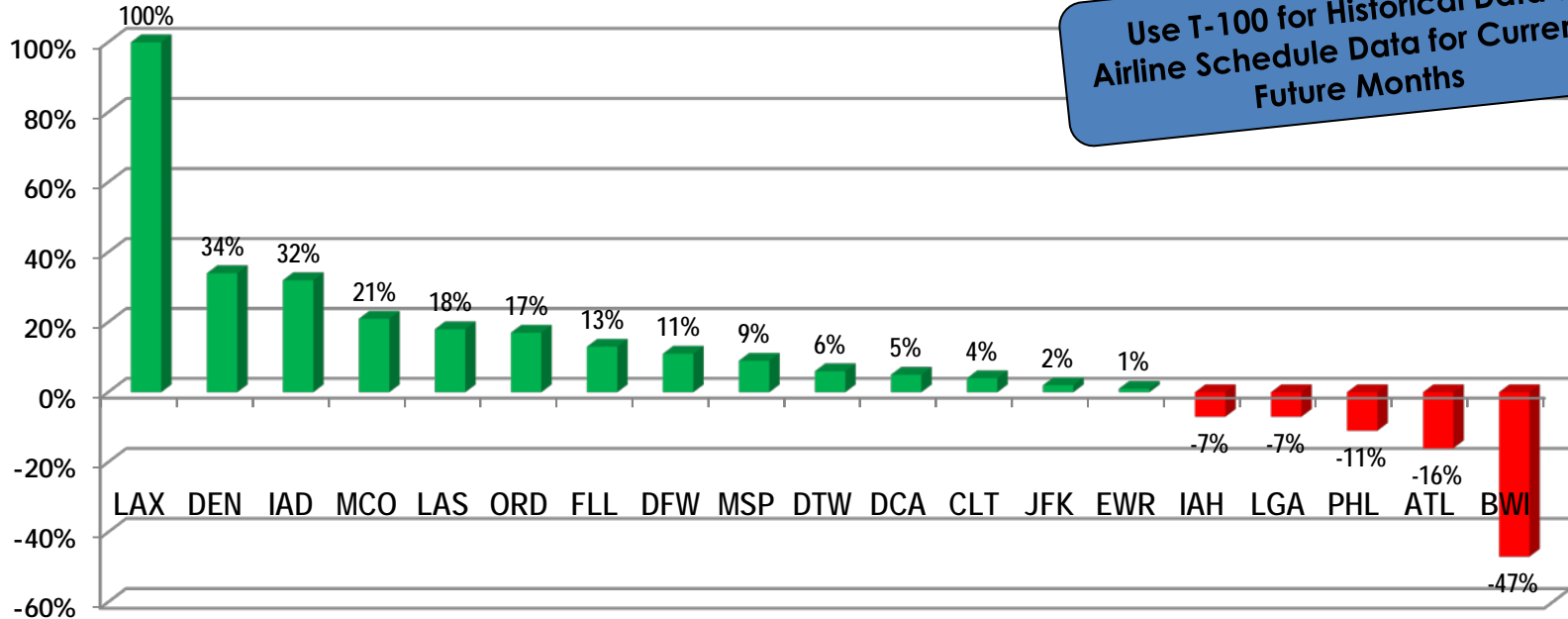
Capacity Time Series Comparisons

Annual Onboard Seats to WAS

Use T-100 for Historical Data & Airline Schedule Data for Current & Future Months

IAD
DCA
BWI

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
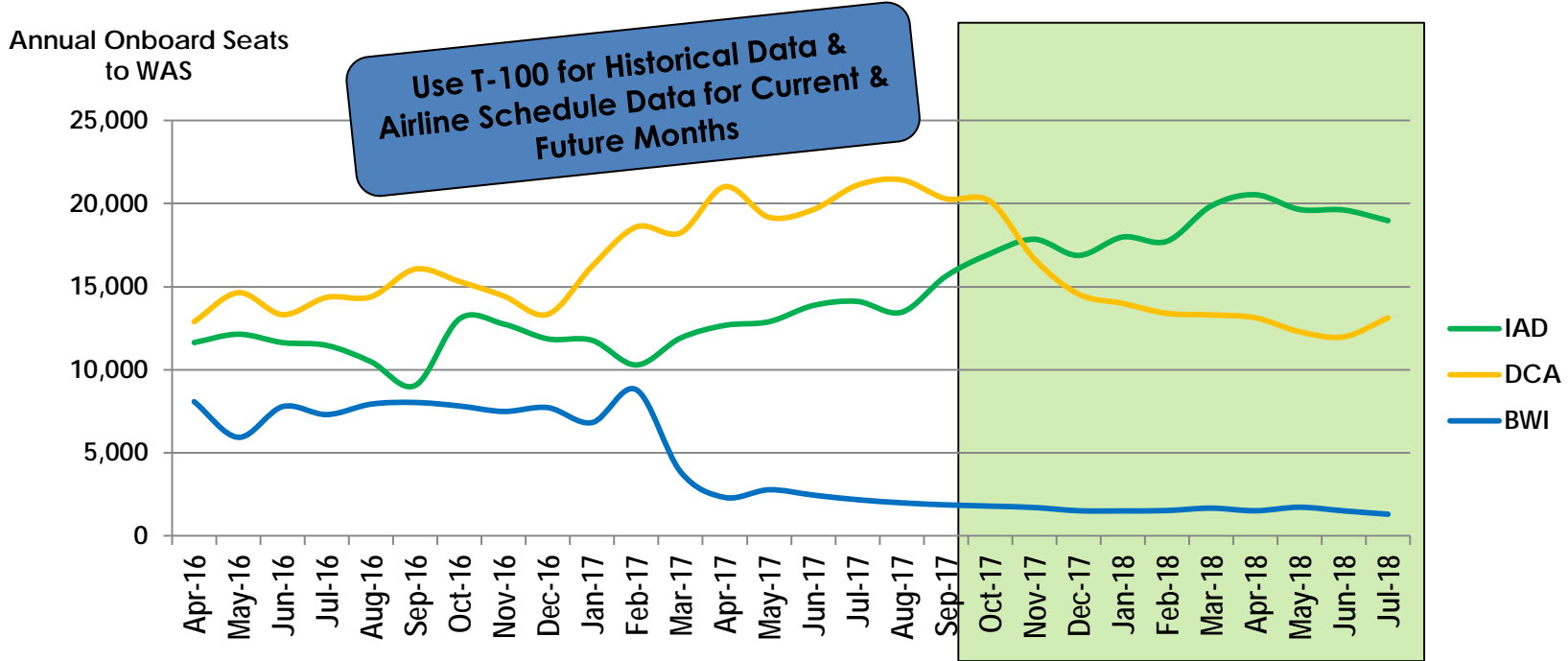
Connecting Flow

ABC-IAD Onboard Passengers

Total Seats & Onboard Pax comes from T-100. Connecting flow pax comes from O&D.

Legend:
- IAD-Total Seats
- IAD-Onboard Pax
- IAD-Connecting Flow Pax

Source: U.S.DOT T-100 Onboard Passenger Data (YE Sep-2017)
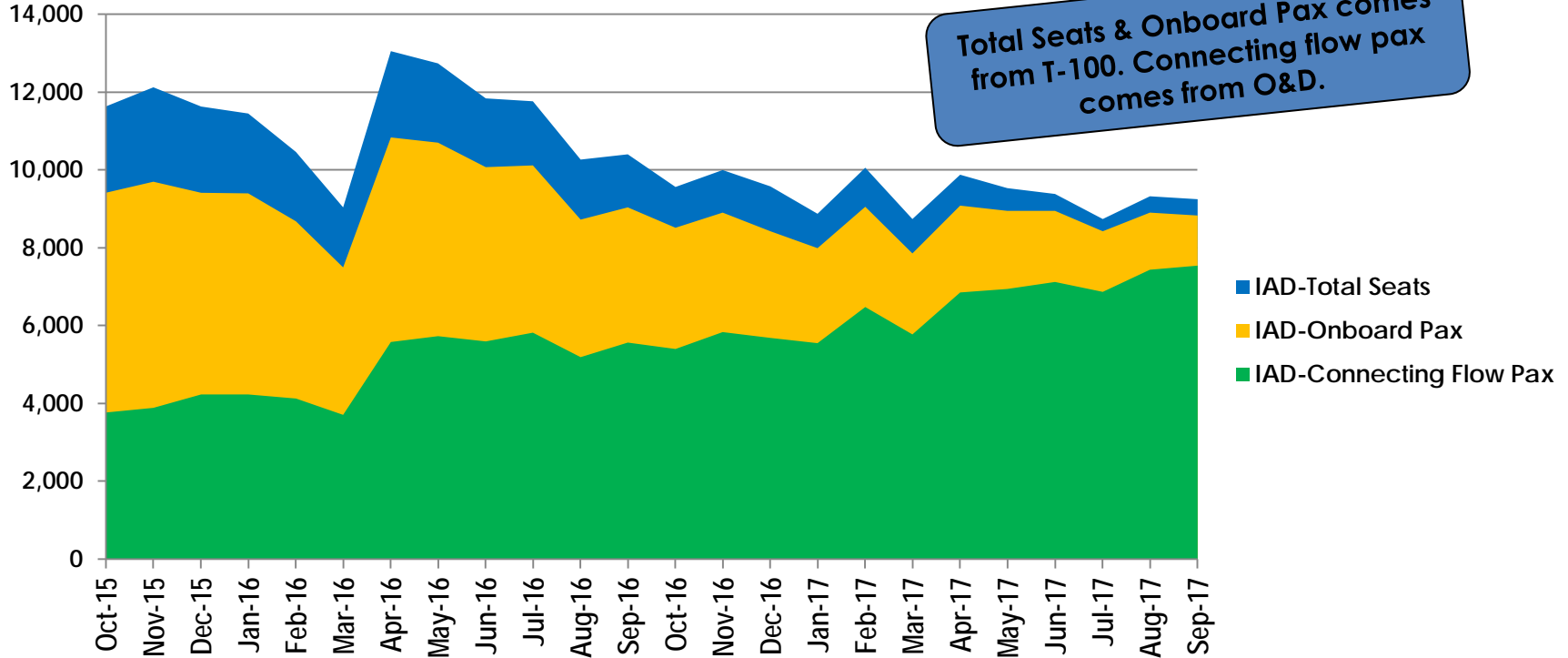
Ways to Combine T-100 with Other Data

✓ **Census Data**

    ✓ Seats or Flights per Capita

✓ **OAG Schedule Data**

    ✓ Use T-100 for historical data and airline schedule data for current months to create a seamless historical time series

✓ **O&D Data**

    ✓ Connecting flow of onboard passengers

    ✓ Load factors by connecting hub

    ✓ Adjustment to solve for total international O&D traffic

        (Total T-100 Onboard – Total Domestic O&D = Total International O&D)

O&D Overview

O&D Data

✓ Quantifies passengers and fares paid from origin to destination. Data detail includes:

   ✓ Marketing carrier of each flight segment
   ✓ Total fare paid
   ✓ Stops at intermediate airports
   ✓ Passenger's point of origin

✓ 10% Sample

   ✓ All passenger tickets with a coupon number ending in 0 are recorded
   ✓ Raw data is multiplied by 10 to represent the total market
   ✓ *(This is why O&D data figures are always a multiple of 10)*

O&D Data

✓ **Aliases Include:**
- ✓ Origin & Destination Data
- ✓ DB1B Data
- ✓ DB1A Data
- ✓ Passenger Traffic Data
- ✓ SABRE Data (not actually O&D at all)

✓ **Must be reported by all domestic marketing carriers that operate flights to, from or within the United States**
- ✓ DB1A (1940s through 1998)
- ✓ DB1B (1998 – Present)

O&D Data

✓ **O&D Based Statistics You Can Calculate**
- ✓ **Total O&D Passengers**
- ✓ **Total O&D Revenue**
- ✓ **Average Fares**
- ✓ **Nonstop Yield** *(Revenue per mile for nonstop distance between Origin & Destination)*
- ✓ **Itinerary Yield** *(Revenue per mile for itinerary distance between Origin & Destination)*
- ✓ **Average Passenger Trip Length**
- ✓ **Point of Sale Ratios**
- ✓ **Local Vs. Connect Ratios**

✓ **O&D Based Statistics You Can Calculate with T-100**
- ✓ **RASM (Revenue per Available Seat Mile)**

Where Do You Get O&D Data?
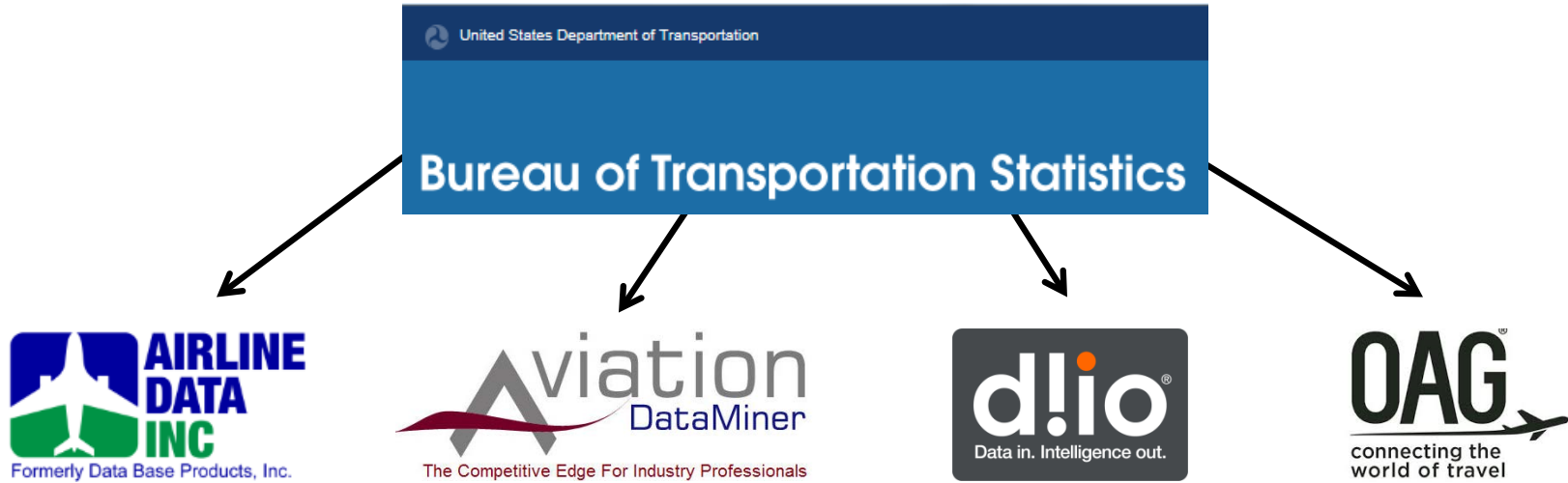
Issues With O&D Data

- ✓ **Reporting Periods**
  - ✓ All Data is Reported on a Quarterly Basis
  - ✓ There is No "Official" Breakdown of O&D by Month, Week, or Day of Week
    - ✓ Difficult to accurately identify seasonality in passenger demand and fare levels
  - ✓ O&D Is Reported on a Three to Six Month Lag

- ✓ **All Data is Reported by Marketing Carrier**
  - ✓ Codeshares make it difficult to figure out whose plane the passenger actually flew on
  - ✓ Many data providers have come up with ways to solve for this

- ✓ **Errors in Reporting**
  - ✓ Certain regional carriers O&D traffic is incorrectly reported
  - ✓ Some airlines report late, incorrectly or both causing delays in the data

Issues With O&D Data

✓ **Small Market Accuracy**

- ✓ Statistically small sample sizes
- ✓ Markets with less than 10 PDEW might not be recorded at all

✓ **Point of Origin**

- ✓ O&D tells you the airport the passenger used, not the airport the passenger lives closest too

✓ **Mental Blocks**

- ✓ Each round trip passenger is counted twice
- ✓ An airport's O&D traffic is two times its enplanements
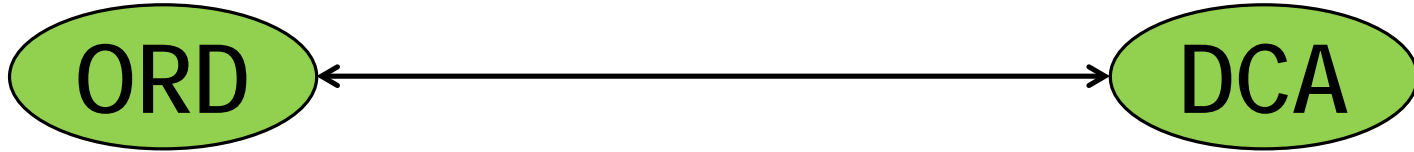- ✓ Think of O&D as "Departing from – Arriving at" data

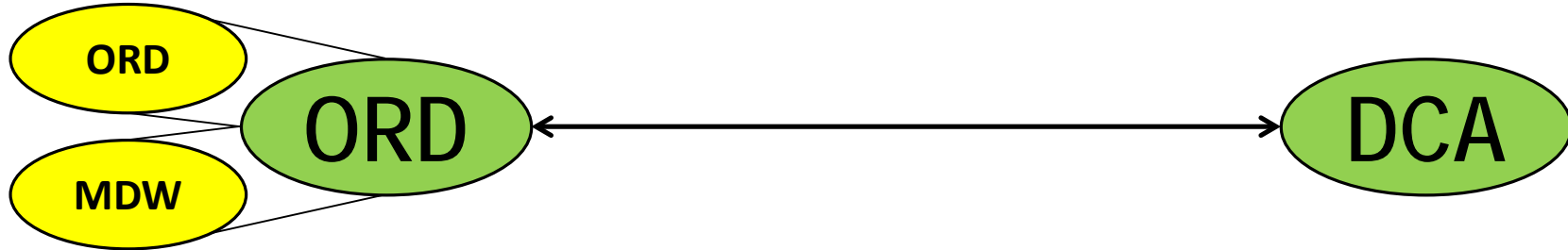Ways to Cut the O&D Data

Local O&D Passenger Traffic

Nonstop – Airport to Airport

ORD ←——————————————→ DCA

✓ Airports:
  ✓ Washington Reagan (DCA) and Chicago (ORD) only
✓ Connecting Hub Traffic:
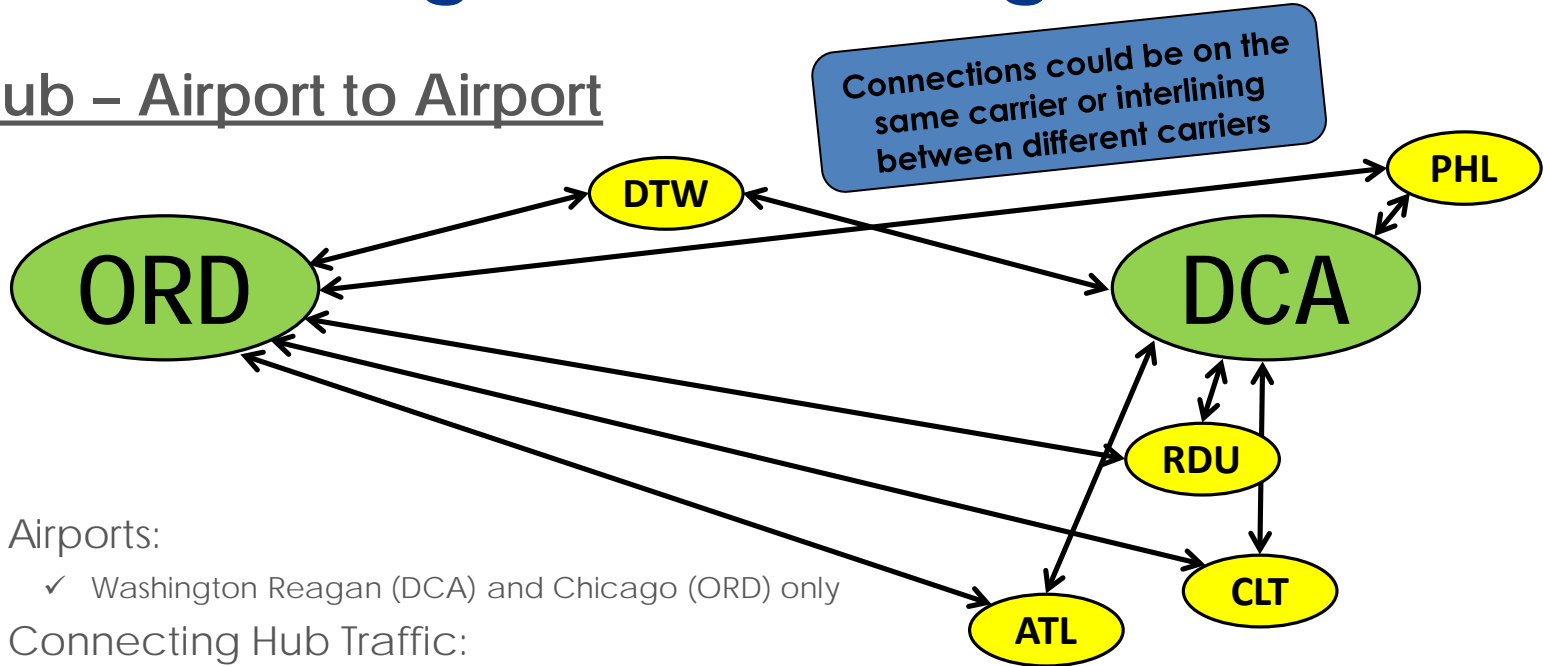 ✓ None - Only nonstop passengers

Local O&D Passenger Traffic

Nonstop – Airport to City (Multi-airport)

ORD

MDW

ORD ⟷ DCA

- ✓ Airports:
  - ✓ Washington (DCA) and Chicago (MDW & ORD) only
- ✓ Connecting Hub Traffic:
  - ✓ None - Only nonstop passengers

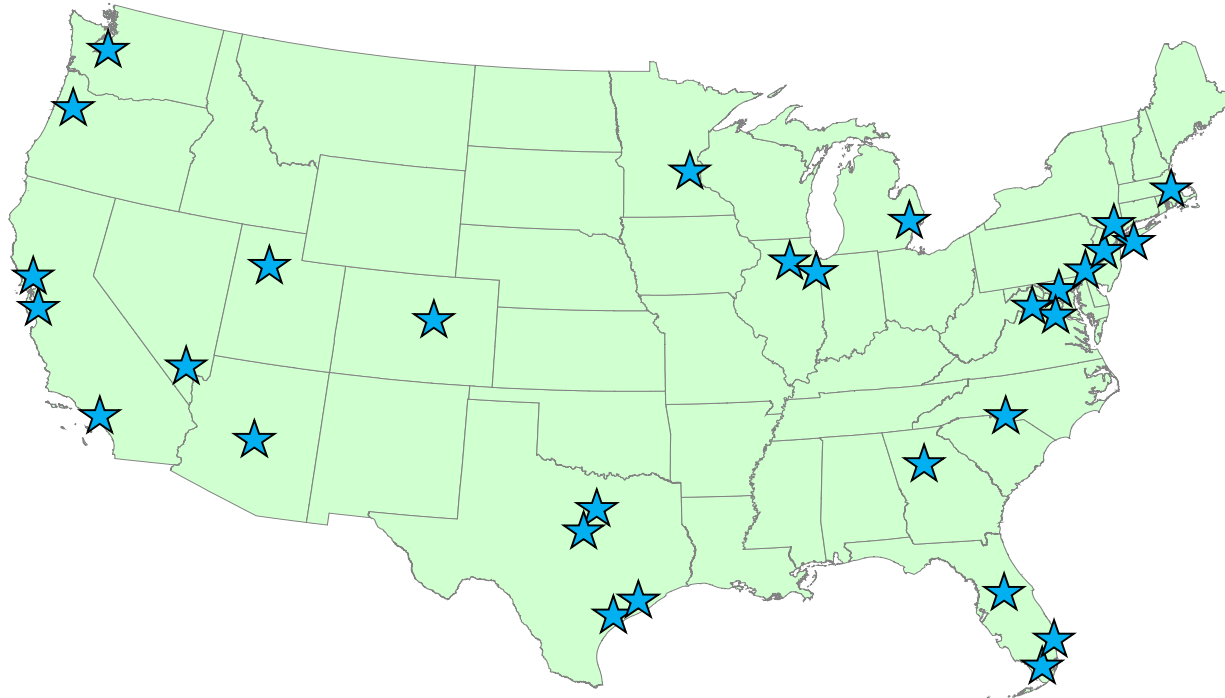# Connecting O&D Passenger Traffic

Via Hub – Airport to Airport

Connections could be on the same carrier or interlining between different carriers

- ✓ Airports:
  - ✓ Washington Reagan (DCA) and Chicago (ORD) only
- ✓ Connecting Hub Traffic:
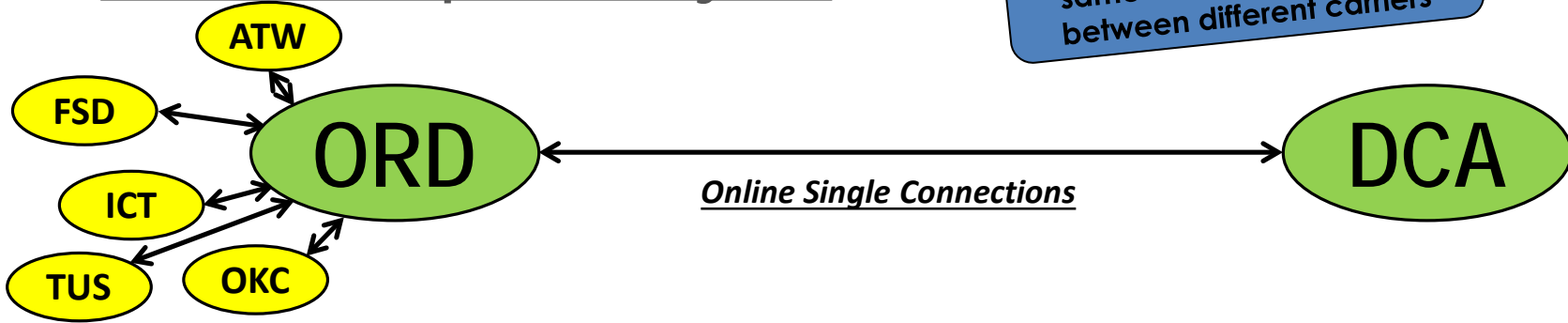 - ✓ Yes – ATL, CLT, DTW, RDU, PHL, etc

Common Connecting Hubs

Online Connecting O&D Passenger Traffic

Via Hub – Airport to Beyond

Connections could be on the same carrier or interlining between different carriers

ATW

FSD

ICT

TUS

OKC

ORD

Online Single Connections

DCA

✓ Airports:
  ✓ Washington Regan (DCA) and anywhere beyond Chicago (ORD)

✓ Connecting Hub Traffic:
  ✓ Yes – Only Via ORD

Online Connecting O&D Passenger Traffic
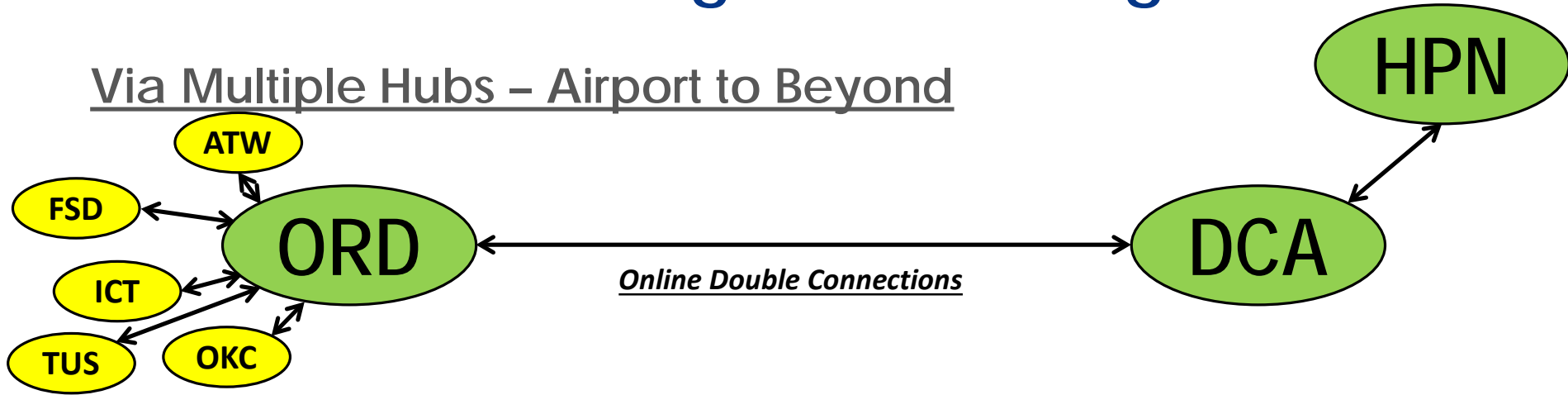
Via Non-Hub – Airport to Airport

ORD ⟷ CMH ⟷ DCA

Online Single Connection

- ✓ Airports:
  - ✓ Chicago (ORD) and Washington Reagan (DCA) via CMH only
- ✓ Connecting Non-Hub Traffic:
  - ✓ Yes – Only via CMH

Online Connecting O&D Passenger Traffic

Via Multiple Hubs – Airport to Beyond

Online Double Connections

- ✓ Airports:
  - ✓ White Plains (HPN) and anywhere beyond Washington Reagan (DCA) & Chicago (ORD)
- ✓ Connecting Hub Traffic:
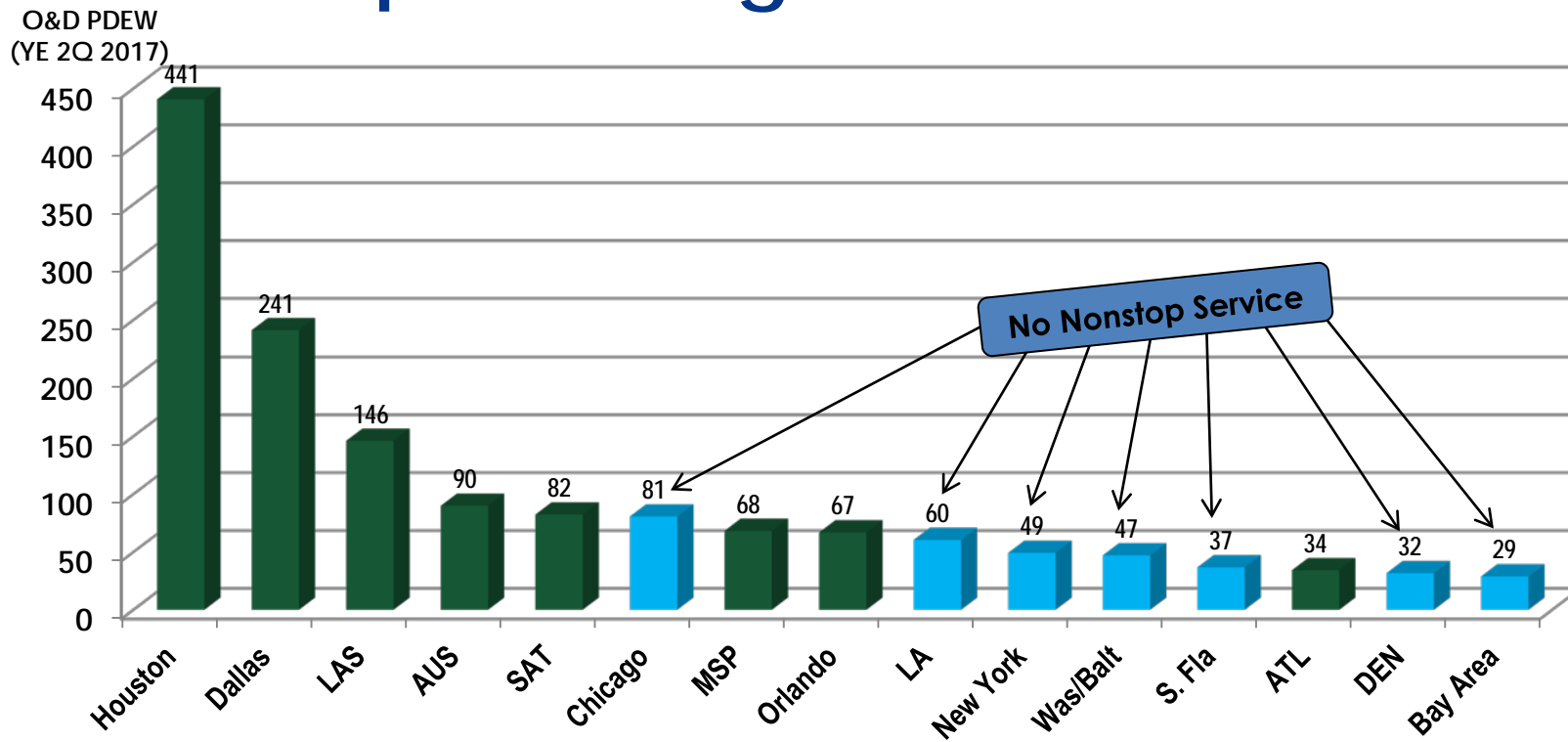 - ✓ Yes – Only Via DCA & ORD

O&D Traffic Analysis

An Airport's Largest O&D Markets?

Rank	Top 15 ABC O&D Markets (YE 2Q 2011)	YE 2Q 2017 O&D Passengers	Fare	Nonstop
1	Houston (HOU & IAH)	321,640	$89	Y
2	Dallas/Ft. Worth (DAL & DFW)	176,010	$104	Y
3	Las Vegas (LAS)	106,640	$122	Y
4	Austin (AUS)	65,630	$69	Y
5	San Antonio (SAT)	60,090	$73	Y
6	Chicago (MDW & ORD)	58,850	$245	N
7	Minneapolis (MSP)	49,830	$221	Y
8	Orlando (MCO & SFB)	48,800	$114	Y
9	LA Basin (BUR, LAX, LGB, ONT, SNA)	44,090	$287	N
10	New York (EWR, HPN, ISP, JFK, LGA, SWF)	35,920	$313	N
11	Washington/Baltimore (BWI, DCA, IAD)	34,320	$298	N
12	South Florida (FLL, MIA, PBI)	26,740	$177	N
13	Atlanta (ATL)	24,970	$185	Y
14	Denver (DEN)	23,090	$286	N
15	Bay Area (OAK, SFO, SJC)	21,030	$364	N

An Airport's Largest O&D Markets?

O&D PDEW (YE 2Q 2017)

No Nonstop Service

Market	O&D PDEW
Houston	441
Dallas	241
LAS	146
AUS	90
SAT	82
Chicago	81
MSP	68
Orlando	67
LA	60
New York	49
Was/Balt	47
S. Fla	37
ATL	34
DEN	32
Bay Area	29

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)

Carrier O&D Market Share
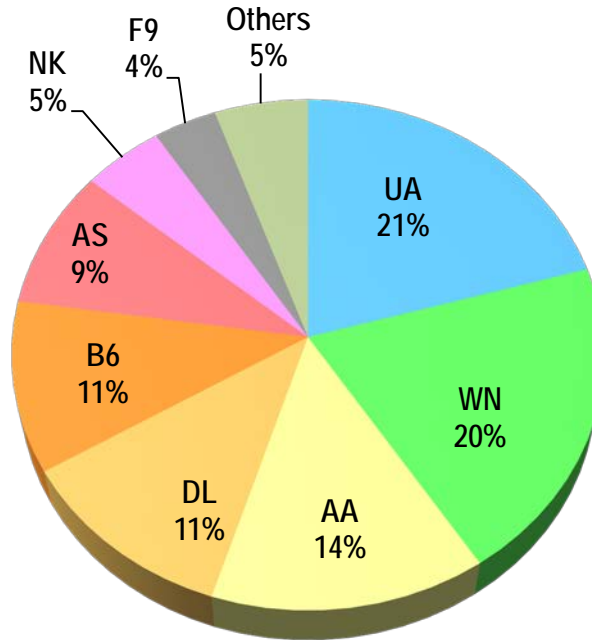
Total O&D Passengers – YE 2Q 2017
(3,084,327 O&D Passengers)

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)

O&D Time Series

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)
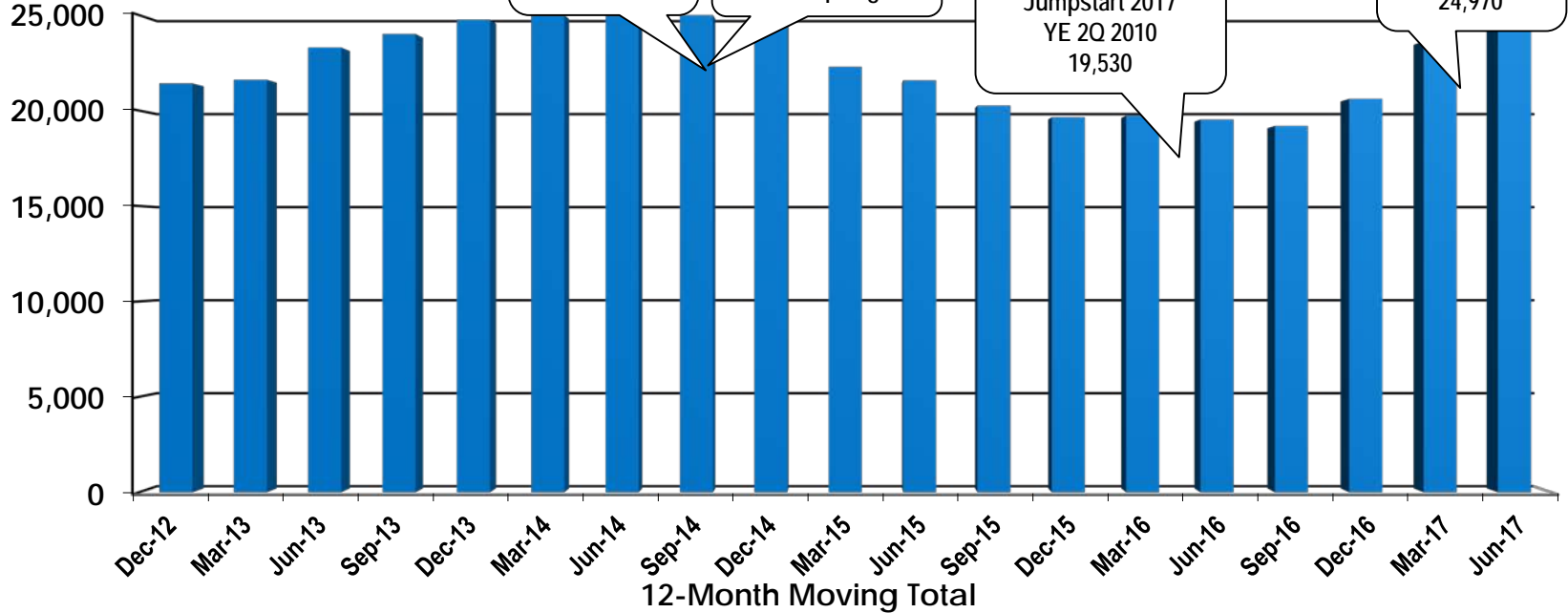
O&D Time Series
By Composite City

O&D Passengers
ABC – South Florida

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)
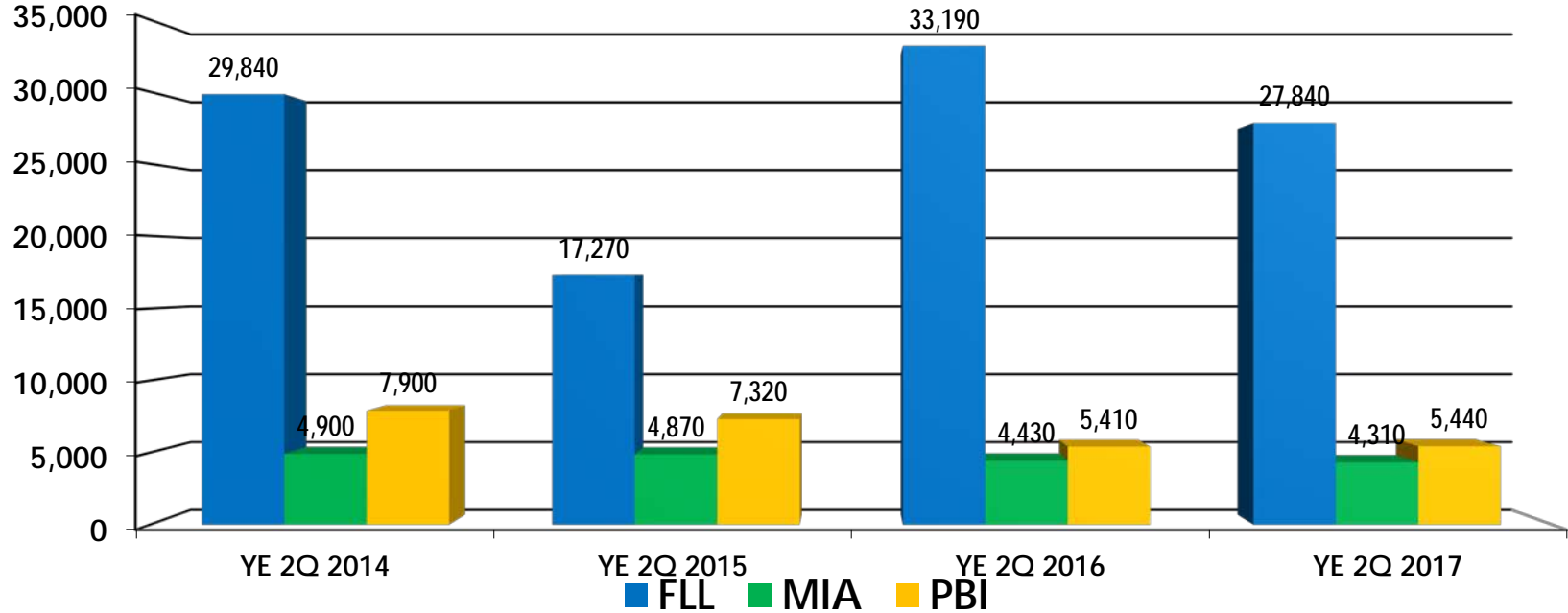
O&D Market Comparisons
By Carrier

**O&D Passengers
ABC – South Florida
(YE 2Q 2017)**

Carrier	O&D Passengers
WN	17,910
B6	14,100
AA	4,170
DL	710
NK	590
UA	110

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)
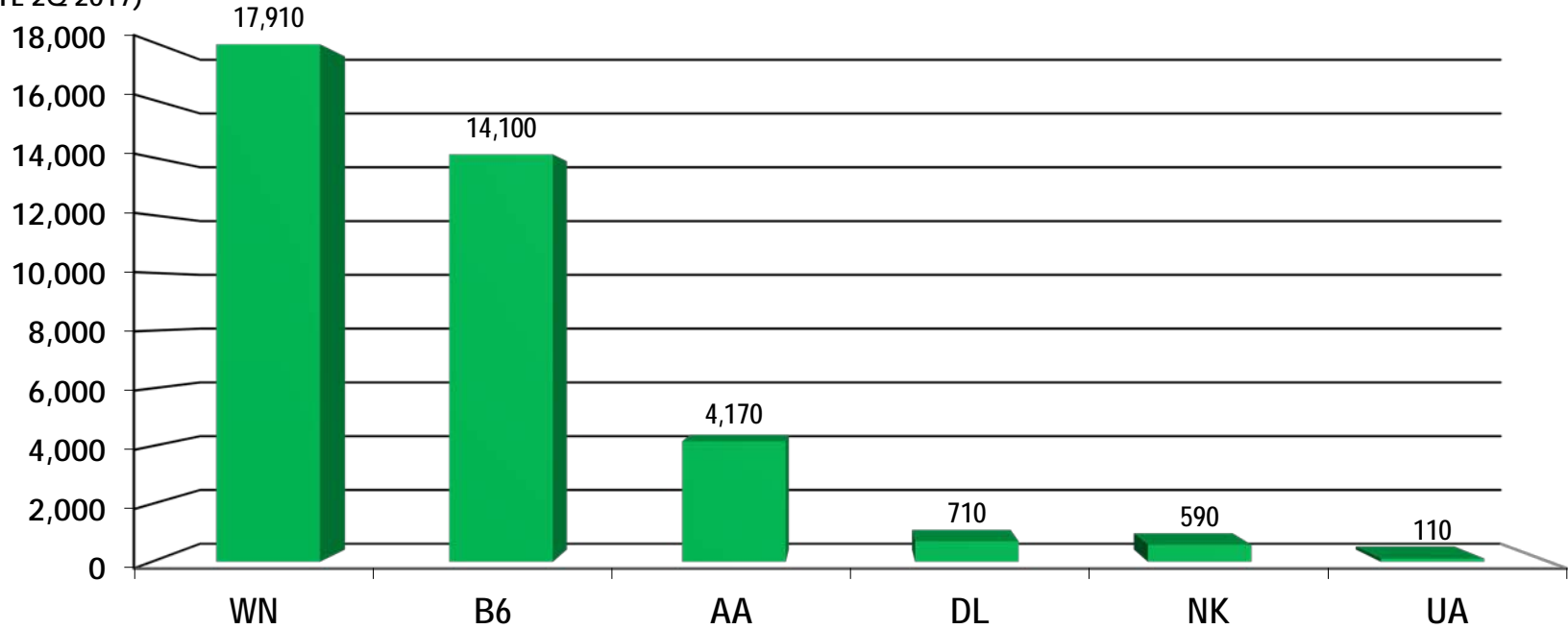
O&D Market Comparisons
By Carrier

**O&D Pax Growth
ABC – South Florida
(YE 2Q 17 vs YE 2Q 16)**

Carrier	Value
WN	940
B6	750
NK	590
UA	-440
AA	-1,860
DL	-2,000

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)

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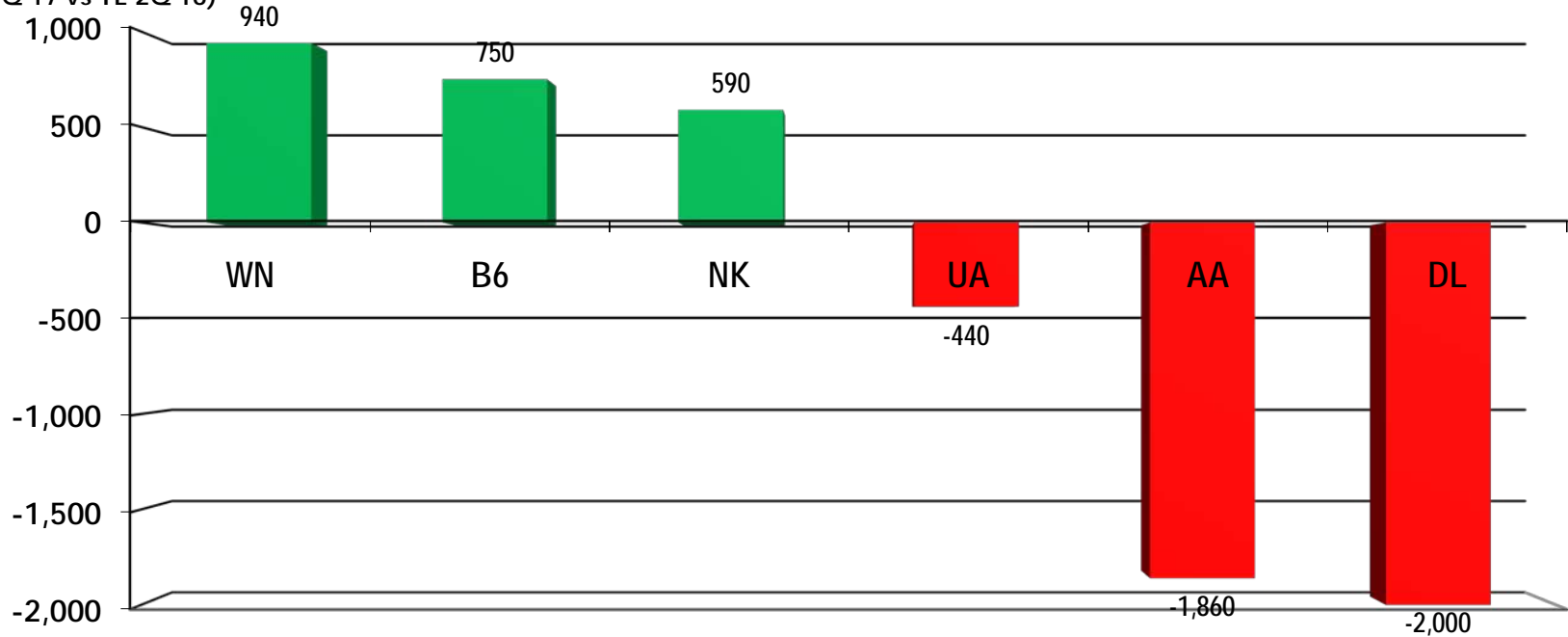
O&D Demand Nonstop Vs. One-Stop
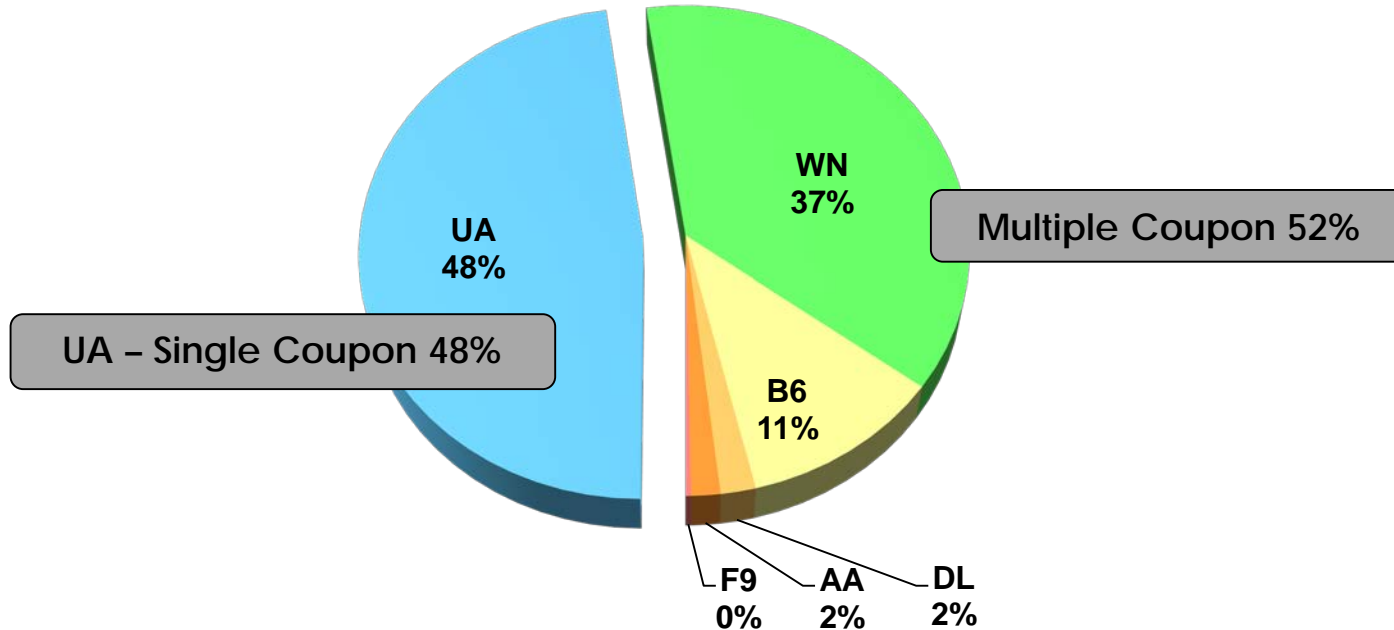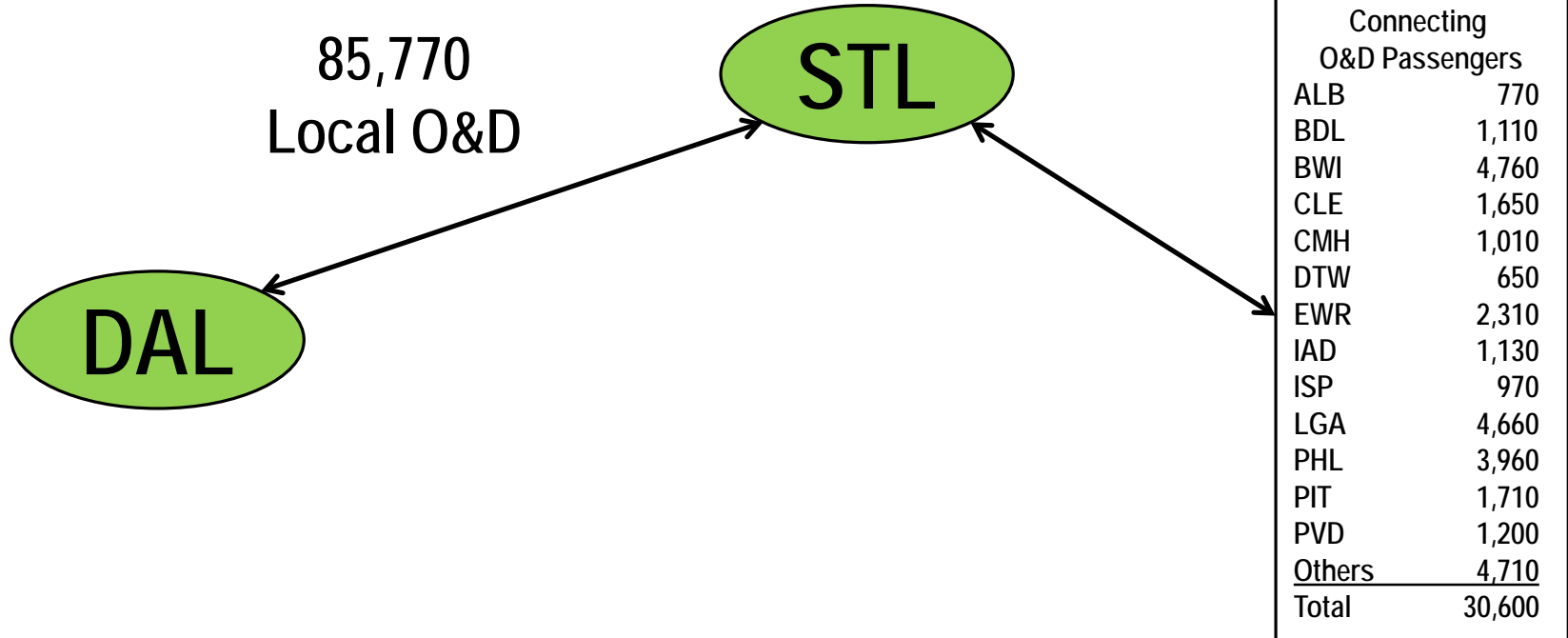
UA 48%

WN 37%

Multiple Coupon 52%

UA – Single Coupon 48%

B6 11%

F9 0%

AA 2%

DL 2%

O&D Connecting Hub Traffic

85,770
Local O&D

STL

DAL

Connecting O&D Passengers	
ALB	770
BDL	1,110
BWI	4,760
CLE	1,650
CMH	1,010
DTW	650
EWR	2,310
IAD	1,130
ISP	970
LGA	4,660
PHL	3,960
PIT	1,710
PVD	1,200
Others	4,710
Total	30,600

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)

Changes to XYZ O&D Market Since Last Meeting

	YE 2Q 2017	Change Since YE 2Q 2016	
		XYZ Only	U.S. Average
Domestic O&D Passengers	756,900	+7.9%	+2%
Average Fare	$157.11	+26.3%	+11%
Domestic O&D Passenger Revenue	$119.2M	+36.3%	+13%
Average Itinerary Yield	21.8¢	+28.2%	
Average Nonstop Yield	23.2¢	+26.7%	
Average Trip Length	678 Miles		

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)

Changes to XYZ O&D Market Since Last Meeting

Average Fare

Chart showing 12-Month Moving Average of Average Fare:

Date	Average Fare
Dec-07	$111
Mar-08	$107
Jun-08	$104
Sep-08	$103
Dec-08	$98
Mar-09	$93
Jun-09	$87
Sep-09	$81
Dec-09	$78
Mar-10	$78
Jun-10	$79
Sep-10	$82
Dec-10	$91
Mar-11	$95
Jun-11	$96

YE 2Q 2017 Vs. YE 2Q 2016
- XYZ Domestic Fares Increased 14%
- Average U.S. Domestic Fares Increased 2%

12-Month Moving Average

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)

O&D Market Changes Compared to Peer Airports

Change in Domestic O&D

Change in Average Domestic O&D Fare

Left chart — Change in Domestic O&D:
- ABC: 23.9%
- DEF: 14.0%
- XYZ: -9.3%

Right chart — Change in Average Domestic O&D Fare:
- DEF: 29.5%
- ABC: 14.6%
- XYZ: 13.7%

Source: U.S.DOT O&D Passenger Survey Data (YE Jun-2017)
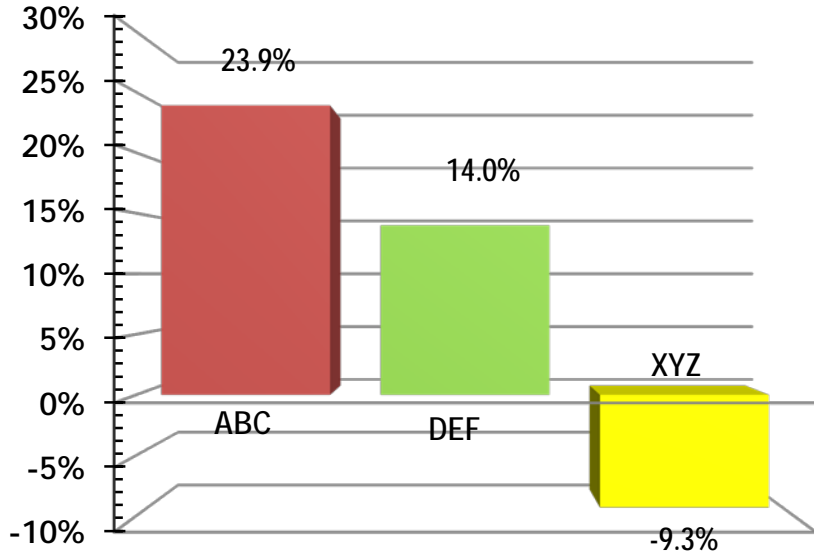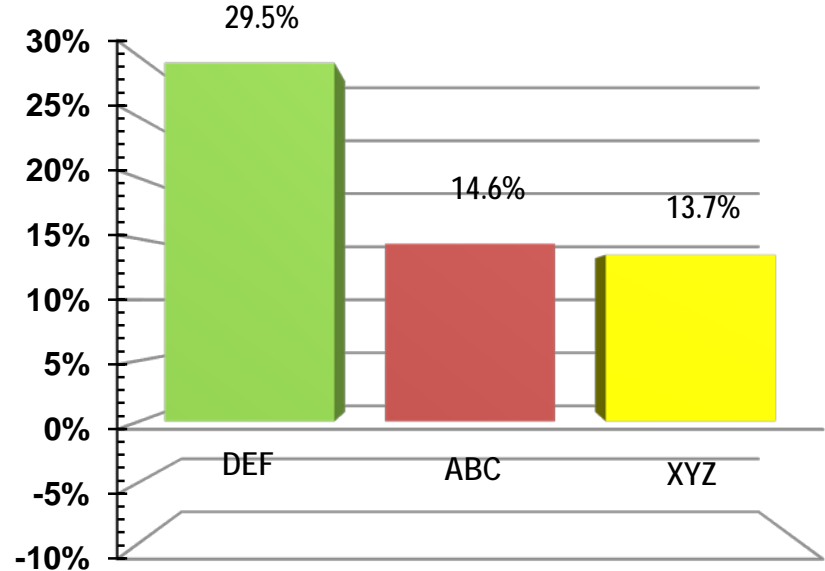
Fare Breakdown Comparison

% of Total Chicago O&D Market

(YE-2Q-2017)

(Outbound Only)

Legend: ABC, DEF

Fare Range	ABC	DEF
FF Rewards	9%	4%
$50-$99	0%	4%
$100-$149	15%	12%
$150-$199	41%	42%
$200-$249	12%	8%
$250-$299	7%	7%
$300-$349	4%	4%
$350-$399	3%	12%
$400-$449	3%	3%
$450-$499	4%	1%
$500+	1%	2%
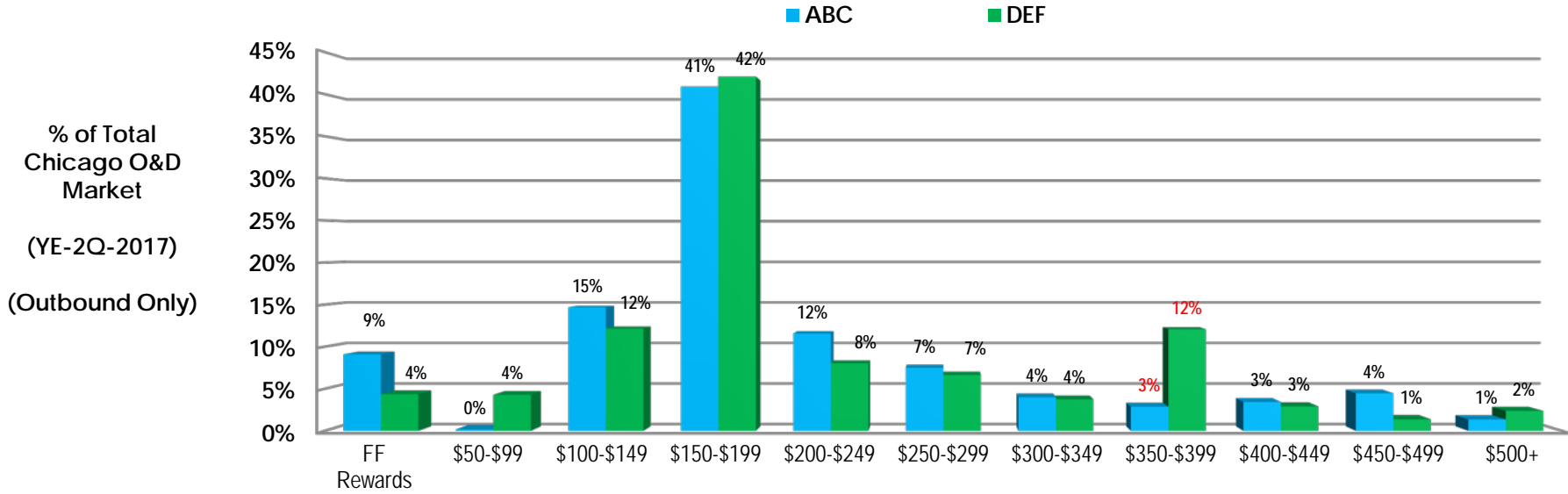
ABC = 12,540 Outbound O&D Passengers   **DEF = 13,090 Outbound O&D Passengers**

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Other Ways to Combine O&D with Other Data

✓ **Census Data**

  ✓ O&D Passengers per Capita

✓ **OAG Schedule Data**

  ✓ Determine top markets/airports without nonstop service
  ✓ Compare available seat capacity with O&D passenger demand to determine if the market is underserved
  ✓ Determine potential connecting markets for proposed new hub service

✓ **MIDT – Leakage Data**

  ✓ O&D serves as the basis to adjust raw MIDT data

International Issues

International DOT Data

✓ **Foreign Carriers are Allowed to view:**
- ✓ T-100 (Domestic & International)
- ✓ Domestic O&D
- ✓ **NOT ALLOWED TO SEE INTERNATIONAL O&D**

✓ **Foreign Carriers US Flights**
- ✓ Must report T-100 data for flights
- ✓ Are not required to report O&D for flights

✓ **International O&D**
- ✓ Does not contain foreign carrier data

Access to International O&D Data is Restricted

✓ **Access to International O&D:**

   ✓ Restricted to U.S. Citizens & U.S. Carriers

   ✓ Approval Needed from DOT-BTS to gain access to International O&D databases

✓ **What can be shared with International carriers?**

   ✓ Trends derived from International O&D

   ✓ ACTUAL DATA MUST BE MASKED

Examples of International O&D Masking
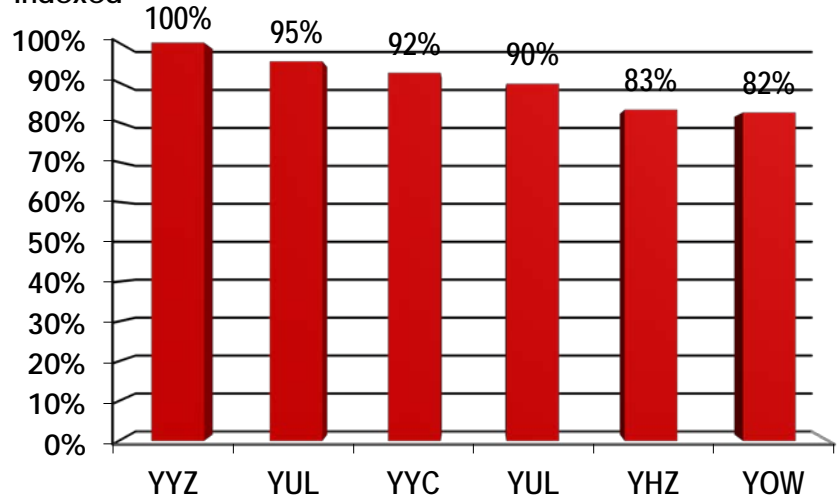
O&D Passengers
(YE 2Q 2017)

For use with a U.S. Carrier

O&D Passengers
(YE 2Q 2017)
Indexed
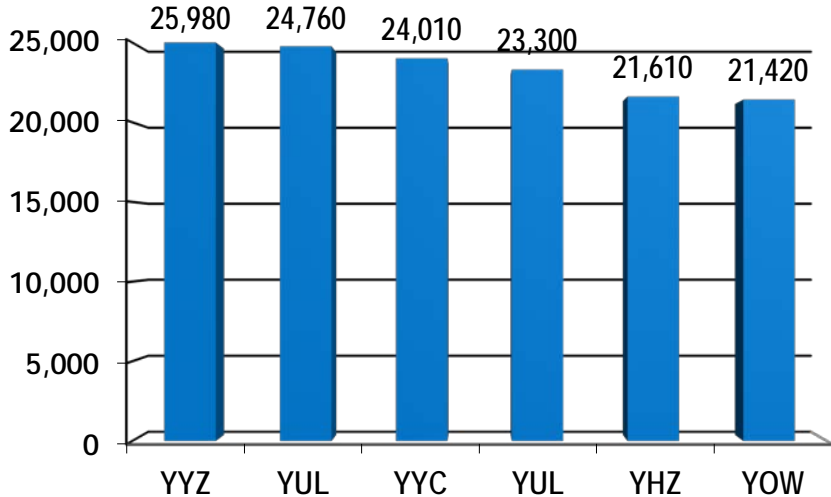
For use with an International Carrier

Conclusions

Conclusions

✓ **Air service development proposals are the equivalent of your airport's day in court**

✓ **Some of the evidence you have to prove your case is hidden inside:**
- ✓ T-100 Data
- ✓ O&D Data
- ✓ Demographic Data
- ✓ Leakage Data

✓ **Know what point you are trying to make**

✓ **Use T-100 & O&D data as the facts that back up your point**

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