Presentation
of
System Airport Efficiency Rate (SAER)
and
Terminal Arrival Efficiency Rate (TAER)

Presented to: Customer Satisfaction Metrics Work Group

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✈The FAA had very little control over many of the metrics it was being held accountable for prior to 2000.

✈The work group that developed the arrival efficiency rate (Command Center, Air Traffic, System Capacity and Mitre) wanted to develop a metric that they could control and influence to improve performance.

✈The methodology used by the Airport Arrival Efficiency Rate (AAER) was developed in January 2000 to provide additional information about an airport's performance. It is a good indicator of overall system performance.

✈Metrics have evolved from Delay only to include Capacity, Efficiency and Throughput measures, Runway Safety (Categories)

Definition of Arrival Efficiency Rate As Computed for System Airport Efficiency Rate (SAER)

The **Arrival Efficiency Rate** is the percentage of time arrivals are greater than or equal to arrival demand or the facility-set arrival rate. The percentage is determined by dividing actual arrivals by the lesser of the arrival demand or the arrival rate. The **Arrival Efficiency Rate** is a measure designed to determine how well the demand for arrivals is met, and is determined by three factors:

→ Arrivals during a given quarter hour - how many aircraft actually landed during that quarter hour

→ Arrival demand for a given quarter hour - how many aircraft wanted to land during that quarter hour

→ Airport arrival rate - the facility-set airport arrival rate for that quarter hour.

Methodology

✈ Each morning approximately 50 airports provide AAR (Airport Arrival Rate) and ADR (Airport Departure Rate) and runway configurations for the previous day for their facility through an Intranet site established by the Command Center.

✈These rates are based on weather conditions, runway configurations, and arrival and departure traffic mix. Whenever AAR, ADR, or runway configuration changes during the day, additional records are provided with this updated information.

✈In ASPM this information is then established for 15-minute time periods for the entire day.

✈ Demand is not derived from the scheduled traffic but is derived in the following manner for each flight:

Start of Demand = Wheels-Off Time + Filed Enroute Time

(this is the time the flight should be at the arrival airport, i.e., wheels-on)

End of Demand = Wheels-On Time

(this is the time the flight actually arrived at the arrival airport)

✈ From the above, you can see that demand for a particular flight could occur in several 15-minute time periods.

Definition of Departure Efficiency Rate As Computed for System Airport Efficiency Rate (SAER)

The **Departure Efficiency Rate** is the percentage of time departures are greater than or equal to departure demand or the facility-set departure rate. The percentage is determined by dividing actual departures by the lesser of the departure demand or the departure rate. The **Departure Efficiency Rate** is a measure designed to determine how well the demand for departures is met, and is determined by three factors:

➢Departures during a given quarter hour - how many aircraft actually departed during that quarter;

➢Departure demand for a given quarter hour - how many aircraft wanted to depart during that quarter;

➢Airport departure rate - the facility-set airport departure rate for that quarter hour.

✈ Demand is not derived from the scheduled traffic but is derived in the following manner:

Start of Demand = Gate-Out Time + Unimpeded Taxi-Out Time

(this is the time the flight should leave the departure airport, i.e., wheels-off)

End of Demand = Wheels-Off Time

(this is the time the flight actually departed the departure airport)

✈ From the above, you can see that demand for a particular flight could occur in several 15-minute time periods.

System Airport Efficiency Rate (SAER)

✈ The SAER is a weighted average (by demand) of arrival and departure efficiency rate.

✈ At ATL on 8/28/2005, for the quarter hour from 16:00 to 16:14:

Departures: 19   Arrivals: 21
Departure Demand: 20   Arrival Demand: 42
Departure Rate: 24   Arrival Rate: 22
Departure Efficiency: 19/20 = 95.00   Arrival Efficiency: 21/22= 95.45

Airport Demand = Departure Demand + Arrival Demand = 62

SAER = (20/62) x 95.00 + (42/62) x 95.45 = 30.65 + 64.66 = 95.31

✈With the current AAER some known shortcomings exist when evaluating a particular airport

✈In order to have a more accurate measure factors outside the control of the airport environment were studied to understand their impact on demand at the airport.

✈The current AAER system methodology has been refined to better estimate the actual demand at an individual airport

Terminal Arrival Efficiency Rate (TAER)

The following changes minimize shortcomings in evaluating individual airports:

Changes for Arrivals

→ **Start of demand takes into consideration excess time flown prior to 100 miles from arrival airport by estimating ETA from data at the 100 mile point**

→ **EDCT delays are not considered**

→ **Buffer adjustment is reduced to 5 minutes from 15 minutes, ETA from ATO-R methodology and On from AZ content time or Wheels On**

→ **Quarter hour actual demand and rates summed to compute hourly score (no quarter score available)**

Metric Impact

→ **The start of demand better reflects only airport impacts (100 miles from the arrival airport).**

→ **This removes any penalty for the arrival airport in case of adverse weather.**

→ **This provides a more accurate start of demand and fewer adjustments.**

→ **Handles facilities concerns of peak demand in quarter hours**

ATL

40-mile

100-mile
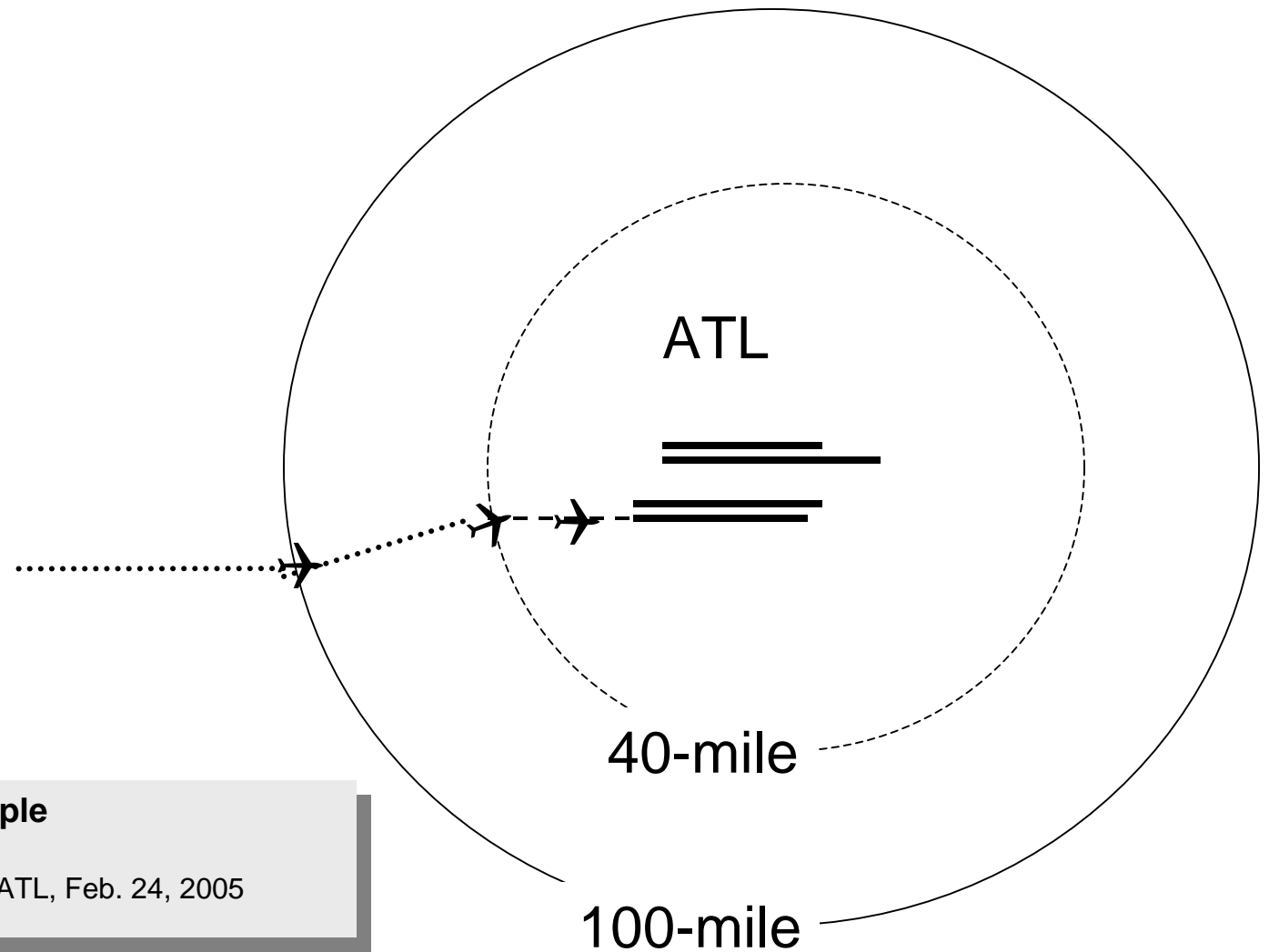
Example

Flight AAL 310, DFW-ATL, Feb. 24, 2005

Terminal Arrival Efficiency Rate (TAER)

Input Data

Each day, input data are received by 0500 for the previous GMT-day completed flights from the following sources:

ETMS: Carrier, flight number, leave and arrive airport, DZ and AZ times, EDCT, ETE.

ARINC: Carrier, flight number, leave and arrive airport, OOOI times.

Circle: Carrier, flight number, leave and arrive airport, latitude and longitude and time at 100 miles from arrival airport.

Runway File: Runway configurations, AAR, ADR, actual arrivals and departures by hour

Terminal Arrival Efficiency Rate (TAER)

Processing Circle Files

✈Use tables by approach fix, runway configuration, equipment type (jet, piston, turbine) and weather conditions (IMC, VMC) to obtain average speed from 100-mile position to 40-mile approach fix.

✈Use average speed to compute time from 100-mile to 40-mile approach fix.

✈Using same tables, obtain average time from 40-mile approach fix to wheels-on (sum of time from 100 to 40 and 40 to wheels-on).

✈Time as computed above becomes the start of demand. Actual wheels-on becomes end of demand.
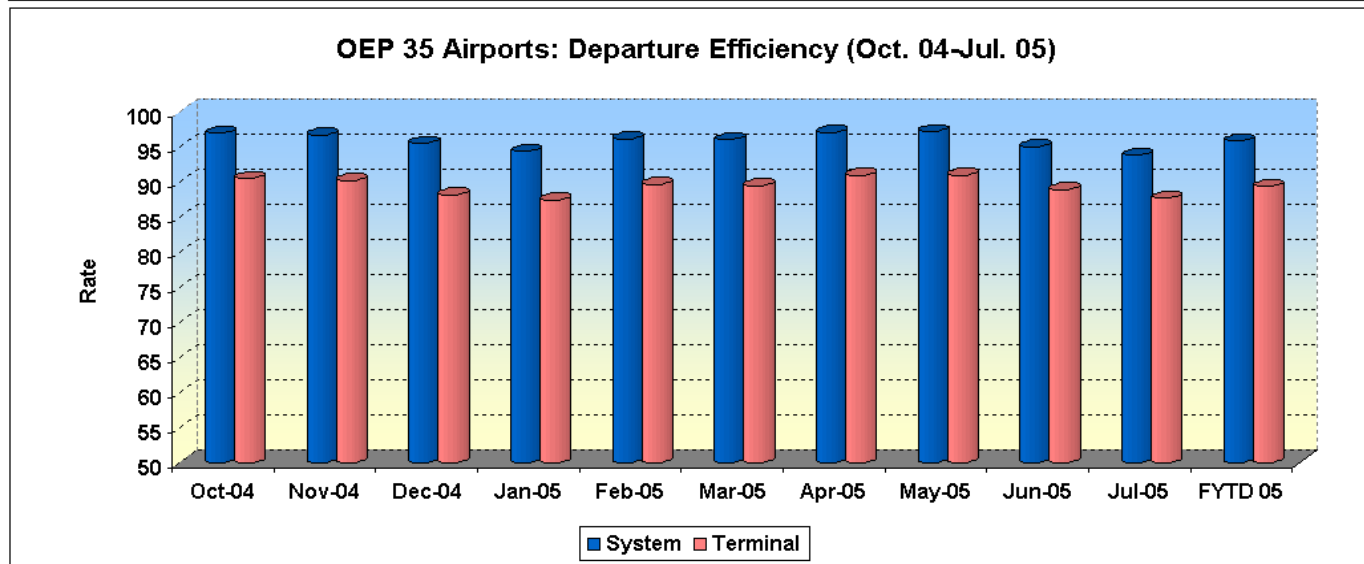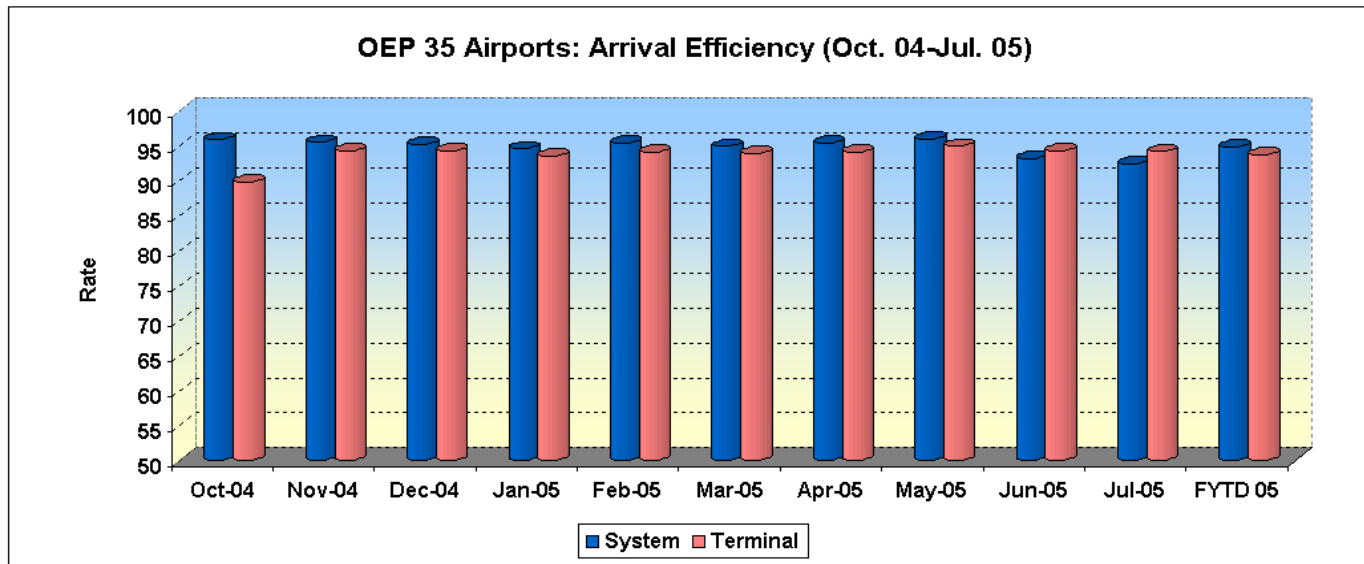
Terminal Arrival Efficiency Rate (TAER)

TAER Methodology

➢ Compute arrival demand based on computed wheels-on time by quarter hour.

➢ Compute end of demand based on actual wheels on by quarter hour.

➢ Sum quarterly demand and actual to obtain hourly counts.

➢ **TAER = Actual arrivals / (Arrival Demand not to exceed AAR)**
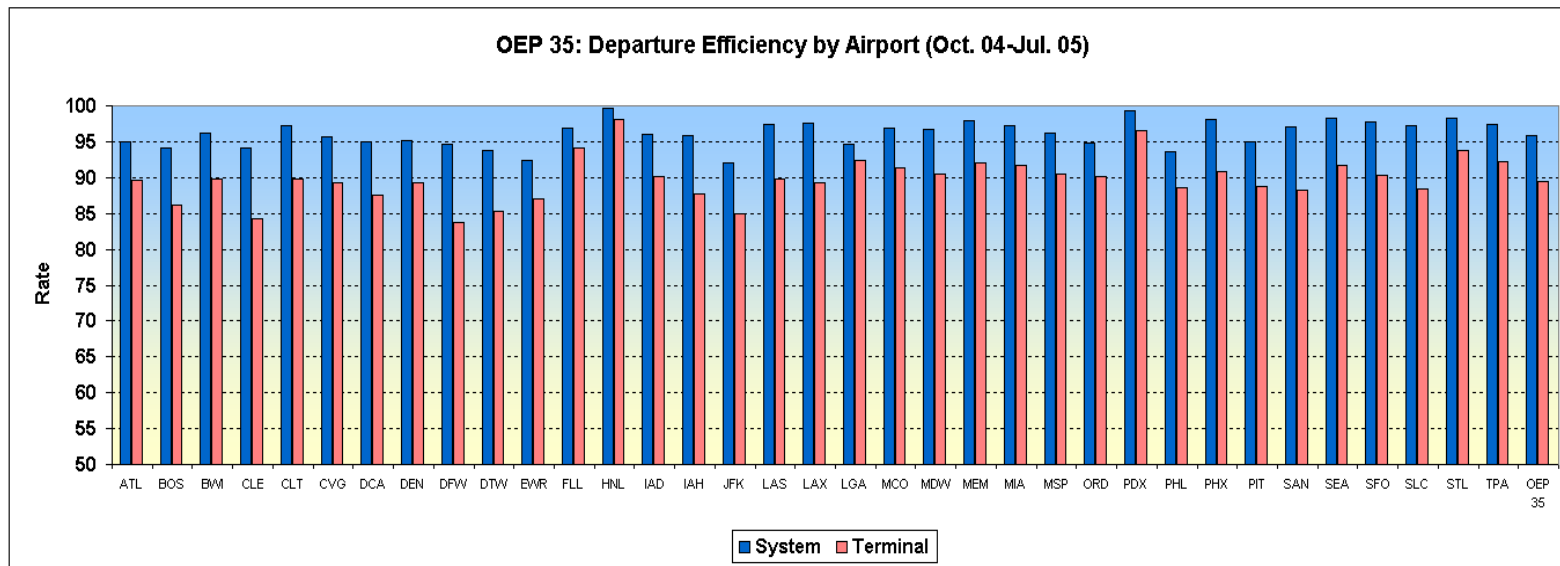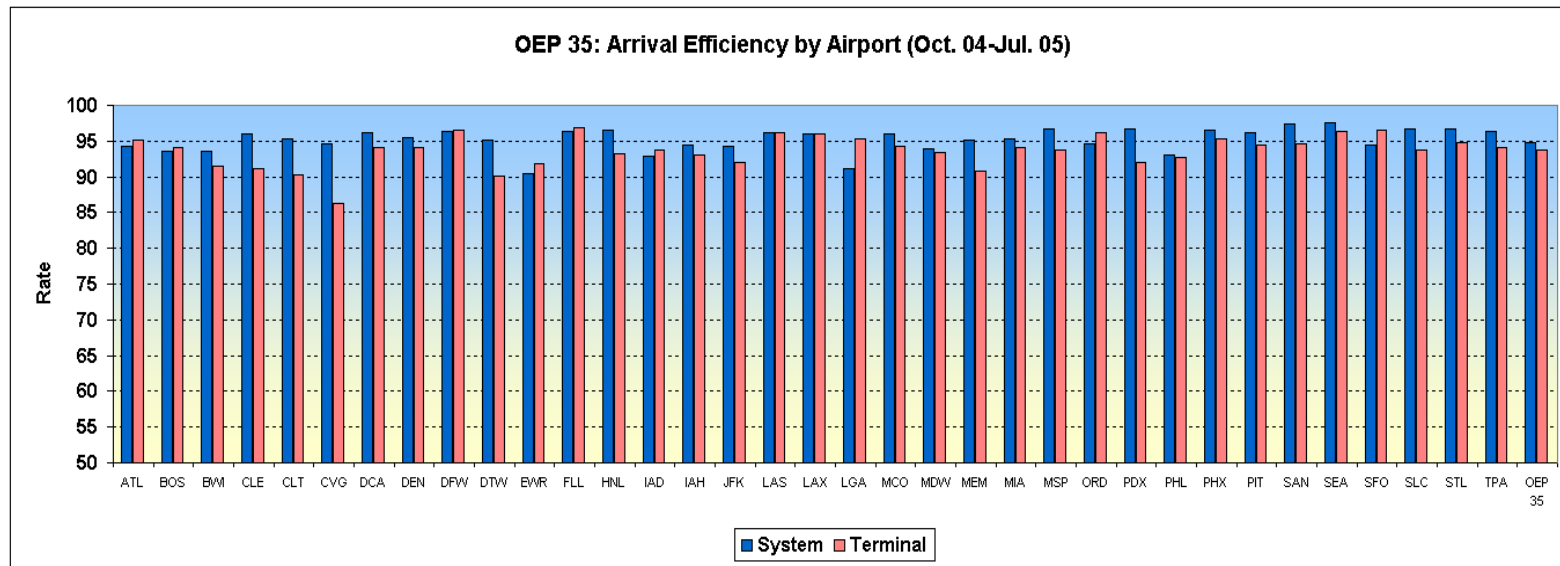
Note: TAER cannot exceed 100.

OEP 35 Airports: Arrival Efficiency (Oct. 04-Jul. 05)

OEP 35 Airports: Departure Efficiency (Oct. 04-Jul. 05)

Source: ASPM

OEP 35: Arrival Efficiency by Airport (Oct. 04-Jul. 05)

OEP 35: Departure Efficiency by Airport (Oct. 04-Jul. 05)

Source: ASPM