PROS ORIGIN-DESTINATION III
REVENUE MANAGEMENT SYSTEM™
PROS O&D III~ALTÉA CONNECTORS™
SOLUTION OVERVIEW

Unlock Your Data • Unleash Your Sales
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PROS O&D III is a state-of-the-art, PNR-based revenue optimization tool for the airline industry. The highly configurable PROS O&D III system provides significant incremental revenue benefits over leg/segment solutions and non-PNR-based systems through ground-breaking, PNR-data-driven forecasting and network optimization to determine the right price that maximizes revenue. With PROS O&D III, airlines increase revenue by differentiating price and availability for passengers based on true value. Best practices in business processes further enhance the tool to provide an advanced, evolving, and comprehensive solution for airline revenue management departments.
ADDRESSING REVENUE-CRITICAL CHALLENGES

• CHALLENGES
  • Are leg-based revenue management solutions maximizing revenue opportunity for major hub-based or network-oriented airlines?
  • How can the overall network revenue be captured?
  • What is the optimal fare mix between local and connecting demand?

• SOLUTIONS
  • PROS PNR-based, direct O&D demand forecasting technology.
  • PROS dynamic programming (“DP”) network-optimization technology.
  • High-performance software architecture with proven scalability.
  • Analyst-friendly, configurable, web-based user interface.
  • Advanced real-time decision support to execute market strategies.

• RESULTS
  • PROS O&D III solution proven in production to generate revenue lift at world-leading airlines.
  • Major advantage over competitors with leg-based revenue management (RM) solutions as validated by real-life experiences and academic research.

ANALYTICS, EXECUTION, AND OPTIMIZATION

• ANALYTICS
  • Identifies low-performing markets.
  • Highlights potential denied boardings.
  • Monitors potential seat spoilage.
  • Alerts users to critical flights with high-revenue opportunity.
  • Identifies market anomalies requiring review or special handling.
  • Highlights opportunities and challenges requiring review and/or action.
  • Provides decision support for pricing availability.

• EXECUTION
  • Provides user influences to impact final controls.
  • Automatically implements optimal controls.

PROS O&D III solution proven in production to generate revenue lift at world-leading airlines.

Major advantage over competitors with leg-based revenue management (RM) solutions as validated by real-life experiences and academic research.
• Manages unique seasonal and holiday demand behavior.
• Implements strategy at configurable levels of detail – i.e., by region, by market, by flight, etc.
• Manages pricing of products based on currency differential.
• Appraises the value of interline traffic demand based on its revenue contribution to the airline.

**OPTIMIZATION**

• Maximizes network revenue by optimizing the traffic mix – i.e., local vs. connecting, point-of-sale, B2B corporate deals, etc.
• Forecasts accurate micro-level demand and passenger show-up.

• Determines optimal overbooking, upgrade and capacity levels.
• Determines optimal minimum acceptance price/bid price controls.
• Maximizes revenue in markets that exhibit low-fare demand behavior by using the “Hybrid Forecaster and Optimizer” functionality in PROS O&D III. PROS has conducted simulations that show airlines can achieve significant revenue benefit by PROS O&D systems to counteract buy-down behavior and revenue spiral-down.

**DATA LOADERS**

PROS O&D III uses multiple sources of data provided by the airline, including rich PNR-level data extracted from the airline reservations system. This data is cleansed, transformed, and processed via the data loaders. The resulting booking and cancellation transactions are the building blocks for providing valuable insight into customer and market behavior.

• Web-based data editors and analytics reporting and custom views allows revenue managers to analyze traffic flows, booking trend, point-of-sale mix.
• The booking and cancellation transactions reported at the detailed itinerary level provide valuable insight into customer behavior as well as market behavior.
• The user has the ability to create custom reports through data extraction and export capabilities.
The PNR-based PROS O&D III “Forecasting” module includes major science innovations that improve forecast accuracy over other RM systems. The PROS O&D III Forecasting module provides distinct forecasts for bookings and cancellations at various levels from passenger itinerary down to the passenger type. The PROS O&D III solution allows analysts to apply influences to the forecasts to account for activities that affect demand such as holidays and special events. This flexibility enables the forecaster to model unique demand patterns and to quickly capture emerging trends.

- Employs robust and sophisticated Bayesian Hierarchical techniques to provide distinct PNR-based forecasts for bookings and cancellations at various levels:
  - Origin and destination
  - Path of passenger itinerary (i.e., trip O&D for both on-line and interline demand)
  - Point-of-sale
  - Class
  - Departure date
  - Time of day
  - Passenger-type (i.e., individual passengers, group passengers, code-share passengers, etc.)
  - Significant improvements in forecast accuracy with new Bayesian Hierarchical technology.
  - High-performance scalable architecture supports the world’s largest airlines.
  - Comprehensive seasonality application and holiday/special event management uniquely cater to deviations in demand.
  - Comprehensive user-influence features enable analysts to intuitively express and reflect business changes directly at the O&D, market, point-of-sale, leg, segment, or flight level.
  - Forecasts can be created and reported at any level of detail desired by other departments and can be sent as input to be used by the other departments’ systems (i.e., planning, pricing, scheduling, etc.).
  - Performance measurement features provide analysis of forecast accuracy.
  - User-friendly decision support and network views are presented.

The PROS O&D III Forecasting module provides distinct forecasts for bookings and cancellations at various levels from passenger itinerary down to the passenger type.
NETWORK OPTIMIZATION

PROS O&D III “Network Optimization” module incorporates leading-edge dynamic programming science with other optimization techniques to address a variety of challenges such as overbooking, upgrade/downgrade potential, convertible seats, flexible cabins, etc. The output from network optimization generates revenue-optimal bid price controls as well as leg/segment allocations to support the legacy booking process.
- Process includes optimizing overbooking, planned upgrades, convertible seats and flexible cabin plans
- The optimization process produces sophisticated bid-price matrices for precise O&D controls as well as leg/segment allocations to support legacy availability and booking procedures.
- Provides user-friendly decision support and network views.
- Flexible management-by-exception (“MBX”) network O&D user interface enables ease of use.

FARE VALUATION

PROS O&D III “Fare Valuation” functionality generates accurate data input to be used in network optimization as well as in the pricing and availability decision process. Airlines with significant B2B and B2C fare differences by point-of-sale will reap significant benefits from the use of more precise price valuation when making decisions to accept/or reject passenger requests.
- Utilizes an airline’s pricing and revenue accounting data to produce forward-looking passenger value estimates by O&D, booking class, and point-of-sale
- The valuation takes into consideration the many factors that can cause a difference in value despite passengers having the same itinerary and fare class.
- Incorporates interline revenue sharing, agency commissions, and other factors of customer-value differentiation.
- International airlines with significant fare differences by point-of-sale and travel agencies will reap significant benefits from the use of more precise passenger valuation in optimization and control.
- Captures the true value of passenger traffic associated with codeshare and alliance partners.
- The estimation of passenger value will be used in the availability decision process to determine the optimal availability of the booking classes by which each request can be accepted.
- The estimation of passenger value will also be used by the PROS O&D III “Network Optimization” functionality so that the optimal bid prices on future
departures are in sync with the reality of market fares.

- Provides key inputs to PROS Real-Time Dynamic Pricing™ (PROS RTDP) engine through sophisticated upload caching technology.
- Based on feedback from airline clients, this module provides vital feedback to the pricing analysts in terms of:
  - which fare products sell more than others.
  - what that means for the overall yields in any given market?
  - User-influence feature allows analyst to influence fare values in order to accurately reflect changing market conditions.

PROS O&D III HYBRID FORECASTER AND HYBRID OPTIMIZER

As an add-on component complementing the PROS O&D III system, the PROS O&D III “Hybrid Forecaster” and “Hybrid Optimizer” functionality provides a new breakthrough solution for airlines to maximize revenue and to minimize revenue dilution when operating a low-fare business model or competing with other low-fare airlines in markets characterized by restriction-free pricing.

- The new Hybrid Forecaster predicts the passenger demand's price-sensitivity and their willingness-to-pay at the O&D market level.
- The Hybrid Forecaster is built on the proven PROS Bayesian forecasting methodology to predict two different types of market segments associated with each O&D/point-of-sale:
  - Yieldable demand ~ traditional demand who tend to buy specific fare products at a specific price based on individual preference and adherence to the rules of those fare products
  - Priceable demand ~ price-sensitive demand who generally buy the lowest price point available; however, the point here is to analyze the relative degree that such demand is willing to buy up AND at what sell-up price from which they would walk away
- This Hybrid Forecaster forecasting technique is conducive particularly to predicting price-sensitive demand, especially in markets with extensive low-fare competition where there are little or no traditional fare products with rules and where there are only multiple price points that passengers could pay.
- The Hybrid Optimizer is a network optimization dynamic programming methodology.
- Essentially, the Hybrid Optimizer incorporates both priceable and yieldable forecasts when determining the optimal inventory controls (i.e., bid prices and AUs) that maximize revenue.
PROS O&D III CONNECTOR TO AMADEUS ALTÉA

This section describes at a high level the interface integration between PROS O&D III and Amadeus Altéa reservation and inventory system. The main interfaces and features are discussed at a high level. These pages cover the standard interfaces at a sufficient level to provide information concerning which interfaces are implemented, which data formats are supported, and supported communication protocols.

The diagram above depicts, at a high level, the integration between PROS O&D III and Amadeus as facilitated by the PROS interface.
NIGHTLY BIF CONVERSION
The nightly BIF consist of the full flight inventory snapshot and post-departure at a certain period at night. This file contains a series of IFLIRR EDIFACT messages representing flight inventory information. This file will be converted by the interface to the PROS O&D III inventory data format and updates the inventory map if required. In addition, the schedule will be derived from the inventory data.

INVENTORY
The O&D inventory file is the source of flight inventory information for O&D. The inventory data must reflect the inventory details of the flights in the reservation system.

SCHEDULE
The O&D schedule file is the primary source of flight-schedule information for O&D. The schedule must reflect the schedule that is open for sale in the reservation system.

ONLINE SBRRES MESSAGE
The Amadeus online SBRRES message is sent whenever the PNR is touched, according to triggers set up with Amadeus. The interface converts these to O&D PNR format and stores these. At a set time the interface will collect these PNRs and present them to O&D in a single file. These messages are sent via MQ series and are in the EDIFACT format.

PNR
PNR load is a nightly process that will load a collection of PNRs that have been converted. The purpose of this PNR data dump is to provide PROS O&D III with booking and cancellation activity to forecast future booking and cancellation demand.

UPLOAD
The upload files are created by the O&D application and contain the optimized AU levels and/or Bid Price-related data (depending on the configuration). The data of these upload files is required to be sent to the reservation system.

IOPTAQ
The O&D Upload files are converted to the Amadeus EDIFACT recommendation file format called IOPTAQ. These messages are then sent to Amadeus using MQ series.

BACKGROUND RE-OPTIMIZATION REQUEST
This is a pseudo-real-time request from the reservation system to optimize a single flight date. This is usually a RES-triggered event. In the case of Amadeus this message comes in the format of the IOPTNQ message, which is a request to optimize. The interface responds to the message by retrieving
the latest flight inventory information from Amadeus using either APIv2 call or Web services (see Request Flight Details). The interface then converts this to the O&D inventory format and hands it to PROS O&D for re-optimization. The IOPTNQ is received via MQ series connectivity and is in EDIFACT format.

REFRESH REQUEST

The Inventory Refresh Request is generated by PROS O&D III if it is configured to expect Inventory Refresh support. It requests updated inventory data for the specified Carrier Code, Flight Number, and Departure Date. The expected response to this request is a standard set of inventory data records for the requested flight. If the requested data cannot be provided, a “Standard Error Record” should be returned instead, conveying the reason for the request failure.

REQUEST FLIGHT DETAILS

This real-time message is sent to Amadeus in response to “Background Re-optimization Request” or a “Refresh Request” as indicated above. This message requests full information for the flight that needs to be optimized. The interface can send a flight detail request using either Amadeus APIv2 communications library or the newer web services call. This sends an IFLIRQ request for flight details and receives the IFLIRR flightails message.

SEAMLESS INTEGRATION AND CHOICE

PROS is not tied to a specific GDS and has integrated successfully with all major PSS systems. You are not locked into an RM system as part of a GDS and are free to choose a reservation system independent of an RM system.

PROS O&D PRICING DATA

This is the pricing data that PROS O&D III uses to optimize the carrier’s network. PROS does provide an add-on interface for those wishing to convert from ATPCO FROP to PROS O&D III pricing format. PROS~ATPCO connector is the application that converts the ATPCO FROP data where the airline stores, manages, and publishes all of its fares so they can be distributed to the PROS O&D III pricing data. The interface shall map FROP file fields to the Pricing Fare data that PROS O&D III requires for the “Fare Valuation” subsystem. PROS~ATPCO connector can be used to process files nightly or on demand. PROS~ATPCO connector also contains processing rules to transform fare basis codes to fare basis group mapping rule, currency conversion, and surcharge values processing rules.
PROS O&D REVENUE ACCOUNTING DATA

This is the revenue accounting data PROS O&D III uses to optimize the carrier’s network.

PROS O&D DCS DATA

The O&D Altea Interface manipulates the nightly SBRRES file, in order to produce the PNR no-show data file that will be loaded into PROS O&D III for further processing in show-rate forecasting. Following the selection of offers that meet the customer’s criteria, the system will generate a “draft contract” for review. If the agent agrees with the conditions in the draft contract, the system will provide the capability to book the group and it will also create the final contract for signature.

PROS O&D DAILY FARE

The PROS O&D III “Daily Fare” data are generated by PROS O&D III. This connector shall be enhanced to handle the transformed fares from the PROS O&D III revenue management business solution to the Altéa system.

IYLDCQ MESSAGE

The interface converts the PROS O&D III Daily Fare format into the Altéa IYLDCQ Yield format. These messages can be sent by FTP and are in EDIFACT format.

SUPPORTED AMADEUS COMMUNICATIONS AND FILE FORMATS

The following communications methods with Amadeus are available:

- FTP (BIF, SBRRES batch)
- Web Services (IFLIRQ, IFLIRR)
- while not recommended, Amadeus APIv2 is still supported for backward-compatibility reasons
- MQ Series (IOPTNQ, IOPTAQ, SBRRES Online)

The following data formats are available:

- BIF (IFLIRR), IFLIRQ, IOPTNQ, IOPTAQ versions 06.1 and 07.1
- SBRRES 7.1, 8.1, 8.3, 9.3.2, 10.3
- IYLDCQ 8.1.3
PROS Holdings, Inc. (NYSE: PRO) is a big data software company that helps customers outperform in their markets by using big data to sell more effectively. We apply years of data science experience to unlock buying patterns and preferences within transaction data to reveal which opportunities are most likely to close, which offers are most likely to sell and which prices are most likely to win. PROS offers cloud solutions to optimize sales, pricing, quoting, rebates and revenue management across more than 40 industries. PROS has completed over 800 implementations of its solutions in more than 55 countries. The PROS team comprises approximately 1,000 professionals around the world.

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