

Surveillance solutions for CAR/SAM area

INTELCAN TECHNOSYSTEMS

PROVIDING SOLUTIONS THAT TAKE FLIGHT



Panama City. September 22nd, 2015

Intelcan Profile

PROVIDING SOLUTIONS THAT TAKE FLIGHT

INTELCAN IS AN INNOVATIVE CANADIAN CORPORATION WITH A PROVEN 40-YEAR TRACK RECORD IN DESIGN, MANUFACTURING, AND DEPLOYMENT OF COMMUNICATIONS, NAVIGATION, SURVEILLANCE (CNS), AIR TRAFFIC MANAGEMENT (ATM), AND AIRPORT INFRASTRUCTURE

Intelcan Offering

CNS/ATM Products

- ATM |
- ADS-B | PSR | MSSR | PAR
- AMHS | D-ATIS | RCMS
- ILS | DME



Integrated Aeronautical Solutions

- Turnkey Aeronautical Solutions
- Integration with 3rd party systems (new & existing)



Customized solutions

- Closer to customers
- Innovative, flexible and nimble solutions

Recent Experience

- ▶ Intelcan has successfully delivered CNS/ATM & airport solutions to countries around the world in all the regions of ICAO.
- ▶ This diversity of experience ensures that Intelcan offers solutions that meet international and regional standards.
- ▶ Adapted to different environments and project size

Europe

LNAF, Latvia
PANSA Poland
PAF Poland
RAF Romania
MoD Bulgaria
GECI Spain

Asia & Pacific

KAC Korea
AASL Sri Lanka
Indonesia

Americas

NAV CANADA
EXCELIS USA
JCAA Jamaica
CAI Cuba
HIA Cuba
QIA Ecuador
GCAA Guyana
DINAC, Paraguay

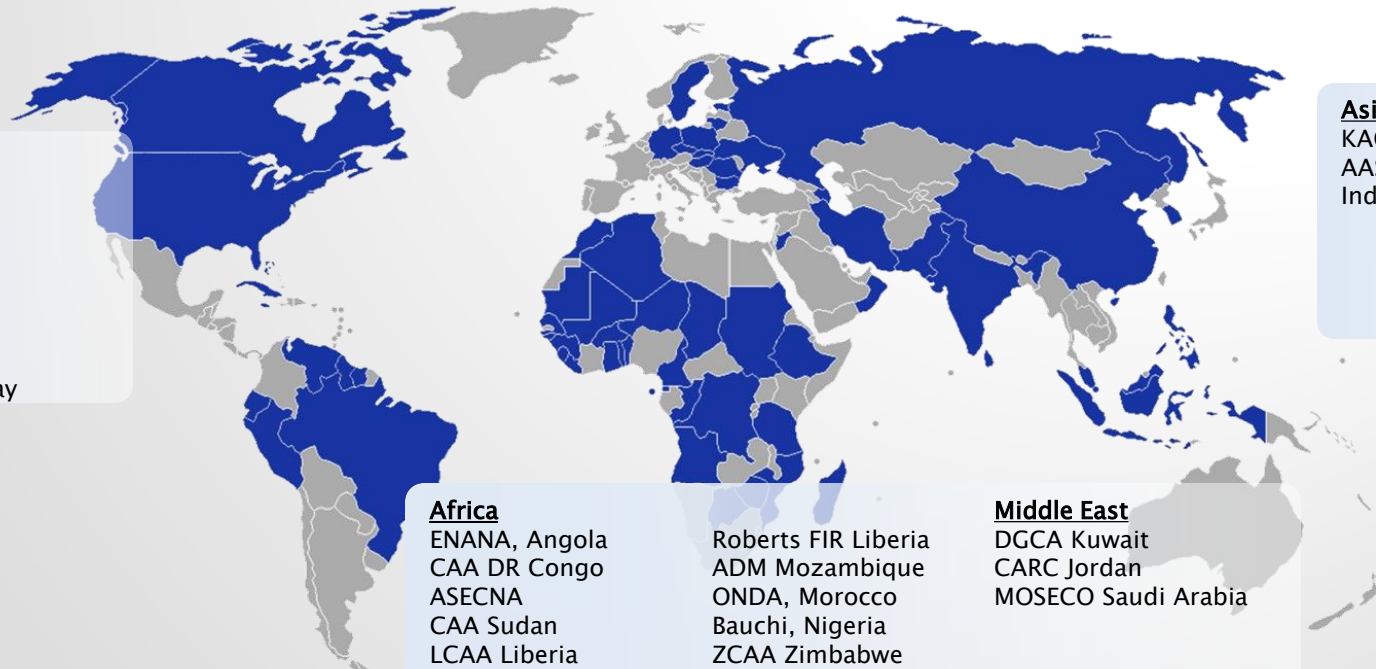
Africa

ENANA, Angola
CAA DR Congo
ASECNA
CAA Sudan
LCAA Liberia
NDCA Guinea
CAA Equatorial Guinea

Roberts FIR Liberia
ADM Mozambique
ONDA, Morocco
Bauchi, Nigeria
ZCAA Zimbabwe

Middle East

DGCA Kuwait
CARC Jordan
MOSECO Saudi Arabia



The Guyana experience



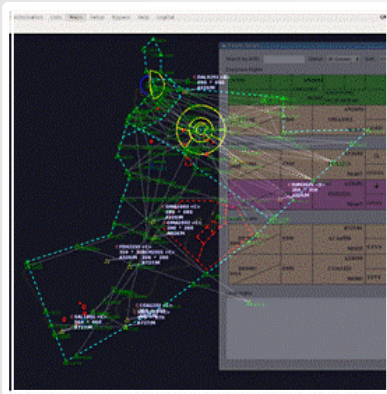
Modernization of the CNS/ATM systems in the republic of Guyana

PROYECT PARAMETERS

- Need for improved awareness
 - Atm system
 - Surveillance means
- Maximize the use of existing infrastructure
 - Airport facilities
 - Airport already crowded with antennas towers
 - Communication means
- Coverage
 - At RWY touch points
 - En- route
- Reliability, availability and maintenance

The Guyana experience

Proposed solution



SkyControl ATM SDPS

- Flexible solution
- Adapted to specific customer need and procedures
- Cost efficient
- Modular for future evolution of needs

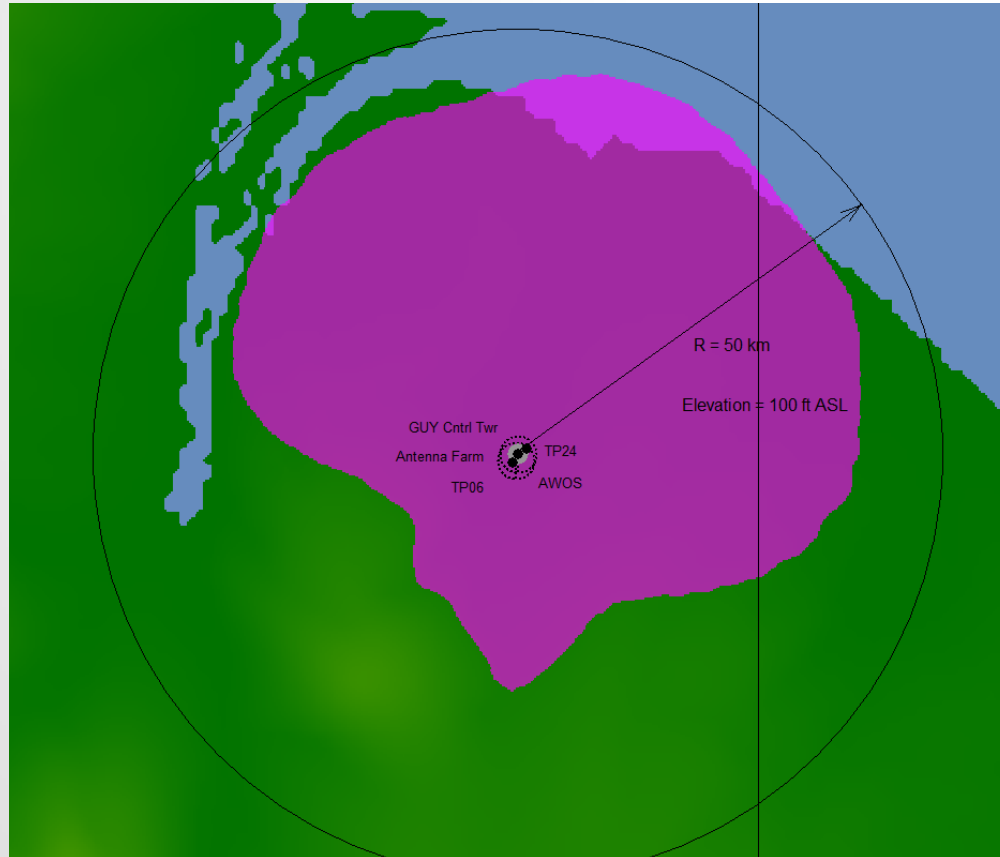
SkyControl ADS-B station

- Cost effective
- Adequate coverage from RWY touch point to en-route
- Easy to install and maintain
- Use of existing infrastructure (VHF antenna TWR and equipment room)
- More than 90% aircrafts equipped



The Guyana experience

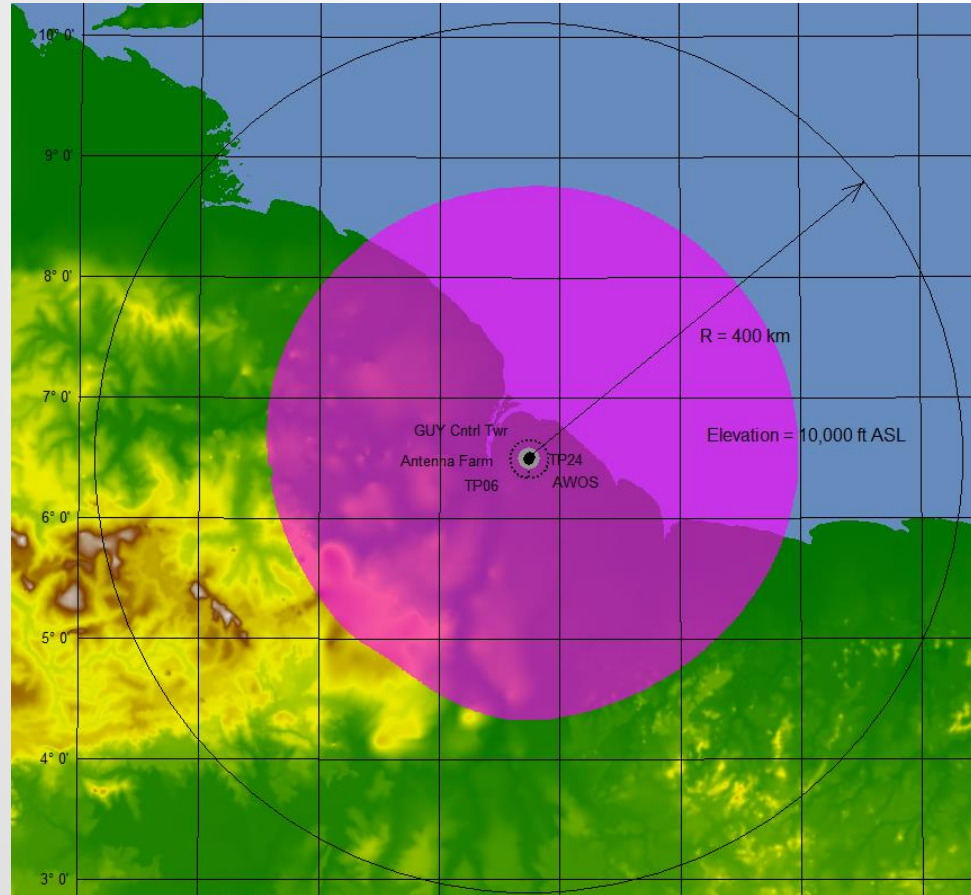
Coverage analysis



LOS COVERAGE AT FL 001

The Guyana experience

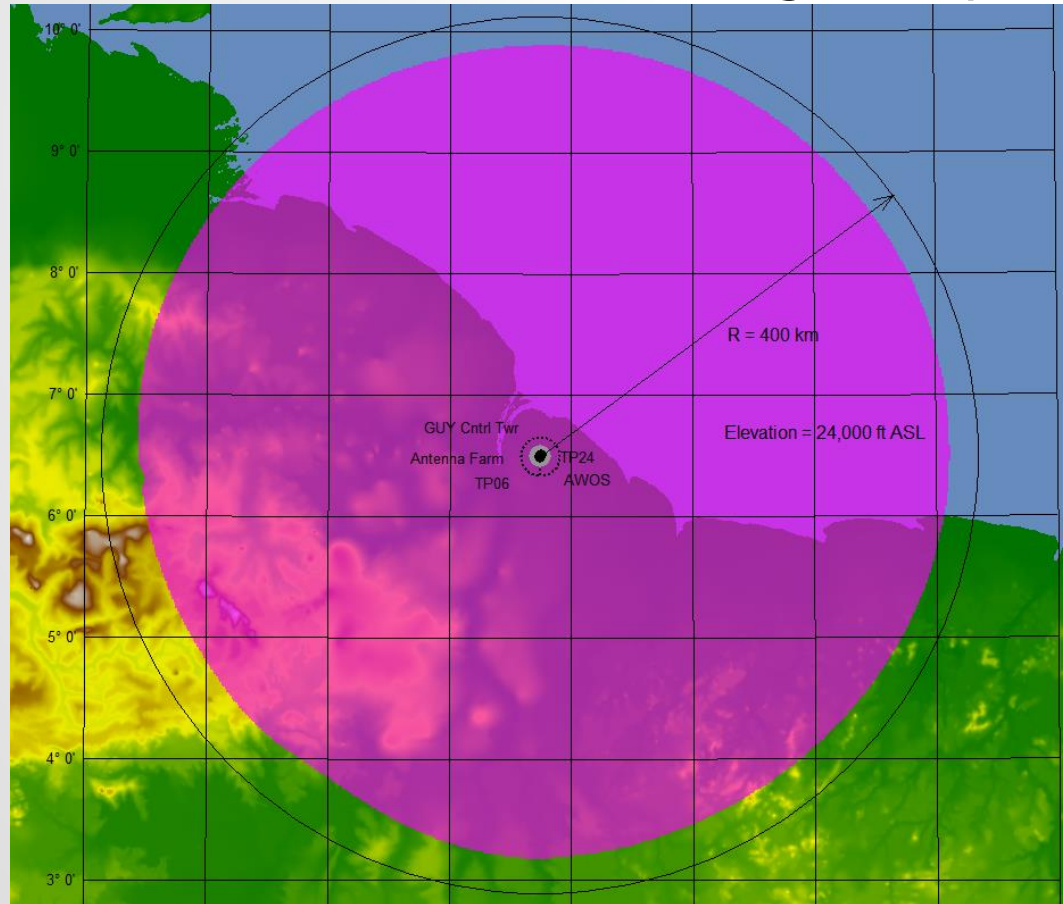
Coverage analysis



LOS COVERAGE AT FL 100

The Guyana experience

Coverage analysis



LOS COVERAGE AT FL 240

The Guyana experience



Modernization of the CNS/ATM systems in the republic of Guyana

PROYECT RESULTS

- Objective coverage obtained
- Maximum reuse of existing facilities and systems.
- Modular System prepared for easy expansion for future needs and extended coverage
- Reliable solution, no failure detected in 1 year. No interruption of service
- More than 90% of aircrafts equipped with ADS-B at FL 245 based on real traffic observation
- Lower cost and maintenance cost vs other technologies

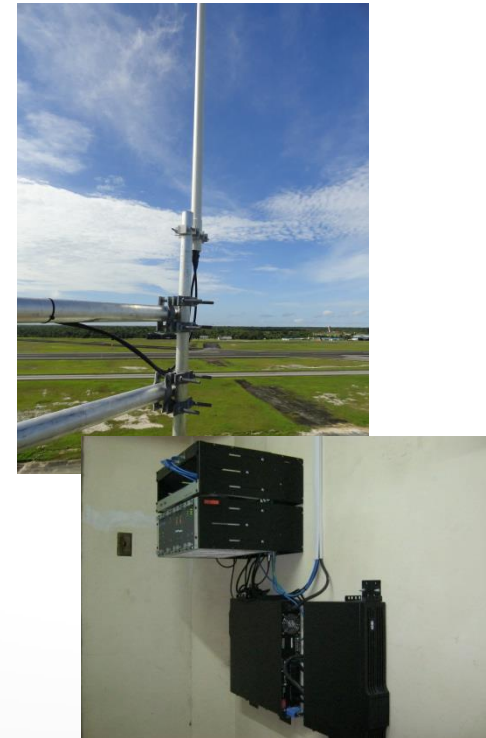
ADS-B Technology

PROS

- **Cost:** ADS-B is a very cost effective alternative in many ATM applications. Total cost of ownership < 35-50% of any other surveillance solutions .
- **Performance:** low latency (< 2s), high update rate (1s), high accuracy (based on GNSS), not affected by range, high capacity (> 500 targets), surface & air surveillance.
- **Flexibility:** small form factor solution, significantly less affected by terrain or weather; solid-state; lightweight, low-maintenance, low power, with the ability to leverage multiple power sources,

CONS

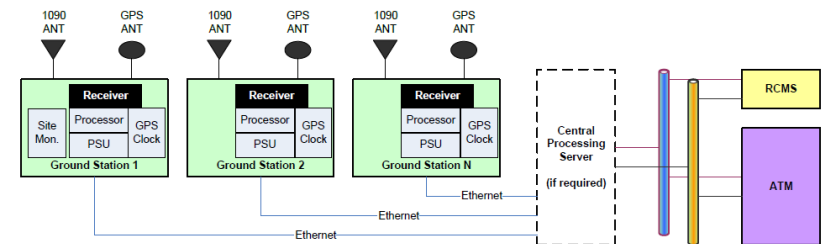
- **Interoperability:** Required that all aircraft are equipped. **But**, as our Guyana analysis shows, we get 90% of targets in their FIR.
- **Security/Safety:**
 - Relies on GNSS: **But**, GNSS modernization/deployment is reducing the risk.
 - Relies on airborne equipment: **But**, just like it SSR technology.



Intelcan ADS-B solution

SKYSURV is comprised of the following:

- **Ground Station:** one or more receiving Ground Stations installed at specified sites (locations), and including a site monitor.
- **Central Data Processing:** ADS-B central data processing equipment - *optional*.
- **Control And Monitor System:** remote/local Control and Monitor System for remote management of the whole system from the control center;
- **Target Display:** offers Radar-like display and viewing of live or recorded ADS-B targets. It is intended for diagnostic and testing of the ADS-B reception and processing performance - *optional*.
- **Record and Playback:** collects ASTERIX and/or Raw messages sent by the ground station and playback the recorded data - *optional*.



The Ground Station

Ground Station is composed of:

- RXU – Receiver Unit (up to 6)
- SMU – Site Monitor Unit (0 or 1)
- PSU – Power Supply Unit (1 or 2)
- MPU – Main Processing Unit (1 or 2)



All units are Line Replaceable Units (LRU), Support full hot swap, and can be unplugged/replugged or replaced easily without interruption of service on a redundant model. They are designed to avoid damage if plugged into a wrong slot.

SkySurv ADS-B is conceived with a cross redundancy design for improved availability and robustness.

System Description

RCMS

The screenshot displays the RCMS software interface with several windows open:

- DORVAL AIREPORT**: Shows station location (SIC: 1, SAC: 10, Latitude: 45.0, Longitude: -73.7474, Altitude: 20.0) and status (STATION: Playback, FPGA: OK, GPS: FRODOBH, CPU: 0%).
- Connections**: Shows 3 Connected ATM and 1 Connected RMM.
- Temperature**: Shows current temperature at -273.15, with min and max also at -273.15.
- FPGA Status**: Lists various FPGA parameters and their values, mostly 0.
- FPGA Statistics**: Lists various FPGA statistics and their values, mostly 0.
- Station Config**: Shows station identification fields (Name, SIC, SAC) and IP address settings (Address, Subnet Mask: 255.255.255.255, Default Gateway address: 255.255.255.255).
- MPU Memory**: Shows CPU Memory (Total: 502032, Available: 72.15) and Hard Drive Memory (Total: 239854112, Available: 94.5292).
- Test Signal**: Shows configuration options for a test signal, including Test Signal Enable (unchecked), Aircraft Address (B1B1B1), Latitude (0), and Longitude (0).
- Event Logs**: Shows a table of events with columns for Date & Time, User, Type, and Event. The table contains 9 records, including login and LOGOFF events.

The status bar at the bottom indicates: QNLDR @ 10.2.2.54, admin is Level3 user, MPU version: V1.0, Model: ADSB 500, 2011/09/16 12:44:46.

System Description

Target Display

The screenshot shows the Intelcan ADSB Display interface. On the left is a flight list table, and on the right is a radar target display. The flight list table is as follows:

ICAO	AID	Filter	Flight Label	Lat (°)
19	AA84CB	UAL9		6.69
20	AA55CA	AAL8		
21	AB00D6	DAL237	United States	
22	B181B1			49.30
23	C00A9B	SWG827	Canada	45.46
24	C01551	404	Canada	43.94
25	C0173E	ACA871	Canada	46.33
26	C01755	ACA857	Canada	46.51
27	C02205	ACA831	Canada	45.45
28	C05089	ACA883	Canada	46.58
29	C053F6	ACA891	Canada	47.21
30	C058AF	ACA815	Canada	45.17
31	C05CDD	KCE2	Canada	47.21
32	C05000	TP	Canada	45.48

The radar display shows a central target at approximately 60 nm range, with concentric circles at 60 nm, 120 nm, and 180 nm. The target is highlighted with a green box and a label. The display also shows other aircraft as yellow icons and terrain as green outlines. The status bar at the bottom indicates: Connection: 1 MCAST, Real-Time Mode, Doral: lat 45.4681° lon -73.7414°, and the timestamp 2012/07/06 14:04:45.

ATM Solution

Today's ATM challenges are:

- Multiple sensors (ADS-B, Radar, Flight Plan, MLAT, ...)
- Compliance to changing standards
- Customized user interfaces
- Scalability
- Cost Reduction
- System Security

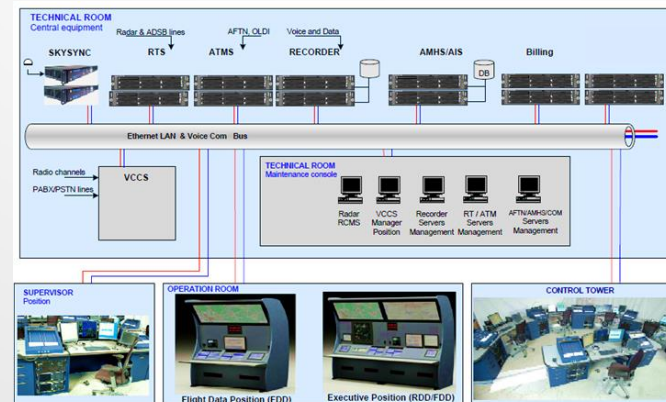


Overview

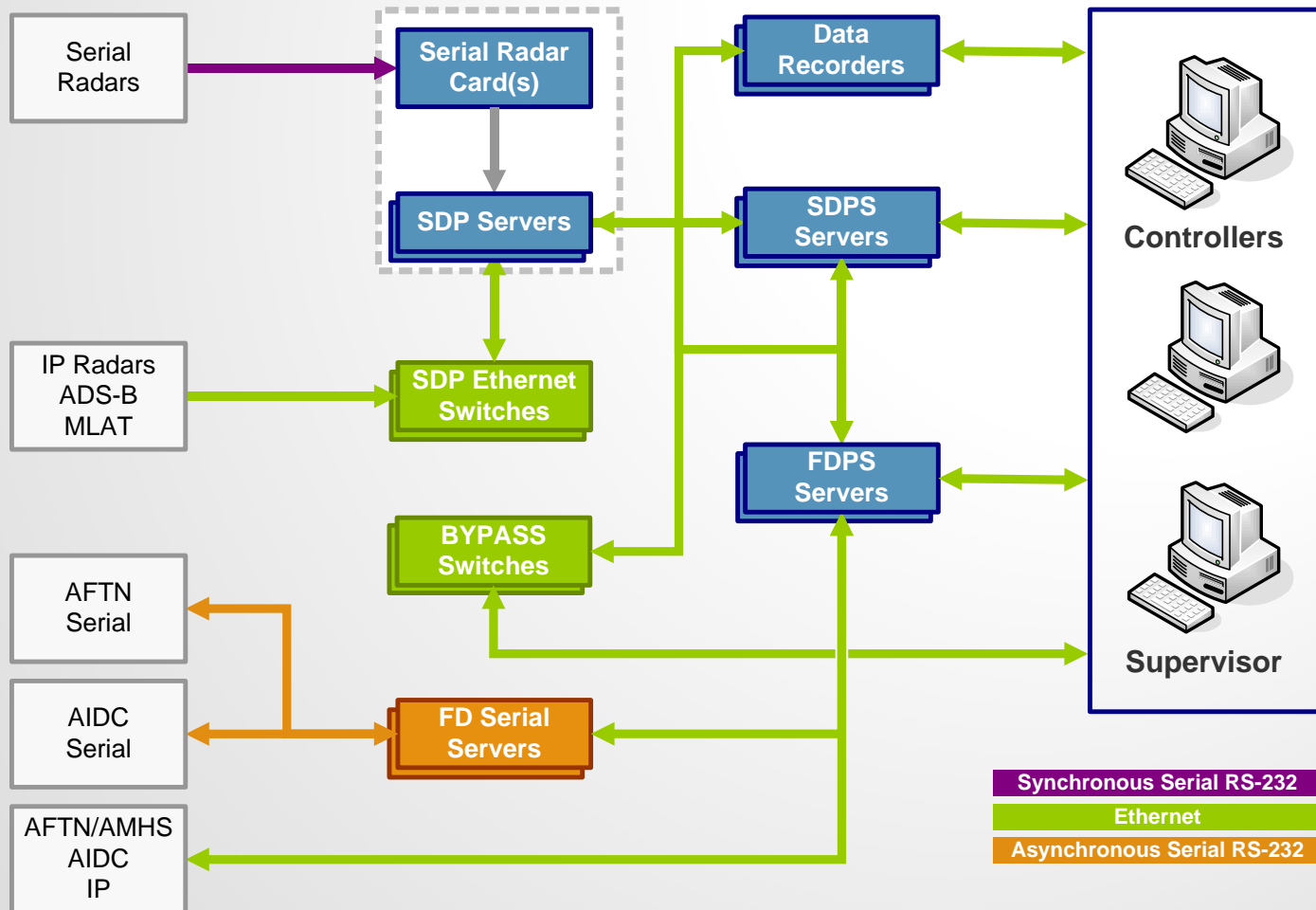
- ▶ SKYCONTROL ATM has a solid track record with deployments on all 5 continents.
- ▶ It complies with ICAO, Eurocontrol and NATO requirements.
- ▶ Selected by ITT (later Exelis, and now Harris) to complete their Surveillance Offering in the US and international Market (Canada's MoD, Sweden's DoD,..)

Intelcan ATM Solution: SKYCONTROL

- ▶ Based on COTS Hardware with an open architecture running on Linux.
- ▶ Highly Scalable:
 - ▶ Support of multiple surveillance sensors: PSR, MSSR Mode S, ADS-B and Multilateration
 - ▶ Offers customization through user definable variable system parameters (VSP)
 - ▶ Virtually unlimited CWP expansion (Tested with up to 128 positions)

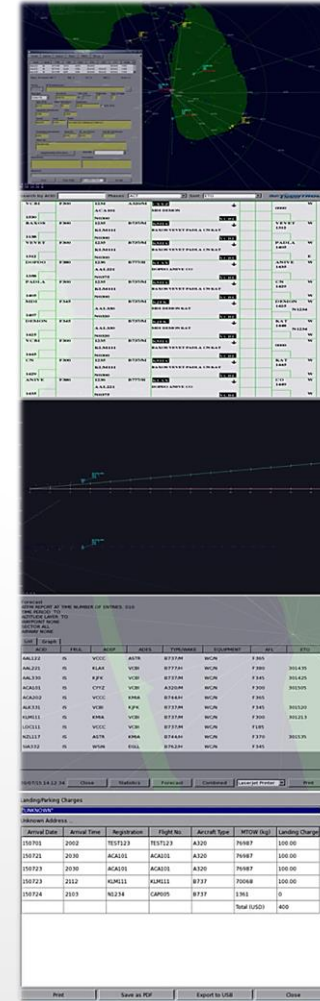


ATM System Components



SKYCONTROL ATM Integrated Solution

- Radar Tracking
- Flight Plan Processing
- Radar – Flight Plan Correlation
- Electronic Flight Strips
- Approach Path Monitoring
- MET & NOTAM Processing
- System Monitoring
- ATC Forecast (ATFM)
- Billing Support

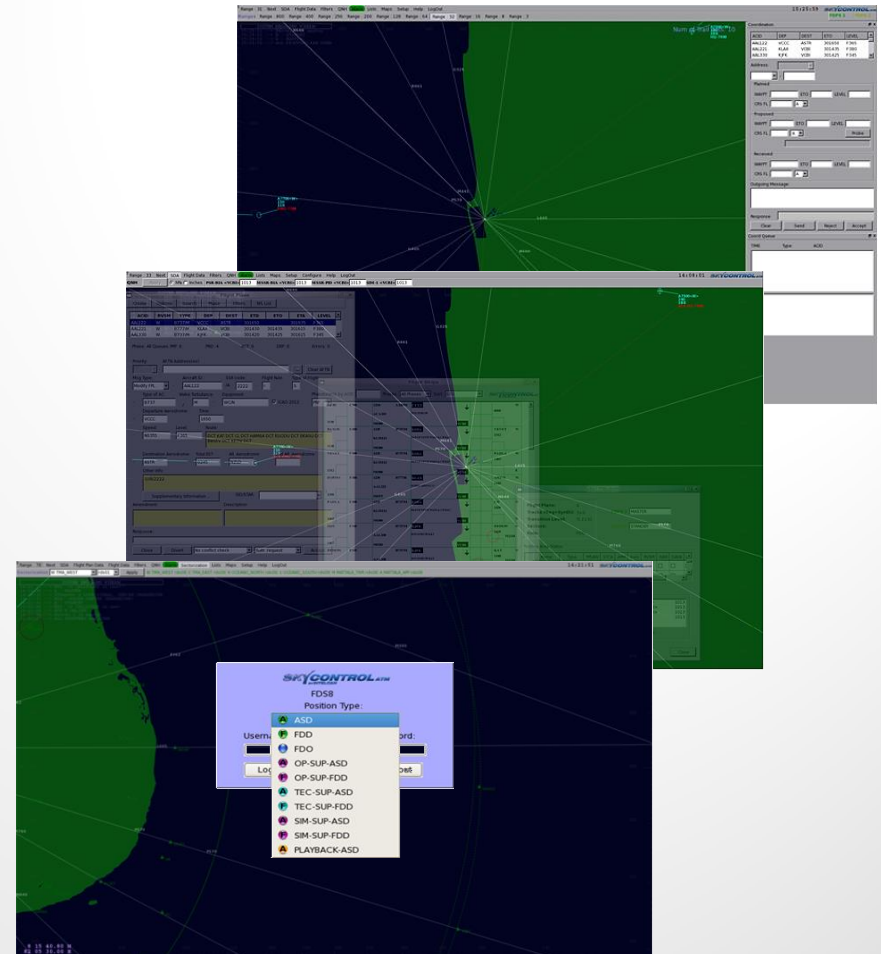


Customized Solution

- ▶ System Customized to meet client requirements providing specific design for:
 - Customized Server Distribution
 - Workstation Graphical User Interface layout
 - Multiple Electronic Flight Strip formats
 - Customized Simulator solutions
 - Billing Data for Invoicing

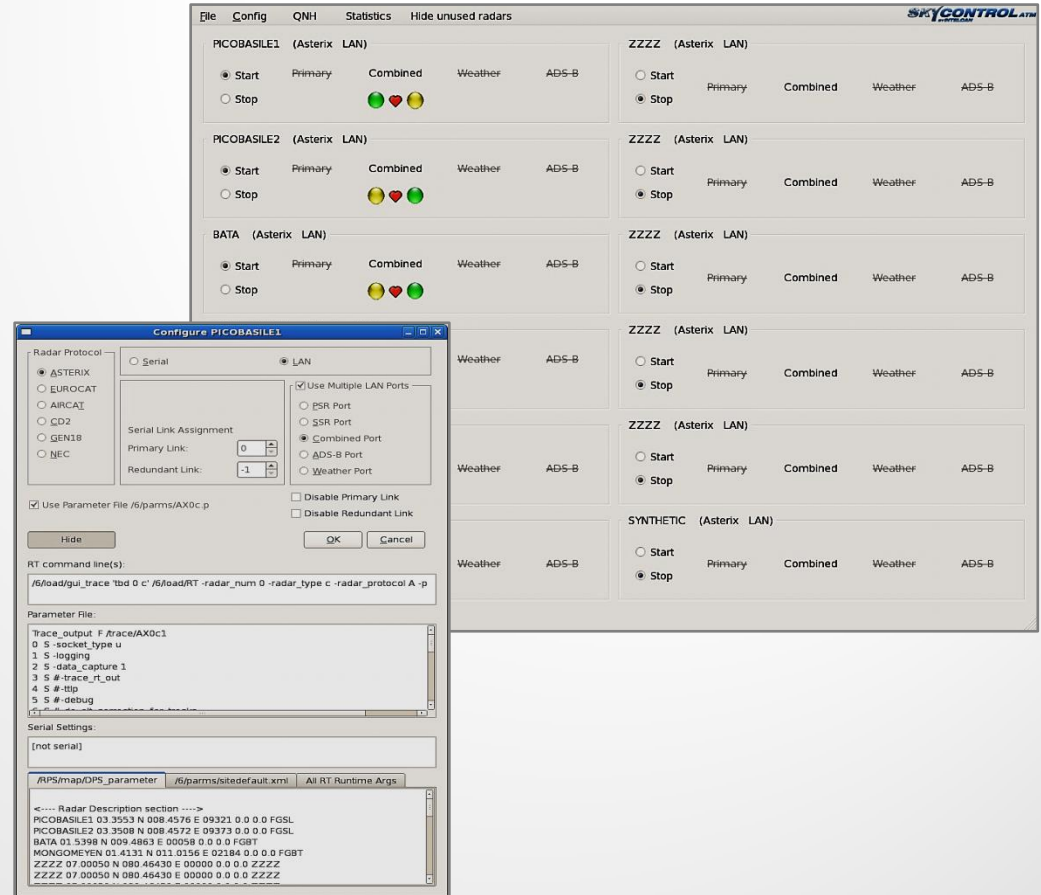
Customized GUI Layout

- ▶ Customized GUI to meet the specific end-user layout
- ▶ Providing ATC system features at each Controller Workstation based on the flexible role definition
- ▶ CWP application based on the latest look-and-feel technologies, including:
 - Transparent windows
 - Multiple color choices for virtually all map elements
 - Customer defined map symbols and target symbols

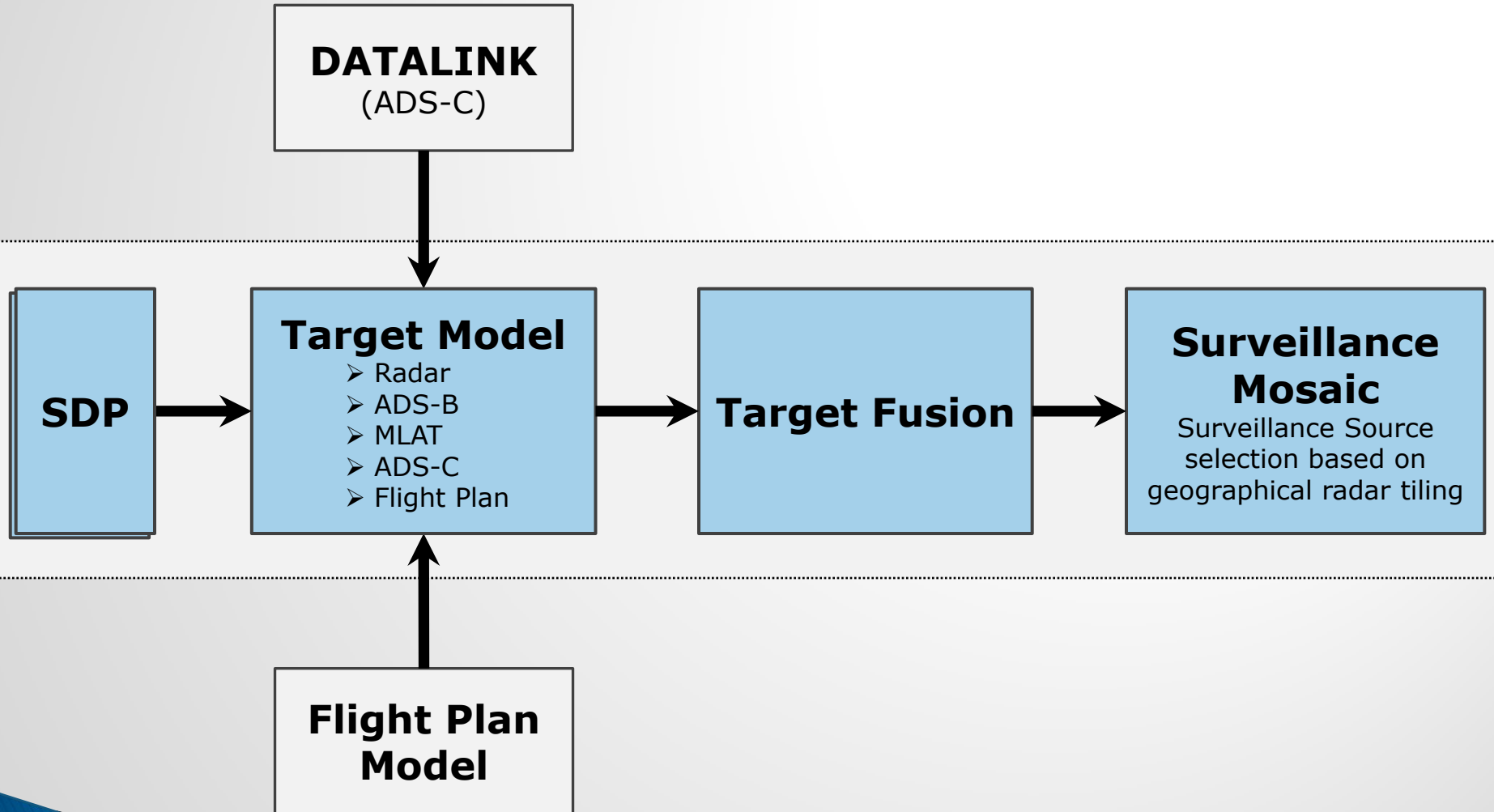


Multi-Sensor Tracking

- ▶ Multi-Sensor Tracking
- ▶ Sensor Data Input
 - ✓ ASTERIX
 - ✓ EUROCAT
 - ✓ AIRCAT
 - ✓ GEN18
 - ✓ CD2
 - ✓ EVZ
 - ✓ NEC
- ▶ Sensor Bypass Output

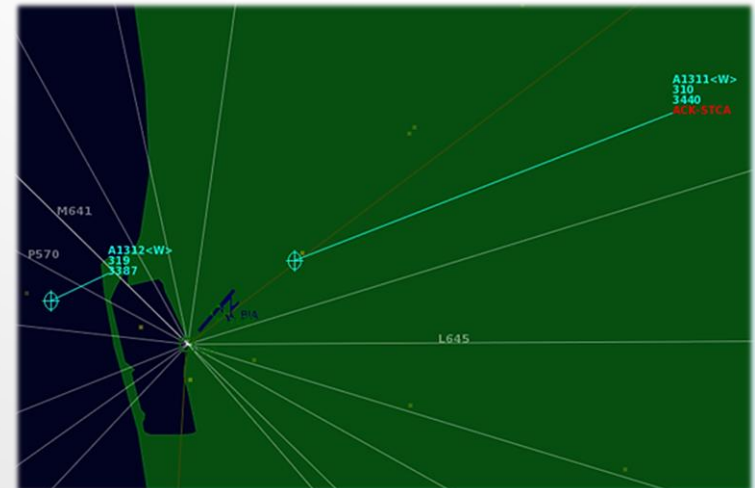
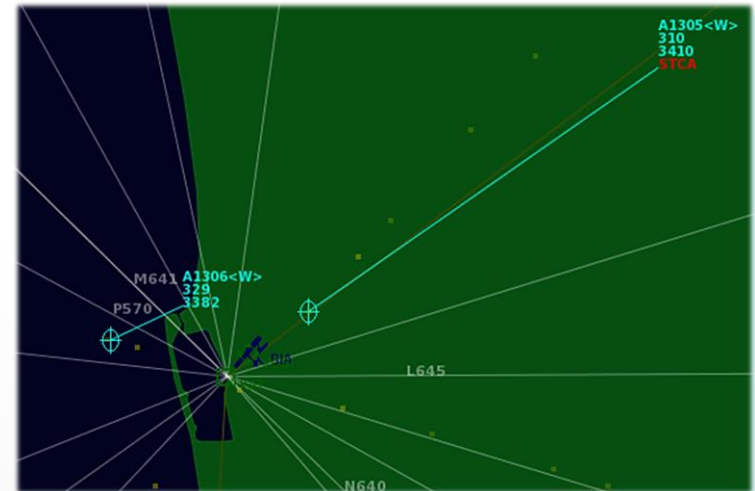


Multi-Sensor Fusion



Safety Nets

- ▶ Short-term conflict alert (STCA):
 - Proximity Conflict Detector (PROCON)
 - Linear Conflict Projector (LINCON)
- ▶ Reduced Vertical Separation Minimum (RVSM)
- ▶ Minimum Safe Altitude Warning (MSAW)
- ▶ Danger Area Infringement Warning (DAIW)

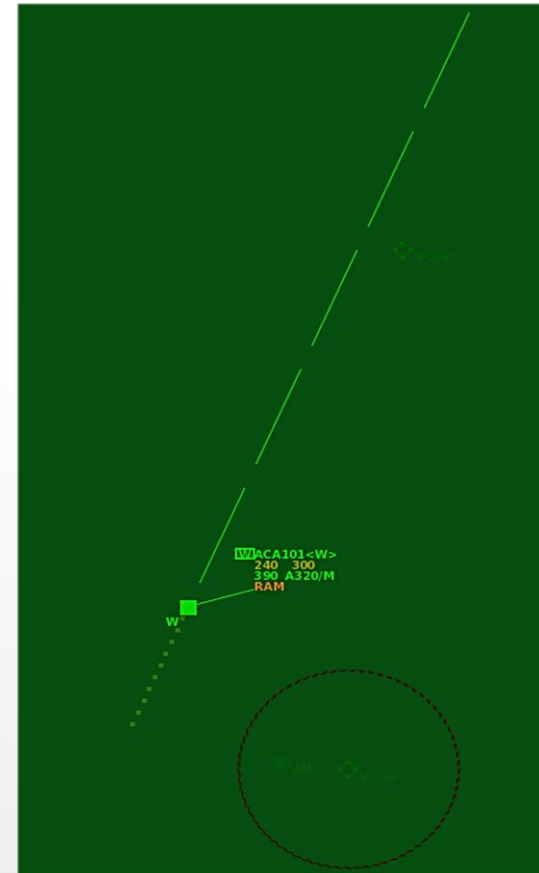


Flight Data Processing System (FDPS)



Safety Nets

- ▶ Medium Term Conflict Detection (MTCD)
- ▶ Cleared Level Adherence Monitor (CLAM)
- ▶ Route Adherence Monitor (RAM)
- ▶ Approach Path Monitor (APM)



System Features

- ▶ 2012 Flight Plan format support
- ▶ Flight Plan Route Analysis
- ▶ Flight Trajectory Modeling based on:
 - Route
 - Aircraft Performance Model
 - Wind Model
- ▶ Dynamic Flight Model Updating based on:
 - Surveillance Position reports
 - Current Meteorological Data
 - Clearance & Coordination
- ▶ Flight Plan Track Generation

The screenshot shows the 'Flight Plans' application window. At the top, there is a menu bar with 'Create', 'Options', 'Search', 'Phase', 'Filters', and 'RPL List'. Below the menu is a table listing flight plans:

ACID	RVSM	TYPE	DEP	DEST	ETD	ETO	ETA70	LEVEL
AAL122	W	B737/M	VCCC	ASTR	301650		301935	F365
AAL221	W	B777/H	KLAX	VCBI	301430	301435	301615	F380
AAL330	W	B737/M	KJFK	VCBI	301420	301425	301615	F345

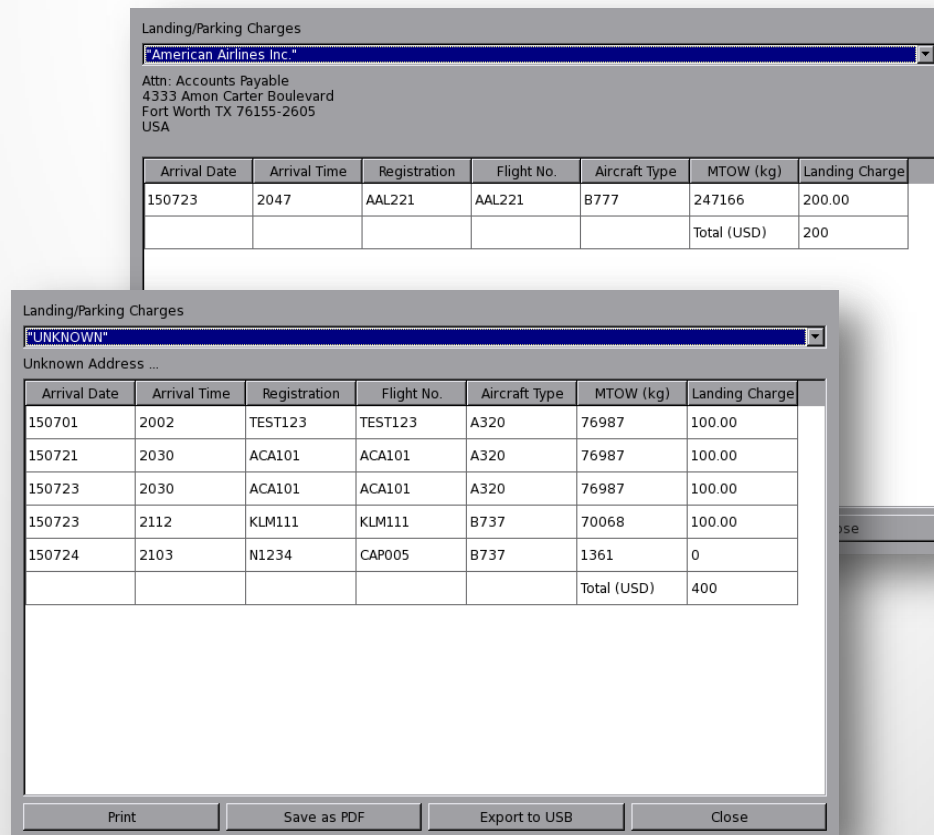
Below the table, there are status indicators: Phase: All Queues PRP: 7, PND: 3, ACT: 0, DRP: 0, Errors: 0. The main form contains various fields for flight plan creation and editing:

- Priority:** AFTN Address(es) field with value 'FF'.
- Msg Type:** Create FPL.
- Aircraft ID:** ALK331.
- SSR code:** /A.
- Flight Rule:** I.
- Type of Flight:** S.
- Type of AC:** B737.
- Wake Turbulence:** M.
- Equipment:** WC/N, ICAO 2012 (checked).
- Departure Aerodrome:** VCBI.
- Time:** 1200.
- Speed:** N0320.
- Level:** F345.
- Route:** DCT KAT DCT DEMON DCT MDI DCT.
- Destination Aerodrome:** KJFK.
- Total EET:** 0155.
- Alt. Aerodrome:** VCCC.
- 2nd Alt. Aerodrome:** (empty).
- Other Info:** REG/4R-AAA.
- Supplementary Information ...** and **SID/STAR** dropdown menu.
- Amendment:** (empty).
- Description:** (empty).
- Response:** (empty).

At the bottom, there are buttons for 'Close', 'Clear Fields', 'No conflict check' (dropdown), and 'Accept'.

Features

- ▶ Flight Plan Database Management
- ▶ RPL Management
- ▶ Automatic SSR Code Allocation
- ▶ Flight Data Recording
- ▶ Logs and Statistics Generation
- ▶ Billing Support



Landing/Parking Charges

"American Airlines Inc."

Attn: Accounts Payable
4333 Amon Carter Boulevard
Fort Worth TX 76155-2605
USA

Arrival Date	Arrival Time	Registration	Flight No.	Aircraft Type	MTOW (kg)	Landing Charge
150723	2047	AAL221	AAL221	B777	247166	200.00
Total (USD)						200

Landing/Parking Charges

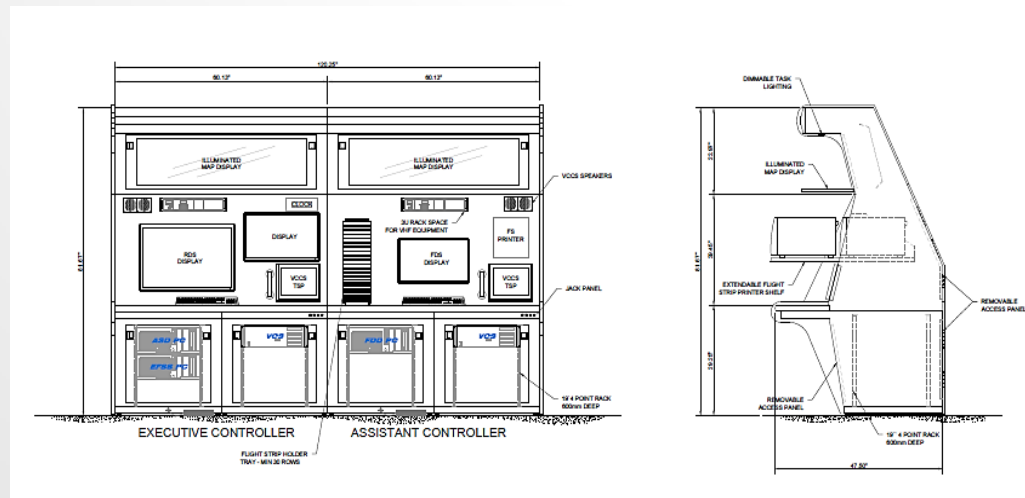
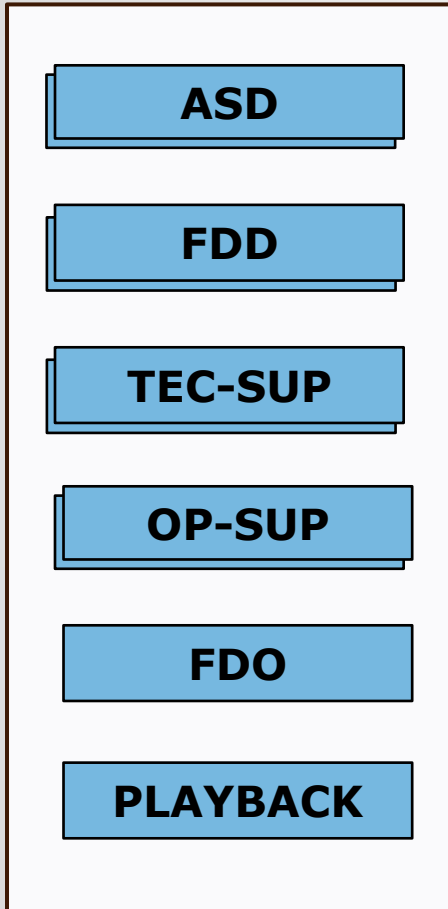
"UNKNOWN"

Unknown Address ...

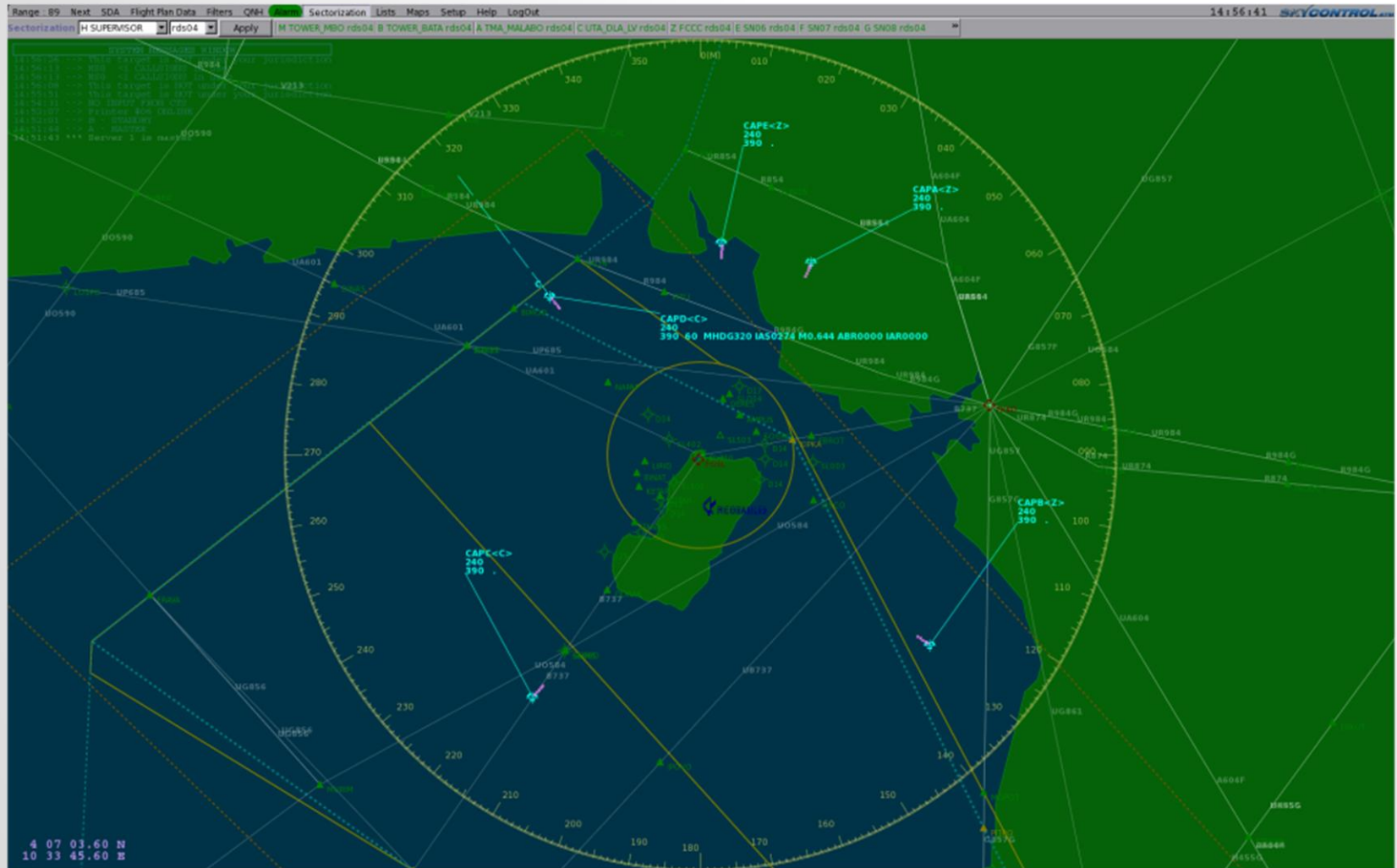
Arrival Date	Arrival Time	Registration	Flight No.	Aircraft Type	MTOW (kg)	Landing Charge
150701	2002	TEST123	TEST123	A320	76987	100.00
150721	2030	ACA101	ACA101	A320	76987	100.00
150723	2030	ACA101	ACA101	A320	76987	100.00
150723	2112	KLM111	KLM111	B737	70068	100.00
150724	2103	N1234	CAP005	B737	1361	0
Total (USD)						400

Print Save as PDF Export to USB Close

Controller Work Station (CWP)



Graphical User Interface



Flight Strip Examples

Guyana

SQ900	1477		TOPAX	1551			
A320/M	RJPN		NAMDO PSN TOPAX				
KPKA	RCHN	F250	SSR/1477 EET/RKRR0002				
CX440	1377		BULGA	1600			
A320/M	RCHN		TOPAX PSN BULGA				
KPKA	RJPN	F250	SSR/1377 EET/RKRR0002				
CX440	1377		BULGA	1600			
A320/M	RCHN		TOPAX PSN BULGA				
KPKA	RJPN	F250	SSR/1377 EET/RKRR0002				
AC100	1577	F250	RJPN				
A320/M	RKPK		RKPK PSN NARAE INVOK				
KPKA	2017		SSR/1577 EET/RKRR0002				
AC100	1577	F250	RJPN				
A320/M	RKPK		RKPK PSN NARAE INVOK				
KPKA	2017		SSR/1577 EET/RKRR0002				
CX440	1377		BULGA	2045			
A320/M	RCHN		TOPAX PSN BULGA				
KPKA	RJPN	F250	SSR/1377 EET/RKRR0002				
CX440	1377		BULGA	2045			
A320/M	RCHN		TOPAX PSN BULGA				
KPKA	RJPN	F250	SSR/1377 EET/RKRR0002				
SES770	2431		RKPK	1657			
C208/L	GGGG		APELA PSN KALOD RKPK				
KPKA	RKPK	F120	SSR/2431 EET/RKRR0001				

Korea

Air Traffic Flow Management

- ▶ Air Traffic Flow Management Forecast (ATFM)
- ▶ Arrival Manager

The screenshot displays the SKYCONTROL ATM interface. On the left, a window titled 'Arrival Manager' shows two columns of flight data for sectors VCB104 and VCB122. On the right, a window titled 'Air Traffic Flow Management' displays a forecast report for 010 entries. The report includes a table with columns for ACID, FRUL, ADEP, ADES, TYPE/WAKE, EQUIPMENT, AFL, and ETO. Below the table are buttons for 'Close', 'Statistics', 'Forecast', 'Combined', 'LaserJet Printer', and 'Print'.

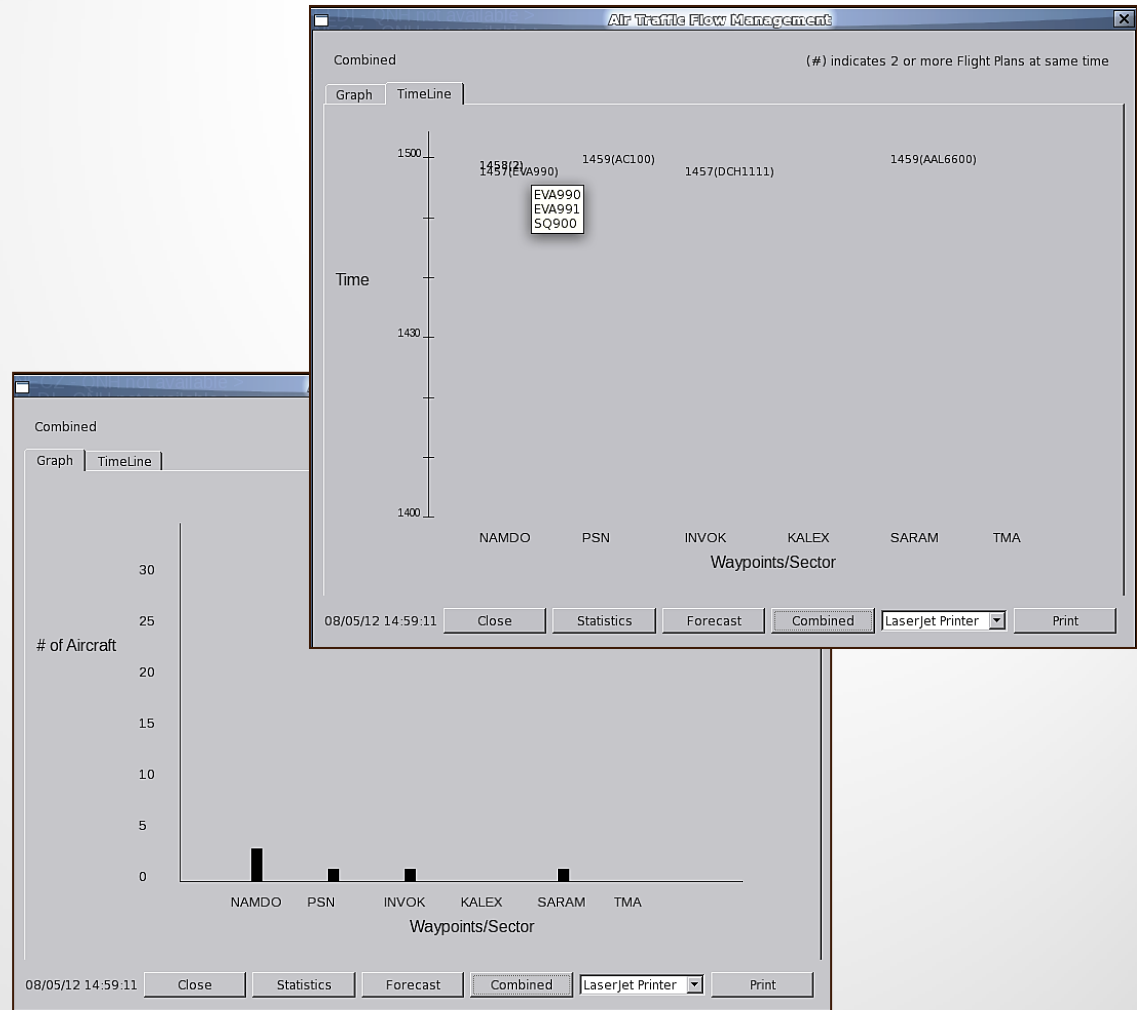
ACID	FRUL	ADEP	ADES	TYPE/WAKE	EQUIPMENT	AFL	ETO
AAL122	IS	VCCC	ASTR	B737M	WCN	F365	
AAL221	IS	KLAX	VCBI	B777H	WCN	F380	301435
AAL330	IS	KJFK	VCBI	B737M	WCN	F345	301425
ACA101	IS	CYYZ	VCBI	A320M	WCN	F300	301505
ACA202	IS	VCCC	KMIA	B744H	WCN	F365	
ALK331	IS	VCBI	KJFK	B737M	WCN	F345	301520
KLM111	IS	KMIA	VCBI	B737M	WCN	F300	301213
LOL111	IS	VCCC	VCBI	B737M	WCN	F185	
NZL117	IS	ASTR	KMIA	B744H	WCN	F370	301535
SIA332	IS	WSIN	EGLL	B762H	WCN	F345	

Air Traffic Flow Management

- ▶ Air Traffic Flow Management (ATFM) is the management of air traffic to avoid exceeding airport or air traffic control capacity in handling traffic, and to ensure that available capacity is used efficiently.
- ▶ The ATFM forecast window contains a list of flight plans for a selected time period.
- ▶ Flight plans filter criteria include:
 - time period
 - altitude range
 - waypoint
 - airway
 - sector

ATFM Combined Forecast

- ▶ The combined ATFM forecast graph is a bar graph showing the number of aircraft for a selected time period and multiple waypoints.
- ▶ Filter criteria include time period, altitude range, waypoints, and sector.
- ▶ Each bar represents a waypoint.



ATM Simulator Exercise Control

The screenshot displays the SkyControl ATM simulator interface, which is used for controlling and monitoring air traffic management exercises. The main window shows a 3D visualization of the flight simulation environment, including aircraft positions and flight paths. Overlaid on this are several control and monitoring windows:

- Aircraft List:** A table listing aircraft with columns for Acft ID, SSR, Model, Next File, Bearing, Route, Speed, and Altitude. The list includes aircraft such as EMERG01 through EMERG06.
- Simulation Startup:** A dialog box for configuring the exercise, showing the Exercise File set to NULL and options for Start, Stop, Configure, Command Display, and View Trace.
- Select Exercise:** A dialog box for selecting an exercise file, currently showing NULL.
- Look in:** A file explorer window showing the directory structure for simulation data exercises, including files like 000a scn, 0000 scn, 0001 scn, etc.
- Command Panels:** Various panels for sending commands to the simulation, including fields for Single Command and Multiple Commands.

The interface also displays real-time data such as time (e.g., 22:41:23) and range information (e.g., Range: 470, Range: 800, etc.).

THANK YOU!

A decorative graphic consisting of three horizontal blue lines of varying lengths, pointing to the right, is positioned to the right of the "THANK YOU!" text.

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