

**Target Generation Facility (TGF)
ACB-860 Simulation Group**

Project Summary

Fiscal Year 2006

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October 30, 2006

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TGF Project Summary FY 2006

Executive Summary

The Target Generation Facility (TGF) completed another successful simulation year. All simulations were provided on-time and met or exceeded customer expectations. In addition to completing these simulations many enhancements were added to the Target Generation Facility's aircraft dynamics engine, simulation pilot workstation and hardware infrastructure.

Section 1 – Simulation Projects Supported

This section summarizes the simulation efforts supported by the Target Generation Facility during the fiscal year.

1.1 STARS Denver FMA

Simulation Dates: January 10 – January 12 2006
 January 17 – January 18 2006

Program Office: STARS ATO-T

Contacts: David Cognata ATO-T Sr. Air Traffic Control Specialist
 609-485-9198

 Gary Miller ATO-T STARS
 609-485-7175

 Ed Gaguski ATO-T STARS

Simulation Summary

This simulation was conducted as regression testing for software builds for Denver's Final Monitor Aid. Denver is a special build for STARS as it runs with ARTS.

1.2 Simulation: ATCT/EFDI (Electronic Flight Data Interfaces) (HFL)

Simulation Dates: May 1 – May 5 2006

Program Office: AJP-61

Contacts: Dr. Todd Truitt
 609-485-4351

Simulation Summary

This was a ground simulation requiring the use of the recently built TGF ground simulator. The purpose of the simulation was to assess the usability of two electronic flight data interfaces (EFDIs). Boston's Logan International Airport was adapted including all runways and taxiways.

1.3 Big Airspace (HFL)

Simulation Dates: May 4 2006 - ongoing

Program Office: ATO-P Systems Engineering
NAS Operational Concepts & Service Engineering

Contacts: Michele Merkle
202-385-7259
micele.merkle@faa.gov

Simulation Summary

This simulation is being run to evaluate the concepts of extending terminal separation standards to en route airspace, and incorporating dynamic re-sectorization to make airspace boundaries more flexible for rerouting traffic when weather, equipment outages, or active special use airspace disrupt traffic flow, and to evaluate the effect of the Big Airspace concept on controller efficiency and safety. The Jacksonville and Miami ARTCC's were adapted and the airspace was "genericized" in order to create an experimental airspace that could quickly be learned by controllers/participants from facilities around the nation.

The simulation required six sectors; 4 en route, 2 terminal, as well as, two ghost sectors; 1 inbound, and 1 outbound. Twelve simulation pilots are necessary to run the simulation. Ghost controllers are necessary to hold and release aircraft into the controlled airspace.

1.4 STARS PHL

Simulation Dates: July 7 -9 2006

Program Office: STARS ATO-T

Contacts: David Cognata ATO-T Sr. Air Traffic Control Specialist
609-485-9198

Gary Miller ATO-T STARS
609-485-7175

Simulation Summary

This simulation was a human factor study. PHL was chosen as the site as previous scenarios were familiar to the customer. The purpose of the study was to evaluate the effects of color on controller reaction and awareness.

1.5 ERAM Capacity Radar Recording

Simulation Dates: August 10, 2006

Program Office: STARS ATO-T

Contacts: Paul Purcell

Simulation Summary

This simulation produced a radar recording of 720 targets. The targets were displayed in the following systematic manner: groups of 60 targets flying away from the center of a circle, each target separated by 6 degrees, and another group of 60 targets being released every minute, until all 720 targets are displayed at the 11:05 min mark. The simulation load decreases in the same way it built up and completes by 24:05 minutes.

1.6 Future En-route Workstation Study II

Simulation Dates August 23 – September 30 2006

Program Office: AJP-61 and ATO-E

Contacts: William B. Hah
609-485-5809

Simulation Summary

The purpose of this simulation was to compare the Future En-route Workstation with the existing DSR workstations from a human factors perspective. The Future En-route Workstation's automated tools were designed with human factors in mind as opposed to the commercial tools that lack integration and human factors design.

The simulation scenario consisted of the generic airspace run with traffic levels of 2015. Thirty two scenarios were developed representing today's 100% traffic level, and the future's 133% and 166% traffic levels. The participants worked the traffic on both types of workstations.

1.7 Dynamic Density DR&A development

Simulation Dates: October 2005 and ongoing

Program Office: NASA Ames Research Center

Contacts: Parimal Kopardekar
650-604-2782

Simulation Summary

This is an ongoing effort to develop various complex metrics for evaluation of air traffic complexity. These metrics are still under development and in general can be subdivided into 3 sets of interrelated algorithms:

- FAA
- NASA
- Metron (MITRE)

All of these algorithms were integrated into TGF's DRAT (Data Reduction Analysis Tool) as Dynamic Density calculations (a total of 50 variables). This is the first step of the Dynamic Density project to provide analysts with tools for statistical evaluation of data and extrapolation..

Section 2 – Technical Summary

This section summarizes the technical achievements of the TGF during the fiscal year.

2.1 Ground Simulation Capability

TGF continued the development of the ground based simulation capabilities. TGF developed the phase II dynamics based ground model.

2.2 Sun Network Attached Storage (NAS) procured and installed.

TGF procured, installed and configured a Sun based NAS device. This device provides additional storage for TGF data. The NAS has redundant access points, removing a single Point of failure in the TGF infrastructure.

2.3 Cisco Firewall Services Module (FWSM) configured and activated

TGF configured and activated the FWSM previously procured. This provides improved performance over the software based Content Based Access Control (CBAC) previously used to secured the TGF networks. Additionally TGF moved to the 192.168.x.x network Addresses space for internal systems. This upgrade eliminated persistent network slow performance and high router CPU utilization.

2.4 CIGI based Simulation Visual Simulation developed

TGF continues to Develop a simulation visualization capability based on the Common Image Generator Interface (CIGI).

2.5 Aviation Simnet

The Aviation SimNet capability was integrated into TGF. Aviation SimNet provides an infrastructure, that enables and promotes sharing of simulation assets and collaborative simulation experiments. TGF is currently testing with NASA, Mitre, and ERAU.

2.6 External Project Network Infrastructure Support

TGF Personnel provided design, equipment procurement, implementation and configuration support for (4) other WJHTC projects/systems. A Cisco 3825 router/firewall was installed for the Bytex system to limit offnet IP access. The RCS network was completely redesigned to include a Cisco 3845 router/firewall and gigabit uplink and a gigabit switched downlink infrastructure. The RCS was also provided with redundant local caching DNS service as well; minimizing RCS Unix system administration. TGF personnel supported proof of concept VoIP communications for the Airbourne Internet research project. Feasibility and interoperability of Cisco VoIP equipment over limited RF 19.2 kbps bandwidth were examined and tested. Finally, TGF personnel continue to provide ongoing design support for the laboratory network infrastructure upgrade

TGF Acronyms and Abbreviations

ADAR	ARTS Data Acquisition & Router
AGW	ARTS GateWay
ARTS	Automated Radar Terminal System
ATCT	Air Traffic Control Tower
CAS	Controller Awareness Study
CTAS	Center TRACON Automation System
CHI	Computer Human Interface
CPDLS	Controller Pilot Data Link Communications
DFS	Deutsche Flugsicherung (German Simulation)
DIS	Distributed Interactive Simulation
DRVSM	Domestic Reduced Vertical Separation Minimum
DSR	Display System Replacement
EDC	Early Display Configuration
ERAU	Embry-Riddle Aeronautical Univeristy
ETVS	Enhanced Terminal Voice Switch
FAST	Final Approach Spacing Tool
FFP	Free Flight Phase
FS1, 2/2+	Full Service 1, 2/2+
GAO	Government Accounting Office
GOERS	GPS Outage En route Simulation
GPS	Global Positioning System
HAD	High Altitude Demonstration
HAT	High Altitude Test
HFL	Human Factors Laboratory
HLA	High Level Architecture
IIF	Integration and Interoperability Facility
LAAEP	LA Arrival Enhancement Project
McTMA	Multi-Center Traffic Management Advisor
NAS	National Airspace System

NASA	National Aeronautics and Space Administration
NATCA	National Air Traffic Controllers Association
PARR	Problem Analysis Resolution and Ranking
PAS	Pseudo Aircraft System
PDU	Protocol Data Units
PTR	Program Trouble Reports
RDHFL	Research Development and Human Factors Laboratory
RNAV	Area Navigation
RVSM	Reduced Vertical Separation Minimum
STARS	Stand Alone Terminal ARTS Replacement System
TATCA	Terminal Air Traffic Control Automation
TFM	Traffic Flow Management
TGF	Target Generation Facility
TMA	Traffic Management Advisor
TRACON	Terminal Radar Approach CONTROL
URET	User Request Evaluation Tool
WJHTC	William J. Hughes Technical Center
XPVD	X-windows Planned View Display

TGF Airports and Centers

ADW	Andrews Air Force Base
DCA	Ronald Reagan International Airport
EWR	Newark International Airport
Genera	Generic airspace generated for HFL studies
JFK	John F. Kennedy International Airport
PHL	Philadelphia International Airport
ZDC	Washington Center
ZID	Indianapolis Center
ZJX	Jacksonville Center
ZNY	New York Center
ZOB	Cleveland Center