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Final Technical Report
December 2009

OPERATIONAL FOCUSED SIMULATION

Rome Research Corporation

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14. ABSTRACT
In an effort to advance warfighter capabilities, the Air Force must research new technologies to improve overall effectiveness, including real-time decision making, dynamic situational assessment, dynamic prediction, and course of action analysis through operationally focused simulations. The objective of this effort was to define, develop, and implement an environment to support Operational Focused Simulation (OFS) exercises, while assisting the Air Force Research Laboratory in the design and execution of exercises and experiments. RRS provided systems engineering, systems evaluation development, integration, test and development and subject matter expertise to support operationally focused modeling and simulation development activities.

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1.1 Objective

In an effort to advance warfighter capabilities, the Air Force must research new technologies to improve overall effectiveness, including real-time decision making, dynamic situational assessment, dynamic prediction, and course of action analysis through operationally focused simulations.

The objective of this effort was to define, develop, and implement an environment to support Operationally Focused Simulation (OFS) exercises, while assisting the Air Force Research Laboratory in the design and execution of exercises and experiments.

1.2 Synopsis

Rome Research Corporation (RRC) provided its services to the Air Force Research Laboratory Decision Support Systems Branch (AFRL/RISB) by conducting limited Air and Space Operations Center (AOC) functions and emulations for the OFS initiative. As different modeling and simulation technologies were selected to interface with AOC systems, RRC planned, developed, and conducted tailored AOC exercises to enhance their interrelationships. Exercises were capable of providing stress inputs either with, or independent of, simulated operational events. RRC also provided related comparison data on both qualitative and quantitative assessments of the AOC and the selected technologies. In order to build the scenario to fit the vignette, the Theater Battle Management Core System (TBMCS) databases were adjusted accordingly. For example, new airborne assets were added to the Air Tasking Order (ATO), complying with new airspace control measures added to the Airspace Control Order (ACO). Priorities were established in the Target Nomination List (TNL) to provide targets for airframes that would be tasked or retasked.

1.3 Scope

The scope of this effort was to provide systems engineering, systems evaluation development, integration, test and development and subject matter expertise to support operationally focused modeling and simulation development activities.

2. BACKGROUND

2.1 Systems

The TBMCS program provided an automated and integrated capability to plan and execute the air battle plan for the modeling and simulation efforts. TBMCS is the operational system of record for the Air and Space Operations Center Weapons System (AOC WS). TBMCS provides the Joint/Combined Forces Air Component Commander with a force level automated and integrated capability to plan and execute the air battle plan. It provides the air commander with the means to plan, direct, and control all theater air operations in support of command objectives and to coordinate with ground and maritime elements engaged in the same operation. The mission of the AOC WS is to provide operational level command and control of air and space forces as the focal point for planning, directing, and assessing air and space operations. Tailored operationally relevant exercises and scenarios were built for local AFRL use.

2.2 Subject Matter Experts (SMEs)

RRC provided Force Level AOC Operational and Intelligence Command and Control expertise. SMEs provided AFRL staff and supporting contractors with class room instruction on AOC operations and procedures. Support for experimental efforts included expertise in exercise planning, hosting numerous planning conferences, maintaining agendas, establishing and tracking critical planning milestones, defining communications and systems requirements, and designing operationally correct AOC floor plans and workstation requirements. SME's also developed and produced all necessary AOC planning and execution products to include Air Operations Directives (AODs), ATOs, TNLs, ACOs and Rules of Engagement (ROE) to name a few. Rome Research Corporation's Command, Control, Communications, and Intelligence (C3I) Group provided the expertise and personnel necessary to make the OFS test bed a practical success. RRC supported the AFRL/RISB team with an iterative campaign of experiments to evaluate and assess the OFS objectives of implementing an environment to support modeling and simulation exercises with game changing implications for the AOC WS. RRC provided AOC WS expertise, system integration, scenario development and implementation, experiment integration, system level experiment participation (operators/evaluators), and Command and Control Concept Center (C2CC) Information Technology (IT) support. RRC also suggested process improvements to better map OFS assets to mission services. RRC applied AOC Tactics, Techniques and Procedures against the technologies presented for OFS interface to ascertain if they are of any benefit.

2.3 Collaboration

OFS software engineers collaborated with counterparts, SMEs, modeling and simulation personnel, and other partners to develop potentially improved warfighter tools. For example, the Air Battle Plan Flyout visualization software allowed operators to view the ATO air tracks through TBMCS. The engineers reported that the collaboration resulted in enhanced understanding and situational awareness regarding the planned order of battle, and the players in the simulation. Teleconferences and meetings were held with the Distributed Missions Operation Center (DMOC), the Joint Semi-Automated Forces (JSAF) modeling and simulation team, and the C2CC team to coordinate simulation team roles, the orders of battle, exercise/experiment design, and schedules. This included preparation and execution of the Advance Concepts Events (ACE) and the Airborne Networking (AN) experiment exercises.

3. TAILORED COMPONENTS FOR EXERCISE

For the exercise, the scenario used an Army Brigade Combat Team with an embedded Joint Terminal Attack Controller (JTAC) performing convoy escort which encountered a Vehicle Borne Improvised Explosive Device (VBIED). Insurgents detonated the VBIED, attacked with small arms, and went into a building. Collection and attack assets were requested, coordinated, and assigned via the Time Sensitive Target (TST) process of Find, Fix, Track, Target, Engage and Assess. TBMCS databases to support this were adjusted accordingly. For example, new airborne assets were added to the ATO. Supporting new airspace control measures were added to the ACO. Priorities were established in the TNL to provide targets for airframes that would be tasked or retasked. To simulate the live-fly over China Lake training range, SMEs updated the TBMCS Friendly Order of Battle to include experimental assets actually flying there, and updated the TBMCS web-enabled airspace deconfliction system. SMEs took experimental asset orbits, put them into the system, and then emulated tasking the experimental C2 assets to play in the Air Battle.

3.1 Databases

RRC utilized those command and control systems (TBMCS 1.1.3) which are currently possessed and configured with basic scenarios, and used Air Force approved scenarios and supporting documentation. RRC tailored these products to support the local efforts involved in testing the integration of various automated information services. For example, existing ATOs were used as tailorable backdrops/foundations. Then, additions, deletions, and corrections were accomplished within that construct to support "exercise time frame" activities which supported the "Air Battle Plan" that was executed in support of the technologies.

RRC SMEs modified existing TBMCS databases to provide the RISB OFS team of scientists/engineers with realistic simulation scenarios that mirrored live fly experiments for AFRL use. The first in-house scenario was built using the USAF PACIFICA scenario as a backdrop and merging it with the Empire Challenge-08 (EC-08). This in-house scenario was named Simulation Exercise-08 (SE-08). All subsequent scenario modifications contained a comprehensive and tailored Friendly Order of Battle (FrOB). TBMCS data bases were modified to include platforms such as the 630th Electronic Systems Squadron airborne sensor and networking experimental aircraft, "Paul Revere", the E-10 Multi Sensor Command and Control Aircraft (MC2A) test platform, Global Hawk (RQ4), Predator (MQ1), the Battlefield Airborne Communications Node (BACN) airborne communication platform, and the E2C test platform (see Figure 1 for a SE-08 aircraft scenario listing). Although the effort was tailored to support SE-08, it can be easily reused or modified to support other or follow-on initiatives with minimal modification.

SE08 MSEL Draft 2 May08 1430L.xls [Compatibility Mode]

	A	B	C	D	E	F	G	H	I	J	
9		OCA	2113	SEAD/EW	362FS	2XF15E	SLAMMER13	KLSV	2G31X2G10		
10		OCA	2115	SEAD/EW	362FS	2XF15E	SLAMMER15	KLSV	2G31X2G10		
11		SEAD	2201		77FS	2XF16CJ	MAGPIE01	KLSC	22A88X2W2	CAP-J	
12		EW	2552		VMAQ2	1XEA6B	LEOPARD52	KDMA	E3Q99X1A88X1	CAP-E	
13	EC08	XCAS	5021		VMF333	2XF18E	BOVINE21	KDPG	FG31X2IDX2W2	CP SE08	
14		OTR	3411	E-10	767RS	1XB767	PYTHON11	KDMA	BEST	EC08	YELLOW
15		OTR	3412	Paul Revere	768RS	1XB767	FISHLIPS12	KDMA	BEST	EC08	GREEN
16		OTR	3403	BACN	769RS	1XC9	ELVIS03	KDMA	BEST	EC08	BLUE
17		XAEW	3461	AWACS	964ACS	1XE3C	TEA61	KLSC	BEST	EC08	YELLOW
18		XAEW	5023	Hawkeye	VAW126	1XE2C	SEAFARER23	CV70	BEST	EC08	GREEN
19		RECCE	3431	Pred	770RS	1XMQ1	BUZZY31	KLSV	2XAGM114	EC08	GREEN
20		RECCE	3432	Global Hawk	771RS	1XRQ4	KODAK32	KLSV	BEST	EC08	YELLOW
21											
22											
23	Notes	Schedule									
24		AM - 1000L-1100L (1400Z-1500Z)									
25											
26											
27	Call Signs	JAOC - PINETREE									
28		AWACS - CHALICE - 227.3									
29		ASOC - CONDOR - 298.4									
30		JTAC - WHITE LIGHTNING - 271.2									
31		WOC - CARDINAL - 343.1									
32		AF CYBER AOC - HOGWASH									

Scenario Overview | MSEL | Sheet1 | Macro Scenario

Figure 1 - SE-08 aircraft listing

3.2 Airspaces

Actual test range airspaces such as China Lake were added to the Airspace data base using the Web Enabled Airspace Deconfliction (WEBAD) application of TBMCS, and made displayable for use by AOC air picture display systems (see Figure 2).

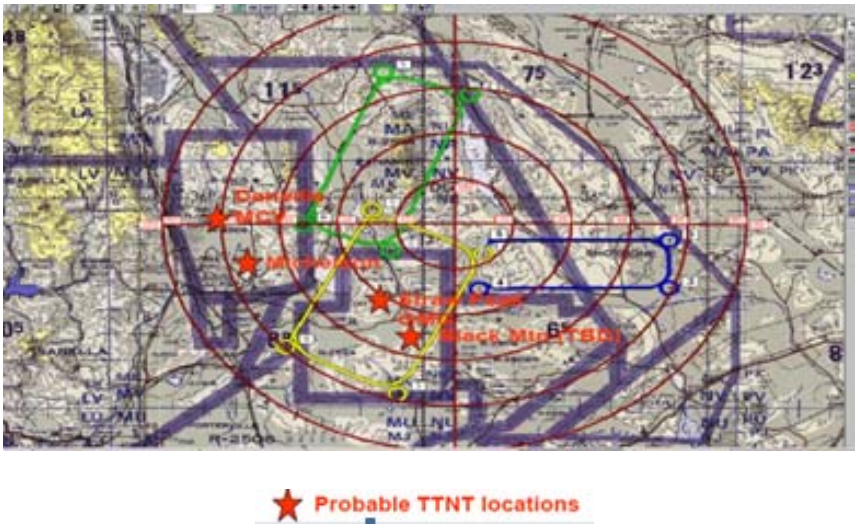

Figure 2 - EC-08 Airspace merged into SE-08 PACIFICA scenario

3.3 Master Scenario Events Lists (MSELs)

Finally, comprehensive and detailed Master Scenario Events Lists (MSELs) were built for each of three exercise scenarios providing exact sequencing of all air and ground assets and doctrinally correct command and control processes and procedures. Up to 345 separate tactical command and control actions were detailed to support the SE-08 scenarios. This level of detail provided the OFS engineers the capability to model exact mission aircraft positioning, altitude, speed, Identification Friend or Foe (IFF) assignments, Mission type, Call Sign, and Link 16 data. In addition, detailed tactical radio calls between all command and control nodes and tasked aircraft were developed to provide the Operational Network (OPNET) engineers with a realistic volume of radio traffic (see Figure 3 for an extract from the SE-08 MSEL).

1457Z	Airstrike hits target. CAS routine post strike comm.		Radio Call	JTAC; BOVINE21 WHITELIGHTNING copies WINCHESTER RTB. Thanks for the work, good day!
1457Z	ISR asset continues to monitor target			
1458:00Z	JTAC TO ASOC routine post-strike comm	JTAC	Radio Call	CONDOR, WHITE LIGHTNING WITH CAS STRIKE RESULTS
1458:10Z		ASOC	Radio	WHITE LIGHTNING, CONDOR READY
1458:18Z		JTAC	Radio Call	CONDOR, WHITE LIGHTNING CONTROLLED BOVINE 21, TOT 1457Z TGTLOC North 360507 West 1173009 TGTID Rectangle building, black roof, vehicles in the open, SUCCESSFUL. RTB. OVER.
1458:48Z		ASOC	Radio	WHITE LIGHTNING, CONDOR, CONDOR COPIES ALL. OUT.
1459:00Z	ASOC NOTIFIES AOC OF BOVINE21 MSN 5021 STATUS	ASOC	Secure phone	PINETREE, CONDOR WITH CAS STRIKE RESULTS
1459:10Z		AOC COD CASDO	Secure phone	CONDOR, PINETREE READY
1459:20Z		ASOC	Secure phone	PINETREE, CONDOR, WHITE LIGHTNING CONTROLLED BOVINE 21, TOT 1457Z TGTLOC North 360507 West 1173009 TGTID Rectangle building, black roof, vehicles in the open, SUCCESSFUL. RTB. OVER.

Figure 3 - Extract from SE-08 MSEL

3.4 AOC Processes

Strategy-to-Task AOC processes were applied and a subset of Strategic Objectives, Tactical Objectives, and Tactical Tasks were incorporated into SE-08. Using the Strategy-to-Task methodology, each target on the Joint Force Commander's (JFC) Joint Integrated Prioritized Target List can be traced directly back to a JFC campaign objective. The effects on JIPTL targets can be kinetic or non-kinetic. After developing an SE-08 Joint Air Operations Plan (JAOP), corresponding AOD missions and strike packages were planned in support of Counter Air (CA) and Counterland (CL) objectives. Using Joint Targeting Toolkit (JTT), pre-planned target sets from the PACIFICA Modernized Integrated Database (MIDB) were selected and tasked in the

vicinity of the China Lake Airspace. Also, Airborne Close Air Support Missions were built to support the Empire Challenge-08 (EC-08) VBIED scenario thread which was merged into the SE-08 PACIFICA scenario. This provided the OFS engineers with a more robust exercise that could be used repeatedly and/or modified to support future scenarios and experimental efforts (see Figures – 4 and 6 for extracts from the SE-08 Strategy Division's Prioritized Tactical Objectives and Tasks (Counter Air /Counterland Scenarios), and Figures 5 and 7 for corresponding extracts from the Combat Plans Master Air Attack Plan (MAAP) briefing).

CFACC Objective	Priority	Tactical Objective	Tactical Task Priorities	Notes on Tactical Tasks (full description in Appendix)
CA2	1	CA2.1 Deny Califon aircraft/missiles access to, or transit of, NV airspace	CA2.1.4	Provide attack warnings
			CA2.1.2	Provide DCA vs SSMs
			CA2.1.1	Provide DCA vs acft
			CA2.1.3	Conduct electronic attack (EA) vs aircraft and missiles
	2	CA2.7 Neutralize Califon space assets that affect CFC operations	CA2.7.2	Destroy offensive space systems
			CA2.7.1	EA vs space systems
			CA2.7.3	Disrupt comm to space systems
	3	CA2.2 Disrupt Califon integrated air defense system (IADS) command and control and air surveillance capability	CA2.2.5	Destroy EW radars w/in 100nm of border
			CA2.2.6	Destroy acq/tracking radars in critical areas
			CA2.2.1	Destroy IADS command centers
			CA2.2.2	Disrupt C4I
			CA2.2.7	Destroy C2/AWACS
			CA2.2.3	Disrupt comm nodes
	4	CA2.6 Destroy enemy SSM capability	CA2.6.6	Destroy SSM C2
			CA2.6.1	Destroy garrison or fielded TELs
			CA2.6.4	Destroy SSM fixed sites
			CA2.6.5	Destroy SSM capable ships
			CA2.6.9	Disrupt SSM comm. nodes
			CA2.6.8	Disrupt ISR support for SSM
			CA2.6.2	Destroy TELs mx facilities
	5	CA2.3 Prevent anti-aircraft (AAA) and surface-to-air missiles (SAMs) from disrupting CFC air operations	CA2.3.1	Strategic and fixed SAMS: priority to those protecting enemy space, C2, C4I, offensive air, PMF
			CA2.3.2	Tactical SAMs affecting Nevidah
			CA2.3.3	Tactical SAMs w/1st echelon ground forces
			CA2.3.4	AAA radars in active killboxes (PMF)
	6	CA2.4 Prevent Califon aircraft	CA2.4.1	Prevent use of runways and

Figure 4 - Extract from SE-08 Prioritized Tactical Objectives (Counter Air)

CA2.3.1 SA5 ATTACKS

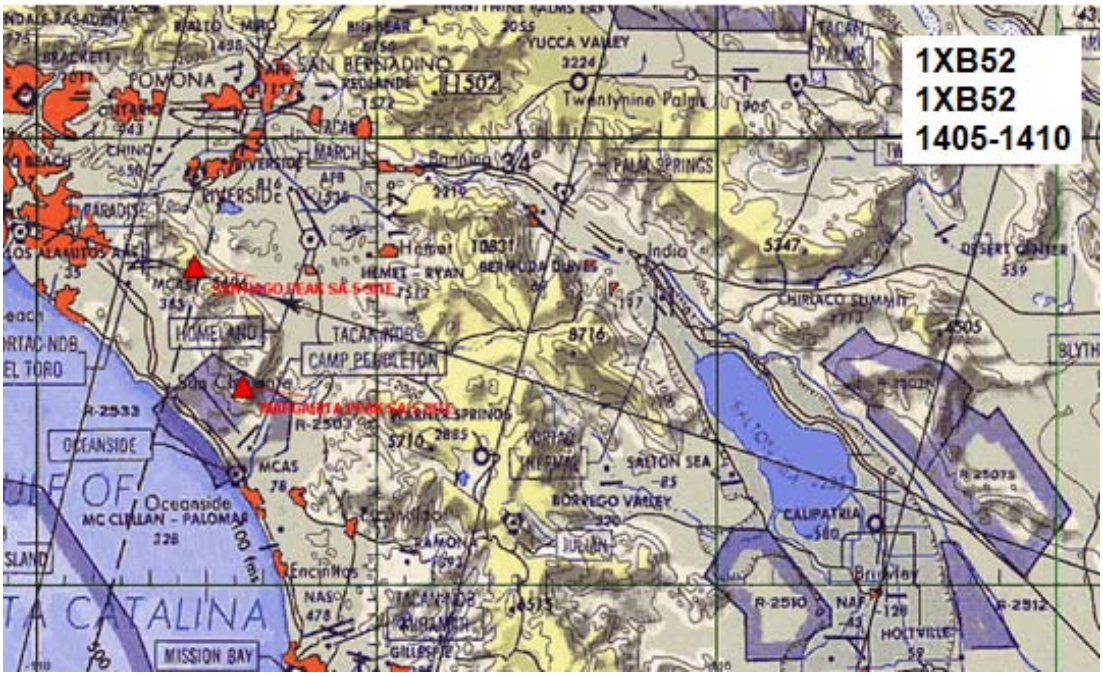

Figure 5 - Extract from the Combat Plans MAAP briefing (Counter Air)

CL2	10	CL2.1 Neutralize Califon long range artillery (LRA) to protect Las Vegas/Nellis	CL2.1.1 CL2.1.2 CL2.1.3	Destroy LRA affecting Las Vegas Disrupt LRA C2 nodes Disrupt LRA supplies
	11	CL2.2 Support CFLCC scheme of maneuver to fix first echelon armies in the PMF	CL2.2.1 CL2.2.6 CL2.2.2 CL2.2.3 CL2.2.4 CL2.2.5 CL2.2.7 CL2.2.8	CAS Destroy bridges, tunnels, passes Califon army C2 (1st echelon) Califon short-range artillery PSYOPS Defensive Obstacles Enemy supplies Interdict supplies
	12	CL2.3 Isolate Califon second echelon	CL2.3.1	Destroy bridges, tunnels, passes

Figure 6 - Extract from the SE-08 Prioritized Tactical Objectives (Counterland)

CL2.2.1 XCAS

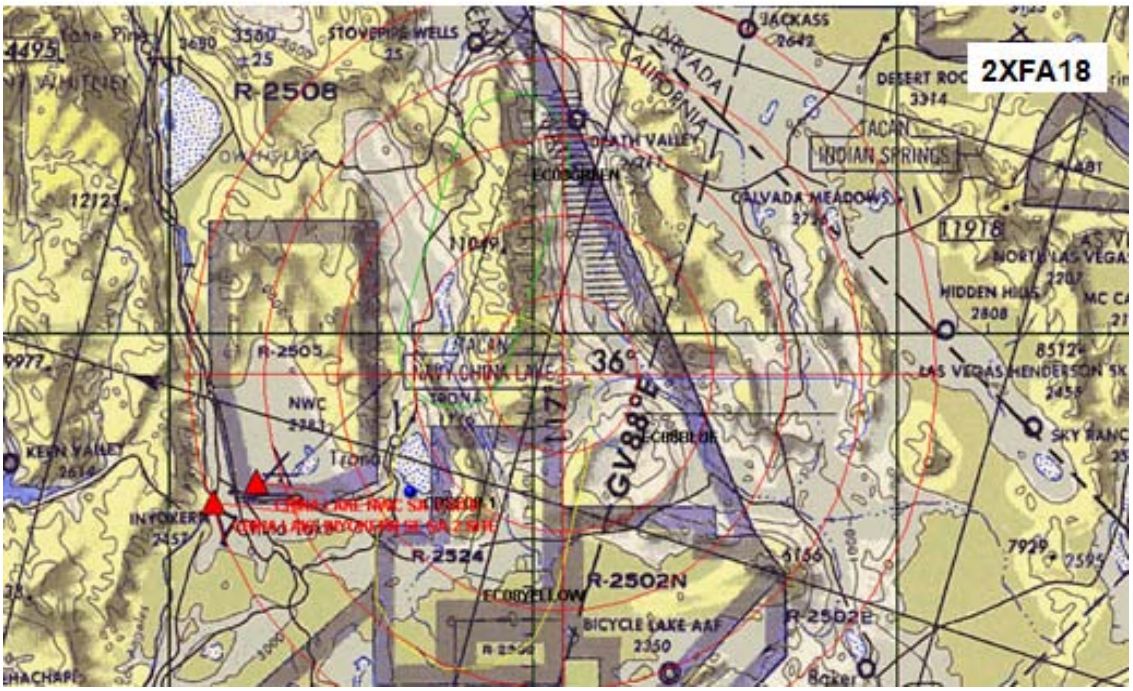

Figure 7 - Extract from the Combat Plans MAAP briefing (Counterland)

3.5 Component Integration and Communication

OFS software engineers ascertained how data was sent between the simulators and Protocol Data Unit (PDU)'s data structures, and pursued seeking connectivity to JSAF simulator. Also, the TBMCS Airspace Service was used to pull data associated with building a three dimensional (3D) airspace simulation which was later able to visualize all airspace data in an Air Battle Plan (ABP) simulator.

Specific technical accomplishments included writing software to test access and gain data from the TBMCS 1.1.3 Enemy Order of Battle (EOB) services. Connection software was written to test the track service in TBMCS 1.1.3. Track services were used to integrate JSAF data feeds with TBMCS Common Operational Picture (COP) views. Software tests were then written for the TBMCS Track, EOB and Airspace service. Because the TBMCS services are written in Java and come with minimal set of Java Doc, intimate knowledge of TBMCS data had to be gained before the services could be of any use. Updates to the ABP Simulation 3D software package were made. The 3D Airspace Views are part of the ABP Simulation software. Using an ABP and connection to TBMCS it could simulate any Air Battle Plan, complete with airspaces. The result is that the user has a bird's eye view of the entire ABP from any angle and altitude. User interface capabilities were added to the 3D airspace scenes in ABP Simulation. Additional

requests for information in the ABP Simulation were displayed in popup dialogs. Users can click on 3D scene objects and the associated data that was pulled from TBMCS is displayed in the popup dialog. Software to call MIDB stored procedures was added as well. Connected the enemy equipment to the enemy facility using a combination of MIDB stored procedures and Structured Query Language (SQL) calls. Software was written to show area of operational zones and enemy air defense facilities. The test software was written to test the track service interface to TBMCS.

Joint Airspace Management and Deconfliction (JASMAD) technology was also integrated with the ABP simulator. The ABP simulation used JASMAD Application Programming Interfaces (APIs), to generate geometry elements necessary to create 3D airspace objects, giving the ABP Simulation software a better user look and feel. The result was that 3D may provide better situational awareness for the Air Warrior than two dimensional (2D) representations. The user could now interact with airspaces using a mouse then turn airspace displays on and off. The endeavor successfully connected and pulled data from the MIDB, and a list of MIDB stored procedures was compiled in order to retrieve the data from the MIDB. The engineer prepared SQL and software to identify facilities associated with enemy air defense systems and their associated equipment. MIDB data was also used to render (i.e., display) the facilities in JView 3D environment.

4. EXPERIMENT DEVELOPMENT – WHERE AND HOW IT ALL COMES TOGETHER

4.1 Overview

The AOC Strategy, Combat Plans, Combat Operations, Intelligence, Surveillance and Reconnaissance, and Air Mobility Divisions SMEs provided operationally relevant concepts, scenarios and products to support OFS not only at the operational level of war, but also at selected tactical environments for RISB. The military subject matter experts prepared a first draft of plans to define objectives, goals, and tasks needed to support OFS. They initiated and continued with the development of simulation exercises as directed by RISB leadership, and refined way ahead recommendations for RISB and partners.

4.2 Objectives

The SE-08 demonstration simulated an airborne network consisting of the Tactical Targeting Network Technology (TTNT), Link 16 and a Tactical Common Data Link (TCDL). The main objectives were to test the data flow on the network and to enhance mission effectiveness through the reduction of resources. The demonstration took place during April 2008. The OFS simulation team and the C2CC team participated in all aspects of the SE-08 planning, preparation, and execution of the demonstration.

The OFS team, using the MSEL, a TNL, an Air ATO, and ACO provided by the C2CC team simulated the airborne network and message traffic. The C2CC team simulated an AOC utilizing the TBMCS suite. The C2CC team utilized the Internet Relay Chat client to simulate radio calls, Force Status and Monitoring (FSTAT) to monitor and update Base status information, Execution Status and Monitoring (ESTAT) to monitor and update mission status information, Command and Control Personal Computer (C2PC) and Falcon View for situational awareness and to receive Tactical Digital Information Links (TADIL) J series messages from the simulation team during execution of the ATO to display situational awareness and operational relevance for the demonstration (see Figure 8 for the SE-08 AOC floor plan, and Figure 9 for the SE-08 System Configuration).

Suite F-5A: Unclassified OFS SE1 April 2008 Floor Plan

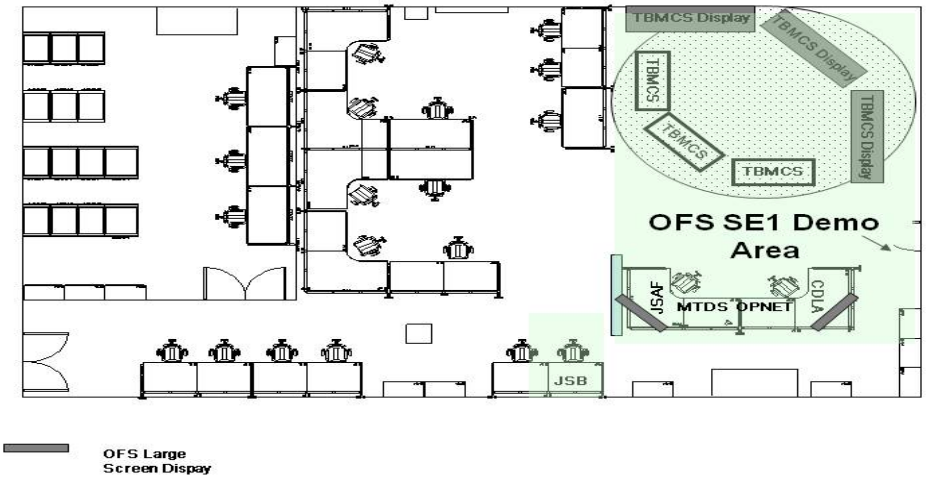

Figure 8 - SE-08 AOC floor plan

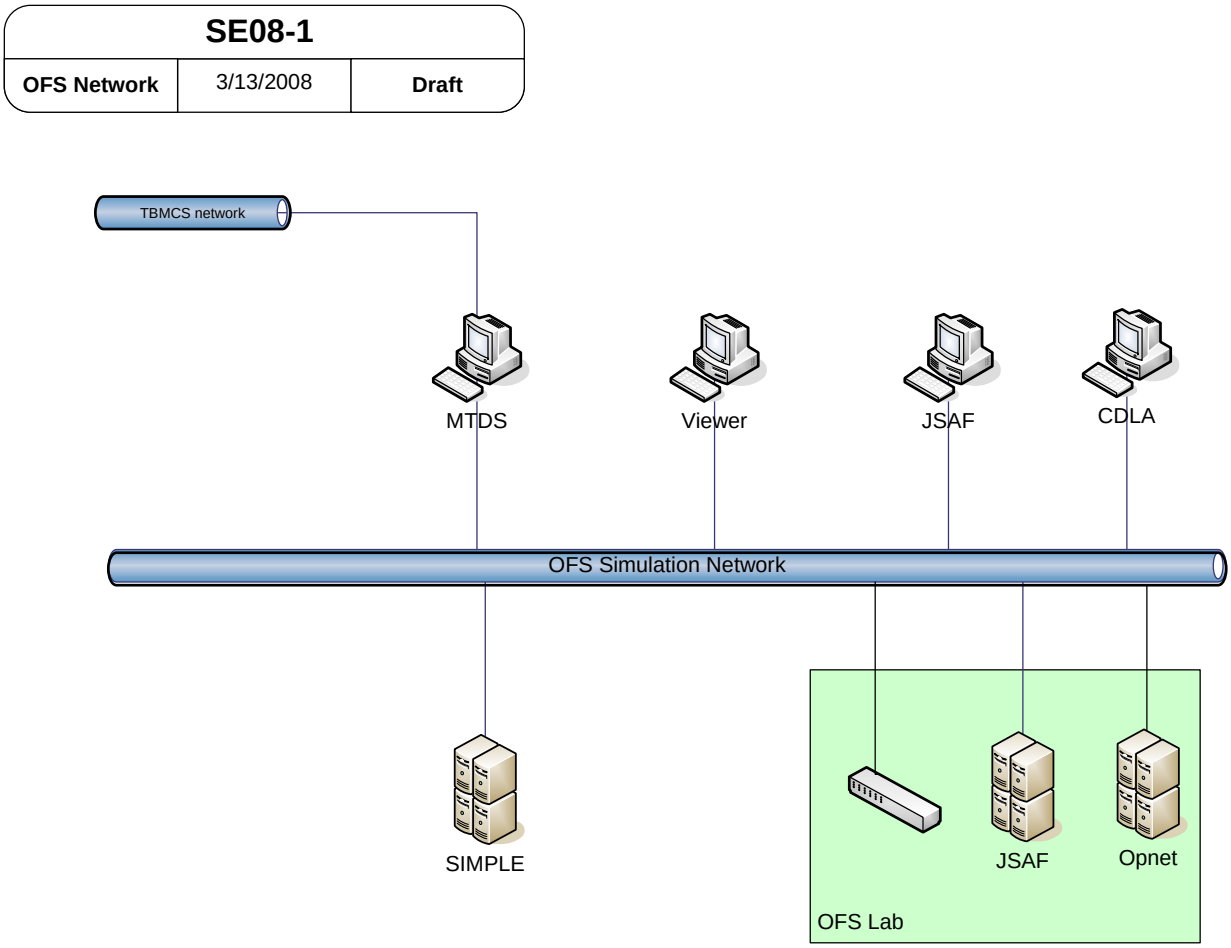

Figure 9 - SE-08 System Configuration

4.3 SE-08 Relevance

The purpose of the OFS Exercise 2008 (SE-08) was to define operationally relevant data that the RISB OFS research team would collect during the July 2008 Empire Challenge live fly exercise. The SE-08 exercise also demonstrated the ability of the OFS team to utilize simulation tools to ingest TBMCS products and then during the exercise produce the appropriate message traffic to be ingested back into the TBMCS suite.

4.4 Activities, Products, and Systems Used

Joint doctrine and procedures were reviewed and incorporated as appropriate for consideration in the technology development of both airborne networking and strategic simulations. Databases were selected and initiated to support a proposed Course of Action (COA) which included ideas for cyber operations. The TBMCS, the Air Force System of Record for the AOC WS, was used. An OFS Action Item tracking system was initiated, maintained, and briefed to all SE-08 team members. Candidate targets were developed and refined for use with OFS scenarios. The initial SE-08 ABP, ACO, and TNL were built using TBMCS applications. These applications included the JTT, TBMCS Theater Air Planner (TAP), WEBAD, and MAAP toolkit. The team initiated and continued to review new AF Doctrine (AFDD2-8, Command and Control) addressing command and control for OFS inclusion; considered C2 of cyberspace forces; researched the Cyber Warfare Integration Network (CWIN), and conducted cyber operations scenario research. As an added feature to the development and execution of exercises, the team introduced and implemented the OFS Simulation Exercise MSEL; researched unclassified versions of USAF Air and Space assets for the scenarios; assisted in efforts to coordinate the experiments with other events such as AN, ACE, and Exercise Empire Challenge 08. The team began adding anticipated assets and events into the OFS effort in order to tailor it to those events. The team continuously monitored and reviewed AOC process updates for inclusion in OFS and updated TBMCS FrOB database with command and control platforms, mission type tasking, burn rates, standard conventional loads, and base inventories. Added Predator and Global Hawk Intelligence, Surveillance and Reconnaissance assets into the Air Battle Plan, modified as needed. The ABP was designed to include Offensive Counter Cyber (OCC) and Defensive Counter Cyber (DCC) mission types. The team reviewed TBMCS Master Air Attack Plan "Tool Kit" (MAAPTk)'s updated map displays for both planning and execution.

The team continued development and coordination of the OFS with Simulation Exercise 08-1 (SE-08-1) and its MSEL, including post-experiment additions based on lessons learned and incorporated Air Support Request script design. The team continued research of unclassified versions of USAF Air and Space assets for the scenario, continued data base selection and strategy build, and built the Close Air Support component into OFS SE-08-1 via TBMCS TAP. The TBMCS was used to review two approved strategy implementing battle plans, including Offensive Counter Air (OCA) and psychological mission types. The team researched effects-based operations from Aerospace Education Foundation, and the reconnaissance, surveillance, and target acquisition (RSTA) Annex procedures for inclusion in the exercise simulations. Intelligence Surveillance and Reconnaissance (ISR) orientation was prepared and delivered to the rest of the OFS team. Appropriate joint procedures were incorporated for consideration in the technology development of both airborne networking and strategic simulations. The SMEs built multiple mission resources and air tasking orders including tankers, fighters, bombers, reconnaissance and special operations platforms. SMEs incorporated psychological warfare targets, and built psychological warfare assets into the database.

4.5 Tailored AOC processes

The team tailored the ACO to emulate live-fly actions and orbits of Exercise Empire Challenge as part of its efforts to coordinate the experiment with Exercise Empire Challenge 08 (EC-08), and continued adding anticipated Exercise Empire Challenge assets and events into the OFS experiment. The team built the anticipated EC-08 order of battle into the TBMCS Theater Air Planner, including new units, basing, command and control interface, and unique aircraft equipment/munitions. They also added Predator and Global Hawk Intelligence, Surveillance and Reconnaissance assets into the Air Battle Plan, modified as needed. Additionally, the team researched doctrine and strategy to task regulations and other avenues to enhance the MSEL for post-SE-08-1 actions. Appendix C, C2CC Simulation Exercise 2008 (SE-08) Demonstration Plan, provides expanded detail about SE-08 and preparations for EC-08.

The team began/continued formulating Simulated Exercise 2009 (SE-09) which was anticipated to be conducted in early December 2008. Updated MSEL to start supporting SE-09, conducted JAOP Review for SE-09, and built the SE-09 File Plan. The team conducted Strategy Review and COA selection process refresher in support of SE-09. The SMEs kept the rest of the OFS team abreast of AF actions to update the unclassified MIDB for use with unclassified research and training, to include OFS.

As the support to various laboratory entities expanded, the team conducted detailed review of the AOC Joint Interface Control processes. An expanded strategy review process was also incorporated into the operationally relevant scenario. A review of Operational Assessment Team Processes, COA development, and Links 11, 11b, and 16 were conducted. The team began/continued Intelligence Preparation of the Operational Environment (IPOE) in the strategy division via real world unclassified sources and conducted a complete review of AOC Strategy Division Processes and deliverables. Additionally, the team initiated an in-depth review of ISR Operations in the AOC and conducted an extensive study of JP 3_0, Joint Operations, and AFDD 2-3, Information Operations concerning the integrated employment of the capabilities of influence operations, electronic warfare (EW) operations, and network warfare operations. The team also conducted an extensive study of AOC processes and training updates in consonance with JP 3_0, Joint Operations, and AFDD 2-3, Information Operations concerning the integrated employment of the capabilities of influence operations, EW operations, and network warfare operations. An expanded AOC process and partner briefing was initiated in support of anticipated System Oriented Architecture (SOA) initiatives, choosing the AOC strategy plans team for this focus, and conducted extensive research into the Strategy Plans Training Techniques and Procedures (TTPs).

The OFS SME team, in concert with the government guidance, initiated and continued coordination with OPNET engineers to develop a detailed communications flow for the scenario. The SMEs expanded the MSEL via three major iterations with unclassified details, and provided same to OPNET software developers. MSEL command and control simulated voice and data traffic were consistently enhanced.

The SME team participated in multiple recurring and situational meetings; as well as organizing and conducting OFS Team meetings, team "how-goes-it" meetings, and "way ahead" meetings with government personnel and team contractors.

The OFS SME team conducted the SIMEX 08-1 (SE-01) Initial Planning Conference (IPC) to include scenario, players, friendly order of battles, enemy order of battles, and communications/computer requirements. Portions of SE-01 scenario's Joint Air Operations Plan and Air Operations Directive were selected to support the development of subsequent scenarios.

The SME team conducted the Main and Final Planning Conferences (MPC/FPC) for SE-01 to include scenario, players, friendly order of battles, enemy order of battles, and communications/computer requirements. The team selected a scenario to include ground ops, air ops, and intelligence support. Selected portions of SE-01 scenario's Joint Air Operations Plan and Air Operations Directive were refined to support the development of subsequent scenarios. Subsequent update meetings were held as necessary.

4.6 Execution Support

OFS System Administration personnel provided technical, system, operation, and network level support for the Operationally Focused Simulation team and experiments. Support was provided for the production of Air Operations Center products including generation of the Master Air Attack Planner displays to include targets and airspaces for the experiment, and the validation and release of the final Airspace Control Order/Air Tasking Order and the Air Operations Database, including runs for four exercise dates. The team provided database schema information on aircraft, air tasking orders, and mission data to the simulation development team in support of the exercise. The team configured Theater Battle Management Core System's C2PC to display all of the Exercise Airspace Control Orders, Target Nomination List and tracks for the exercise; and configured Internet Relay Chat (IRC) software to support communications during the exercise, and provided technical support when Operationally Focused Simulation was ready for additional testing of communications link. By the end of the exercise, simulated tracks from the Marine Tactical Data System were being received by the Theater Battle Management Core System. The simulation software supplying the tracks still needed work, but some tracks were making it through. Recommend that a follow on experiment be conducted between the OFS simulation system and TBMCS to resolve simulation software issues.

The team configured and tested the Situational Awareness and Assessment (SAA) server to receive TADIL J tracks from the Marine Tactical Data System. Verified and tested the configuration of the TBMCS SAA server and the C2PC gateway, and successfully received all tracks from the Marine Tactical Data System during integration.

The team also moved and tested all of the Theater Battle Management Core Systems into the Air Control Enclave of the Command and Control Concept Center in preparation for the exercise. Assisted the OSF system administrator with the installation and configuration of heat and power sensors for their systems in the J6H server room so that the systems would automatically shutdown in the case of excessive heat or lack of power.

Training on select systems/applications was also prepared and provided as necessary. In preparation for experiments, the team trained Duty Officers on all Theater Battle Management Core System applications used during the exercise. This included planning phase applications of Master Air Attack Planner, Theater Air Planner, and Joint Targeting Toolkit; as well as the execution phase applications of Map Control Manager, Command and Control Personal Computer, Internet Relay Chat Client, Execution Status and Monitoring, and Force Status and Monitoring.

In addition, the OFS system administration team supported the execution of the Operationally Focused Simulation Experiment 08 by acting as a Duty Officer during the exercise by updating the Execution Status and Monitoring system with actual mission event times and changing mission status information as the exercise progressed. The team also assisted with communication into Internet Relay Chat Client by entering all message traffic related to the assigned missions from the Master Sequence Event List as the exercise progressed, and monitoring situational awareness with the Command and Control Personal Computer.

Finally, the team attended the Operationally Focused Simulation Exercise 08 Semi Weekly Technical meetings. It attended and provided inputs to the IPC, Main Planning Conference (MPC), and Final Planning Conference (FPC). These were conducted in a manner paralleling the content and process for real-world military training exercises. The team also attended exercise hot wash meetings in support of the program in the Command and Control Concept Center.

5. TACTICAL AIR CONTROL PARTY SME

The Tactical Air Control Party (TACP) SME assisted with the development of the Urban Close Air Support (CAS) scenario for the JTAC Strike training system with Energid Technologies, and attended weekly meetings with government program management personnel at AFRL/RISB.

The SME researched lessons learned on Urban Operations, and developed add-on scenario features based on Operation Anaconda for the JTAC STRIKE technology. The JTAC conducted follow-up action items from the 4 December 2007 Headquarters Air Combat Command (ACC) brief with Energid Technologies. Lessons learned from fighting in the urban environment were researched and software developers were collaborated with to provide the urban CAS scenario for JTAC Strike. Assistance was also provided in developing a JTAC Strike demonstration disc.

The TACP SME worked with developers to refine the JTAC Strike speech dialog, and developed a Tri-fold brochure for JTAC Strike. Additionally, the SME developed a "Splash" Screen image for JTAC Strike and assisted with the development of the JTAC STRIKE Demo/movie. Teleconferences with Energid Technologies were held to discuss the JTAC Strike Demo with the ACC JTAC Career Field Chiefs, the demonstration movie, and Splash screen image (see Figure 10 for the JTAC Strike Depiction).

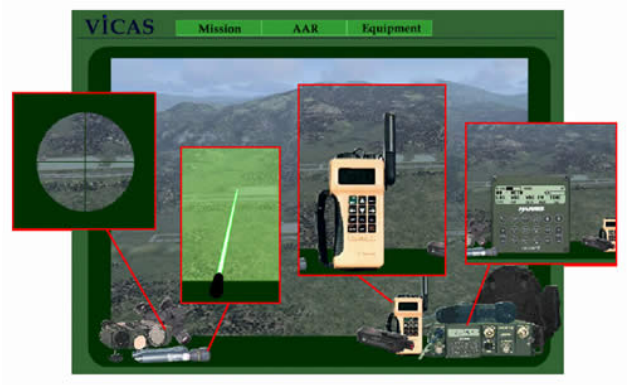

Figure 10 - JTAC Strike Depiction

The TACP SME supported the AN/ACE, providing AOC expertise for the September 2007 ACE; reviewing lessons-learned from the System Level Experiment for Dynamic GIG Execution (SLEDGE) for potential incorporation into ACE type activities; and participating in teleconference meetings with AN for the ACE experiment of September 2007.

6. SUCCESSFULLY MANAGING INSURGENCIES AND TERRORISM EFFECTIVELY (SMITE) SME

The SMITE program was previously known as Insurgency and Terrorism Investigation and Measurement (INTERIM). SMITE continued to examine and analyze literature on insurgency and terrorism, including ways to combat them. It also examined other topics more broadly applicable such as organized crime, proliferation issues, strategy and diplomacy, and also on the subjects of modeling, simulation, and wargaming. SMITE will ultimately determine how to measure progress in COIN/CT & AT/FP operations and then incorporate those measures into planning support tools in new ways by examining new ideas and technologies.

7. OTHER EFFORTS SUPPORTED

In addition, the team's efforts and products were able to be utilized by other AFRL entities on a non-interference basis. The IT and SME team assisted the AFRL Technology Directorate, Information Systems Division, Air and Space Command and Control Branch (RISA) via the Dynamic Air and Space Effects-Based Assessment (DASEA) effort with Basic Encyclopedia (BE) suffix fields on United States Message Text Format (USMTF) Mission Reports (MISREPs), Phase I and 2 Battle Damage Assessment Reports (BDAREPS), and USMTF Next Generation Assessment Environment (XGEN) Scenario updates for its MIDB-based System of Systems Model (SOSM).

The SMEs worked with the AFRL Technology Directorate, Information Grid Division, Networking Technology Branch (RIGC) on TBMCS capabilities (Portable Flight Planning System (PFPS) and Falconview). They also worked with RIGC to provide suggestions on its hi-resolution imagery project and to coordinate AOC and ATO assistance to one of its projects.

The SMEs partnered with the AFRL Technology Directorate, Information Systems Division, Air & Space Command & Control Systems Branch (RISA) in coordinating AOC and ATO advice to one of its projects and worked with Technology Directorate, Information Systems Division, Enterprise Information Management Branch (RISE) in coordinating AOC and ATO assistance to one of its projects.

The IT and SME team provided Information Systems division, Agile Information Concepts branch (RISF) with the ATO used in system level experiment; researched and provided synopses of operational and tactical action results' definitions and their uses, and researched and provided AFRL personnel with information concerning Air Force operational weather support organizations and processes.

The SMEs assisted in providing ATO via the TBMCS for other projects. The ATO was prepared and sent and a telecom was coordinated to collaborate on the description of fields and needs in the context of an operationally relevant scenario. Extensive follow-up information was provided, relative to the ATO requested by other projects and as approved by the AFRL program manager.

The SMEs reviewed George Mason University's scenario presentation to be played out on the Command and Control Wind Tunnel (C2WT), and Provided Air Tasking Order and AOC process explanation to AFRL/RISB, Information Systems Research Associate Computer Scientist. AOC explanations were provided on chat interpretations to AFRL/RIED Information and Intelligence Exploitation, Situational Awareness personnel. The SME team collaborated with members of 152 Air Operations Group at Hancock Field for AOC field ops updates and met with AFRL Information & Intelligence Exploitation Division Information Handling Branch (RIEB) to provide TST guidance for an initiative called Sentinel. SME support was also provided for Sentinel's Graphical User Interface (GUI).

SMEs conducted detailed teleconferences with developers at Scientific Research Corporation (SRC), and General Dynamics Corporation (GDC) in concert with AFRL RISB and RIGC. They mentored developers in the construct of both ATOs and ACOs. They conducted training in the mission planning process to include the intricacies and relationships of the ATO and ACO. This information was crucial for SRC and GDC to understand in their effort to build software that can assist communication planners with the management and control of the complexity of the Airborne Network and its gateways. The team extracted, formatted and transmitted to the government Program Manager an ATO and ACO for their use.

The Defense Advanced Research Project Agency (DARPA) Personal Assistant that Learns (PAL) Open Source Intelligence (OSINT) Current Intelligence (CI) Briefings were incorporated into activities for scenario development. Daily Intelligence Summaries (DISUMs) were produced and transmitted, and "Strategy Huddle" briefings were prepared and provided by the SMEs.

The IT and SME team provided SE-08 battle plans that were used by the AFRL Operational Information Management (OIM) Team for their activities.

8. RECOMMENDATION AND CONCLUSION

RRC provided focused and tailored AOC functions and emulations for the OFS initiative to define, develop, and implement an environment to support OFS exercises, while assisting the Air Force Research Laboratory in the design and execution of exercises and experiments. In addition to the direct OFS support, opportunities that evolved to enhance other initiatives were also accommodated on a non-interference basis. Recommend that a follow on effort be considered between the OFS simulation system and TBMCS to resolve simulation software issues. It is also recommended that OFS-generated data and scenarios be considered for potential future use as appropriate instead of expending additional resources to re-create military simulations in support of exercises and experiments.

9. LIST OF ACRONYMS

2D	Two Dimensional
3D	Three Dimensional
ABP	Air Battle Plan
ACC	Air Combat Command
ACE	Advance Concepts Events
ACO	Airspace Control Order
AFDD	Air Force Doctrine Document
AFRL	Air Force Research Laboratory
AN	Airborne Networking
AOC	Air and Space Operations Center
AOD	Air Operations Directive
API	Application Programming Interface
ATO	Air Tasking Order
BACN	Battlefield Airborne Communications Node
BDAREPS	Battle Damage Assessment Reports
C2	Command and Control
C2CC	Command and Control Concept Center
C2PC	Command and Control Personal Computer
C2WT	Command and Control Wind Tunnel
C3I	Command, Control, Communications, and Intelligence
CA	Counter-Air
CAS	Close Air Support
CI	Current Intelligence
CL	Counterland
COA	Course of Action
COP	Common Operational Picture
DASEA	Dynamic Air and Space Effects-Based Assessment
DCC	Defensive Counter Cyber
DISUM	Daily Intelligence Summary
DMOC	Distributed Mission Operation Center
E2C	U.S. Navy's all-weather, carrier-based tactical airborne warning and control system platform
EC	Empire Challenge
EOB	Electronic Order of Battle; Enemy Order of Battle

ESTAT	Execution Status and Monitoring
EW	Electronic Warfare
FPC	Final Planning Conference
FrOB	Friendly Order of Battle
FSTAT	Force Status and Monitoring
GUI	Graphical User Interface
IFF	Identification Friend or Foe
INTERIM	Insurgency and Terrorism Investigation and Measurement
IPC	Initial Planning Conference
IPOE	Intelligence Preparation of the Operational Environment
IRC	Internet Relay Chat
ISR	Intelligence Surveillance and Reconnaissance
IT	Information Technology
JAOP	Joint Air Operations Plan
JASMAD	Joint Airspace Management and Deconfliction
JFC	Joint Force Commander
JSAF	Joint Semi-Automated Forces
JTAC	Joint Terminal Attack Controller
JTT	Joint Targeting Toolkit
JView	A computer program that can manipulate information and results.
MAAP	Master Air Attack Plan
MIDB	Modernized Integrated Database
MISREP	Mission Report
MPC	Main Planning Conference
MQ1	Unmanned Aerial Vehicle System for Reconnaissance and attack, aka Predator
MSEL	Master Scenario Events List
MTDS	Multi-Link Translator and Display System
OCA	Offensive Counter Air
OCC	Offensive Counter Cyber
OFS	Operationally Focused Simulation
OIM	Operational Information Management
OPNET	Operational Network
OSINT	Open Source Intelligence
PAL	Personal Assistant that Learns
PDU	Protocol Data Unit

PFPS	Portable Flight Planning System
ROE	Rules of Engagement
RQ4	Unmanned Aerial Vehicle (R=Reconnaissance, Q=Unmanned Aircraft System, 4=fourth of a series)
RRC	Rome Research Corporation
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SAA	Situational Awareness and Assessment
SE	Simulation Exercise
SLEDGE	System Level Experiment for Dynamic GIG Execution
SME	Subject Matter Expert
SMITE	Successfully Managing Insurgencies and Terrorism Effectively
SOA	Service Oriented Architecture
SOSM	System of Systems Model
SQL	Structured Query Language
SRC	Scientific Research Corporation
TACP	Tactical Air Control Party
TADIL	Tactical Digital Information Link
TAP	Theater Air Planner
TBMCS	Theater Battle Management Core Systems
TCDL	Tactical Common Data Link
TDL	Tactical Data Link
TNL	Target Nomination List
TST	Time Sensitive Targets
TTNT	Tactical Targeting Network Technology
TTP	Training Techniques and Procedures
USMTF	United States Message Text Format
VBIED	Vehicle Borne Improvised Explosive Device
WEBAD	WEB-based Airspace Deconfliction
WS	Weapon System
XGEN	Next Generation Assessment Environment

APPENDIX A EXPLANATION OF TERMS

Term	Definition
2D	Two Dimensional
3D	Three Dimensional
ABP	Air Battle Plan: The term Air Battle Plan is not a formalized military expression, but a term associated with the automated systems that support the planning and execution of Air Operations. As of 2007, this automated system is known as the Theater Battle Management Core System (TBMCS). TBMCS provides the air commander with the means to plan, direct, and control all theater air operations in support of command objectives and to coordinate with ground and maritime elements engaged in the same operation.
ACC	Air Combat Command: A major command of the United States Air Force. Air Combat Command is the primary force provider of combat airpower to America's warfighting commands. To support global implementation of national security strategy, ACC operates fighter, bomber, reconnaissance, battle-management and electronic-combat aircraft. ACC also provides command, control, communications and intelligence systems, and conducts global information operations.
ACE	Advanced Concepts Events: Advanced Concepts Event: The purpose of the OFS Advanced Concepts Event 2007 (ACE-07) was to explore futuristic combat capabilities. This was a simulation driven event that exhibited possible Advanced Concept contributions to the Warfighter and to the Department of Defense.
ACO	Airspace Control Order: (DOD) An order implementing the airspace control plan that provides the details of the approved requests for airspace coordinating measures. It is published either as part of the air tasking order or as a separate document.
AFRL	Air Force Research Laboratory
AN	Airborne Networking: the sum total of all capabilities required for conducting airborne network-centric operations to shorten the kill chain and facilitate the synchronized flow of relevant information by extending the Global Information Grid (GIG) to the airborne domain. The AN is the airborne extension of the Air Force's Constellation Net portion of the Global Information Grid (GIG). The AN is defined to be an infrastructure that provides communication transport services through at least one node that is on a platform capable of flight. This can best be visualized in the context of the operating domains served by the GIG. The Transformational Communications Satellite System (TSAT) network will provide space connectivity and the GIG-Bandwidth Expansion (GIG-BE) network together with networks such as those provided under the Combat Information Transport System and Theater Deployable Communications will provide surface connectivity. Airborne connectivity within the GIG will be provided by the AN. The AN will connect to both the space and surface networks, making it an integral part of the communications fabric of the GIG.
AOC	Air and Space Operations Center (see AOC WS)

Term	Definition
AOC WS	Air and Space Operations Center Weapons System: The AOC weapon system (WS) is the senior C2 element of the Theater Air Control System (TACS) and operational level focal point for C2 during AF and combined (coalition)/joint operations. Based on the tenet of centralized planning and control, and decentralized execution, the AOC provides operational-level C2 of air and space forces. The AOC includes personnel and equipment to ensure the effective conduct of air and space operations.
AOD	Air Operations Directive: The C/JFACC daily guidance ensures that joint air and space and information operations effectively support combined/joint force objectives while retaining enough flexibility to adjust to the dynamics of the range of military operations. The AOD provides operational and tactical objectives and tasks and their measures of effectiveness for the ATO execution and recommended targets sets to achieve desired effects.
API	Application Programming Interface: An interface defining the ways by which an application program may request services from libraries and/or operating systems. An API determines the vocabulary and calling conventions the programmer should employ to use the services. It may include specifications for routines, data structures, object classes and protocols used to communicate between the requesting software and the library.
ATO	Air Tasking Order: A method used to task and disseminate to components, subordinate units, and command and control agencies projected sorties, capabilities and/or forces to targets and specific missions. Normally provides specific instructions to include call signs, targets, controlling agencies, etc., as well as general instructions.
BACN	Battlefield Airborne Communications Node: A bridge, or gateway, between different radios. BACN uses software - a package called the Joint Translator Forwarder - to translate radio signals transmitted on different frequencies and in different messaging formats or protocols. The BACN payload can receive messages from one user in any of several major waveforms, translate the messages into a different datalink format and relay the information to the intended receiver.
BDAREPS	Battle Damage Assessment Reports: The BDAREP PHASE1 is used to provide a timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a predetermined objective. It is a single source report which contains initial physical damage assessments. The BDAREP PHASE2 is used to provide an all-source assessment containing detailed physical and functional damage assessments, inputs to the target system assessment, and comments on munitions effectiveness.
C2	Command and Control: The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.

Term	Definition
C2CC	Command and Control Concept Center: The Command and Control Concept Center (C2CC) is an AFRL test and integration facility that supports research and development experimentation with current and future capabilities in a controlled, operationally relevant environment. The facility provides systems of record, network communications, hardware, system administration support and subject matter experts to ensure successful demonstrations.
C2PC	Command and Control Personal Computer: A client application that displays tactical track data from a UNIX-based Tactical Database Manager (TDBM) data server. C2PC is delivered with TBMCS as part of its intelligence portion.
C2WT	Command and Control Wind Tunnel. A phrase used to describe an area to test technologies in a simulated C2 environment
C3I	Command, Control, Communications, and Intelligence
CA	Counter-Air: A mission that integrates offensive and defensive operations to attain and maintain a desired degree of air superiority. Counter-air missions are designed to destroy or negate enemy aircraft and missiles, both before and after launch (see also air superiority; mission; offensive counter-air).
CAPSTONE	The top joint doctrine publication in the hierarchy of joint publications. The capstone publication links joint doctrine to national strategy and the contributions of other government agencies, alliances, and coalitions, and reinforces policy for command and control. The Chairman of the Joint Chiefs of Staff signs this publication and it is intended to be used by combatant commanders, subunified commanders, joint task force commanders, Service Chiefs, and Joint Staff directors.
CAS	Close Air Support: Air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.
CI	Current Intelligence: One of two categories of descriptive intelligence that is concerned with describing the existing situation.
CL	Counterland: Counterland operations are air and space operations against enemy land force capabilities to create effects that achieve joint force commander (JFC) objectives. The aim of counterland operations is to dominate the surface environment using air and space power.
COA	Course of Action: 1. Any sequence of activities that an individual or unit may follow. 2. A possible plan open to an individual or commander that would accomplish, or is related to the accomplishment of the mission. 3. The scheme adopted to accomplish a job or mission. 4. A line of conduct in an engagement. 5. A product of the Joint Operation Planning and Execution System concept development phase and the course-of-action determination steps of the joint operation planning process.

Term	Definition
COP	Common Operational Picture: A single identical display of relevant information shared by more than one command. A common operational picture facilitates collaborative planning and assists all echelons to achieve situational awareness.
CWIN	Cyber Warfare Integration Network: A virtual, real-time, geographically distributed battlefield environment. Customers can rapidly design, implement and analyze operational scenarios using a customized mix of virtual airborne and space-based intelligence, surveillance and reconnaissance (ISR) sensors; command and control elements; and simulations of precision strike platforms.
DARPA	Defense Advanced Research Project Agency: DARPA is the central research and development organization for the U.S. Department of Defense. DARPA's mission is to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security. We fund researchers in industry, universities, government laboratories and elsewhere to conduct high-risk, high-reward research and development projects that will benefit U.S. national security.
DASEA	Dynamic Air and Space Effects-Based Assessment: DASEA's objective is to develop and evaluate processes and technologies to support accurate and timely effects-based assessment, and to capture lessons learned. Its goal is to enable actionable effects-based assessment to assist the commander in shaping the campaign. Its focus is on the operational level of war, CAOC, and post-execution effects based assessment.
DCC	Defensive Counter Cyber: The objective of defensive counter cyber (DCC) is to protect friendly forces and vital interests from adversary cyber attack. DCC consists of active and passive cyber defense operations including all defensive measures designed to destroy attacking adversary forces or reduce their effectiveness. Cyber defense includes measures to preserve, protect, recover, and reconstitute friendly cyber capabilities before, during, and after an adversary attack. Currently, cyber defense operations are limited to electronic protection (EP) and network defense (NetD), but should also extend to other terrestrial, airborne, and space based systems that are a part of cyberspace.
DISUM	Daily Intelligence Summary: A report prepared in message form at the joint force headquarters that provides higher, lateral, and subordinate headquarters with a summary of all significant intelligence produced during the previous 24-hour period. The "as of" time for information, content, and submission time for the report will be as specified by the joint force commander. This message is also used daily to provide updated intelligence summaries of world events. The DISUM will include intelligence previously reported in spot intelligence reports (SPIREP) and amplified, as appropriate.

Term	Definition
DMOC	Distributed Missions Operation Center: DMOC serves as Air Combat Command's tactical to operational level synthetic battlespace hub through scheduling and integration of warfighter units, resources, scenario development, networking virtual adversary support, linking operational and strategic-level simulations, providing network connectivity to joint and Coalition players around the world and by performing lead agent responsibilities for Air Combat Command's Synthetic Battlespace inter-team training events. DMOC directs AEF-aligned, quarterly recurring VIRTUAL FLAG exercises, currently the only exercise to train full spectrum TACS (theatre air control system) warfighters from start to finish, and Warfighter Focused Events, which highlight mission areas to include OCA, DACT, CAS, DCA, DT/TST and CSAR.
E2C	U.S. Navy's all-weather, carrier-based tactical airborne warning and control system platform
EC	Empire Challenge: A multi-intelligence, Joint/Coalition Distributed Common Ground System (DCGS) interoperability demonstration series.
EOB	Electronic Order of Battle; Enemy Order of Battle: EOB – Enemy (or Electronic) Order of Battle. Used by SAA where Intel analyst accesses EOB to assess threats and capabilities of opposing forces. TBMCS uses General Military Intel (GMI) Query to search MIDB. Order of Battle refers to the identification, strength, command structure and disposition of personnel, units and equipment of any military force.
ESTAT	Execution Status and Monitoring. A duty officer's primary job is to monitor the execution of the Air Tasking Order (ATO) – monitor the progress of their assigned missions. Within TBMCS, WEBEM ESTAT is the primary tool for monitoring progress of ATO missions – it is the duty officer's primary tool for mission awareness. ESTAT provides a chart (Sortie Flow Chart) and a table (Mission Status Update Table) to enable the duty officer to quickly visually determine the status of the missions being monitored.
EW	Electronic Warfare: Military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Electronic warfare consists of three divisions: electronic attack, electronic protection, and electronic warfare support. Also called EW (see also directed energy; electromagnetic spectrum; electronic attack; electronic protection; electronic warfare support).
FPC	Final Planning Conference. Commonly used when multiple conferences are conducted to plan an exercise. The final planning conference is, of course, the last one.
FrOB	Friendly Order of Battle: The identification, strength, command structure and disposition of personnel, units and equipment of any friendly military force.

Term	Definition
FSTAT	Force Status and Monitoring: Within TBMCS, WEBEM FSTAT is the primary tool for reporting and modifying friendly order of battle (FrOB). Flying and other units subordinate to the AOC or TACC use both ESTAT and FSTAT to update statuses. In fact, they should be the primary source for status updates. WEBEM FSTAT provides a means of updating and/or monitoring 6 main products: • ADA (Air Defense Artillery) Unit Status • Aircraft Unit Status • Base Status • Surface C2 (Command and Control) Unit Status • Missile Unit Status • Fire Unit Status
GUI	Graphical User Interface: A type of user interface which allows people to interact with electronic devices such as computers; hand-held devices such as MP3 Players, Portable Media Players or Gaming devices; household appliances and office equipment with images rather than text commands.
IPC	Initial Planning Conference: Commonly used when multiple conferences are conducted to plan an exercise. The initial planning conference is, of course, the first one.
IPOE	Intelligence Preparation of the Operational Environment: An analytical methodology employed to reduce uncertainties concerning the enemy, environment, and terrain for all types of operations. Intelligence preparation of the battlespace/operational environment builds an extensive database for each potential area in which a unit may be required to operate. The database is then analyzed in detail to determine the impact of the enemy, environment, and terrain on operations and presents it in graphic form. Intelligence preparation of the battlespace/operational environment is a continuing process.
IRC	Internet Relay Chat: A form of real-time internet text messaging or synchronous conferencing. It is mainly designed for group communication in discussion forums called channels, but also allows one-to-one communication via private message as well as chat and data transfers via direct client-to-client.
ISR	Intelligence Surveillance and Reconnaissance: An activity that synchronizes and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations. This is an integrated intelligence and operations function (see also intelligence; intelligence, surveillance, and reconnaissance visualization; reconnaissance; surveillance).
IT	Information Technology: The study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware.

Term	Definition
JAOP	Joint Air Operations Plan: A plan for a connected series of joint air operations to achieve the joint force commander's objectives within a given time and joint operational area.
JASMAD	Joint Airspace Management and Deconfliction: AFRL technology demonstration effort to design, develop, test, and field a single, network-centric, joint-service airspace management and deconfliction capability for integration into the Air and Space Operations Center-Weapon System (AOC-WS)
JFACC	Joint Force Air Component Commander: The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. The joint force air component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. The term Combined Force Air Component Commander (CFACC) is used when the military force is composed of elements of two or more allied nations.
JFC	Joint Force Commander: A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force.
JSAF	Joint Semi-Automated Forces: Joint Semi-Automated Forces (JSAF) is a simulation system sponsored by U.S. Joint Forces Command (USJFCOM). The system generates entity-level simulations which interact individually in a synthetic environment. Individual entities include infantrymen, tanks, ships, airplanes, munitions, buildings, and sensors. They can be controlled separately or organized into appropriate units for a given mission.
JTAC	Joint Terminal Attack Controller: A qualified (certified) Service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. A qualified and current joint terminal attack controller will be recognized across the Department of Defense as capable and authorized to perform terminal attack control.
JTT	Joint Targeting Toolkit: JTT is a Joint Chiefs of Staff (JCS) initiative that is being developed and fielded Department of Defense (DoD) -wide. It is the primary targeting application for the Global Command and Control System (GCCS) that allows "complete targeting interoperability" within the joint community. JTT brings all Services', Commands', and government agencies targeting requirements together in one tool, increasing their interoperability and collaboration capability.
JView	Java View. An application programmer's interface, Java View is designed to reduce the time, cost, and effort associated with the creation of computer-visualization applications or the visualization interface of an application. Jview allows for the importing, displaying, and fusing of multiple simultaneous-information sources.

Term	Definition
Link 16	Link 16 is the primary data link used to support joint air operations. It is a secure, jam-resistant data link that supports voice and data communications used for the simultaneous exchange of real-time orders, commands, surveillance and intelligence data on air, space, surface, subsurface, and ground tracks among participating units. Normally, Link 16 is used between units that are within line of sight (LOS) of each other; but advances in technology also give us a beyond LOS Link 16 capability.
MAAP	Master Air Attack Plan: A plan that contains key information that forms the foundation of the joint air tasking order. Sometimes referred to as the air employment plan or joint air tasking order shell. Information that may be found in the plan includes joint force commander guidance, joint force air component commander guidance, support plans, component requests, target update requests, availability of capabilities and forces, target information from target lists, aircraft allocation, etc.
MC2A	Multi Sensor Command and Control Aircraft: Intended to be the ultimate theater-wide combat control center and to provide enhanced signals and electronic intelligence capability on a Boeing 767 aircraft. Budget pressures after 2007 cancelled the program, but some radar advances may yet survive.
MIDB	Modernized Integrated Database: An architecture for improving the manner in which military intelligence is analyzed, stored, and disseminated. The Integrated Database (IDB) forms the core automated database for the Military Intelligence Integrated Data System (MIIDS) program and integrates the data in the installation, order of battle, equipment, and selected electronic warfare and command, control, and communications files. The IDB is the national-level repository for the general military intelligence information available to the entire Department of Defense Intelligence Information System community and maintained by DIA and the commands. The IDB is kept synchronized by system transactions to disseminate updates. Also called MIIDS/IDB.
MISREP	Mission Report. The MISREP is used to report aerial mission results and items of intelligence interest in all tactical roles. It may also be used to retransmit or amplify an inflight report. The MISREP message is filled out to provide timely reports of mission results and all other intelligence information obtained during post-flight debriefing. The MISREP is used to report specific results of non-imagery recorded tactical combat missions and sightings made along ingress and egress routes. The MISREP may be used to retransmit or amplify an inflight report and is submitted to the tasking agency, the requesting unit/agency, and to other interested organizations. Visual-only reconnaissance missions will utilize this message in lieu of an imagery exploitation message type. When missions are covered by a Close Air Support Summary (CASSUM), a MISREP is not required.
MPC	Main Planning Conference: Commonly used when multiple conferences are conducted to plan an exercise. The main planning conference is where most items are resolved.

Term	Definition
MQ1	Unmanned Aerial Vehicle System for Reconnaissance and attack, aka Predator. The multimission weaponized Predator A. It carries a multi-spectral targeting system (MTS) A sensor ball supplied by Raytheon in place of the Wescam sensor ball. The MTS A provides a laser target designator with EO/IR sensors in a single package. The SAR from the RQ-1 was removed. The MQ-1 can be controlled via direct line of sight or via satellite from a remote location. A new signals intelligence sensor payload (ASIP) is under development.
MSEL	Master Scenario Events List. A compilation of scripted events that depict activities injected during the exercise by controllers to cause player actions. It is developed in consonance with the exercise participants' objectives and organization, and contains critical and supporting exercise events. It usually contains at least the event, the date-time-group, the drafter, the injector, and the event description.
MTDS	Multi-Link Translator and Display System: A bridge that connects various incompatible communications systems together.
OCA	Offensive Counter Air: Offensive operations to destroy, disrupt, or neutralize enemy aircraft, missiles, launch platforms, and their supporting structures and systems both before and after launch, but as close to their source as possible. Offensive counterair operations range throughout enemy territory and are generally conducted at the initiative of friendly forces. These operations include attack operations, suppression of enemy air defenses, fighter escort, and fighter sweep.
OCC	Offensive Counter Cyber: Notional description. Offensive counter cyber (OCC) operations deny, degrade, disrupt, destroy, or deceive an adversary's cyber capability. Adversary cyber capabilities include electronics, networks, and other systems that use the Electro Magnetic System (EMS). OCC targets include adversary terrestrial, airborne, and space networks; electronic attack (EA) and network attack (NetA) systems; and, command, control, communication, computers, and intelligence nodes (C4I). As an adversary becomes more dependent on cyber capabilities, OCC operations have the potential to produce effects that directly impact the ability and will to wage war at the strategic, operational and tactical levels. Denying adversary use of the cyber domain may hinder their ability to effectively organize, coordinate, and orchestrate a military campaign.
OFS	Operationally Focused Simulation: The objective of the OFS effort was to define, develop, and implement an environment to support Operationally Focused Simulation (OFS) exercises, while assisting the Air Force Research Laboratory in the design and execution of exercises and experiments

Term	Definition
OIM	Operational Information Management: In 1999 the Scientific Advisory Board's (SAB) final report first stated the need for Information Management (IM) for the warfighter. This concept was taken by the Air Force Research Laboratory (AFRL) and evolved into the Joint Battlespace Infosphere (JBI), an AFRL/RRS in-house project to design and develop the first generation prototype of a Joint warfighter IM system. This system, known as the JBI Reference Implementation (RI), served as the springboard for AFRL IM projects over the successive years and is still in development today. Operational Information Management (OIM) is an adaptation of the successes of this project from the large data processing centers to the tactical users at the extreme edges of the military information space.
OPNET	Operational Network: Activities conducted to operate and defend the Global Information Grid. Also called NETOPS.
OSINT	Open Source Intelligence: Information of potential intelligence value that is available to the general public.
PACIFICA	The fictitious name of an Island used in a series of unclassified joint military training exercises. The Island of Pacifica is home to three sovereign countries: The Confederation of Washorgon States, The Peoples Republic of Califon, and The Republic of Nevidah. Its overlay is the Western United States.
PAL	Personalized Assistant That Learns. A Defense Advanced Research Project Agency (DARPA) initiative within Cognitive Agent that Learns and Organizes (CALO) used on the Non-secure Internet Protocol Router Network (NIPRNET) for unclassified information gathering.
PDU	Protocol Data Unit: Information that's delivered as a unit among peer entities of a network and that may contain control information, address information, or data.
PFPS	Portable Flight Planning System: Portable Flight Planning System/FalconView: It's included in Personal Computer-Integrated Imagery and Intelligence (PC-I3). FalconView is a Windows based mapping application that displays various types of maps and geographically referenced charts. The primary overlays of interest are aeronautical charts, satellite images and elevation maps. FalconView also contains a large array of overlay types that can be displayed over any of its map backgrounds. The overlays produced from FalconView can be used to depict order-of-battle displays.
ROE	Rules of Engagement: Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Incorporates the law of war, or that part of international law that regulates the conduct of armed hostilities.
RQ4	Unmanned Aerial Vehicle (R=Reconnaissance, Q=Unmanned Aircraft System, 4=fourth of a series) This refers to the Global Hawk, a high-altitude, long-range, long-endurance unmanned aircraft system.
RRC	Rome Research Corporation

Term	Definition
RSTA	Reconnaissance, Surveillance, and Target Acquisition: This process is normally placed in the operations plan in the form of a RSTA Annex. It tasks joint prioritized collection. The AOC's Chief of the ISR Operations Team oversees the ISR operations planning process and development of the RSTA Annex. The RSTA Annex is the ISR supplement to the ATO. It contains detailed tasking of intelligence collection sensors and PED nodes and provides specific guidance to tasked ISR assets, including ISR platforms, sensors, and PED nodes/architecture (U2, Predator, EP3, Distributed Ground Station [DGS], etc.). This product outlines the entire C/JFACC ISR plan for a given ATO, possibly at multiple classification levels.
SAA	Situational Awareness and Assessment: (TBMCS application). Used by Ops & Intel. Provides a configurable data display for various users, and provides analysis tools for experts to support identification and intent of threats. TBMCS does not have an icon called SAA. It is a collection of applications that work together to perform the tasks. System Chart will graphically display all-source-correlated info about enemy forces, including electronic combat info, to assist in analysis and evaluation of enemy threat status. The Tracks application will receive, process, and correlate multiple source/sensor inputs. Provides text info for Friendly OB operating location weather & intel data.
SE	Simulation Exercise
SLEDGE	System Level Experiment for Dynamic GIG Execution. An AFRL project to conduct operationally relevant experiments to further assess the technical merit of information services (publish/subscribe/query/transform), evaluate the combat capability derived in selected tactical and operational contexts, and operate within a system level experiment framework.
SME	Subject Matter Expert: A person who is an expert in a particular area.
SOA	Service Oriented Architecture: SOA practices provide a framework for organizing and orchestrating systems, and indeed entire organizations, to rapidly achieve interoperability and improved agility by leveraging the World Wide Web Consortium (W3C) web services standards. These standards enable interoperability by establishing open XML-based communications protocols and service definitions.
SOSM	System of Systems Model: A model which has used the system of systems concept. This approach looks at interdependencies and vulnerabilities between systems as well as intra-system dependencies in order to maximize the effectiveness of, for example, target development. Thorough examination of the adversary as a system of systems in order to understand where critical linkages and vulnerabilities lie. Critical elements (i.e., linkages and vulnerabilities) are those that a system requires in order to function. Linkages within a system often enable the functioning of several interrelated parts of the system, and so affecting them in the right way can disable several components or even cause cascading system-wide failure. Vulnerable elements are those that can be attacked or otherwise affected with relative ease. Thorough analysis should reveal "critical vulnerabilities," if they exist. These are elements of the adversary's system that are both critical and vulnerable.

Term	Definition
SQL	Structured Query Language: The query language extracts information from messages, files, and databases. Queries written in Structured Query Language (SQL) specify the information to be retrieved and the output format used to view the retrieved data. A query is specific enough to identify a single message, in which case it acts as an information filter. A query can also be applied to a collection of messages in the message journal and acts as a database retrieval query. SQL is a well-known data retrieval language for relational databases. SQL has been extended to deal with structured messages, instead of totally flat relational tables. A design goal of the language is that anyone familiar with SQL and with the general structure of messages should find queries easy to formulate.
SRC	Scientific Research Corporation
TACP	Tactical Air Control Party: A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft. Also called TACP.
TADIL	Tactical Digital Information Link: A Joint Staff-approved, standardized communication link suitable for transmission of digital information. Tactical digital information links interface two or more command and control or weapons systems via a single or multiple network architecture and multiple communication media for exchange of tactical information. Also called TADIL.
TAP	Theater Air Planner: A TBMCS application used by the AOC's Combat Plans Division . It is used to generate the ATO. A combat planner can perform Air Battle Plan (ABP) management functions, set up Air Operations Data Base (AODB) functions, perform mission planning functions plus review & analyze ABPs.
TBMCS	Theater Battle Management Core Systems: Theater Battle Management Core Systems (TBMCS) constitutes an integrated system, implementing the legacy capabilities of the Contingency Theater Automated Planning System (CTAPS), and the Combat Intelligence System (CIS). These capabilities have been integrated onto an infrastructure composed of a mix of Microsoft Windows based items and the Defense Information Infrastructure (DII) Common Operating Environment (COE) for the Unix-based platforms. In addition to the integration of the legacy capabilities, enhancements were included and future enhancements will be introduced as the joint community approves additional system requirements.
TCDL	Tactical Common Data Link: The TCDL provides near-real-time connectivity and interoperability between multiple TCDL collection platforms, TCDL surface terminals, and currently fielded Common Data Link (CDL) interoperable systems operated by the armed services and Government agencies.
TDL	Tactical Data Link: TDLs (also referred to as TADILs) are standardized communication links approved by the Joint Chiefs of Staff, suitable for transmission of digital information. All Services, including the Air Force, use these links primarily for C2 of the air defense network. Since the nodes for air defense are also the nodes for airspace control, these rapid data transmission means can support airspace control as an ancillary function. Link 16 has been designated as the primary data link for use in the combat air forces (CAF).

Term	Definition
TNL	Target Nomination List: A target-consolidated list of targets made up of the multiple candidate target lists. A prioritized list of targets drawn from the joint target list and nominated by component commanders, appropriate agencies, or the joint force commander's staff for inclusion on the joint integrated prioritized target list. Also called TNL.
TST	Time Sensitive Targets: A joint force commander designated target requiring immediate response because it is a highly lucrative, fleeting target of opportunity or it poses (or will soon pose) a danger to friendly forces.
TTNT	Tactical Targeting Network Technology: The Tactical Targeting Network Technology (TTNT) program develops, evaluates and demonstrates rapidly re-configurable, affordable, robust, interoperable and evolvable communications technologies specifically to support emerging networked targeting applications that are designed to keep fleeting targets at risk.
TTP	Training Techniques and Procedures: A unique subset of operational level doctrine is Air Force operational tactics, techniques, and procedures (AFOTTP). AFOTTP describe how operations centers and other command and control nodes function and how they plan and employ air, space, and information capabilities to achieve desired effects and objectives at the operational level of war. Tactical doctrine describes the proper employment of specific Air Force assets, individually or in concert with other assets, to accomplish detailed objectives. Tactical doctrine is codified as tactics, techniques, and procedures (TTP) in Air Force TTP (AFTTP) -3 series manuals.
USMTF	United States Message Text Format: (DOD) A program designed to enhance joint and combined combat effectiveness through standardization of message formats, data elements, and information exchange procedures. Standard message formats with standard information content provides all tactical commanders at the joint interface with a common playing field and a common language.
VBIED	Vehicle-borne Improvised Explosive Device — A device placed or fabricated in an improvised manner on a vehicle incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy, incapacitate, harass, or distract. Otherwise known as a car bomb.
WEBAD	WEB-based Airspace Deconfliction: Web-based airspace deconfliction (WebAD) within the TBMCS performs a basic deconfliction analysis based on estimated launch times and routes, using minimal amounts of data including departure base, estimated time of departure, target location, and estimated arrival time at the final landing location. WebAD issues alerts when it detects conflicts.
WEBEM	Web Execution Management: A Web-based TBMCS tool for duty officers using Microsoft NT workstations to monitor the progress of ATO missions. Mission monitoring simply means staying abreast of a mission's progress starting when a unit is first tasked to execute a mission through mission termination. The appropriate duty officer(s) monitor and, if needed, adjust the air operations they oversee. WEBEM draws data from and writes data to the Air Operations Database (AODB). The tool includes ESTAT and FSTAT.

Term	Definition
WS	Weapon System: A term used to identify certain military systems as weapons
XGEN	Next Generation Assessment Environment: Securboration has developed a powerful solution in the form of its Next Generation Assessment Environment (XGEN). Through XGEN, Securboration is using ontological-based modeling and inferencing to evaluate Effects Based Operations, in particular Political, Military, Economic, Social, Infrastructure, and Information (PMESII) effects.

APPENDIX B COMMAND AND CONTROL CONCEPT CENTER (C2CC) SIMULATION EXERCISE 2008 (SE-08) DEMONSTRATION PLAN

B-1 Introduction

The Command and Control Concept Center (C2CC) is a test and integration facility that supports research and development experimentation with current and future capabilities in a controlled, operationally relevant environment. The facility provides systems of record, network communications, hardware, system administration support and subject matter experts to ensure successful demonstrations.

B-1.1 Purpose

The purpose of the Operationally Focused Simulation (OFS) Exercise 2008 (SE-08) is to define operationally relevant DATA that the RISB OFS research team will want to collect during the July 2008 Empire Challenge live fly exercise. The SE-08 exercise will also demonstrate the ability of the OFS team to utilize simulation tools to ingest Theater Battle Management Core System (TBMCS) products and then during the exercise produce the appropriate message traffic to be ingested back into the TBMCS suite.

B-1.2 Scope

The scope of this document will cover the demonstration plan for SE-08 that will take place in the C2CC during the month of April 2008.

B-1.3 Document Organization

This document is organized as follows:

Section C-1 describes scope of this document.

Section C-2 presents the demonstration overview and detailed plan.

Section C-3 provides the approved validation approach for the demonstration.

Section C-4 provides the TADIL Interface Channel Interface Control Settings made on the SAA server in the TBMCS environment.

Section C-5 provides the SE1 target nomination list for the SE-08 Demonstration.

Section C-6 provides the SE1 Air Tasking Order generated to support the SE-08 demonstration.

B-1.4 References

All reference documents contained in this section may be used for guidance unless otherwise specified within the body of this document.

B-1.4.1 Government Documents

Table 1 Government Documents

Document ID	Document Title
PCSN. S-7-3226	Statement of Work for Command, Control, Communications, Computer and Intelligence (C4I) Systems

B-1.4.2 Project Technical Documents

Table 2 Technical Documents

Document ID	Document Title
	Simulation Exercise 08-01 Master Scenario Event List
	SE_000_000.ATO
	SE08_000_000.ACO
	SE1.TNL

B-2 Demonstration Overview

The SE-08 demonstration will simulate an airborne network consisting of the Tactical Targeting Network Technology (TTNT), Link 16 and a Tactical Common Data Link (TCDL). The main objectives are to test the data flow on the network and to enhance mission effectiveness through the reduction of resources. The demonstration will take place during the month of April 2008. The OFS simulation team and the C2CC team will participate in the demonstration.

The OFS team, using the Master Scenario Events List (MSEL), a Target Nomination List (TNL), an Air Tasking Order (ATO), and an Airspace Control Order (ACO) provided by the C2CC team will simulate the airborne network and message traffic. The C2CC team will simulate an Air Operations Center (AOC) utilizing the TBMCS suite. The C2CC team will use the Internet Relay Chat client to simulate radio calls, Force Status and Monitoring (FSTAT) to monitor and update Base status information, Execution Status and Monitoring (ESTAT) to monitor and update mission status information, Command and Control Personal Computer (C2PC) and Falcon View for situational awareness and to receive Tactical Digital Information Links (TADIL) J series messages from the simulation team during execution of the Air Tasking Order (ATO) to display situational awareness and operational relevance for the demonstration.

B-2.1 Demonstration Plan

B-2.1.1 Demonstration Environment

The demonstration will take place in the C2CC laboratory. The OFS simulation systems will be located on their own virtual network. The TBMCS systems will be located on a routable network accessible to the OFS systems by a dual homed system within the virtual network. TBMCS duty stations will be displayed on large screen displays to monitor the execution of the scenario. OFS systems will be displayed on large screen displays to monitor network traffic and simulation execution.

B-2.1.2 Demonstration Schedule

The demonstration will consist of two planning conferences, a testing / integration phase, two days of dry runs, the exercise run and a Lessons Learned Briefing. This schedule was compressed due to obligations of the OFS team requiring initial data collection to be completed by the 14th of April 2008.

The first conference will be the Main Planning Conference (MCP) taking place on 13 Mar 08 in the C2CC. Testing and integration will take place during 1 – 6 Apr 08. The Final Planning Conference (FPC) will take place on 6 Apr 08 in the C2CC. Demonstration dry runs will take place 7- 8 Apr 08 followed by the SE-08 exercise 9 Apr 08 in the C2CC. The Lessons Learned Briefing will take place on 29 Apr 08.

B-2.1.3 Equipment to be used

The equipment to be used for the demonstration will be a combination of OFS owned and C2CC owned equipment. All equipment will be moved into the C2CC demonstration area of the C2CC prior to the testing and integration phase.

B-2.1.4 OFS Simulation Systems

JSAF - Entity Simulation

OPNET - Network Simulation

MARCI – Simulation Control Application

CDLA – Data Logger

MTDS – Multi-Link Translator and Display System Data Link Tool

B-2.1.5 C2CC TBMCS Systems

Oracle AODB, SaMBa and WebLogic Server

Sybase MIDB Server

Common Operational Picture Server

Active Directory Primary Server

Command and Control Personal Computer Gateway

AOC Duty stations

B-2.1.6 Large Screen Displays

There will be a total of five large screen displays utilized for the OSF demonstration. The TBMCS duty stations will be displayed on three large screen displays in the demonstration area. One screen will display the MSEL, one will display the Common Operational Picture (COP) and the final screen will display TBMCS applications monitoring mission execution of the ATO. The OFS simulation systems will be display two large screen displays. One screen will display JSAF entity simulation and the other will display the OPNET network simulation.

B-2.1.7 Floor Plan

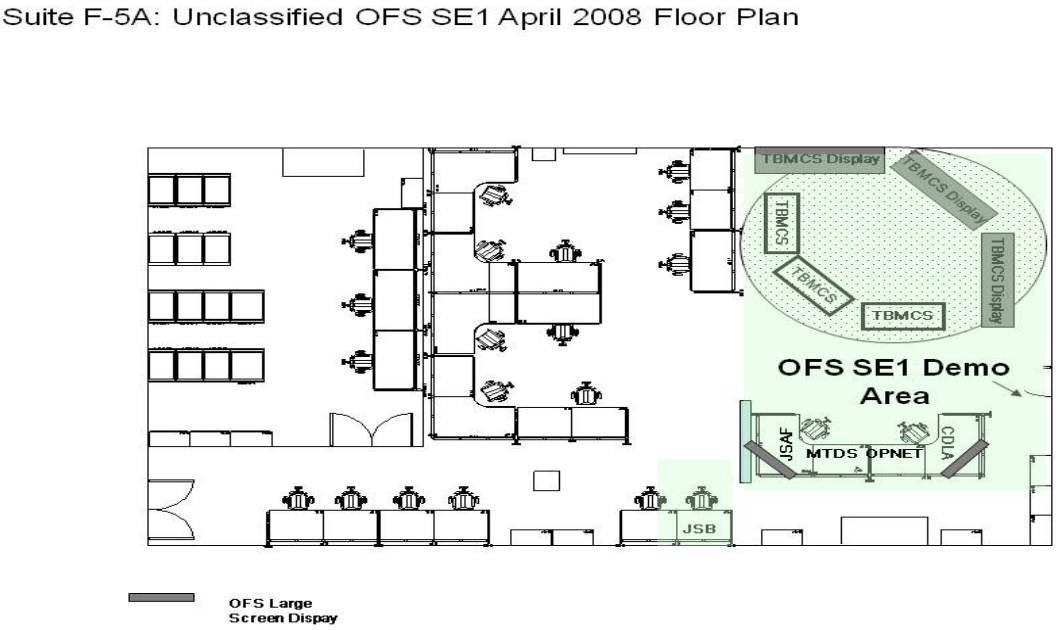

Figure 11 OFS Demonstration Floor Plan

B-2.1.8 Network Diagrams

SE08-1		
OFS Network	3/13/2008	Draft

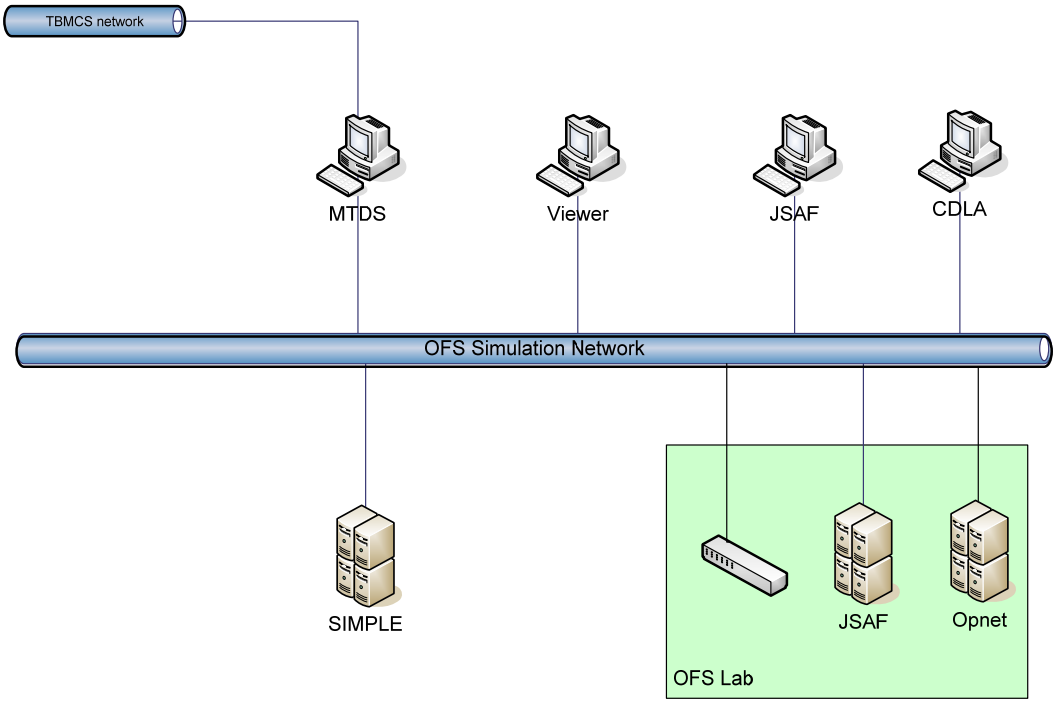

Figure 12 OFS Network Diagram

SE08-1		
C2CC Network	3/13/2008	Draft

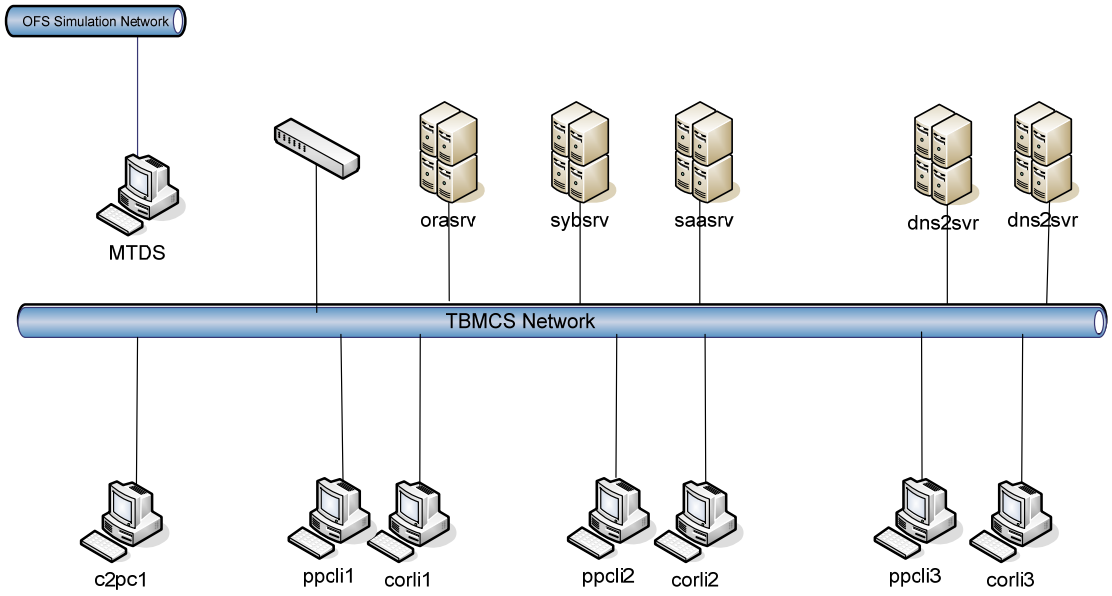

Figure 13 C2CC Network Diagram

B-2.1.9 Scenario(s) to be Demonstrated

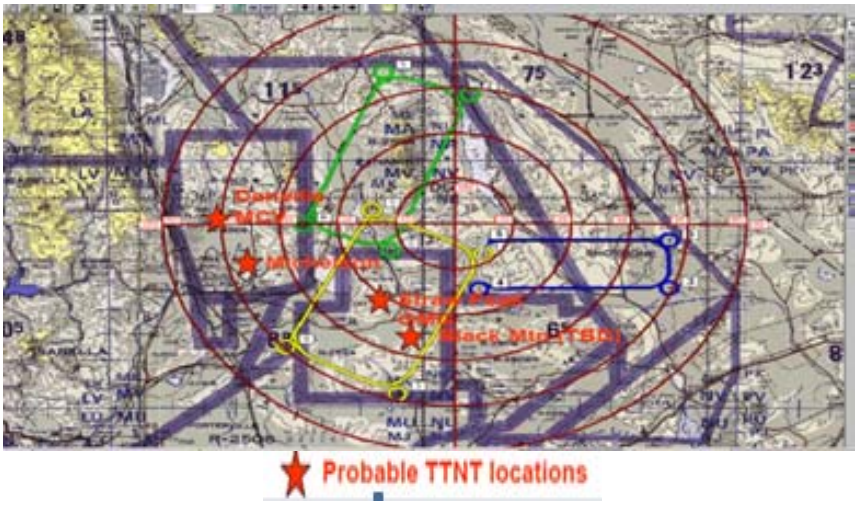

Figure 14 Demonstration Scenarios

The demonstration will contain two Pacifica based scenarios based on Joint Air Operations Plan (JAOP) and Air Operations Directive (AOD).

The first scenario will be a cross domain Counter Air (CA) scenario with an operational objective to extend air superiority over Califon. The scenario will be attacking forces over the Pacifica Area of Interest (AOI), as required, to execute tasked air and space operations without prohibitive losses. The Measure of Effectiveness (MOE) will be that Califon is unable to adversely impact coalition air operations over eastern Califon and the Pacific Mineral Fields (PMF). The Weight of Effort (WOE) by Air Tasking Order (ATO) is High (45%). WOE by Intelligence, Surveillance, and Reconnaissance (ISR) is High (50%). The Counter Air Tactical Objective will be to prevent anti-aircraft artillery (AAA) and surface to-air-missiles (SAMs) from disrupting Combined Forces Command (CFC) air operations. The Counter Air Tactical Task will be to attack strategic and fixed SAMs with a priority to those protecting enemy space, C2, C4I, offensive air and PMF.

The second scenario will be a cross domain Counter Land (CL) scenario with an operational objective to contain Califon attacking ground forces. The MOE will be that Califon Army forces will be contained in PMF. The WOE by ATO is low (19%). The WOE by ISR is Medium (10%). The Tactical Objective is to support the Combined Forces Land Component Command scheme of maneuver to fix first echelon armies in the PMF.

B-2.1.10 Output/Product

The products that will be produced by the C2CC team are the Command and Control (C2) plan, the Master Scenario Events List (MSEL), the Joint Air Operations Plan (JAOP), the Air Operations Directive (AOD), a Target Nomination List (TNL), a Counter Air Scenario, a Counter Land Scenario, an Air Tasking Order (ATO), an Air Control Order (ACO), and Special Instructions (SPINS). The products that will be produced by the OFS team are the TADIL J messages, experiment collection plan and results.

B-2.1.11 Anticipated Results

The anticipated results from the demonstration is that the OFS simulation software will run with products produced from the C2CC team and provide the C2CC team with situational awareness during the scenario execution to the TBMCS displays. The OFS simulation software will also be collecting data during the exercise for analysis to see what data the OSF team will need to collect during the Empire Challenge live fly exercise in July 08.

B-2.1.12 Actual Results

The SE08 demonstration results were very positive. The main objective was accomplished. The OFS simulation team was able to obtain the data that they required for their data analysis for the Empire Challenge live fly exercise.

The secondary objective of sending TADIL J message traffic to the TBMCS COP was partially successful. The OFS simulation was able to send TADIL J message traffic to the TBMCS COP, but many of the TADIL J messages were never sent over the MTDS Bridge. All of the messages received had the same Track ID number which caused the appearance of a single track which appeared to jump all over the COP during the demonstration. The new version of the MTDS bridge software had not been tested by the OFS team prior to the demonstration due to the accelerated schedule. We agreed to work together after the end of the demonstration to correct these problems.

The messages that were transmitted contained the correct heading, altitude and air speed. The Call Sign, Mission Number, Identification, Friend or Foe/ Selective Identification Feature (IFF/SIF), Weapon Status Change, and Fuel Status fields that are required in order to provide situational awareness were not populated. The information is available and the simulation software can potentially ingest that data and transmit it to the COP. This will be attempted during the next demonstration effort.

B-2.1.13 Transition Plan (to Next Phase)

After the initial demonstration, additional demonstrations are to be planned with enhancements to the simulation software in order to provide added situational awareness to TBMCS and to collect additional operationally relevant data.

B-2.1.14 Benefits

The benefits of the SE-08 demonstration is, if successful, we will be able to provide an operationally relevant simulation environment for future experimentation that will have the ability to provide situational awareness during the execution of an Air Tasking Order (ATO).

B-3 Validation

Data collection and validation is to be performed by the OFS simulation team members for this demonstration.

B-4 TADIL J INTERFACE CHANNEL CONFIGURATION

Configuring the TADIL interface channel allows TADIL tracks to be displayed on the Common Operating Picture (COP).

The MTDS system was designated with the adrouter alias in the Unified Build (UB) Configuration under the Tactical Management System (TMS) Universal Communications Processor (UCP) which is part of the TBMCS environment.

The following is the detailed TADIL J Interface Communication Channel configuration settings that were made on the Situational Awareness and Assessment (SAA) server in the TBMCS environment in order to communicate with the OFS Mission Training via Distributed Simulation (MTDS) for the SE-08 demonstration.

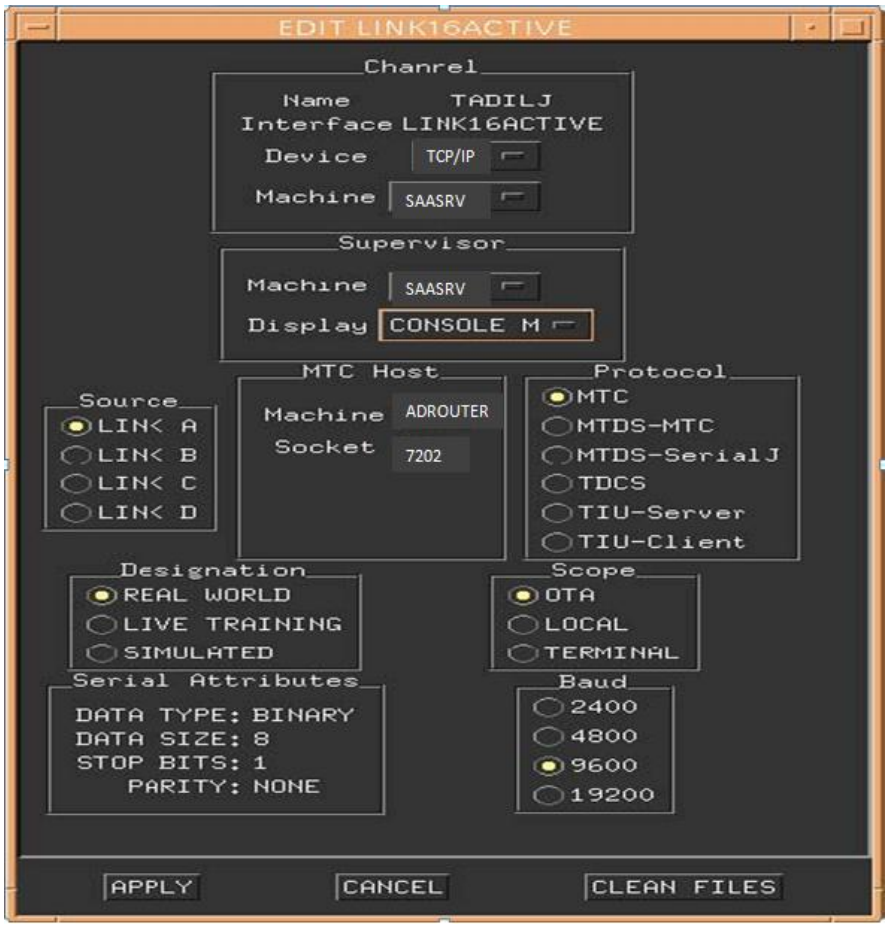

Figure 15 TADIL J Configuration