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Airborne Network Management Strategy

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Airborne Network Management Strategy

- Overview -

The Airborne Network is envisioned to be the information transport component for the airborne domain of the Common Integrated Infrastructure (CII). The CII provides information transport, information assurance and information management infrastructure that enables C2 enterprise level computing as described in the Air Force C2 Enterprise Technical Reference Architecture (C2ERA)¹. In this same fashion, the Airborne Network should be viewed as the information transport infrastructure component for the airborne domain in related enterprise architecture constructs such as the Global Information Grid and the C2 Constellation.

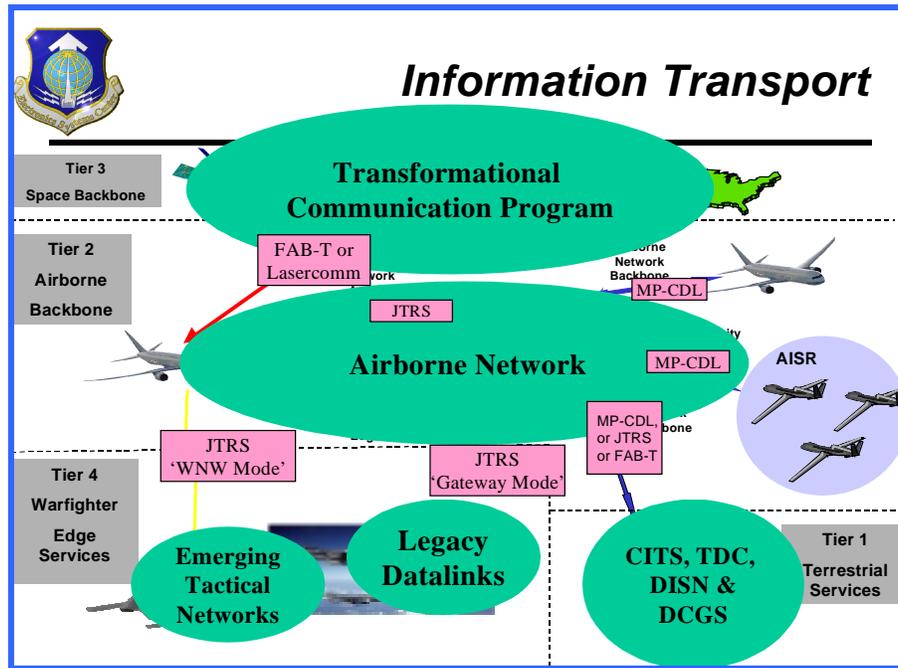
In support of the C2 Enterprise Integration directive, an Airborne Network Management Strategy has been defined. The plan is focused on achieving the vision of an Airborne Network capability as shown in Figure 1. The Airborne Network is envisioned to be a common user internetworking service for airborne platforms and enabled through emerging airborne communications programs and airborne platform infrastructure programs. The Airborne Network will be interoperable with emerging space networks (i.e. Transformational Communications Architecture), terrestrial network services (e.g. DISN, DCGS, CITS, TDC...) and emerging tactical networks using standard IP based mechanisms. Legacy and non-IP airborne networks will connect through gateways. All airborne platforms are candidate nodes in the airborne network including C2ISR platforms, combat aircraft, mobility aircraft, unmanned aerial vehicles and, potentially even guided or loitering munitions packages. An important part of this activity will be to coordinate delivery of networking capability across these many airborne platforms to ensure the warfighter has seamless connectivity across the airborne enterprise.

The approach taken for the Airborne Network Management Strategy assumes that no single program will be established to develop an airborne network capability, rather the plan is based on a collaborative approach leveraging existing and planned programs that will be delivering airborne communications equipment and platform network infrastructure. Specific targets of opportunity exist within the following new acquisitions programs: Joint Tactical Radio System Cluster 4 (JTRSc4) managed by ESC/DIGR; Multi-Platform Common Datalink (MP-CDL) managed by ASC/RAJD; Multi-sensor Command and Control Aircraft Battle Management C4 (MC2A BMC4) managed by ESC/MAB; Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) and Lasercom managed by ESC/MCW; Transformational Satellite (TSAT) managed by SMC/MC. In addition, technology demonstrations underway may provide enabling concepts and technologies for airborne networking. Some relevant examples include DARPA's Tactical Targeting Network Technology (TTNT), Network-Centric Collaborative Targeting (NCCT) and the Advanced Joint Communications Node (AJCN). These technology demonstrations will be exhibiting new communications networking capabilities needed by the airborne fleet of the future.

The Airborne Network Management Strategy is a management tool to coordinate activities of these and other related programs, collaboratively defining the architecture, standards and roadmaps to deliver an integrated, interoperable airborne network capability. In addition, these forums will assess the viability of achieving an end-to-end internetworking capability given these programs-of-record and, as necessary, develop courses of action to address capability gaps. Courses of action may include recommended program scope changes or recommended new programs.

¹ C2ERA Web Site: <https://dii-af.hanscom.af.mil/infrastructure/c2era/>

Figure 1 – Airborne Network Component of the CII



The operating concept and organizational structure for this plan is depicted in figure 2. ESC/DI will establish a Airborne Network Senior Steering Group to serve as the focal point for all matters pertaining to the development of an Airborne Network capability. The Senior Steering Group will be chaired by ESC/DI and report to ESC/CC as the Designated Acquisition Commander for C2 Enterprise Integration. All major airborne nodes within the Command and Control Constellation, all major airborne communications programs, and all major partners (Ops, Research, etc) will be represented on the Senior Steering Group (see tab 1, Senior Steering Group Charter).

The Airborne Networking Special Interest Group (AN SIG) will support the Senior Steering Group. The AN SIG will define standards, develop architectures and construct program and technology roadmaps that establish an Airborne Network. Also, the AN SIG will develop an integrated development schedule of technology and acquisition efforts to help coordinate the disparate contributions to the Airborne Network. The AN SIG will be composed of technical representatives of the affiliated program offices. The Senior Steering Group will approve AN SIG products and affiliated program offices will implement the associated directives. See tab 2, AN SIG Charter, for details.

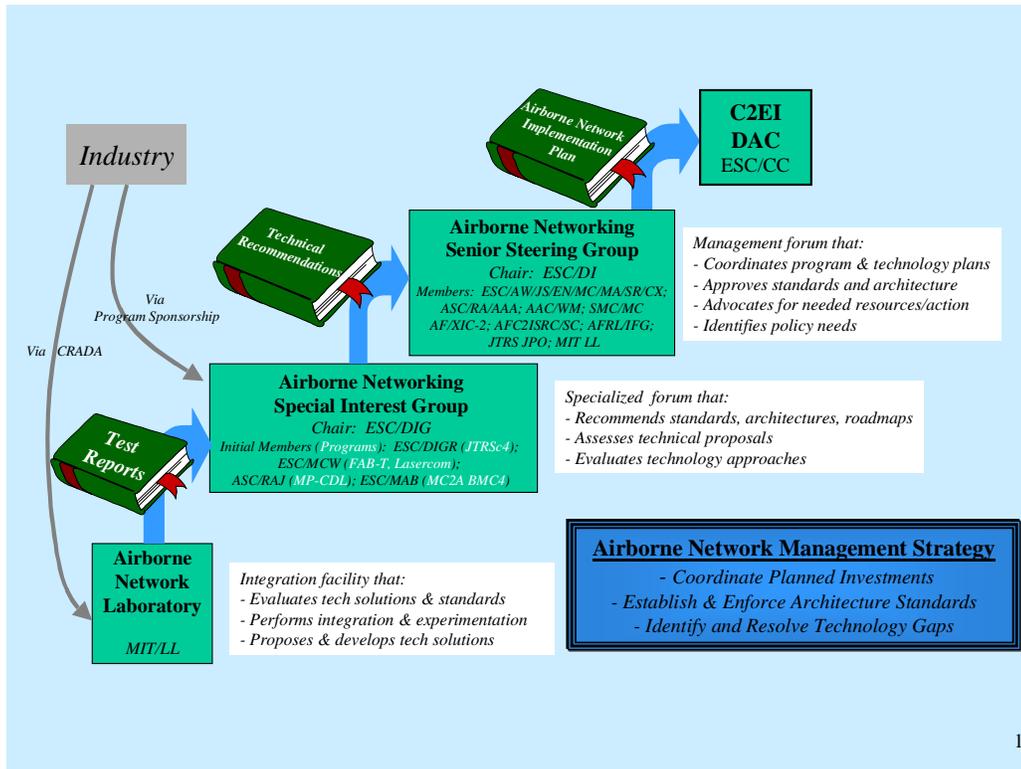
An Airborne Networking Laboratory will be established as a venue to evaluate proposed standards and architectures. The Airborne Networking Laboratory will be an integral part of the Command and Control Enterprise Integration Facility and will leverage related facilities such the Paul Revere testbed and the Transformational Communications testbed. Industry and Program Offices will have access to the Airborne Network Laboratory for their airborne network experimentation and integration needs. The charter for the Airborne Network Laboratory is captured in tab 3.

The methodology used to develop AN SIG products will be as follows. The AN SIG will develop an objective architecture based on anticipated and/or documented user requirements, CONOPS and operational architectures. The objective architecture will represent an end-state capability, likely in the 2015+ timeframe. Also, the AN SIG will establish a baseline architecture based on currently or soon-to-be fielded programs as a representation of the '04 architecture. Interim architectures for the intervening periods aligned to the POM will be developed to capture a reasonable migration plan to the end-state capability. The architecture effort will produce, using the C4ISR Architecture Framework as a guide, the program roadmaps, technology roadmaps and technical standards. Specific

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activity schedules for development of AN SIG products will be determined upon completion of a review of related program milestones.

Figure 2 -Airborne Network Management Strategy



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Tab 1 – 12 Feb 03

Airborne Networking (AIRNET) Senior Steering Group

COORDINATION SHEET

Chair

Mr. Matt Mleziva (ESC/DI)
Capability Integration Director
Common Integrated Infrastructure (CII)

Members

BG (Sel) Brad Butler, ESC/CX

Ms. Christine Anderson, SMC/MC

Mr. Ron Mason, ESC/MC

Col. Joseph Smyth, ESC/MA

Col. Gary Connor, ASC/RA

Col. Charles Whitehurst, AFC2ISRC/SC

Col. Vincent Snyder, ESC/SR

Dr. William Dyess, AAC/WM

Mr. Terry Tucker, ASC/AAA

Col. Rory Quesinberry, AF/XIC-2

Mr. Wayne Bonser, AFRL/IFGC

Mr. Rich Bleau, ESC/JS

Col. Brian Waechter, ESC/AW

Col. Steve MacLaird, JTRS JPO

Dr. Lou Metzger, ESC/EN

Dr. Ed Taylor, MIT Lincoln Lab

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Common Integrated Infrastructure

AIRBORNE NETWORKING (AIRNET) Senior Steering Group (SSG) Charter

1. **PURPOSE:** The AIRNET Senior Steering Group has been established to provide management oversight within Air Force Material Command (AFMC) for the definition and development of the Airborne Network component of the Common Integrated Infrastructure. In particular, this board will provide guidance to and receive recommendations from the AIRNET Special Interest Group. The AIRNET Senior Steering Group will also be the organizational steward for the Airborne Networking Lab (ANL), advocating for lab resources and prioritizing lab activities.
2. **BACKGROUND:** The Common Integrated Infrastructure (CII), sponsored by ESC/DI has established the CII vision as a goal for the evolution of the Air Force (and DoD) infrastructure. The Airborne Network will be the Global Grid component of the CII for the airborne nodes. The first major tenet of the Global Grid architecture is to create one network of networks across all operational elements to enhance interoperability. A second major tenet of this vision is to use properly layered architectures and open system standards to avoid developing mission specific stovepipes and facilitate technology evolution. In addition, OSD has adopted and expanded upon this vision in the form of the Global *Information* Grid to underscore the importance of developing an information enterprise capability for DoD. Recently, several new acquisition programs for airborne communications systems have started to consider the challenges of applying these architectural goals. The programs most immediately impacted are the Multi-Platform Common Data Link (MP-CDL), the Joint Tactical Radio System Cluster 4 (JTRSc4), the Family of Advanced Terminals (FAB-T) and the Laser Communications Terminal (Lasercom). These terminals will be used to initially satisfy the communication needs of Joint STARS, Multi-sensor Command and Control Aircraft (MC2A) and other nodes in the Command and Control Constellation (C2C).
3. **SPECIFIC OBJECTIVES:**
 - a. Provide AFMC focal point for senior leadership on matters regarding the Airborne Network
 - b. Identify policy needs for governance of the Airborne Network
 - c. Advocate funding requirement by support to the consolidated POM inputs
 - d. d. Resolve discrepancies (i.e., R-DOCs, funding, schedule, technology, etc) between System Program Offices delivering airborne network capability
 - e. Approve Airborne Network products (standards, architectures and roadmaps) and coordinate through Air Staff, as necessary
 - f. Support to AF/XI in development of user requirements, CONOPS and operational architectures for the airborne network
4. **SSG COMPOSITION:**
 - a. Chairperson: ESC/DI
 - b. Members: ESC/MA, ESC/MC, ESC/CX, ESC/JS, ESC/AW, ESC/EN, ESC/SR, SMC/MC, AAC/WM, ASC/RA, ASC/AAA, AF/XIC-2, AFC2ISRC/SC, AFRL/IFGC, JTRS JPO
 - c. Advisors: MITRE, Lincoln Lab, others as required
 - d. Membership changes: Changes to the SSG membership will be made at the discretion of the chair.
5. **PRODUCTS:**

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- a. Roadmap of time-phased implementation schedules by program against approved specs and standards
- b. Definition of a set of specifications, standards and application across network by implementing programs
- c. Architecture views for AF approval (i.e., baseline, interim & objective architectures)
- d. Recommendations for new capabilities to be implemented through on-going or new programs to achieve an airborne network as part of the CII
- e. Technology roadmap that captures on-going, planned or needed technology efforts related to achieving an airborne network and identifies technology transition points for acquisition and fielding.
- f. Coordinated budget for Airborne Network Laboratory

6. RESPONSIBILITIES:

a. Chair responsibilities:

1. Leading the coalition of members to collaboratively define and implement an Airborne Network Management Strategy
2. Administration of the forum to include scheduling and hosting SSG meetings, publishing minutes and tracking action items.
3. Coordinating technical and/or business positions for ESC/CC on matters pertaining to the Airborne Network
4. Coordinate agenda for the AN SIG and approve AN SIG recommendation for ANL activities including coordinating commitment of resources to these activities.

b. Member responsibilities:

1. Deliver their program's implementation for inclusion in SIG analysis (i.e. program roadmap, technical content relevant to airborne networking matters)
2. Provide resources to SIG to develop roadmaps or deliver program roadmaps for implementation
3. Abide by & implement collaborative decisions of the Senior Steering Group
4. Empower & enable their industry contractors to deliver technical proposals for SIG evaluation and technical implementations for lab evaluation
5. For AF/XI, provide CONOPS, user requirements and operational architectures for the airborne network to the AN SIG

7. PROCEDURES

- a. Meetings: Meetings shall be scheduled quarterly or more frequently as agenda items arise. Every effort will be made to email the agenda to the members and interested parties at least two weeks prior to the scheduled meetings. The minutes will be distributed via email within two weeks of the meeting. The agenda and minutes will additionally be posted on the AN SSG web site (URL TBD). Request for agenda items should be made through the Chair at least three weeks prior to a scheduled meeting. Although attendance of representatives at all SSG meetings is preferred, absent members may submit presentations and votes on scheduled agenda items for delivery on their behalf to the Chair in writing. Responsibility for delivery of such presentations and votes to the Chair will remain with the absent representative
- b. Coordination: The final disposition of all matters presented to the SSG will be determined collaboratively by a consensus of the members. Members may non-concur if they are opposed to a majority view. Members who non-concur will be asked to submit their rationale in writing within 7 calendar days of the SSG meeting along with any recommendation(s) on the matter. Should the Chair deem the matter warrants additional consideration, the Chair may forward the majority and dissenting views to ESC/CC for disposition.
- c. Technical Positions: Approved specifications, standards and other guidance regarding the Airborne Network capability will be maintained on the AN SSG web site (URL TBD).
- d. Industry Involvement: On an annual basis, the AN SSG will host an Industry Day as an open exchange on

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the topic of the Airborne Network. The SSG will provide a summary of the group's accomplishments and future plans. Industry will be invited to present their related efforts. The agenda for the Industry Day will be coordinated by the Chair and approved by the SSG.

- e. Joint Service Involvement: TBD

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Tab 2 – 12 Feb 03

Communications Architecture Council Airborne Networking (AIRNET) Special Interest Group (SIG) Charter

COORDINATION SHEET

Sponsoring Organization:

Mr. Matt Mleziva (ESC/DI)
Capability Integration Director, Common Integrated Infrastructure
Chair, AIRNET Senior Steering Group

Mr. Len Schiavone (ESC/DIG)
AIRNET SIG Chair

Member Organizations:

Lt. Col. Maryann Watson, JTRS Cluster 4 PM, ESC/DIGR

Lt. Col. Charles Helwig , FAB-T & Lasercomm PM, ESC/MCW

Lt. Col. Laurie Carpentier, MC2A BMC4 PM, ESC/MAB

Lt. Col. William Shelton, Gateway PM, ESC/DIVG

Lt. Col. Kevin Lopez, CDL PM, ASC/RAJD

Mr. Stuart Lever (AFRL/IFGC)

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Communications Architecture Council

CHARTER FOR AIRBORNE NETWORKING (AIRNET) SPECIAL INTEREST GROUP (SIG)

1. **PURPOSE:** The SIG has been established to develop products (roadmaps, standards and architectures) that will guide the acquisition of network capability for airborne platforms. In particular, the products of this SIG will inform business and acquisition decisions to be made by the Airborne Networking Senior Steering Group.
2. **BACKGROUND:** The Communications Architecture Council, co-sponsored by ESC/DI and ESC/MC has established the Global Grid vision as a goal for the evolution of the Air Force (and DoD) communications infrastructure. The first major tenet of this vision to create one network of networks across all operational elements to enhance interoperability. A second major tenet of this vision is to use properly layered architectures and open system standards to avoid developing mission specific stovepipes and facilitate technology evolution. In addition, OSD has adopted and expanded upon this vision in the form of the Global *Information* Grid to underscore the importance of developing an information enterprise capability for DoD. Recently, several new acquisition programs for airborne communications systems have started to consider the challenges of applying these architectural goals. The programs most immediately impacted are the Multi-Platform Common Data Link (MP-CDL), the Joint Tactical Radio System Cluster 4 (JTRSc4), the Family of Advanced Terminals (FAB-T) and the Laser Communications Terminal (Lasercom). These terminals will be used to initially satisfy the communication needs of Joint STARS, Multi-sensor Command and Control Aircraft (MC2A) and other nodes in the Command and Control Constellation (C2C).
3. **SPECIFIC OBJECTIVES:**
 - a. Analyze and recommend standardization of network functionality as proposed by members
 - b. Develop an overall migration plan to achieve the airborne network
 - c. Define the specific capabilities to be fielded on specific platforms in specific timeframes
 - d. Identify needed capabilities that are not currently planned or require additional research and/or development
 - e. Survey, leverage and interact with related DoD and service networking efforts (e.g., NCCT, AJCN, JTF WARNET)
4. **SIG COMPOSITION:**
 - a. Chairperson: ESC/DIG will chair this SIG
 - b. Program Representatives: ESC/DIGR (JTRSc4), ESC/MAB (MC2A BMC4), ESC/DIV (Gateways), ESC/MC (FAB-T, Lasercom), ASC/RAJD (MP-CDL).
 - c. Advisory Staff: AFRL/IFG, ASC/AA, ESC/CX, TC Network Working Group, MITRE, Lincoln Labs, ESC/DIJ, others as required
 - d. Membership changes: Changes to the SIG membership will be coordinated through the SSG.
5. **PRODUCTS:**
 - a. Roadmap of time-phased implementation schedules by program against approved specs and standards
 - b. Definition of a set of specifications and standards for approval (by governance) and application across network by implementing programs
 - c. Architecture views for AF approval (i.e., baseline, interim & objective architectures)
 - d. Recommendations for new capabilities to be implemented through on-going or new programs to achieve an

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airborne network as part of the CII

- e. Technology roadmap that captures on-going, planned or needed technology efforts related to achieving an airborne network and identifies technology transition points for acquisition and fielding.

6. RESPONSIBILITIES:

a. Chair responsibilities:

1. Leading the coalition of members to collaboratively develop AN SIG products
2. Administration of the forum to include scheduling and hosting SIG meetings, publishing minutes and tracking action items.
3. Coordinating technical and/or business positions for AN SSG on matters pertaining to the Airborne Network
4. Coordinate agenda for the ANL activities

b. Member responsibilities include:

1. Deliver their program's implementation for inclusion in SIG analysis (i.e. program roadmap, technical content relevant to airborne networking matters)
2. Work with SIG to develop coordinated roadmap for airborne network implementation
3. Abide by & implement collaborative decisions of the Senior Steering Group
4. Empower & enable their industry contractors to deliver technical proposals for SIG evaluation and technical implementations for lab evaluation

7. PROCEDURES

- a. Meetings: Meetings shall be scheduled monthly or more frequently as agenda items arise. Every effort will be made to email the agenda to the members and interested parties at least one week prior to the scheduled meetings. The minutes will be distributed via email within one week of the meeting. The agenda and minutes will additionally be posted on the AN SIG web site (URL TBD). Request for agenda items should be made through the Chair at least two weeks prior to a scheduled meeting. Although attendance of representatives at all SIG meetings is preferred, absent members may submit presentations on scheduled agenda items for delivery on their behalf to the Chair in writing. Responsibility for delivery of such presentations to the Chair will remain with the absent representative
- b. Coordination: Products, positions and recommendations delivered will be delivered to the SSG. In cases where there is not a consensus amongst all SIG members, the chair will ensure that both majority and minority opinions are forwarded to the SSG for their consideration.
- c. Ad-hoc Working Groups: As deemed necessary by the Chair, ad-hoc working groups will be formed with subsets of the members to address special topics (e.g., Quality-of-Service) and/or product-focused activities (e.g., technology roadmap).

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Airborne Networking Lab Charter

COORDINATION SHEET

Mr. Matt Mleziva (ESC/DI)
Capability Integration Director, Common Integrated Infrastructure
Chair, AIRNET Senior Steering Group

Mr. Len Schiavone (ESC/DIG)
AIRNET SIG Chair

Mr. Tony Sharon (MIT/LL)
ANL Director

Community-of-Interest Participants:

TBD

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AIRBORNE NETWORKING LABORATORY (ANL) CHARTER

1. **PURPOSE:** The ANL will provide a modeling, simulation and emulation capability that will guide the acquisition of network capability for airborne platforms. Specific applications and activities for the ANL will be determined and documented by the AN SIG. In particular, the ANL will allow test and integration of airborne network components (including transport, information assurance and information management) and application development.
2. **BACKGROUND:** The Airborne Network COI Participants will provide funding and resources for the Airborne Network Laboratory. Activities of the Airborne Network Laboratory will support technical products (architectures, standards and roadmaps) developed by the Airborne Network Special Interest Group.
3. **SPECIFIC OBJECTIVES:**
 - a. Network experimentation
 - b. Evaluate technical solutions that program plan to deliver
 - c. Propose and evaluate tech solutions to fill gaps
 - d. Evaluate standards utility from performance perspective
 - e. Network integration
 - f. Support technical issue resolution and interface resolution as requested by programs and industry
 - g. Document network conformance, interoperability testing and verification procedures and processes.
 - h. Perform risk analysis including support for testing designs, components, protocols and standards
4. **ROLES & RESPONSIBILITIES**
 - a. Community-of-Interest (COI): Provide funding for ANL
 - b. ESC/CX: Provide facilities within C2 Enterprise Integration Facility (CEIF) and access to resources (MASC, communications, power, etc.)
 - c. MIT LL: Staff and manage ANL for day-to-day operations. Provide analysis, risk evaluation and propose technical solutions
 - d. Industry: Participate in lab activities through CRADA or direct funded programs
5. **PRODUCTS**
 - a. Test Reports & Analysis
 - b. Recommendations to SIG regarding network architectures, standards and technology solutions
 - c. Recommendations to SIG regarding follow-on testing/experimentation
6. **PROCEDURES**
 - a. **Resourcing:** The SSG will provide 'foundation' resources to MIT/LL for the purpose of establishing and maintaining an airborne network lab capability that augments the Paul Revere program. This 'foundation' level will be sufficient to provide minimal staff and equipment to create a viable test environment. Specific tests, experiments or other activities will be resourced on per-activity basis through a negotiated process between COI participants and MIT/LL.

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GLOSSARY

Acronym	Definition
AJCN	Adaptive Joint C4ISR Node
AIRNET	Airborne Network
AN SIG	Airborne Network Special Interest Group
ANL	Airborne Network Lab
AWACS	Airborne Warning and Control System
BM	Battle Management
BMC4I	Battle Management, Command, Control, Communications and Computers, Intelligence
C2	Command and Control
C2ISR	Command, Control Intelligence Surveillance & Reconnaissance
C2C	Command and Control Constellation
C4	Command and Control, Communications, Computers
CDL	Common Data Link
CII	Common Integrated Infrastructure
COA	Course of Action
COI	Community of Interest
CONOPS	Concept of Operations
DCGS	Distributed Common Ground Station
DISN	Defense Information Systems Network
DTIG	Deployable Theater Information Grid
FAB-T	Family of Beyond Line of Sight-Terminals
GIG	Global Information Grid
IP	Internet Protocol
ISR	Intelligence, Surveillance & Reconnaissance
JTF WARNET	Joint Task Force Warfighter's Network
J-STARS	Joint Surveillance Target Attack Radar System
JTRS	Joint Tactical Radio System
JTRSc4	Joint Tactical Radio System Cluster 4 (Airborne version)
JTRS-NB	Joint Tactical Radio System-Narrow band
JTRS-WNW	Joint Tactical Radio System-Wide band Network Waveform
LASER	Light Amplification by Simulated Emission of Radiation
LASERCOM	LASER communications
LOS	Line of Sight

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M2M	Machine-to-Machine
MC2A	Multi-sensor Command and Control Aircraft
MP-CDL	Multi-Platform Common Data Link
NCCT	Network-Centric Collaborative Targeting
NCW	Network Centric Warfare
OSA	Open Systems Approach
POM	Program Objective Memorandum
SSG	Senior Steering Group
TADIL-J	Tactical Data Information Link-J
TDC	Theater Deployable Communications
TDL	Tactical Data Link
TSAT	Transformational Communications Satellite Program
TTNT	Tactical Targeting Network Technology
UAV	Unmanned Aerial Vehicle