Federal Aviation Administration

NEW YORK INTEGRATED CONTROL COMPLEX (NYICC)

CONCEPT OF OPERATIONS

Approved by: ______________________________ Date: ______________
Terminal Vice President

Submitted by: ______________________________ Date: ______________
Director of Eastern Terminal Area

NEW YORK INTEGRATED CONTROL COMPLEX (NYICC)

TABLE OF CONTENTS

TABLE OF FIGURES

1 EXECUTIVE SUMMARY

The New York metropolitan area airspace is one of the most challenging air traffic environments in the world. During the 1990's, air traffic in this area grew at alarming rates with delays rising proportionately. Although traffic growth has slowed since 2001, FAA aerospace forecasts (2003-2014) predict the economic recovery will drive air traffic demand up and test capacity limits again. The record air traffic delays experienced in the New York terminal area can return with added economic impact if the FAA does not take innovative action to modernize the air traffic control environment.

The high volume of air traffic and congestion created by the closeness of three major and many satellite airports characterizes the area. The number of air traffic control facilities with responsibility for airspace that overlays the New York terminal area further complicates effective air traffic flow. The two primary air traffic control facilities in the area are the New York Terminal Radar Approach Control (TRACON) and the New York Air Route Traffic Control Center (ARTCC). The Washington ARTCC, Cleveland ARTCC, Boston ARTCC and Philadelphia (PHL) TRACON also feed air traffic in and out of the New York Terminal area.

The New York Integrated Control Complex (NYICC) concept was developed four years ago as a means to solve operational and facility issues in the New York area. The NYICC idea goes beyond the historical FAA consolidation model by seeking to integrate the best aspects of terminal and enroute air traffic control into one facility. The integration removes many of the artificial boundaries that now divide the enroute and terminal environment and provides seamless transitions through all phases of flight in the area. The NYICC concept provides the opportunity for dynamic airspace reconfiguration and traffic flow management as envisioned in the FAA's Strategic Vision for the Provision of Air Traffic Services. Innovation in managing staffing provides benefit and the leveraging of human capital.

The NYICC will be the model for providing air traffic services in the future. The facility design reflects changes that take advantage of interaction between controllers, equipment and the vast amount of information available. Many of the surveillance, automation, and communications systems provide the needed capability for dynamic configuration and integration at the NYICC. These systems will be the final requirements solution or an interim solution until new technology is available.

2 INTRODUCTION

This document describes the Concept of Operations for the New York Integrated Control Complex (NYICC). The FAA has the responsibility for the safe, orderly, and expeditious flow of air traffic throughout the National Airspace System (NAS), and ensures the integrity of the infrastructure and associated systems. These responsibilities will not change at the NYICC.

The FAA Eastern Region Air Traffic and Airway Facilities Divisions developed this document with support from:

- Air Traffic Planning and Procedures Program (ATP)
- Terminal Business Service (ATB)
- Air Traffic Airspace Management Program (ATA)
- National Air Traffic Controllers Association (NATCA)

2.1 Problem Statement

No single facility is responsible for the airspace over the extended New York, New Jersey, and Philadelphia (NY/NJ/PHL) area. New York ARTCC, Boston ATRCC, Cleveland ARTCC and Washington ARTCC share responsibility for enroute air traffic services. New York TRACON and Philadelphia TRACON share responsibility for terminal air traffic services. The complex interactions among these facilities result in airspace and procedural inefficiencies that negatively impact air traffic throughout the area.

The New York Air Traffic Control Services Mission Need Statement #336, states, "…existing airspace structure in the New York Area does not provide an efficient means of meeting the current and projected air traffic demands." Capability shortfalls identified include:

- Closeness of the airports and current airspace arrangement (delegation) creates operational complexities and increases workload.
- Design and layout of airport airspace boundaries and other protected airspace that creates narrow, one-way corridors not usable for absorbing overflow air traffic.
- Inability to hold aircraft in terminal airspace, (because of lack of room), results in inefficient, non-uniform flows from the enroute to terminal environment during periods of high volume.
- Vertical limits of terminal airspace limit use of the tower-enroute procedures.
- Airspace boundaries that require controllers to separate aircraft from airspace rather than from other aircraft limits their ability to effectively respond to high volume or adverse weather events. Complicated enroute/terminal airspace layout compresses the terminal airspace environment, causing controllers to do too much low level vectoring. This increases pilot and controller workloads, aircraft fuel costs and noise that affects local communities.

- Airspace boundaries between enroute and terminal airspace are near many of the arrival airports. Often, when air traffic becomes congested in terminal airspace, sudden “no notice holding” is needed in enroute airspace.
- The automation systems at the ARTCC (Host/Oceanic computer system replacement (HOCSR), Advanced Technologies and Oceanic Procedures (ATOP)) must communicate and interface radar and flight data processing to the different automation systems in the terminal environment (Standard Terminal Automation Replacement System (STARS), Common Automated RADAR Terminal System (ARTS)). The computer interface is a single-point-of-failure of the system. When not working properly, coordination between controllers at different facilities increases and dynamic responses to air traffic demands decreases.
- The current configuration requires too much inter-facility coordination among Traffic Management Coordinators that takes time and affects controllers’ ability to optimize airspace.
- The cost for telecommunication and data distribution between the enroute and terminal facilities is high because of the number of lines involved, redundancy needed and the communication network between facilities.

2.2 Resolution

The physical integration of New York ARTCC and New York TRACON will ultimately provide a platform for modern automation, communication and power systems. Control room organization will increase controller productivity, system safety, capacity and efficiency. Integrating the two airspace systems will allow for expansion of the NY/NJ/PHL terminal area airspace making more efficient use of surveillance systems that will allow controllers to use ideal aircraft separation standards. Integrated enroute/terminal arrival and departure arrival areas will result in more efficient aircraft spacing and sequencing, increased holding pattern efficiency, better weather avoidance and fewer aircraft delays. Integration will reduce inter-facility telecommunications costs, eliminate many system points of failure, and allow for high-speed data transfer at no additional recurring cost. The NYICC will meet current standards for security and vulnerability and provide economies of scale in system maintenance and human resource management.

2.3 Assumptions

The NYICC Concept of Operations is based upon the following assumptions.

That the NYICC will…

- provide the services needed to keep pace with the air traffic volume demand that is forecasted to return to pre-September 11, 2001 levels by 2006[1],
- be the model type facility for large, busy metro areas throughout the NAS,
- be a facility that utilizes airspace dynamically and shifts traffic flows as necessary, alleviating the “domino-effect” throughout the NAS created by enroute congestion,

[1] FAA Aerospace Forecasts FY 2003-2014, March 2003

- provide an airspace mass that will accommodate the creation of an expanded Area Navigation (RNAV) system,
- provide for a seamless transition between radar and oceanic airspace,
- use terminal separation standards wherever feasible, advancing the OEP goal to "maximize the use of the 3-mile separation standard.",
- logically collocate controllers to enhance the dissemination of weather and traffic information, facilitating efficient flows of traffic during periods of adverse weather and high volume through increased face-to-face communication,
- be a facility with an enhanced traffic management and communications infrastructure, made up of operational areas that include Tracker/Traffic Flow Management (TFM) positions that will increase system situational awareness,
- employ sector teams made up of radar and hand-off controllers,
- keep cross training to a minimum, focusing on familiarizing controllers with existing terminal separation standards,
- employ one radar console and one hand-off/data console per sector,
- commission with a maximum of 80 sectors,
- be staffed in accordance with the provisions of all existing collective bargaining agreements, any future national agreements and the appropriate staffing standards.,
- use automation, communication, navigation and traffic management systems based upon current and near-term deployments with the ability to migrate to future common platforms,
- provide benefits in facility administration and maintenance, technology costs, security, construction and modernization independent of operational advantages.

2.4 Concept Scope & Intended Use

This *Concept of Operations for NYICC* provides a high-level description of the proposed integration of New York TRACON and New York ARTCC. This document has evolved from discussions with various FAA organizations as well as research and analysis performed and sponsored by the FAA.

2.5 Document Plan

Concept of Operations for NYICC is organized as follows:

- Section 2.0, Introduction – Describes the purpose, problem statement and resolution, scope, and intended use of this document.
- Section 3.0, Integrated Air Traffic Environment – Describes air traffic operations for the proposed integrated facility.
- Section 4.0, Integrated Airway Facilities Environment – Describes the proposed facility, the air traffic support systems, and system maintenance for the proposed integrated facility.

3 INTEGRATED AIR TRAFFIC ENVIRONMENT

Creating the NYICC will align NAS resources to optimize air traffic system efficiency in the NY/NJ/PHL terminal areas. The complex, multi-facility coordination now needed by controllers limits the efficiency and flexibility of the operation and results in increased numbers of air traffic delays.

This NYICC Concept of Operations addresses these limits by:

- Realigning airspace boundaries currently delegated to adjacent facilities.
- Integrating New York TRACON and the reconfigured New York ARTCC into the NYICC.
- Enlarging the area within the integrated NYICC airspace to apply terminal air traffic control procedures.

There is greater potential for efficiency gains when control of the New York Metropolitan area airspace is 'under one roof.' Air traffic flows can be based on route efficiency, not navaid location. Controller operating positions can be based on layouts that can more effectively handle major traffic flows. Not all major and minor traffic flows are busy or impacted by adverse weather simultaneously and the ability to shift traffic to take advantage of underutilized airspace quickly and effectively would keep the system moving. Controllers will have more face-to-face and simpler communication with other controllers up and down-the-line. The ability to look around and see the relative workload of controllers from the runway to the facility boundary is a huge benefit. Decisions about vectoring, speed control, sequencing and holding can be made in an instant and with greater confidence knowing the impact they will have on the surrounding sectors. Using terminal separation procedures farther from the airports will create air traffic capacity and efficiency improvement.

3.1 Airspace Environment

The overall 'airspace environment' determines the types of traffic manipulations that can occur in the airspace, the separation standards used, and the controller workload. The geographical arrangement of airspace boundaries, airway routes and radar surveillance sources determine the types of control actions and coordination required.

3.1.1 Airspace Delegation

Efficiency of air traffic operations in the NY/NJ/PHL area is adversely affected because of increased coordination needed where terminal area control boundaries straddle multiple enroute facility boundaries. See Figure 1.

New York TRACON must interact with New York ARTCC Enroute sector, New York ARTCC Oceanic sector, Boston ARTCC, and Washington ARTCC. This increases the workload and complexity of the coordination needed to carry out traffic sequencing and spacing. The congested terminal area causes holding to occur in the enroute environment farther from the airports than is desirable. New York ARTCC Oceanic Sector must also interact with New York ARTCC, Washington ARTCC, New York TRACON, and Boston ARTCC to coordinate air traffic flying to, from, or over the NY/NJ/PHL area.

Air traffic flow information received by the Air Traffic Control System Command Center is often fragmented and contradictory because of the limited view of each facility.

Figure 1. Current Airspace

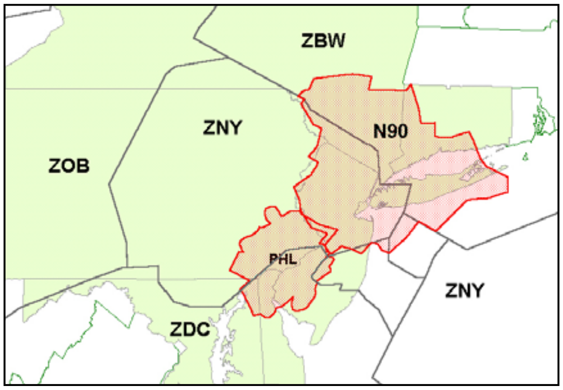
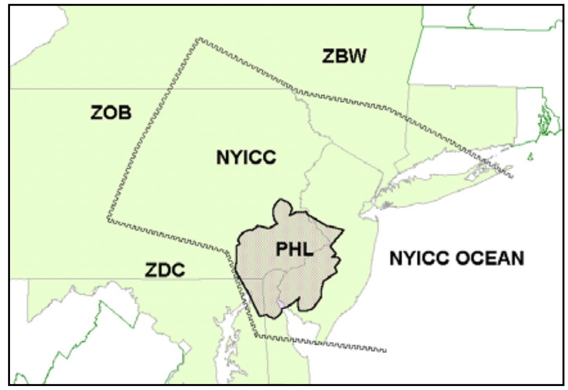


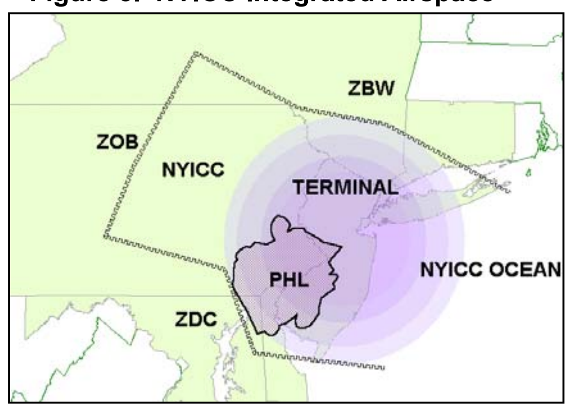
Figure 2. Airspace Reconfiguration



Integrating NY TRACON and NY ARTCC will establish a larger terminal area for NY and NJ. **(See Figure 2).** Together with an expanded PHL terminal area, it will form a unified link to the NYICC Oceanic Sector airspace and reduce the number of facilities that interact with it.

An expanded terminal environment around the NY/NY/PHL areas will result in a more unified mass of terminal airspace where controllers will apply terminal control procedures **(Figure 3).**

Figure 3. NYICC Integrated Airspace



Figures 4 and 5 show how NYICC lessens the complexities involved in handling traffic into and out of the NY/NJ/PHL terminal areas.

Figure 4. Existing Boundary Interactions

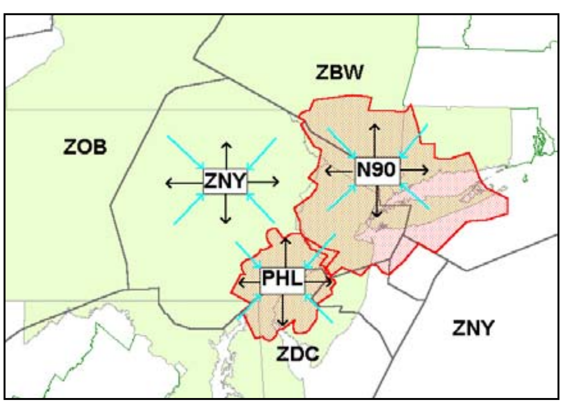
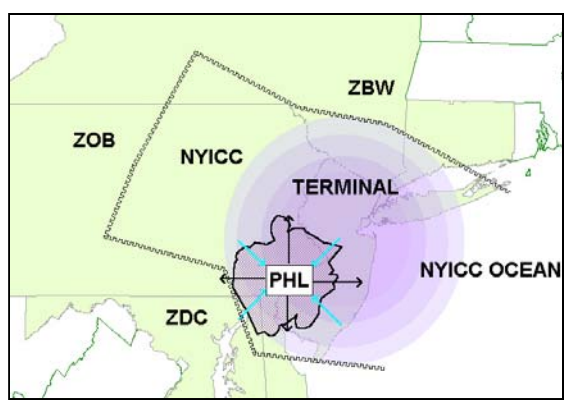


Figure 5. NYICC Boundary Interactions



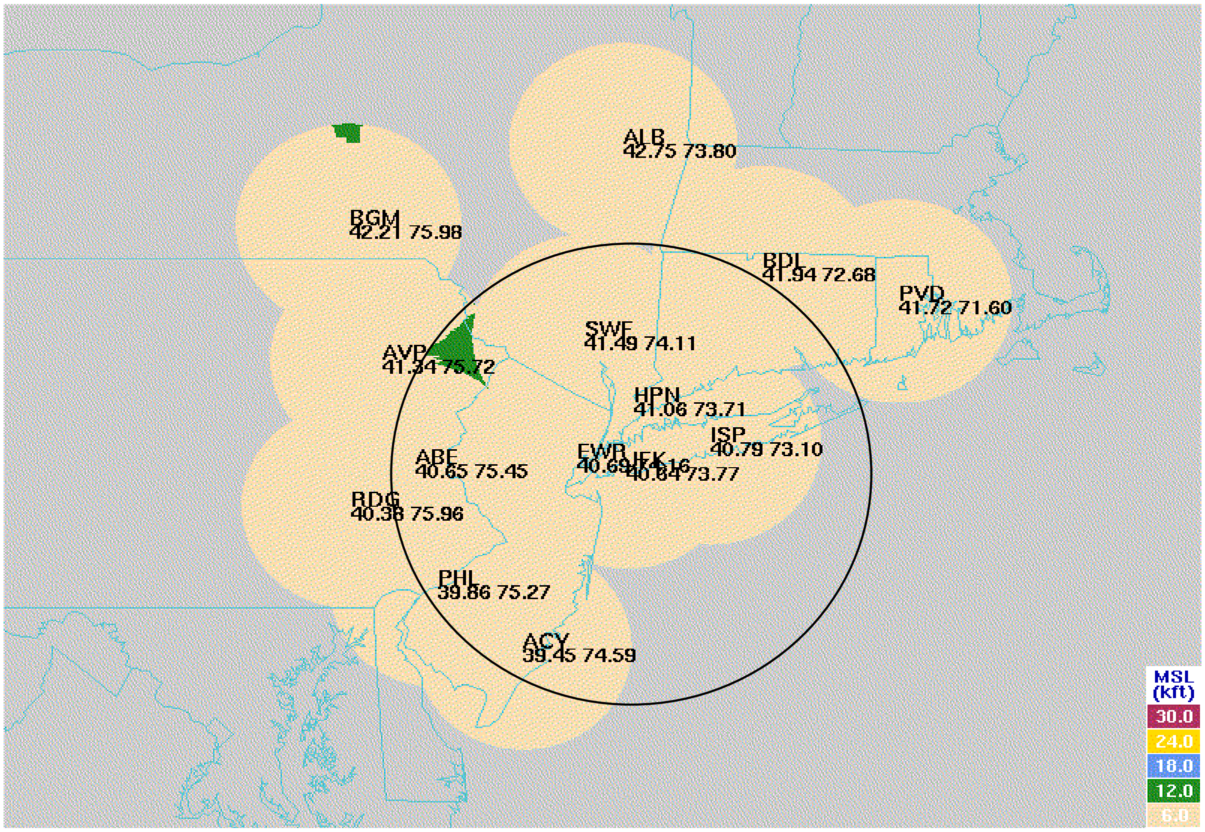
The overall integration of airspace results in NYICC Enroute, Terminal, and Oceanic airspace that provides cohesive, single-facility control extending from western Pennsylvania to the transatlantic routes. This creates seamless transitions between the terminal, enroute, and oceanic environments by integrating all three into one facility. Other benefits of this integration are as follows:

- Reducing the number of inter-facility airspace boundaries and moving those remaining a significant distance away from the terminal areas lessens and simplifies inter-facility coordination needed.
- Integrating facilities will push transfer of control points farther from the airports and the expansion of terminal airspace will allow for creation of terminal holding patterns throughout the area. Fewer enroute/terminal boundaries allow aircraft to transition seamlessly to and from cruising altitudes and the airports. Expanding terminal airspace that is now managed under enroute procedures provides controllers increased flexibility to conduct traffic sequencing and spacing more efficiently with terminal standards. Increasing the vertical limits of the terminal airspace will gain efficiency and allows an expanded and higher “tower-enroute” structure. This keeps short distance flights in the terminal environment and out of the enroute structure.
- The decrease in airspace complexity benefits oceanic air traffic by lessening disruptions, restrictions, and delays resulting from multi-facility airspace division and inherent coordination problems. Enlarging the access corridor between the NYICC airports and the oceanic route system provides efficiency and capacity benefits. With the NYICC having greater control of the oceanic route feeds, more route flexibility and less restrictive climbs to cruise altitude combines to lessen delays and fuel costs. Under adverse weather, the corridor’s increased capacity allows more aircraft to reach the now-underutilized weather avoidance routes and lessens weather-related delays.
- The larger, more flexible terminal airspace structure improves traffic flow management. It will help keep constant flows to the airports to maximize use of available arrival capacity. Expanded use of terminal separation criteria and linking presently disparate departure controllers in the NYICC will reduce static mileage restrictions placed on departures. Direct communication between controllers will allow them to maximize the use of available airspace by adjusting restrictions in real time as needed. Integrating facilities and creating the arrival and departure areas (dedicated operational positions) in the NYICC will replace cumbersome inter-facility coordination with simpler “in house” and face-to-face coordination and communication. Controller positions logically collocated will expand and improve controller situational awareness of system demands in the region. Quickly changing flight paths, setting up temporary routes and removing transfer of control points, resolve demand imbalances. Fuel savings will result from a decrease of vectoring close to the airports and through increased point-to-point navigation.

3.1.2 *Radar Coverage*

New York ARTCC must use enroute separation standards and procedures that are larger than terminal standards. The terminal procedures can be used at the NYICC based on exiting monopulse secondary surveillance radar coverage. Increased airspace capacity and efficiency will result from using terminal standards over a wider area.

Figure 6. Radar Coverage with NYICC Terminal Area Overlay

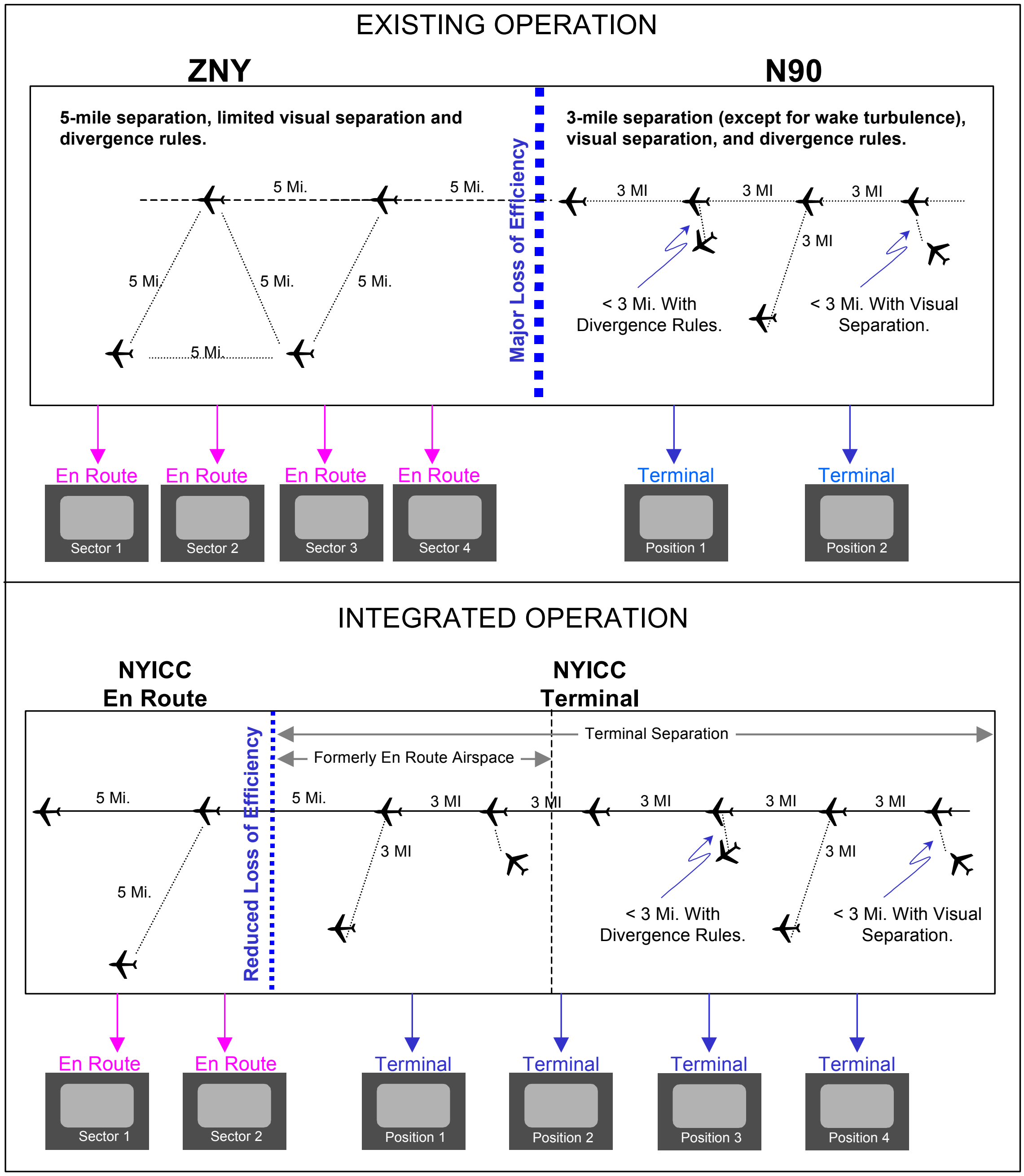


3.1.3 *Separation Standards & Methods*

The NYICC will provide terminal, enroute, and oceanic air traffic control services. The NYICC expansion of terminal type airspace and procedures enables controllers to control more aircraft. Monopulse secondary surveillance radar coverage throughout the area maximizes the use of terminal separation standards of 3 miles between aircraft instead of the enroute standard of 5 miles between aircraft. Terminal procedures also allow visual separation and aircraft divergence that are not available in enroute operations and allows more effective staging of arriving aircraft for landing slots as they become available.

Figure 7 on the next page, shows the varying effects of terminal and enroute separation standards and methods.

Figure 7. En Route & Terminal Separation



3.1.4 Traffic Flows

The current navigation structure adds unnecessary vectors and mileage to arrivals and departures and restricts the controllers' ability to use multiple parallel arrival or departure paths. Setting up RNAV procedures in the current airspace arrangement is not feasible because of the multitude of transfer of control points and automation limits. The NYICC promotes an RNAV environment that enables aircraft to navigate direct from point-to-point and allows parallel arrival and departure routes where practical. These routes provide increased throughput and fewer flying miles for the users while supporting end-to-end optimization of flows.

Another adverse impact imposed by the current airspace and navigation systems is the segregated arrival and departure paths far from the terminal area, as shown in **Figure 8.**

Figure 8. Segregated Arrival / Departure Rows

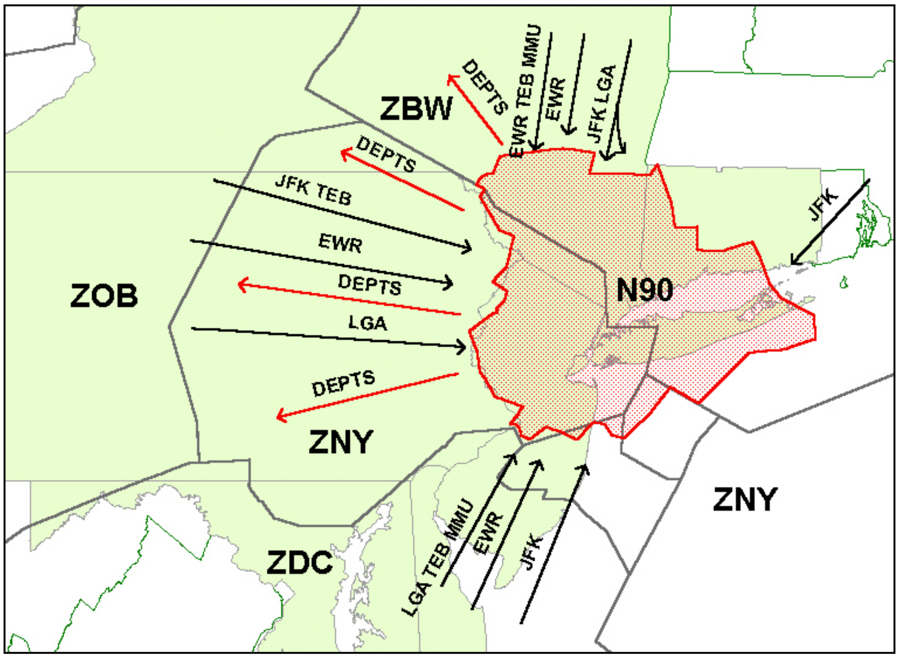
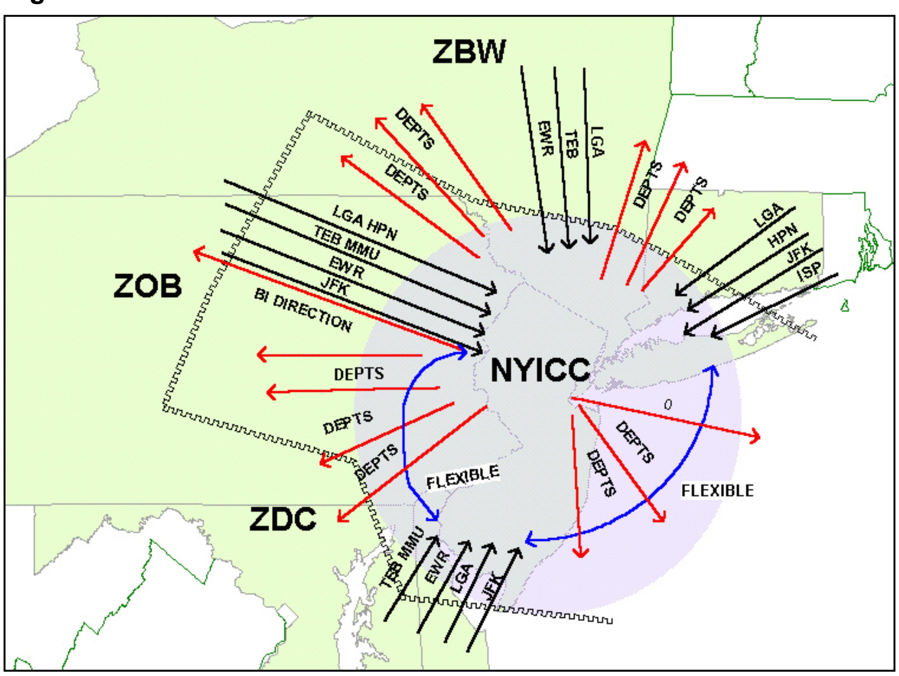


Figure 9 shows the migration from segregated to more flexible traffic flows. Some flows will be bi-directional for arrivals and departures as traffic permits. Use of the same airspace for multiple arrival flows enables more effective air traffic manipulations closer to arrival airports. The nature of the NYICC airspace will lessen the static route constraints that exist in today's environment.

Figure 9. Bi-Directional - Flexible Flows



3.1.5 Airspace Sectorization

Two traditional goals of airspace sectorization are providing a balanced controller workload to the overall air traffic population, and optimizing coordination needed for effective air traffic control. Sectorization schemes try to set apart aircraft that share similar objectives such as arriving, departing, overflying.

Sectors responsible for the NY/NJ/PHL area are designed to conform to facility boundaries and accommodate traffic flows. The design provides enough workload balancing among the sectors, but results in complex and rigid sectorization schemes. The NYICC reconfigured airspace and integrated traffic flows enable designers to lessen many of the complexities created by the current sectorization. Sectors will have the flexibility to adjust in response to traffic flows and system constraints.

3.2 Traffic Handling

The NYICC will provide the means for improved capacity, efficiency, and air traffic management. The following discussion explains the impact on traffic sequencing, spacing, holding, and weather avoidance.

3.2.1 Traffic Sequencing and Spacing

Improved point-to-point navigation, flexible traffic flows, coordination, and more efficient separation procedures combine to allow enhanceded traffic sequencing and spacing. The NYICC operations reduce the need to begin arrival flow disruptions far from the airport. Arrival areas managing traffic flows collaboratively with increased utilization of terminal rules and terminal holding patterns will enable the airspace to effectively absorb more aircraft into the area with reduced levels of restrictions. This results in improved airspace and runway use by ensuring that aircraft are always geographically available to fill gaps in the traffic flow.

3.2.2 Holding

Improved airspace design, integrated traffic flows, and more efficient separation procedures combine to allow more effective holding in NYICC. **Figures 10 and 11** depict notional holding pattern locations to show current inefficiencies in enroute holding. As shown in Figure 11, the NYICC operation allows holding patterns to be more usefully placed in the metropolitan area where holding is conducted within single-facility terminal airspace. Improved airspace and runway use results by ensuring that aircraft are continuously available to fill gaps in the traffic flow.

Figure 10. Enroute Holding

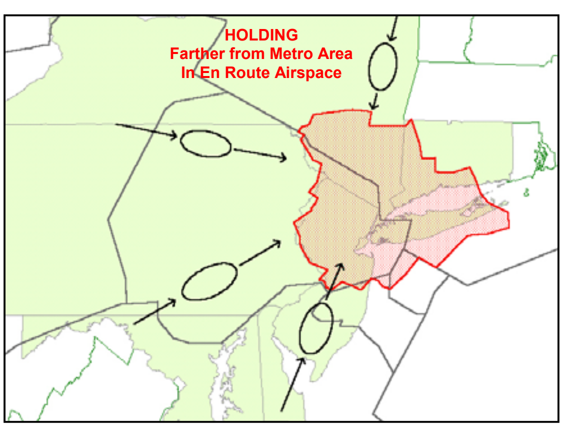
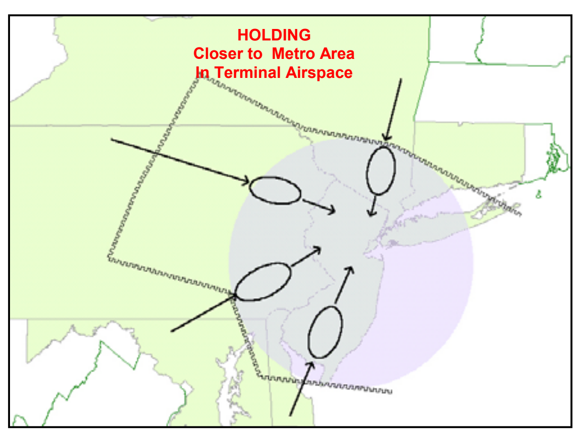


Figure 11. NYICC Terminal Holding



Terminal separation criteria allow holding patterns to be more efficiently managed. More than one aircraft could be brought out of holding through use of altitude separation or divergence criteria not presently available. Integrating facilities and linking terminal type patterns with arrival sectors will enable controllers to more dynamically manage holding because they are directly aware of and involved with the traffic flows to the runway.

Terminal holding techniques are more efficient and increase the use of available runway capacity. **(Shown in Figures 12 and 13).**

Figure 12. Current Enroute Holding

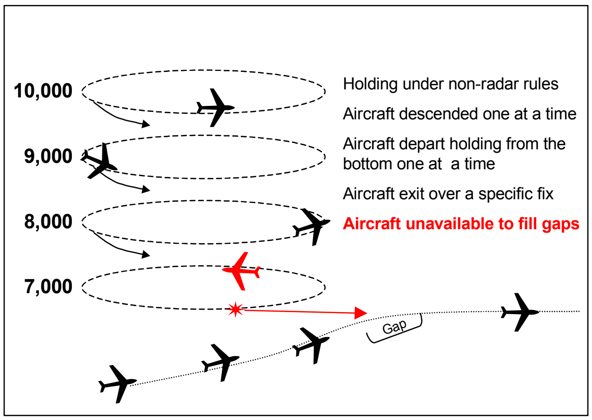
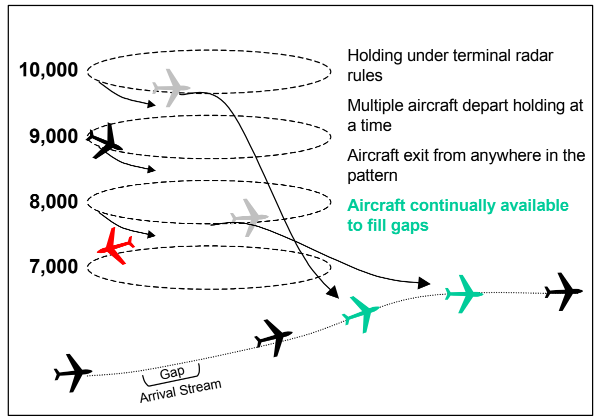


Figure 13. NYICC Terminal Holding



3.2.3 Weather Avoidance

In 2000, significant weather related delays affected between 9% and 15 % of air traffic at Kennedy, Newark and LaGuardia airports. Reaction to adverse weather in today's environment is coordination dependent and time-consuming. Often, by the time the coordination is done for air traffic to be rerouted, the weather conditions have moved and now impact the new routes.

After ARTCC and TRACON integration into the NYICC, controllers and Traffic Managers will have a more immediate and global view of the impact of weather events on nearby routes and sectors. The combined, enhanced airspace and infrastructure of the new facility will allow controllers to collaborate more with Traffic Managers and respond in real time to weather events which can cause system wide delays. Controllers will have more freedom to vector aircraft around adverse weather without the communication and data processing constraints that exist in today's multifacility environment. This will improve safety and efficiency. The use of multiple traffic flows through areas unaffected by adverse weather or high traffic volume will be possible. Teams of controllers will dynamically shift arrivals and departures with less reliance on airborne holding and departure ground delays.

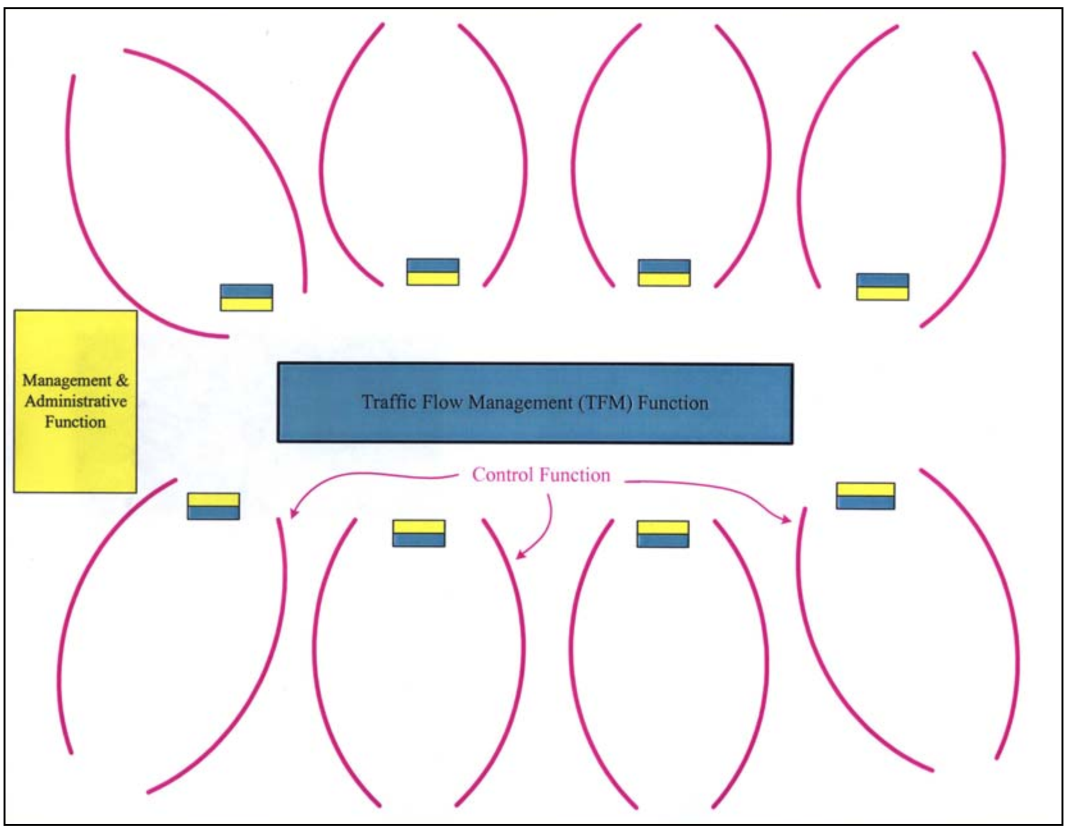
3.3 Operational Environment

The NYICC operational environment will be aligned with the Strategic Vision for the Provision of Air Traffic Services. The NYICC, functioning as a hybrid of a Consolidated Arrival/Departure Facility, Low Altitude Facility and Oceanic Facility will fully address the critical role the New York airspace plays in the NAS. This concept seeks to take advantage of continuing technological advancements such as those comprising Free Flight Phase II (URET, CDM, TMA) and beyond.

3.3.1 Control Room Organization

Section 3.1 outlined the benefits the NYICC provides for improved airspace delegations, traffic flows, and sectorization. The NYICC increases benefits by creating a single control room environment where controllers who oversee interrelated sectors are logically placed. Controllers specialized in a geographic area will be trained to control aircraft to and from airport areas, to and from facility boundaries and in the traditional enroute air traffic control. Physical closeness enables controllers to be more aware of the conditions at interacting sectors. Improved awareness promotes improved tactical planning. Research conducted at the NAS Human Factors Branch indicates that collocation of terminal and enroute controllers would be beneficial (Effects of Collocation and Reduced Lateral Separation Standards in the NYICC). More efficiency and flexibility results from the controllers' increased familiarity of interdependent air traffic flows and improved situational awareness. The control room layout will be designed with sufficient room to allow maintenance technicians to perform their duties with required clearances.

Figure 14. Notional Control Room Layout



3.3.2 Controller Teams

Most sector teams at NYICC will consist of a RADAR (R) controller and a Handoff (H) controller. The advent of a "stripless" environment will minimize the need for data (A) positions. The role of the Tracker/Coordinator (T/C) position currently in limited use will be expanded to facilitate Traffic Flow Management (TFM). The T/C controller would be trained in the use of TFM tools and could be a CPC, TMC, or A/S. The T/C will be responsible for the distribution of TFM information to and from controllers and facilitate dynamic adjustments to flows within the specified control area.

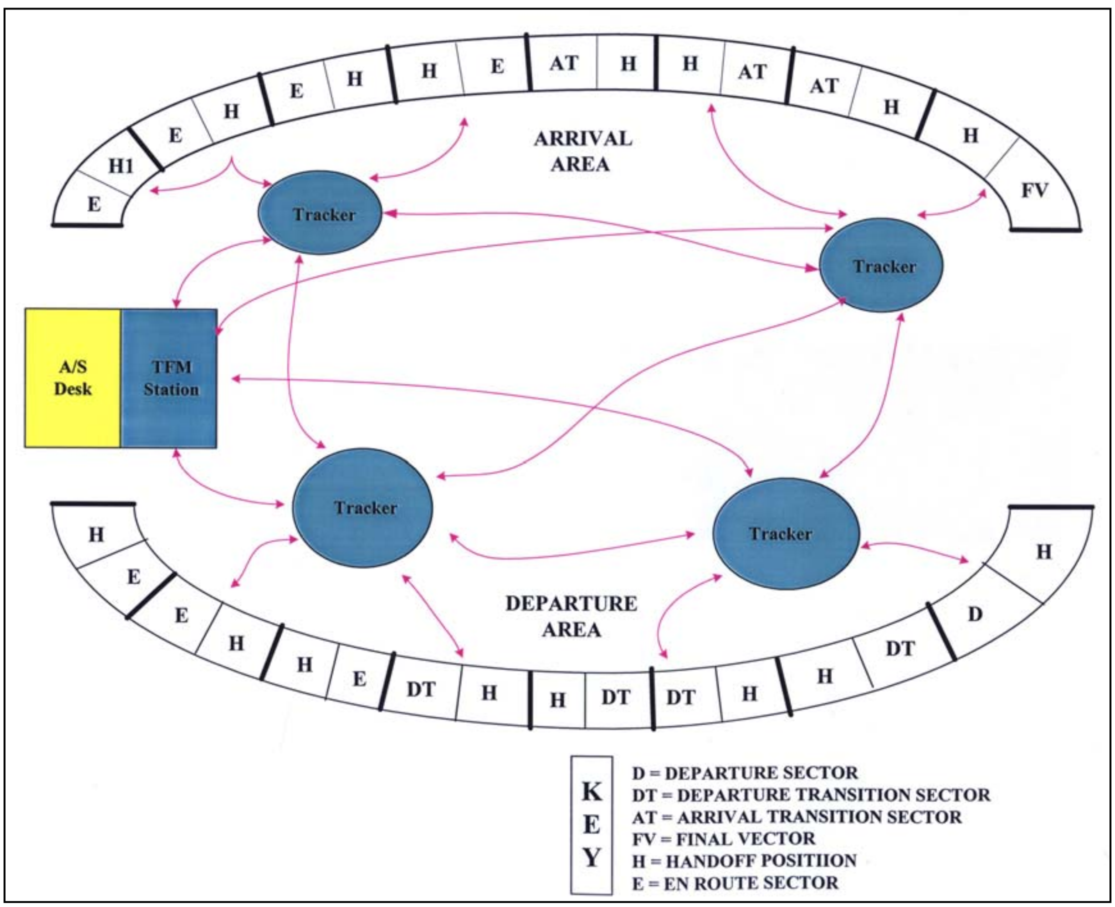
3.3.3 Coordination and Information Flow

Coordination ensures each controller is aware of every aircraft that will enter or approach its designated airspace. Controllers coordinate with one another in the radar environment by making aircraft ‘handoffs’ and ‘point-outs.’ Written agreements often require specific information be included with coordination. The many interfacility transfer-of-control points increase demand on controllers.

At the NYICC, because controllers and automation systems are in the same facility, enroute to terminal transfer-of-control points are removed. The time controllers spend coordinating decreases and efficiency increases.

The integrated mass of airspace, the greater use of the Tracker position, and the logical location of controllers provides improved ability to coordinate dynamically and better react to demands. A controller at any position is able to reroute aircraft and create accurate flight plan data throughout the system. Traffic Management initiatives are conveyed instantly and carried out more effectively. By allowing information to pass simply between sectors, controllers direct aircraft away from bottlenecks created by volume, equipment outages, weather or other constraints. **(See Figure 15).**

Figure 15. Information Flow



3.4 NYICC Operational Views

3.4.1 Controller View

The view from the NYICC Controller's perspective will be radically different from the view experienced today at New York ARTCC or New York TRACON. The dark cluttered control rooms of the past have given way to a naturally lit open architecture floor plan workspace. Ultimately all workstations are infinitely adaptable to airspace needs from final approach, to deep ocean operations to computer-based training. Controllers train to work all potential configurations in various areas of specialization using separation procedures approved for the given operation. The majority of cross training needed to integrate the operations will revolve around the expanded terminal separation and transition zones.

As each controller signs in for the shift, they receive an electronic briefing on all relevant information needed to meet the day's challenge. The briefing includes weather, equipment and airport status, intrafacility and interfacility traffic flows as well as the area, sector, and position configurations. System Wide Information Management (SWIM) provides information at the control position adding a new dimension to the controller toolset. It allows controllers to make decisions with a more global perspective. This global perspective is augmented by the increased TFM presence in the control area. The Tracker position in each area will be supported by a TFM tool station.

3.4.2 Traffic Management View

One of the major benefits of the NYICC is to integrate New York ARTCC and New York TRACON Traffic Management Units into a single regional control complex. The Regional Traffic Management idea is the natural extension of the joint TRACON/ARTCC approach now embraced by the individual facilities and underscored by the future vision of FAA.

Air Traffic Coordinators and customers, using a suite of automated Traffic Flow Management (TFM) planning tools, will characterize the Traffic Management environment of the future. The airspace is finite therefore airspace use must be flexible to meet demands. Automated TFM tool development is underway and is being carried out with a shared vision of future, not based on historical airspace use. The current ARTCC/TRACON TFM model has notable equipment and human redundancy not needed at NYICC. For example, the existing Enhanced Traffic Management System (ETMS) suite of tools would not have to be duplicated in an integrated facility. Each facility currently has an arrival director and a departure director of which one set would be eliminated in the NYICC.

Melding terminal and enroute airspace, developing fanned departures and creating parallel air traffic flows are all options that require us to approach Traffic Management in new ways. An integrated Traffic Management strategy enables Traffic Managers to play even more of a role than they do today in meeting these challenges.

Integrated Traffic Management at the NYICC meets the vision of a single regional entity that evaluates, plans and sets up flexible airspace to meet expected flows and traffic volume demands. A regional Traffic Management Unit creates an environment of seamless coordination and communication, removes psychological barriers and provides a single point of accountability and action. The increased presence of TMU in the control areas pushes the seamless coordination and information flow concept down to the controller level.

3.4.3 Customer View

The customer demands a system in the New York Metropolitan Area that is safe, has minimal delays, flexibility, and easy access. Greater access to dynamic re-routes and bi-directional flows will help the NYICC meet these demands. Real time information will allow customers to manage their flights and schedules more efficiently. NYICC will simplify Collaborative Decision Making initiatives already under way.

The System Wide Information Management program will provide a virtual pool of information. Decisions made by controllers, pilots, and dispatchers represent information used by others in their own decision-making. The goal is to provide all stakeholders with an integrated picture of the state of the NAS that serves as a common basis for improved decision-making.

3.5 OPERATIONAL SCENARIO

The following scenario describes the improved air traffic functionality of the NYICC. A narrative with corresponding illustrations depicts the efficiency gain for arrivals from the south into EWR. While it is specific to a single airport, the scenario is meant to illustrate the benefits provided to all of the area's airports by the NYICC Concept of Operations. **Figure 16** depicts a normal flow of traffic in and out of Newark.

Figure 16. Normal Traffic Flow

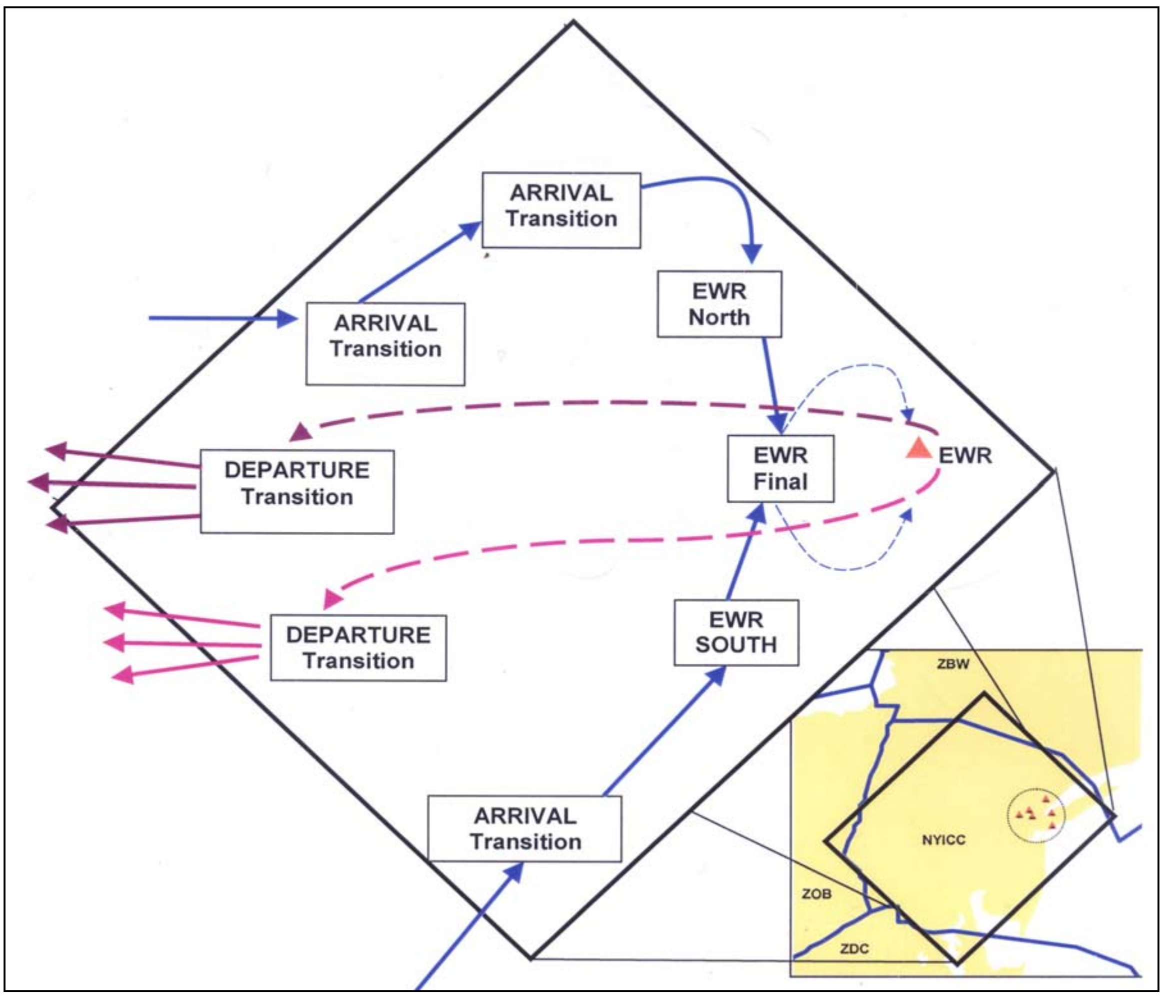
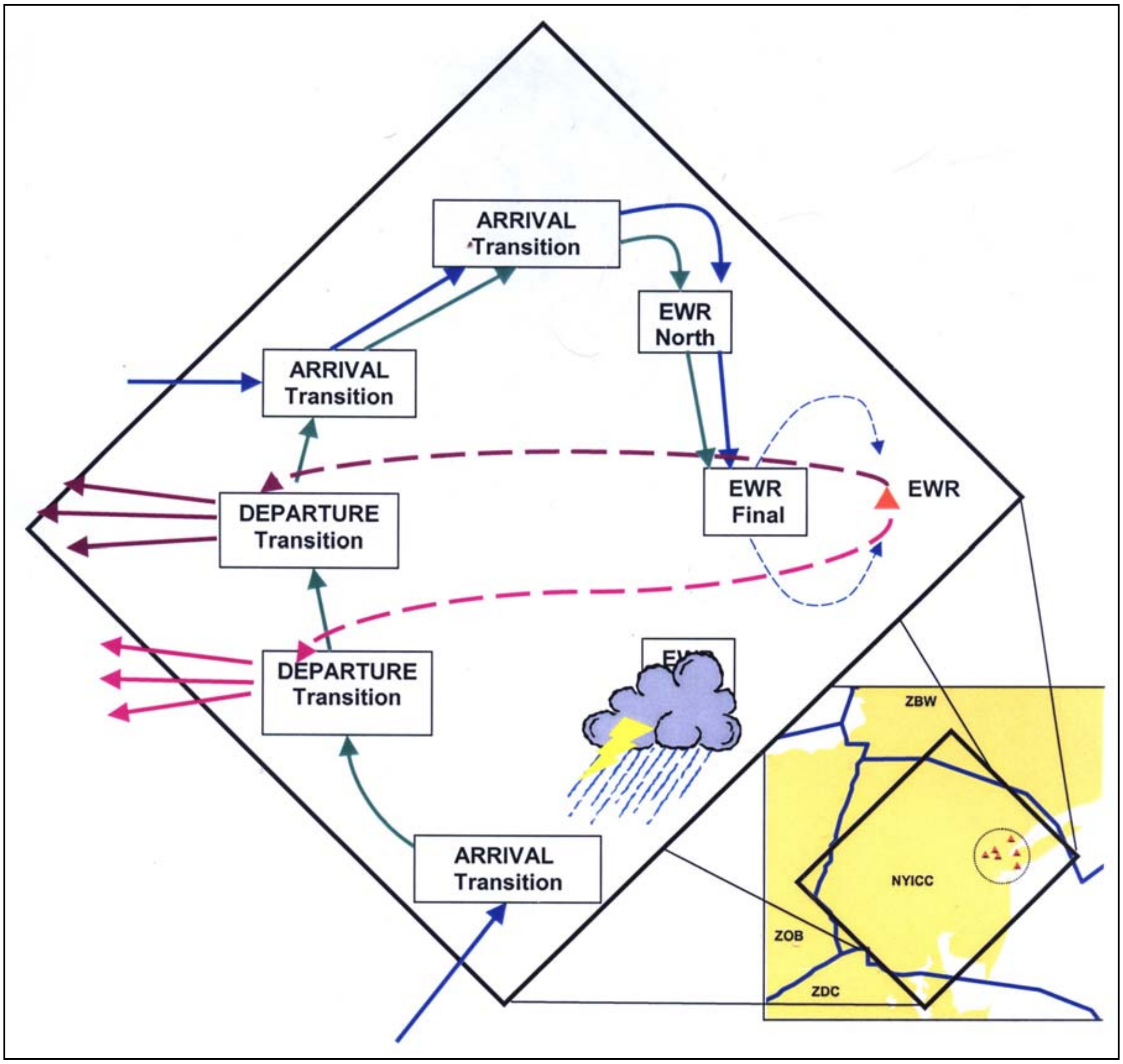


Figure 17 depicts the rerouting of EWR arrival traffic around adverse weather. Traffic cut off from the airport can be quickly moved to the north through "transition sectors" that routinely handle metro area departures. ("Transition Sectors" will exist as dedicated arrival and departure areas that will integrate current enroute and terminal positions.) They are then blended with the arrival flow from the west and north to provide an uninterrupted stream into the airport. A combination of airspace mass and logically collocated controllers allows for dynamic shifts of traffic in response to weather or volume.

Figure 17. Traffic Flow - Adverse Condition



4 INTEGRATED FACILITIES ENVIRONMENT

Designed in the 1960's and 1970's, the New York ARTCC and NY TRACON have undergone many reconfigurations and renovations to keep up with a continually changing ATC environment. These facilities presently face a set of limiting factors, which makes adapting them to modern requirements of security, occupational safety, access and energy conservation difficult. Changes and improvements to these systems have become increasingly costly. Property limits create facility security risks that are difficult to mitigate.

The single integrated control facility in this plan will allow for many of the needed improvements to the current infrastructure. Most importantly it will allow for the maximum use of the ideas developed in Airspace Redesign and Human Resources Management. There are many tangible benefits realized through a thoroughly planned and logically configured floor plan. The economies of scale achieved will save resources (for example telecommunications, utility, security services, janitorial) and reduce overall support space needed.

4.1 Facility

Early estimates call for a fifty-acre site selected by standard agency site selection conducted by the FAA Eastern Region. The estimate is consistent with recent FAA projects and considers added security setback requirements for new federal buildings required by Department of Justice standards.

The new facility will be built following the latest design standards, including FAA security requirements, accessibility, energy conservation and the most current agency standards for power system design. The structure will be designed for maximum adaptability for all building functions, providing transition space for integrating current and future needs and considering a 25 to 30-year growth life cycle for facility and real estate planning. No new technology is needed to achieve initial NYICC objectives.

4.2 Air Traffic Support Systems

This section reviews the major systems used for the NYICC automation, communications, and power. The basic assumption for the NYICC is to make maximum use of available technology and incorporate multiple smaller scale systems to maximize availability and redundancy. Adaptation of existing technology is needed to meet the needs of this project and will be available in the time frames necessary.

4.2.1 Automation Systems

Air traffic control automation upgrades with new features and functionality are continually being deployed. Several advanced automation developments, such as Automatic Dependence Surveillance-Broadcast and Traffic Information Services-Broadcast are on the horizon. These tools have the potential to revolutionize air traffic control, especially in the oceanic environment. While the NYICC can incorporate any new automation upgrades into its operation, the concepts projected in this document have been developed with the existing systems in mind and do not require any major breakthrough in technology to be implemented. The changes proposed are in the use of available technology, not changes to the technology. The control room envisioned for the NYICC will be an open environment, configured in a way to maximize efficiency in the flow of air traffic and communications between controllers. This vision will require an intermingling of systems from the terminal, enroute and oceanic domains throughout the control room.

While this concept has not been implemented on a facility wide basis in the past there are no major barriers to this being accomplished with the existing systems in use today. The design of the room will be slightly more complicated to allow for the flexible placement of control suites, but manageable within the parameters available in today's technology. There will however need to be provisions considered in the design of the NYICC control room to allow for failure mode contingencies since there will be a mix of systems. These risk mitigation factors will be turned into a benefit in the future, as these positions will be used for the integration of new systems.

There are always changes in systems and hardware that must be incorporated into existing facilities. The design of NYICC as envisioned in this concept will allow much greater flexibility in accomplishing these technology refreshes without having a major impact on the operation of the NAS. When a new automation architecture is developed, which will allow for the integration of multiple domains into one system, the NYICC will be ready to implement that system and maximize the benefits of this concept.

4.2.2 Telecommunications

The enroute and terminal air traffic environments use two different communications systems. New York ARTCC uses the Voice Switching and Control System (VSCS) while New York TRACON uses the Rapid Deployment Voice Switch (RDVS). The difference between systems has to do mainly with the speed and redundancy of communications. Faster communication speed is needed for the 3-mile separation procedures used in terminal airspace. The NYICC concept proposes the use of a next generation voice switch, which meet the needs of the enroute, terminal and oceanic domains, that is projected to be available in FY 2005. This timeframe matches well with the NYICC schedule, which does not require hardware until at least FY 2007.

The existing telecommunications picture within the FAA is a collection of dedicated leased capacity and FAA owned infrastructure. The implementation of the new FAA Telecommunications Infrastructure (FTI) program will consolidate these capabilities into one coherent system. Even with FTI however, the FAA's air traffic control structure still requires connectivity from both ZNY and N90 to the remote facilities, causing multiple paths to these facilities and extra costs to the FAA. The NYICC concept will eliminate these unnecessary multiple paths and allow for significant cost savings while maintaining redundancy. The implementation of NYICC blends well with the capabilities of FTI to maximize efficient use of vendor infrastructure while minimizing costs.

4.2.3 Power Systems:

The NYICC will need power that provides extreme reliability because of its critical impact on the NAS. The FAA is reevaluating its current power program to adapt to changing needs and recent issues. Several large TRACON facilities are installing Dual Redundant Critical Power Distribution Systems while other new facilities are installing Critical Redundant Power Distribution Systems (CRDPS). The NYICC will use a form of the CPDS that meets redundancy and availability requirements. NYICC assumes a state-of-the-art power distribution system and will work with AOS-1000 on its size and design.

4.2.4 Vulnerability and Backup

FAA Order 1900.47A, Air Traffic Services Contingency Plan, establishes a framework and requirements for developing, coordinating, maintaining, revising and activating contingency plans for air traffic control facilities. This order discusses operational capability levels that would trigger contingency activities.

It is premature to discuss the exact airspace configurations of the end-state NYICC. The details are still under development by various airspace and procedural groups. The groups have developed a broad outline that provides a basis for some preliminary conclusions. If there is a NYICC outage, bordering facilities are expected to preserve the integrity of the NAS. The primary facilities bordering the NYICC are Boston ARTCC, Washington ARTCC and Cleveland ARTCC. Newark, Philadelphia, LaGuardia and Kennedy towers and PHL TRACON will remain operational. The NYICC will have primary responsibility to provide backup services to one or more of these facilities in the event of failure.

The exact responsibilities and parameters associated with a NYICC outage will be determined before commissioning. Developing and defining requirements for the new facility is dependent on design efforts currently underway. Before commissioning, under the terms of FAA Order 1900.47A, the respective parties will negotiate these responsibilities. At a minimum, the vulnerability and backup issues affecting the NYICC will pose no greater challenges than those faced now at New York TRACON and New York ARTCC.

Volpe Center has been tasked to assess risks for both NY TRACON and NY ARTCC and the collocation risk. To accredit both facilities to the latest security Order 1600.69B would be a substantial cost and may not be possible due to physical constraints. AOP-500 and ASI-100 will be involved early on in the design process.

4.3 System Maintenance

Airway Facilities operations will be conducted under NAS Infrastructure Management, an integrated, multi-tiered structure for centralized command and control. The focus is on user and customer satisfaction. The NAS Infrastructure Management System provides the tools to support the approach. The Systems Management Office provides administrative, training, and technical support to the Airway Facilities personnel.

4.3.1 Hardware

Hardware maintenance will be under FAA Order 6000.30C, National Airspace Maintenance Policy. Maintenance will consist of a two-level, field and depot approach. Field-level maintenance includes removal and replacement of defective Line Replaceable Units. Depot-level maintenance includes repair by government or contractor maintenance personnel.

The hardware maintenance approach applicable to the NYICC (for example, the decision to select organic repair, contractor repair, or discard) is based on the maintenance concept approved for individual systems, subsystems, and equipment under their respective acquisition programs.

5 CONCLUSION

Combining the terminal, enroute and oceanic operations into one integrated facility will meet the air traffic demand and correct the existing air traffic anomalies and inefficiencies in the New York Metropolitan area. The NYICC Concept promises two deliverables, that when combined together, will have a dramatic positive impact on the NAS. Implementation of airspace redesign will mitigate some of the complexities and inefficiencies of today’s environment. Additionally, the logical placement of sectors, redesigned positions, controller face-to-face communications, new information flow procedures, extensive terminalization of en route airspace, etc. will substantially change the way air traffic services are provided in the future.

Page: 1

[SW1] Statistics NYICC PL1.doc, 7,551 words
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Style Index 114, Bad for General Writing
Average Sentence 20, Excellent
Passive Index 32, Good