EN ROUTE
LONG RANGE RADAR
DEACTIVATION PLAN

Draft

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1INTRODUCTION

2Document Objectives

The primary objective of this document is to present the steps required to deactivate en route primary long range radars (LRR), excluding the Air Route Surveillance Radar (ARSR)-4 and radars at Joint Service Sites (JSS) in the en route environment. In this document, deactivation refers to the following process:

1. Selection, preparation, and commissioning of a mix of en route and terminal beacon-only radars that shall supply secondary data for ATC operational use,
2. Termination of the use of any and all primary radar data by FAA Air Traffic Control (ATC) personnel, and
3. Shutdown of selected primary and beacon radar equipment, equipment sites, and associated communication networks as applicable.

This document does not cover strategies for any related LRR issues not directly associated with the actual deactivation process.

The secondary objective of this strategy document is to designate the time frame, responsible organization, and point of contact for each deactivation step.

1Background

The FAA's Air Route Surveillance Radars (ARSR-1, -2, -3, -4) and Department of Defense (DOD)'s FPS-20/, -60 series radars have collectively been in continuous en route surveillance and weather coverage service over a range of 10 to 40 years. These primary radar systems have exceeded their planned service lives and are in need of major refurbishment or replacement activities and funds to continue uninterrupted service to the aviation community.

In 1990, under the joint sponsorship of AXO and AXD, the FAA conducted a safety impact and cost benefit study[1] to determine the need to retain the primary LRRs once an alternate weather product source (NEXRAD) was available. The study concluded that there were no significant safety impacts if the LRR usage was discontinued.

In August 1993, with the availability of NEXRAD as an alternate source of weather information, AXO-1 and AXD-1 approved a Decision Memorandum to deactivate these aging and expensive radar resources (excepting the ARSR-4 and JSS sites). The Decision Memorandum identified two significant requirements that must be satisfied before the LRRs could be deactivated. First, a Notice of Proposed Rule Making (NPRM) requiring transponders on all IFR flights at all altitudes and VFR flights above 6000 feet after 1997 must be approved. Second, Next Generation Weather Radar (NEXRAD) products must be available to the controller on the controller's situation display screen. The first requirement makes anenables aircraft to be detectable with a beacon-only (secondary) radar; the second permits ATC to issue clearances under an. The second requirement permits ATC to have improved weather situational awareness under which to issue air traffic clearances.

[1] Martin Marietta study, actual report title, date, authors go here

2Contents: What You Will See

Section One, *Introduction*, provides the background to the LRR Deactivation Project. Section Two, *Selection Criteria*, identifies and describes the equipment/site selection process, the variables which constitute the selection criteria, and the interrelationships between variables that have been considered in the complex selection process.Section Two concludes with the lists of selected NAS LRR resources. The lists recommend beacon-only sites, sustained sites, and sites recommended for total facility shutdown.

Section Three, *Deactivation Steps*, details the steps necessary to accomplish LRR deactivation and present the results of the selection process applied to the NAS LRR resources. This section lists the recommended beacon-only sites, total facility shutdown sites, and sustained sites. The section recommends a deactivationdeactivation. The section also recommends a prioritized order of precedence and identifies transition sites and actions to be taken.

Section Four, *Transition Plan*, identifies cost effective activities to be immediately implemented to extend the life of the current LRR resources until such time as the requirements in the Decision Memorandum have been approved and implementedNEXRAD weather products become available in the NAS. The Transition Plan operates under the current LRR set aside funds and anticipates satisfaction of the requirements by the year 2005.

There are many other programmatic, operational, functional, and budget issues that must be resolved in order to: (1) allow primary radar deactivation to take place, and, (2) institute a beacon-only system for ATC use. Some of the issues will require additional F&E funding. This report is directed toward those activities that are part of the actual deactivation process itself. Associated issues, such as the development of new non-radar procedures, are not covered in this document.

3SELECTION CRITERIA (FORMERLY RELATED ISSUES)

[This is the current text:]
There are a number of issues and problem areas that are directly or indirectly related to or impacted by the LRR deactivation decision. Many of these issues are resolvable over time, have alternate solutions that require further review or require some form of additional study. Without timely resolution of these issues, primary radar deactivation cannot take place within the schedule presented in this strategy plan.

[Suggest we remove discussion of the related issues and substitute a set of criteria used to decide whether a site is to be retained, converted to beacon-only, or shut down entirely. This introductory paragraph will explain that the criteria was used for decision-making of the final disposition of each site, not for transition decisions and terms will be defined. Criteria we may start with are:

1.*National Security (dodDoD, Justice, Treasury, or Customs) needs*
2.*NEXRAD coverage overlap withcompleteness within ARTCC boundaries or LRR coverage areas*
3.*Availability of backup data (beacon or weather)*

The paragraphs below will explain what each of the criteria mean and how the criteria influenced the choices of deactivation. Each of the criteria (or combinations thereof) could be listed on the final output selection list if desired.]

1NEXRAD Weather Products

[This is the current text:]
The ability to provide weather products to the controller will not occur with the deployment of the NEXRAD alone. NEXRAD data and formats are incompatible with FAA automation and display systems. The Weather And Radar Processor (WARP) must be implemented to read, filter and process the NEXRAD products for FAA use. The WARP generates weather display graphics. Installation of the Display System Replacement (DSR) will be required for displaying WARP radar weather data.

[Issues:
- *Usefulness of NEXRAD products*
- *Coverage equivalence*
- *Failure rates, MTBF, backup issues.*

Criteria:
Available NEXRAD coverage overlapping most of ARTCC geographic boundaries with some alternate source of hazardous weather over 50% of the most heavily traveled routes]

2Rulemaking Requirements

[This is the current text:]
Rulemaking activities requiring transponders on all IFR flights at all altitudes and VFR flights above 6000 feet will be necessary to ensure safe and efficient

surveillance coverage of en route traffic in the absence of primary radar. *[Added:]* **The Aviation Rulemaking Advisory Committee (ARAC), under the guidance of ATS, will be responsible for introducing and implementing the necessary rulemaking and ARAC procedures to support the LRR deactivation decision.**

3Beacon Failure Impact

[This is the current text:]
When a long range radar is deactivated, en route ATC is totally dependent on the cooperative beacon system for all its traffic position data. Without primary LRR radar there is no backup means of determining an aircraft's position if the on board transponder fails. The only ATC alternative is to revert to non-radar procedures, thus reducing system efficiency.

The percentage of transponder failures in the en route environment is low. Although no hard statistical data was available, the FAA study on the Impact of Shutting down En route Primary Radars Within the CONUS Interior reported that ARTCCs observe transponder failures on the order of one per week with the high rate being one per day. The overwhelming majority of transponder failures are in single, low-cost units installed in small general aviation aircraft. These small aircraft present a radar cross section that is small enough to make primary radar detection at en route ranges unreliable or unlikely. Therefore, primary radar is not a totally effective backup system for the ATC preferred beacon system.

This study also reported that there are military aircraft using en route airspace with single, older, transponders that fail on a regular basis. The lack of internal long range primary radar would negate the ability of ATC to provide efficient service to these military flights and civil flights in their vicinity. This issue has been reported by other FAA organizations as having a possible impact on national security. The "national security" impact has not been defined. However, if there is a serious impact, the cost of uninterruptable service should be borne by the military.

Reverting to standard non-radar separation rules is the final ATC option. Decreased efficiency for the affected aircraft and aircraft in its vicinity is expected. The decrease in efficiency may have a greater impact as demand upon the ATC system grows. However, for a small percentage of the time and for the low number of small aircraft in the en route system, a small interval of inefficiency appears acceptable.

4Non-Cooperative A/C Detection

[This is the current text:]
Non-cooperative air traffic can be grouped into two categories, those avoiding detection and those not equipped with transponders. Detection of the first group, international intruders and drug related traffic, is provided by the ARSR-4 located around the perimeter of the CONUS. The inability to detect non-equipped aircraft in internal en route airspace is mitigated by the rule making that denies non-transponder equipped aircraft access to en route airspace (IFR and VFR above 6000 feet). After deactivation, the non-transponder equipped aircraft operating in non-terminal airspace below 6000 feet will not have any radar

coverage. These regions are uncontrolled airspace, areas for which surveillance for ATC purposes is not available.

A requirement still exists that independent surveillance shall be provided for all en route aircraft without the need for the aircraft to have cooperating equipment on board. Nothing in writing, nor in any form of a policy, has been issued changing air traffic's basic requirement for primary en route radar. No policy has been made directing air traffic control to alter their standards and procedures for operating in any manner from those currently being used. This requirement was based on the use of available surveillance resources and technology. The current question is the degree of dependence on primary radar in today's en route air traffic control environment, excluding the requirement. The FAA study reported that only 3% of the aircraft using en route airspace were not transponder equipped. Although precise figures are not available, the greater portion of that 3% were probably in the failed transponder (GA and military) or flight following categories.

5Approach Control Services At Non-Primary Radar Airport

[This is the current text:]
Because of the location of some long range radar facilities with respect to airports with no surveillance coverage, primary radar coverage and air traffic services are often provided to the ground. With deactivation of the long range primary radar, all of the en route facilities providing approach control services in these areas will no longer be able to detect non-equipped air traffic. The price for this service to the flying public who desire it will be a transponder or some device that supports detection by other surveillance means.

6Existing Beacon Equipment

[This is the current text:]
Deactivation of the LRRs places a complete dependence on the Air Traffic Control Radar Beacon System (ATCRBS). Mode S systems have replaced all of the older ATCBI-3 and some of the ATCBI-4 equipment. The remaining ATCBI-4 and ATCBI-5 equipment is 25 years old and is quickly becoming unsupportable. The inventory of spare parts is depleting and replacements are difficult to obtain. A cost-benefit analysis is underway to determine whether to upgrade these aging systems in order to extend their useful life or replace them with new systems. If the beacon is to be the sole means of surveillance in the en route environment, the inventory of beacon equipment must be reliable and maintainable.

7Beacon Coverage

[This is the current text:]
The volumes of airspace for which we currently have beacon coverage will not be effected by the deactivation of the LRRs. Removal of the LRRs would only effect the detection of non-transponder equipped aircraft. Thus, when transponder equipage is required to 6000 feet, there will still be volumes of airspace for which no beacon coverage exists. One remedy to this situation could be the commissioning of additional beacon sites to fulfill the gaps in coverage. However,

the LRR deactivation decision is not contingent upon acquisition of additional beacons.

8Department of Defense

[This is the current text:]
The military currently uses surveillance data from several FAA en route long range radar sites. They have indicated their need to keep 25 of these primary radar systems operating for training and other purposes. The FAA can turn off their primary radar inputs and leave the radar systems functioning. However, the issue of the military providing funds to maintain those radar systems or take over the complete maintenance of those systems needs to be resolved.

9AFSS and NWS

[This is the current text:]
The FAA Long Range Radars supply raw radar data to a Radar Remote Weather Display System (RRWDS). The RRWDS processes the primary radar signals and outputs 5 level weather data to the ARTCCs, the National Weather Service (NWS) and the Automated Flight Service Station (AFSS). When the primary radar at an en route facility is deactivated, and finally decommissioned, weather data will no longer be available via the RRWDS. Yet, the need for weather surveillance data in the AFSS will continue. A source for NEXRAD data must be made available to the AFSSs. This could change the funding profile of this strategy plan and may seriously impact the proposed schedule. This issue requires resolution prior to the actual deactivation of any LRR.

[CENRAP]

10The Deactivation Environment

[This is the current text:]
There are a total of 134 LRRs in existence at the present time. Of those LRRs 65 are candidates for deactivation. Table 2.10-1 shows a breakdown of the total LRR environment.
[Does this table need updating to reflect the FPS sites?]

Table 2.10-1
LRR Breakdown

Total LRRs	134
Military Only LRRs	(20)
FAA LRRs Remaining	114
ARSR-4 LRR Replacements	(28)

Remaining FAA LRRs	86
LRRs Retained for Military Training	(25)
Total LRRs Remaining for Deactivation	65
Total En route Beacons	153

11Site Selection List

[Include here a list of sites and the disposition of each, based on the criteria above]

12DEACTIVATION STEPS (FORMERLY DECOMMISSIONING STEPS)

[This section identifies the plan to execute the deactivation process. It answers the question, "How would FAA accomplish an LRR or site deactivation in accordance with the '93 DM?" The deactivation proceeds under the assumption that the 1993 Decision Memorandum will be accepted and approved as written. If the SWG wants to elaborate any conditions or other assumptions, those stipulations can be recorded here, such as:

1.*NEXRAD system availability (MTBF)*
2.*Suitability and usefulness of NEXRAD products for ATC*
3.*Alternate source of beacon data in high volume sectors of airspace*

By stipulating conditions, this section avoids the discussion of issues as currently written below and definitizes how best to accomplish the DM. This section should be focused on a list of all things that need be done. The next sections, ***Transition*** *and* ***Extended Transition****, address contingencies in the plan. The next sections identifydone once deactivation begin, such as identifying the order in which the steps occur and the prerequisites for each step. The next section,* ***Transition,*** *addresses the things that need to be done from now until deactivation begins.*

The paragraphs below should detail the steps for each type of site/equipment to be deactivated along with the overall mission support steps such as writing NAS change proposals and tailoring procedures]

[Current text:]
There are several significant steps that must be taken before beginning deactivation of long range primary radars. Some steps are critical to the deactivation goal. There are other important issues that must be addressed and steps taken to add credibility to the deactivation plan and ensure that no step or function has been overlooked in reaching the ultimate goal.

An alternate path to achieving the deactivation goal in a shorter time frame is also discussed. This is provided for consideration and is intended to replace the critical paths without high level executive direction.

1DEACTIVATION STEPS (suggested sample)

The general process of equipment or site deactivation follows the steps below:

1.***Selection, preparation, and commissioning of a mix of en route and terminal beacon-only radars that shall supply secondary data for ATC operational use***
- *identification of sites required by dod andDoD and other Agencies*
- *identification of sites currently requiring backfill of available terminal radar beacon data*
- *Analysis of site overlapping coverages and identification of en route beacon-only sites that can be eliminated*
- *development of procedures and inter-facility agreements*
- *analysis of communication, triggering, synchronization, signal processing, and interface needs of remaining sites into site upgrade and implementation plans*

- *implementation and commissioning of sites*

2. ***Termination of the use of any and all primary radar data by FAA Air Traffic Control (ATC) personnel.***
   - *Analysis of site overlapping coverages and identification of en route radars that can be eliminated*
   - *Site changeover plans*
   - *NEXRAD data ATC training*
   - *Beacon-only en route procedures and inter-facility checkouts*
3. ***Shutdown of selected primary and beacon radar equipment, equipment sites, and associated communication networks as applicable.***
   - *Site interruption plans*
   - *For beacon-only sites:*
     - *Removal of LRR antennas from pedestal*
     - *Removal of primary electrical cabinets*
     - *Restoration of beacon-only service, test and checkout*

This document does not cover strategies for any related LRR issues not directly associated with implementation of the deactivation plan. See Section 3.3.2 for another suggested starting point for this process]

1Critical Steps

[Current text:]

2Critical Steps

The following steps make use of current and planned Integrated Product Team (IPT) programs that relate directly to the LRR deactivation process. They also include functions and processes that are critical to the final deactivation goal.

3NEXRAD

[Current text:]
The NEXRAD system, developed by the National Weather Service (NWS) generates meteorological radar weather products for use by several weather data users. The first NEXRAD delivery occurred in mid 1990. The last system is scheduled to be delivered in October 1996. This implementation appears to be on schedule. Any slip in the completion of the NEXRAD program will not likely impact long range primary radar deactivation plans. AND-420 is responsible for all liaison activities between the FAA and the National Weather Service (NWS) regarding the NEXRAD.

4NPRM

[This section has been deleted.]

5WARP

[Current text:]
The WARP is a processor, which will read and filter NEXRAD weather data and formats and generate a digital weather data display. Funding for the WARP program was moved from 1995 to 1996. The current WARP schedule includes procuring 22 systems. Contract award is scheduled for July 1996. The first Operational Readiness Demonstration (ORD) is planned to be completed in May 1997. The last ORD is scheduled for July 1997. This is an ambitious schedule that has a medium to high degree of risk in meeting the planned contract start and delivery dates. A slip in program schedule for the ORDs is not unreasonable. This would move the last ORD to mid 1998 which is the latest date that can be acceptable (based on the DSR Schedule). This program needs to be supported with sufficient executive oversight to ensure that no policy decisions or requirements modifications are made that will delay the start of the contract. AND-460 is responsible for all activities concerning the WARP contract.

*6*Non-Radar Procedures

[Current text:]
Non-radar ATC procedures are defined in FAA Handbook 7110.65. ATP reports that these procedures are used so infrequently that experience with their use is almost non-existent. Academy curriculums and classes need to be updated to provide additional emphasis on non-radar traffic control. Processes and schedules will have to be established to retrain current en route controllers in the use of non-radar procedures. To support the LRR deactivation exercise, new procedures and non-radar training must be accomplished and the operation tested by mid 1999 at the latest. However, to be ready to apply non-radar operations when a primary radar fails, non-radar operation needs to be in place by mid 1997. The review and update of the ATC procedures handbook is the responsibility of ATP-100. Establishing the training activities is the responsibility of ATZ-100.

7NAS Change Proposals

[Current text:]
NAS Change Proposals (NCPs) will have to be prepared for implementation of en route beacon only operations, beacon only system configurations and beacon only equipment data handling. An NCP will be required to define the changes to ATC requirements in NAS-SR-1000. Preparation of this NCP is the joint responsibility of ASD-100 and ATR-100. An NCP will be required to define the changes in system configurations described in the NAS baseline documents (NAS-SS-1000 and NAS-DD-1000). ASD-120 is responsible for preparing this NCP. An NCP will be required to define all changes required for beacon only operation in the CD-2 and ARSR-3 systems. AND-400 is the organization responsible for en route radar modifications. An NCP will be required to define the necessary changes to the software in one or both of the en route automation systems, the DSR and the HOST. AUA-200 will be responsible for preparing this NCP. In order to accomplish the LRR primary radar deactivation for the DSR dependent schedule, these NCPs must be prepared and board approved by mid 1998. In the event that NEXRAD weather data is provided to the PVDs prior to DSR implementation, these NCPs must be board approved by mid 1997.

8DSR

[Current text:]
DSR equipment will replace the current PVDs in the ARTCCs, taking the place of the ISSS with reduced functionality. The DSR is currently under contract to the Loral Corporation. The first DSR ORD is planned to be completed in late 1998. The last DSR ORD is planned for completion in mid 2000. Considering the work to be performed, the delivery schedule appears to be easily achievable. Early deliveries should be expected. However, the Operational Test and Evaluation (OT&E) process could delay actual implementation. If the LRR deactivation is to take place with the least disruption of radar surveillance and weather services, all efforts must be made to improve the delivery schedule and maintain the ORD schedule. A detailed schedule of DSR critical path items must be obtained. Close monitoring of these critical components must be conducted with pro-active, not reactive, efforts being made to complete implementation on schedule. AUA-200 is responsible for DSR procurement, test, implementation and operational test and evaluation.

9Additional Functions

[Current text:]
There are many additional steps that must be taken prior to deactivating a long range primary radar system. These actions are not dependent on any other functions but are definitely critical to the deactivation process. Most of these additional functions relate to *early* and *normal* availability schedules. The *early* schedule is based on there being an early availability of NEXRAD products from the WARP to the Host and presented on the PVDs. The *normal* schedule is based wholly on the NEXRAD data being available only on the DSR.

*10*Weather Radar and Beacon Interdependency Study

[This section may be deletedCurrent text:]
*[*There are two interdependency issues that require further study to provide the users of en route radar an assurance that safe and efficient air traffic control services can be provided when en route primary radar coverage is discontinued. The first issue deals with the interdependency of the weather data provided by the en route radar that is a candidate for deactivation with the availability of weather data available implementation of NEXRAD/WARP/DSR. The second issue deals with interdependency of the beacon system on the primary radar as the source for timing triggers.*[ATCBI-6]*

Typically, en route radar weather data is shared by more than one ARTCC, thus providing airspace coverage to an ARTCC which exceeds that of the local LRR. Also provided is an ability to continue operations, albeit reduced, when a radar outage occurs. Before an LRR can be decommissioned, *[Suggested wording: NEXRAD data must be available to provide weather coverage that the LRR provided to the ARTCCs.] [How the feeds need to be configured is a technical implementation issue Remainder of paragraph deleted.]*

*[*When primary radars are deactivated at en route facilities, the timing of all surveillance activities will be dependent on the resident beacon system. When radar and beacon system coexist, both systems use the radar triggers for pulse repetition frequency (PRF) and system coordination timing. Without the primary radar, all timing will be based on the free running beacon triggers. *[*A short study

need to be performed to determine *[or, The ATCBI-6 or Mode S beacon must have]* the stability of free running beacon triggers for supporting a constant, within tolerance, PRF and accurate timing signals on which the positive detection of beacon target responses are based. *[*The study should include a review of operations and system configurations at current beacon only facilities and confirm that beacon trigger signals are adequate for maintaining timing accuracy. The study must also establish any LRR configuration changes required to render adequate beacon timing. *[Remainder deleted]*

11 Deactivation Plan

[Current text:]
A step-by-step plan for deactivating each long range primary radar from service at each ARTCC must be prepared. This plan must describe all equipment adjustments that are required to allow a beacon only operation, establish the requirements for any equipment field modifications that may be necessary and provide a description of pre-ORD fall back provisions. The plan must describe the hardware required to enable the CD-2 and the ARSR-3 to be able to operate as beacon only systems without generating undue alarms. The plan must also describe the changes required to convert en route automation to an efficient and reliable beacon only ATC support system and eliminate the tests for quality primary targets. The plan must establish the precise surveillance and automation alteration requirements on which equipment and software changes can be based. The plan should include all system logistics and maintainability impacts, issues and resolutions for each all beacon en route system. This plan must also describe the sequential steps that will be followed to disconnect the primary radar inputs from each LRR system connected to an ARTCC and commence beacon only IOC. A final and approved draft of this plan should be completed by early 1997 to allow the necessary NCPs and change orders to be developed. For the *normal* schedule of events, a deactivation plan must be approved and in force by late 1997. For the *early* deactivation schedule, this plan must be complete by early 1997.

The Regions should be the lead organizations for the preparation of the deactivation plan, reflecting their estimated schedule for implementing required equipment modifications via EEMs, training their controllers, and NEXRAD and WARP availability. Direct IPT support form AND-440, AND-450, ALM-400 and AUA-200 will be necessary to complete an acceptance plan.

[Add details: Responsible organizations and roles
technical issue resolutions
coordination with regions and other customers

1. *At NEXRAD/WARP, turn off -1/2 and FPS transmitters.*
2. *BI-4: leave other electronics ON*
3. *BI-5 self-trigger can allow more electronics to be turned OFF.*
4. *Eventually the towers and radomes will be pulled out and replaced by -6s.*
5. *BI-6 installations will bring new towers and radomes (smaller pedestals).*
6. *BI-6 installations will be done in parallel to operational -4/5 sites. Then, upon commissioning, the -4/5 sites will be shut down and parts will be reclaimed for possible use at dod LRR sites.]*

1Deactivation Schedule

[add any Program Implementation Plans (PIP) that to be developed in addition to this document. This document specifiescould specify what needs to be included in each of the LRR PIPs]
[Modified text:]
A center-by-center deactivation schedule must be developed to take primary radars out of service and cause the least disruption in en route ATC services. This schedule needs to be based on availability of NEXRAD weather products to ARTCC controllers, coverage of weather information, the extent of primary only radar services provided (operation types, e.g., SUA spillout et al, if any) and the interconnectivity (data feeds) of LRRs to various ARTCCs. The schedule should establish an ordered list of centers that will convert to beacon only operation and a corresponding list of LRRs that can be deactivated.

2Operational Readiness Demonstration Plan

[Before switchover, you need an ORD plan]
Current text:]
The plan to be developed should enable beacon only operation to be fully tested and demonstrate that en route air traffic can be safely and efficiently controlled. The plan should include a test section to cover an operational readiness demonstration. The plan should also include any necessary requirements for defining the coverage of the en route airspace using only secondary radar. *[Sentences deleted]* The Regions are responsible for developing and issuing this plan, and testing the plan during as part of the EEM for beacon only operations.

3Alternatives

[Current text:]
Alternative steps to deactivation are considered only if the execution of an alternative supports an earlier deactivation of the long range primary radars. Alternatives that could support other issues such as cost, backup, operations etc. were not included.
[Second paragraph deleted]

4WARP to HOST Interface

[Modified text:]
A component of the WARP procurement program is the implementation of a WARP to Host interface. This interface component provides the capability of presenting NEXRAD weather data products to the en route controllers on the Display System Replacement (DSR) screen. [*The WARP includes a function to convert NEXRAD data into nn levels of weather data, at specific range and azimuth cells, in CD format, for presentation to the Host.]*

[Current text:]
Implementation of this alternative would allow weather data, from a source other

than the LRRs, to be presented on the PVDs. The primary radars could then be systematically deactivated. Installation and operational conversion to the DSRs, when they become available, would be a normal transition as currently planned.

The advantage of this alternative is that long range radar deactivation could occur as early as 1997, as opposed to the 1998 to 2000 time frame. LRR deactivation would be dependent on only one program (WARP) instead of two (WARP & DSR). The disadvantage would be the impact to the WARP program. Weather data processing and Host interface functions are additions to the normal WARP requirements. These functions would have to be implemented, tested and operationally verified. Implementation of this additional capability may delay the delivery or the operational readiness dates of the WARP.

Acceptance of this alternative should not make en route primary radar deactivation totally dependent on the WARP program. However, the plans and procedures should be in place at the expected WARP/Host interface ORD. This will allow LRR deactivation to commence at the earliest possible time.

5Department of Defense Concerns

[Current text:]
The DOD has identified 25 LRRs, internal to the CONUS, *(the "DOD 25")* which they wish to remain operational. They require this functionality to support intruder detection and operations training.

To support the military's needs and maintain *the "DOD 25"* operational, several options are available. One option would require that the DOD fund the cost of maintaining the LRR equipment. The FAA would continue to operate and maintain the entire long range radar site and fund only the ATCBI equipment. This would entail DOD supplying all the necessary spare parts and components to extend the life of the primary en route radar at the selected LRR sites. This would also require the DOD to share the maintenance costs of common primary and beacon components, such as the rotary joint and antenna components. Under these conditions, the military should find the costs acceptable.

Another option is to share the operation and maintenance of the LRR site equally between the FAA and DOD. The FAA would be responsible for the operational and maintenance costs of the ATCBI equipment, while the DOD would be responsible for the operation and maintenance costs of the LRR equipment. This would require FAA/DOD coordination and an agreement for sharing maintenance cost, time, and labor for common use components. The issues of operation and maintenance of these sites needs to be resolved by and between the FAA and DOD.

The FAA is currently considering a parts saving program to retrieve components from those LRRs that are replaced by ARSR-4 systems. These parts would become spares for the remaining LRRs. When the FAA no longer requires the en route primary radar systems at the "DOD 25" sites identified as military concerns, DOD would be expected to share the cost for their portion of the parts retrieval program.

The FAA's ARSR-3 leap frog program no longer exists. The DOD may be

interested in relocating the ARSR-3 systems that are replaced by the ARSR-4 to ARSR-1/2 or FPS LRR sites. The total cost of the ARSR-3 leap frog and parts retrieval program for each ARSR-3 replacement site would be borne by DOD.

The long range primary radar deactivation schedule for the “DOD 25” sites must be coordinated between FAA and DOD. This coordination is most critical at those sites that the DOD chooses to leap frog with an ARSR-3. A long range primary radar deactivation and LRR military support agreement must be prepared and approved prior to commencement of final deactivation preparations.

6TRANSITION PLAN (FORMERLY FUNDING PROFILE)

7Scope of Transition Plan

[*The Transition Plan addresses refurbishment or replacement activities and funds necessary to continue uninterrupted LRR services to the aviation community during the years in which the NEXRAD requirements are being addressed (1997 through approximately 2005).*

In the paragraphs below, specific activities and approximate funding requirements will be identified such that resource planning of the NAS will permit an orderly transition from the current LRR environment to the future beacon-only environment.

The Transition Plan itself is a three phase process:

1.*Logistics Projection and Placement of Final Orders of Replacement/Spare Parts*
2.*ARSR-3 Limited Leapfrog Campaign*
3.*Refurbishment Campaign]*

[Beacon Replacement Program, ATCBI-6]

1Transition, FY 98-99

[Logistics Projection and Placement of Final Orders of Replacement/Spare Parts
Purpose:
Activities:
Funding Requirements:
Responsible Organization:]

2Transition, FY 00-02

[ARSR-3 Limited Leapfrog Campaign
Purpose:
Activities:
Funding Requirements:
Responsible Organization:]

3Transition, FY 03-05

[Refurbishment Campaign
Purpose:
Activities:
Funding Requirements:
Responsible Organization:]

[Current text:]

4Funding Profile

[Current text:]
The funding profile for long range primary radar deactivation does not include any of the related programs that impact or affect the deactivation and decommissioning process. Primary radars can be deactivated and the systems subsequently decommissioned with only small amounts of additional F&E funding.

The NEXRAD is already funded by the FAA and the NWS. The WARP is a budgeted and approved program. The DSR is a funded and on going program. The NPRM and non-radar procedure changes are in house FAA functions that use operational funds. Deactivation and operational readiness plan preparations are in house efforts that are supported by in place contractor support. The recommended radar dependency study need not be a costly project. It can be conducted with current SETA and TAC resources.

CD-2 and ARSR-3 field modifications will require a minimum amount of F&E support to enable these systems to be converted to beacon only operation. Software modifications to the Host will require F&E dollars to patch or modify the en route surveillance processing software to function as beacon only operation.

AND-400 will submit a funding profile the accomplish all activities directly related to the LRR deactivation process. Additional funding needs to be identified by the organizations selected to conduct additional activities.

Diagram 5-1. The En Route LRR Decommissioning Path

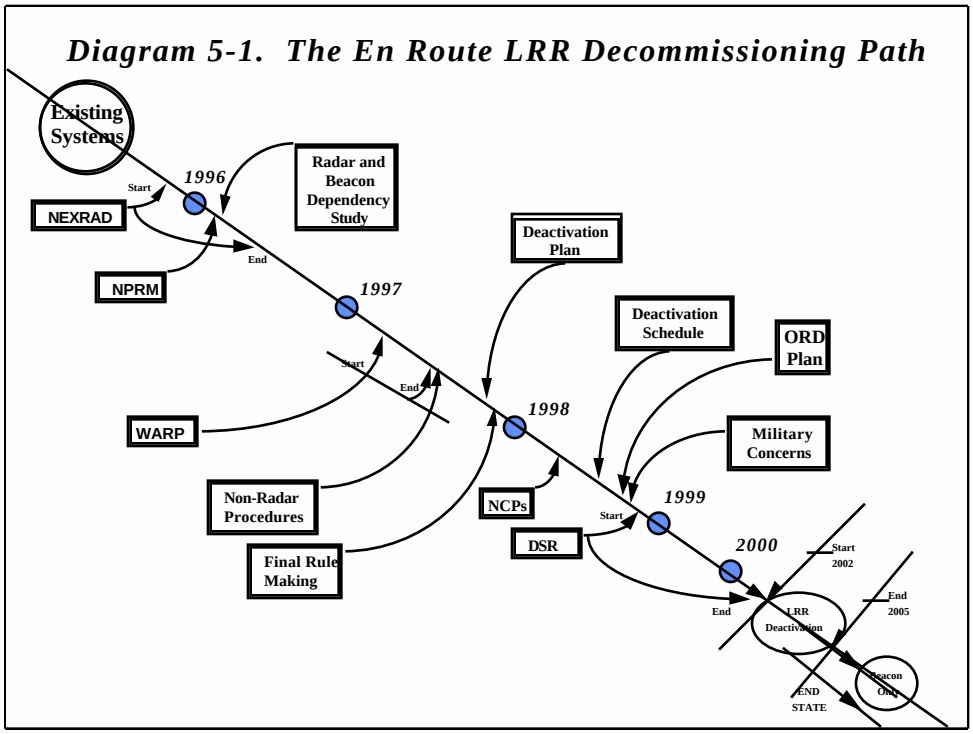

Diagram 5-1 is a graphic of the entire schedule of critical and dependent parts of a DSR dependent deactivation schedule. This schedule of events, which appears to be the most accepted solution, begins the commencement of primary radar deactivation immediately following DSR commissioning with displayed weather products. Completion of deactivation activities will occur before 2001. This schedule presumes no implementation of a beacon failure backup mechanism. *[Update this diagram]*

5RESPONSIBILITIES

Table 6-1 lists the systems and functions required for deactivation long range primary radar systems. Each function lists the organization responsible for that function, the point of contact within that organization and the respective telephone numbers.
[Need to update this table]
Table 5-1
LRR Program Responsibilities

LRR Deactivation Programs	Point Of Contact	Organization	Phone
NEXRAD *NWS*	*Ray Weimer* *Rich Heuwinkel* *Steve Albersheim*	*AND-420* *ACS-300* *ASE-300*	*(202) 385-4960* *(202) 267-7443* *(202) 267-7491*
NPRM	*Harold Becker*	*ATP-200*	*(202) 267-3731*
WARP	*Stewart Gibb*	*AND-460*	*(202) 267-8657*
Non-Radar *Procedures* *Training*		*ATP-100* *ATZ-100*	
NCPs *SR-1000* *DD/SS-1000* *CD-2/ARSR-3* *Automation*	*Don Bui* *Rob Paul* *Don Bui*	*ASD-120* *ATR-100* *ASD-120* *AND-400* *AUA-200*	*(202) 358-5185* *(202) 267-7045* *(202) 358-5185*
DSR	*Ann Tedford*	*AUA-200*	*(202) 376-6545*
Interdependency *Studies* *Weather Radar* *and* *Beacon*	*Carmine Primeggia*	*ASD-120* *ATR-110* *AND-440* *AND-450* *AOS-300*	*(202) 358-5523*
Deactivation Plan *Radar* *Beacon* *Supportability* *Automation*		*AND-440* *AND-450* *ALM-400* *AUA-200*	
Operational *Readiness Plan*		*ATR-110* *AND-440* *AND-450* *AOS-300*	

Deactivation Schedule	*Don Bui*	*ASD-120*	*(202) 358-5185*
Military Concerns	*Bill Syptak*	*DOD/AND-440*	*(202) 267-8485*

Operational/Safety Impacts of Deactivating LRR

CATEGORY 1: AIR TRAFFIC CONTROL (ATC)

- Loss of transponder requiring transitioning to non-radar procedures
- Secondary radar outages with no overlapping coverage
- Inability to provide safety/traffic advisories on aircraft without transponders
- Inability to assist lost or distressed aircraft
- Inability to monitor some military operations (SUA activity, formation flights)
- Decreased service/efficiency due to IFR aircraft without transponders
- Migratory bird activity advisories
- Inability to provide terminal radar backup capability
-

CATEGORY 2: MILITARY (FORWARD TO DOD/CUSTOMS/DEA USERS SUBGROUP)

- Assumption of some ATC responsibility assisting lost or distressed aircraft
- Increased restrictions during use of SUA's (internal buffer area requirement)

CATEGORY 3: SEARCH AND RESCUE (SAR)

- Inability to provide primary radar information for NTAPs, 2 cases:
  1. Post SAR Data Analysis
  2. SAR event Assistance (Location Finding, Directions)

Note: During the meeting, an additional suggested impact to add to ATC was identified: Backup for terminal radar (ARTCC assumes terminal radar airspace)- proposed

CATEGORY 4: ENFORCEMENT

- Tracking Non-compliants
- Perimeter Penetration

Table 1. Loss of Transponder Impact

Impact: Loss of Transponder		
Below 100: no transponder required	***100-180: transponder required***	***Above 180: transponder required***
Summary: not much change from current operations, except at the fringes of terminal areas	Summary: two individual cases, IFR and VFR status.	Summary: Class A, apply non-radar separation procedures.
• Reduced safety	• Reduced safety	• Reduced safety (short term)
• Reduction in service (advisories)	• Reduction in service (flight advisories)	• Decreased capacity delays - CF[2] - users
•	IFR VFR transponder transponder failure failure (descend below 100) non-radar (ref: above 180) VFR (descend below 100)	• Increased ATCS workload

Table 2. Safety/Traffic Advisories Impact

Impact: Inability to Provide Safety/Traffic Advisories on aircraft without transponders		
Below 100: no transponder required	***100-180: transponder equipped***	***Above 180: transponder required***
Summary: not much change from current operations, except at the fringes of terminal areas	Summary: marginal workload decrease.	Summary: Class A, apply non-radar separation procedures.
• SUA “Spillout”	• SUA “Spillout”	• SUA “Spillout”

• Formation flight monitoring	• Formation flight monitoring	• Formation flight monitoring

Table 3. Distressed Aircraft Impact

Impact: Inability to present level of radar assistance to distressed aircraft		
Below 100: no transponder required	***100-180: transponder required***	***Above 180: transponder required***
Summary: three cases, IFR rated in IMC, lost aircraft, and non-IFR rated in IMC	Summary: two individual cases, IFR and VFR status.	Summary: Class A, apply non-radar separation procedures.
• Reduced safety, self (rocks) & to other aircraft • Reduced safety during position determination	• Reduced safety	• Reduced safety (short term)
• Reduction in service (advisories)	• Reduction in service (flight advisories)	• Decreased capacity delays - CF[2] - users
• Increased ATCS workload	IFR VFR	• Increased ATCS workload
All cases create above impacts, level of risk changes. Risk is function of delays in clearance as a function of lack of position information, ATC situation complexity, and ATCS workload. **IFR Rated**: position determination risk time limited (mitigated by pilots IFR training **Lost aircraft**: Same as IFR Rating **Non IFR Rated**: unlimited position determination delay or reduction in service	transponder transponder failure failure (descend below 100) non-radar (ref: above 180) VFR (descend below 100)	

Table 4. Operational/Safety Impacts Summary

Operational/Safety Category/Case	Impact Definition
Category 1: Air Traffic Control (ATC)	
Loss of transponder requiring transitioning to non-radar procedures	Table 1
Secondary radar outages with no overlapping coverage	Insignificant frequency of occurrence. Trend is to decrease further in future from increased robustness of new systems.
Inability to provide safety/traffic advisories on aircraft without transponders	Table 2
Inability to assist lost or distressed aircraft	Table 3
Inability to monitor some military operations (SUA activity, formation flights)	Table 2
Decreased service/efficiency due to IFR aircraft without transponders	Table 1
Migratory bird activity advisories	Reduction in Safety, all altitudes. (PIREPs may mitigate some cases)
Inability to provide terminal radar backup capability	Impact to terminal area operations, capacity and safety (transition); some impact to terminal/en route transition areas such as use of non-radar procedures (capacity impact), users can't go direct (efficiency impact), increased workload (coordination).
Category 2: Military	
Assumption of some ATC responsibility assisting lost or distressed aircraft	Refer to DoD/Customs/DEA Users Subgroup for input
Increased restrictions during use of SUA's	Refer to DoD/Customs/DEA Users Subgroup for input
Category 3: Search and Rescue (SAR)	

Inability to provide primary radar information for NTAPs	Table 3, Case 2: Lost Aircraft