

National airspace system

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MGMT 203 Management for Aeronautical Science Manager's Perspective

Paper - The National Airspace System (NAS) March 16, 2013 Prepared for Dr.

Daniel Nation Lecturer Prepared by Ong Wei Jian Lionel Introduction In this

report, we will be looking at the National Airspace System (NAS). We will be

taking an in depth look at the overview and the infrastructure of the NAS,

discuss about the FAA Next Generation Air Transportation System (NextGen),

and also examine the future needs of the National Airspace System.

Overview of the NAS The National Airspace System is defined as a complex combination of systems, procedures, facilities, aircraft, and personnel which work together as one system to ensure safe and efficient air travel in the

United States. The NAS consists of several components, and these include: •

NAS Operational Facilities (unstaffed) • Air Route Traffic Control Centers

(ARTCC) • Air Traffic Control Towers (ATCT) • Ground Radios and Radar

Systems • Airports • Aircrafts (commercial, private, and military) Airline

Personnel (operating, maintaining, and modernizing the system) •

Passengers (commercial and military) Infrastructure of the NAS The NAS

helps to maintain a safe and efficient flight over the US airspace by allowing

all control towers, control centers, radios, radars, and many airports to be

interconnected to one another to form a NAS operational communications

network. This NAS communications network helps pilots to communicate

with air traffic controllers and airline operation centers to ensure a safe flight

as they travel over the airspace.

There are a three systems that make up the NAS, and these include the

Digital Airport Surveillance Radar (DASR) System, the

Voice Communication Switching System (VCSS), and the Department of

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Defense (DoD) Advanced Automation System, or DAAS for short. The DASR System is a traffic air control radar system that helps to detect aircraft position and weather conditions in the vicinity of civilian and military airfields. It consists of two main electronic subsystems: the primary surveillance radar and the secondary surveillance radar, which make use of electromagnetic waves reflected off aircraft to monitor their positions.

The VCSS is the communications system used to manage the voice communications of any Air Traffic Control (ATC) facility. The VCSS must be able to support all analog and digital communications between the DoD, the ATC facilities, and the pilots. The DAAS is a system that is used to retrieve and process radar data, flight plans, and weather / airport environmental data to support DoD ATC services. The system transmits part or all of this processed data to a display or workstation (within geographical proximity) for air traffic controllers to access in order for them to control and monitor the activities in the airspace.

FAA NextGen Air Transportation System The NextGen program is an initiative developed by the Federal Aviation Administration (FAA) to help improve the efficiency, convenience and dependability of the NAS. The NextGen modernization of the U. S. air traffic system seeks to increase the efficiency of the NAS through technological advancements; and as well as improved approaches and procedures. The NextGen program plans to make use of satellite navigation, which will allow pilots to know the precise locations of other airplanes around them and enhance the overall safety of air travel.

Airports are now already benefitting from the NextGen program. These new capabilities include the national rollout of a network of Automatic Dependent

Surveillance-Broadcast (ADS-B) ground transceivers. These transceivers will receive GPS position reports from aircraft equipped with ADS-B Out (an upgrade required by 2020 for aircraft flying in most controlled airspace); and by 2013, these transceivers will be installed to provide nationwide coverage. Air traffic data such as Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) will be transmitted by the ADS-B transceivers.

The FAA also tested a newly automated Collaborative Departure Queue Management (CDQM) system that aims to help airports improve departure management. The FAA is also putting in place tools that will enable airport operators, airlines, and other NAS users better access to shared surface surveillance data, which is vital for safe and efficient airport operations. The Future Needs of the NAS The current features of the NAS unfortunately, are not sufficient to guarantee efficient or uninterrupted operation in the future.

The greater interconnectivity of systems brought about by the NextGen program means that the cyber risks to the NAS are also increased. The future cyber security needs of the NAS require a change in both the NAS infrastructure and safety culture in order to be effective against increased the potential cyber risks that will follow. Improved cyber security requires changes to the present NAS safety provisions. More safety reviews for continual monitoring is needed. Actions and responsibilities of each and every NAS staff now have to be carefully scrutinized and taken into consideration.

Responsibilities of system administrators and network operators have to be expanded, from maintaining the performance of the system to detecting

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intrusive actions. Improved cyber security also requires changes to the current NAS infrastructure. Data provided by external partners and actions requested by external partners have to be made sure that they are not malicious in intent. The existing cyber security architecture also has to be modified and upgraded accordingly to counteract the changing cyber threats, all in a short timeframe; whilst not compromising on the operations of the NAS during these infrastructure changes and modifications.

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