NVS

NAS Voice Switch

NextGen

The Goals of NexGEN

- Increase **capacity and reliability**

- Improve **safety and security**

- Minimize the **environmental impact of aviation**

Needs of National Aerospace System per Sid McGuirk

- Improve aircraft separations

- Increase weather forecast accuracy
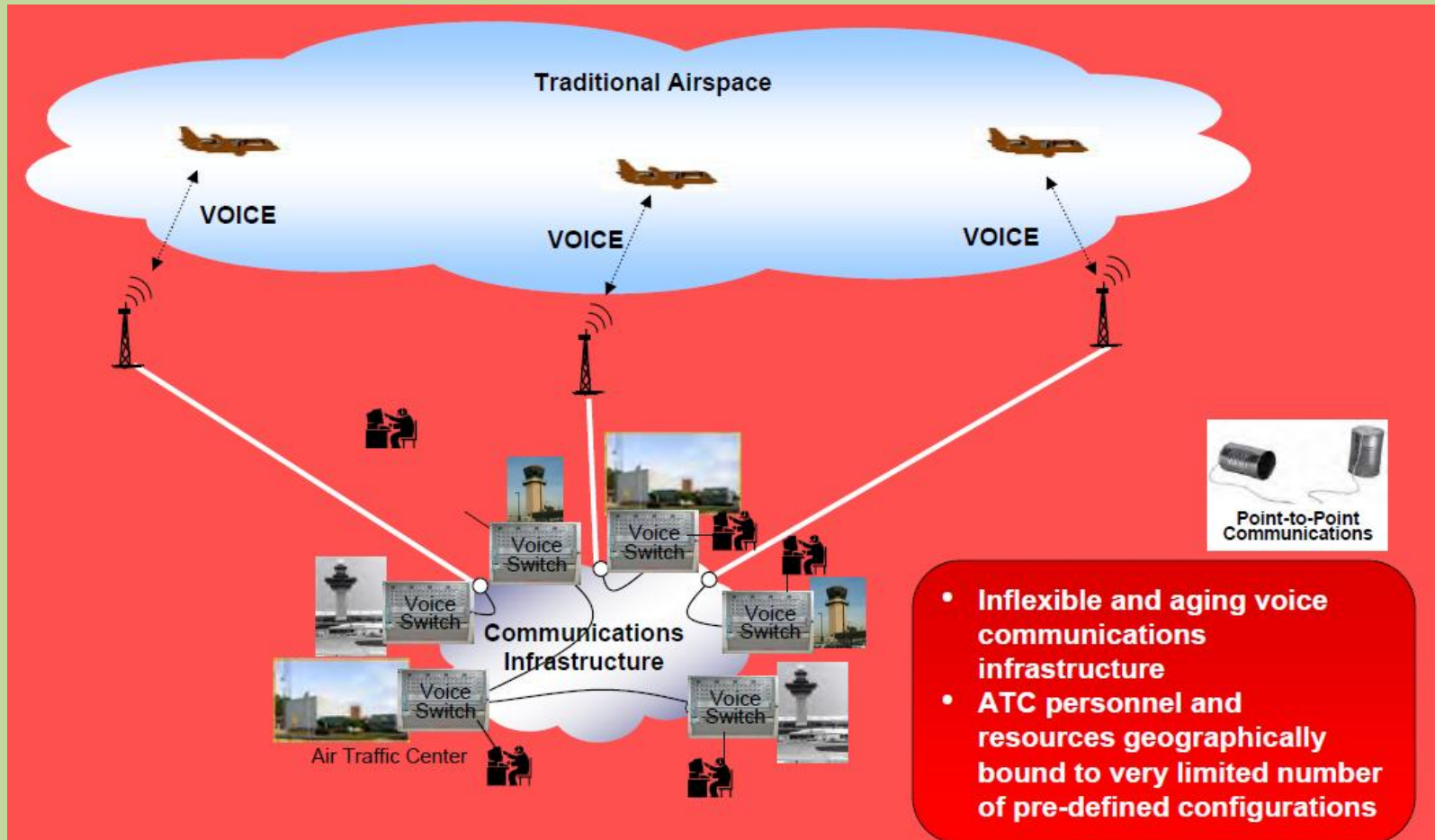
- Build more runways

Overview

- Introduction to Voice Switches
- Existing Voice Switch System
  - Voice Switching and Control System (VSCS)
  - Why replace VSCS
- Nas Voice Switch (NVS)
  - Why NVS
  - Benefits of NVS
- Delays to NVS implementation
- Status of NVS
  - Contractors
  - Operational Date
- Conclusions

The advancement of FAA voice switches

http://www.faa.gov/tv/?mediaId=100

Voice Switching – The old system

Traditional Airspace

VOICE   VOICE   VOICE

Voice Switch

Communications Infrastructure

Voice Switch

Air Traffic Center

Point-to-Point Communications

- Inflexible and aging voice communications infrastructure
- ATC personnel and resources geographically bound to very limited number of pre-defined configurations

Delivering NextGen
April 8, 2010

Federal Aviation Administration
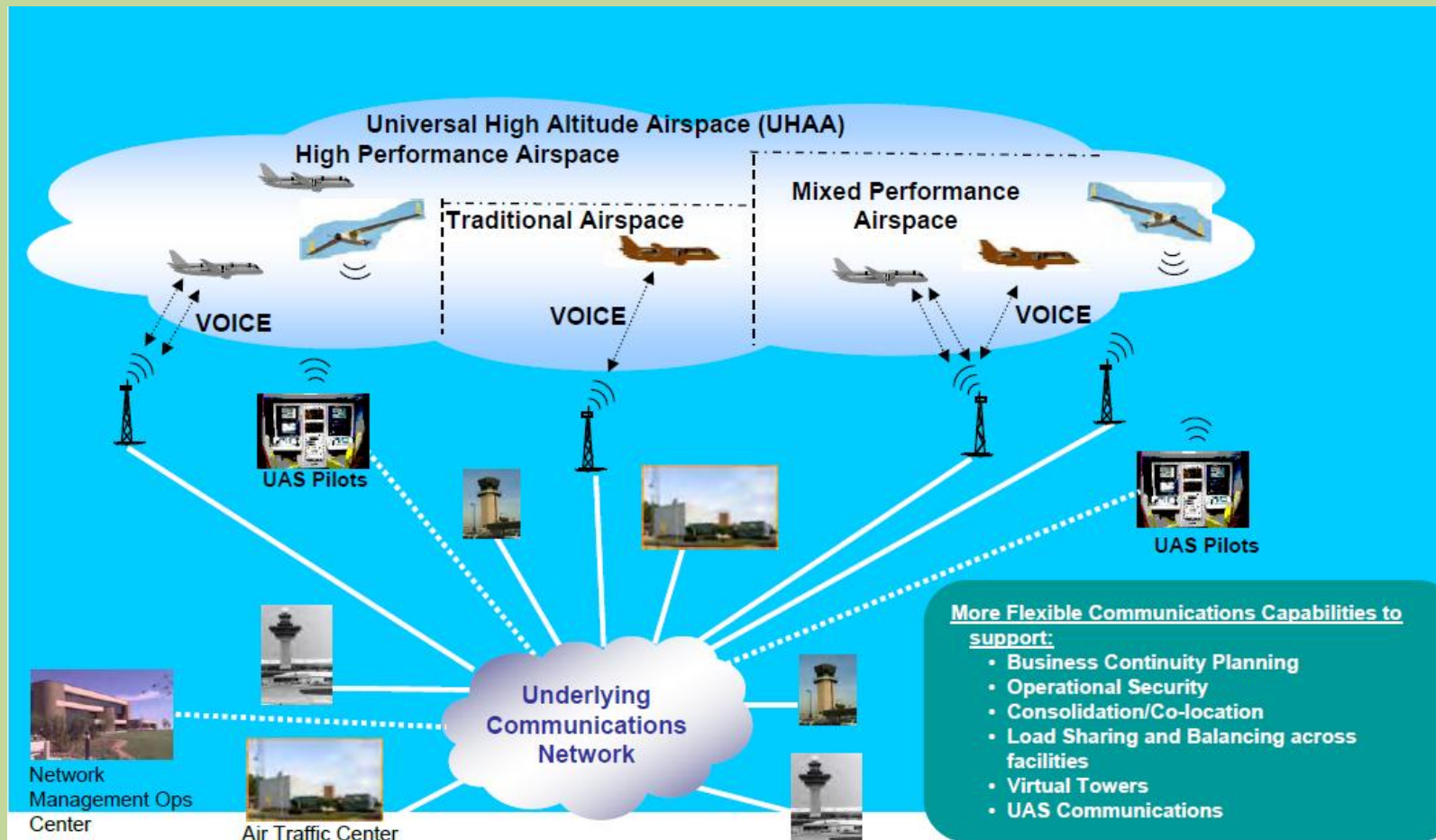
Voice Switching and Control System (VSCS)

The current system

- Easily handles the peak traffic load of 1,419 calls per minute with a maximum of 2,828 calls per minute
- Connects A/G voice paths in less than 15 milliseconds
- Unprecedented voice quality
- Supports up to 350 radios, 240 backup emergency communications, 570 trunks, and 430 positions
- High degree of configuration flexibility
- Touch screen technology
- Easy-to-use computer human interface developed in partnership with FAA controllers and maintenance personnel
- Dynamic reconfiguration within each facility— permits rapid and safe ATC sector reassignment
- Switchovers during fault detection and resolution are transparent to air traffic controllers
- Built-In Test/Automatic Fault Isolation (BIT/AFI)

Why replace VSCS with NVS

- An FAA study concluded
  - The current switch bases are old with looming support problems
  - 17 different switches are currently used in the NAS
  - Many of the switches are experiencing obsolescence issues.
- The current legacy voice switches operate independently at individual facilities and some have been in place since the early 1980s.
- NextGen requires a voice capability which can supplement data communications for tactical situations and emergencies.
- Current system restricts air to ground communications to geographical facility boundaries.
- NextGen requires communication paths to be controlled by an intelligent network
- Current voice switches are not network enabled and are not capable of being modified for installation in new NextGen facilities.

NVS – Needed for NexGen

NAS Voice Switch (NVS)

- NVS is the key voice communication component for NextGen
- Replaces existing voice switches at En Route, Terminal, and support facilities with network-capable switches to enable flexible voice communications.
- Provides networked voice communications that supports the evolution to NextGen operations
- Linkages support sharing of airspace within and across facility boundaries.
- Replaces 17 different voice switching systems with a single air/ground and ground/ground voice communications system.
- NVS is a major modernization initiative that will enable the FAA to route, monitor and share information from one facility to another.

NAS Voice Switch (NVS)

- "NVS will help ensure more efficient and reliable voice communications between our air traffic facilities as we maintain the world's safest aviation system."

  FAA Acting Administrator Michael Huerta, 2012

- NVS will allow for controllers' airspace to be shifted around rather than the air traffic controllers themselves.

- "You could crunch the airspace towards Miami in the wintertime, reducing the size of the airspace assigned to each controller, while you give Minneapolis controllers more airspace to monitor because there traffic demand is down"

  Bradford 2009

- NVW will improve collaborative air traffic management

Why has NVS been delayed

- FAA revised original NVS requirements from just replacing aging technology to developing a new capability that will replace the current voice switch system with a new network.

- The NVS program experienced a 2-year delay in its investment decisions due to a lack of coordination with the NextGen Integration and Implementation program office

- The NVS program depends on the FAA Telecommunications Infrastructure (FTI) to provide network connectivity to route voice communications for controllers along with radio transmitters and receivers. NVS program officials identified FTI as a significant program risk because it may not be capable of supporting NVS requirements for air-to-ground communications.

Status Of NVS

- November 2009, Northrop Grumman, demonstrated their version of Next Generation Voice Over Internet Protocol (VoIP) Voice Switch, in response to a request for proposal from the FAA.

- August 2012, Harris Corp was awarded The NAS Voice System (NVS) contract, a 15-year, $291 million award to deliver the communications network that will serve as the cornerstone of NextGen.

- NVS is currently in the planning phase but is scheduled to be operational by 2016.

- A secure, Internet Protocol (IP)-based voice communications network derived from Harris' proprietary family of commercial off-the-shelf voice communication solutions will be installed in air traffic control facilities across the U.S.

- The Harris solution replaces legacy technology with a dynamic, IP-based network that offers the flexibility and security to effectively support the FAA's Data Communications Integration Services.

"To-Be" NAS Voice Communications System OV-1

FACILITY LEGEND

A/G Communication Facilities Consist of the Following:
Remote Transmitter/Receiver (RTR) are connected to terminal air traffic control facilities.
Remote Communications Air/Ground (RCAG) are connected to en route air traffic control facilities.
Remote Communications Outlet (RCO) are connected to flight service stations.

Voice

f_3 is hand-off frequency as TRACON passes aircraft over to ARTCC while aircraft ascends to cruising altitude.

f_4 is hand-off frequency as aircraft changes sectors.

f_3 f_4 * Clearances * Advisories

f_4 f_2 * Clearances * Advisories

RCAG   RCAG

* Clearances
* Advisories
* Arrival Clearance

Voice

f_5 * Clearances * Advisories * Departure Clearance

f_8

RTR   NVS RRN   NVS RRN   RTR

NVS RRN

f_1 Voice

RTR

BUSINESS CONTINUITY

If TRACON B should fail, ARTCC B will takeover TRACON B responsibilities by establishing a connection to frequency f_4.

NVS RRN

Normal Connection

Normal Connection

Normal Connection

NVS Secure VoIP Network Over FTI

Normal Connection

Normal Connection

Hand-off Coordination

NVS AVN

LOAD-SHARING

After proper coordination and authorization, ARTCC A can relieve ATC load on ARTCC B by taking over responsibilities for sector covered by frequency f_2.

Load Sharing Connection

Business Continuity Connection

OEP ATCT

Hand-off Coordination

NVS AVN   Normal Connection

Hand-off Coordination

NVS AVN   NVS AVN

Hand-off Coordination

Hand-off Coordination

Hand-off Coordination

TRACON A

NVS AVN

NVS Global Manager

Configuration Coordination

Configuration Coordination

TRACON B

ARTCC A   **NVS Control Facility TBD**   **ARTCC B**

EQUIPMENT LEGEND

Voice Communications System Equipment Consists of the Following:
ATC Voice Node (AVN) represents all NVS model voice switches used to provide flexible voice connectivity (see the details listed in the AV-1 and shown in the SV-2).
Remote Radio Node (RRN) represents the network addressable replacement for the Radio Communications Equipment (RCE) is used to interface voice switches remote radios to AVNs.

The NAS Voice System consists of NVS Global Management, Voice Switches and Remote Radio Nodes interconnected by a Voice over IP network. This system enables any Air Traffic Controller to communicate with any other controller and to access any A/G radio. This system capability facilitates Air Traffic Control load-sharing and business continuity operations enabling the FAA to provide better ATC services at a lower cost.

Questions

Prepared by

D. Leonard

Learning Specialist

The Academic Support Center @ Daytona State College

http://www.daytonastate.edu/asc/ascsciencehandouts.html