



USAF Military Auxiliary Radio System Today

Deane Bouvier, AFA9DB
09 October 2018



What Is MARS?

- DoD sponsored contingency radio communications program
 - Using volunteer FCC licensed radio operators
 - Specially trained in military messaging
 - Operating on military frequencies under appropriate authorities
 - Separately managed by the services
- Traces its history to the Army Auxiliary Amateur Radio System (AARS) created in 1925
- During World War II radio amateurs were shut down and the AARS was deactivated
- After the war the AARS was started up again and in 1948 the Military Affiliate Radio System was established separately for the Army and Air Force
- Navy-Marine Corps MARS formed in 1962 and then disbanded in 2015
- Best known for handling Marsgrams and providing phone patches for overseas servicemen to contact their families since the Korean War up to the Gulf War
- Rebranded to Military *Auxiliary* Radio System at the end of 2009 and mission refocused on emergency preparedness



The MARS Mission



- Provide contingency HF radio communications to DOD and Military Services and their missions
- Provide international humanitarian assistance and disaster relief to US Combatant Commands
- Provide contingency communications for Defense Support to Civil Authorities (DSCA)
- Provide morale and welfare communications support to deployed DOD personnel

DoD Instruction 4650.02



Remembering Our Legacy

Ton Son Nhut
Airbase
Vietnam, circa
1967

Chief Operator –
Sal Negro
(currently AFD4SE)

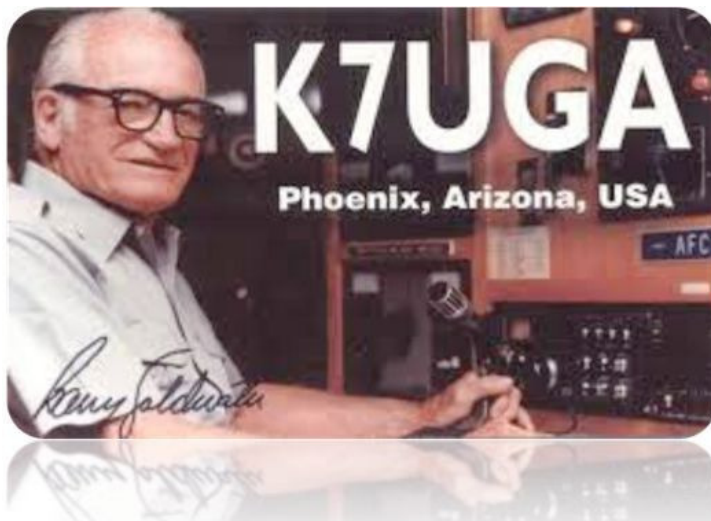




Remembering Our Legacy

Senator Barry Goldwater, K7UGA
AFA7UGA (AF MARS)

MARS Station Operator, Proponent
and Ambassador

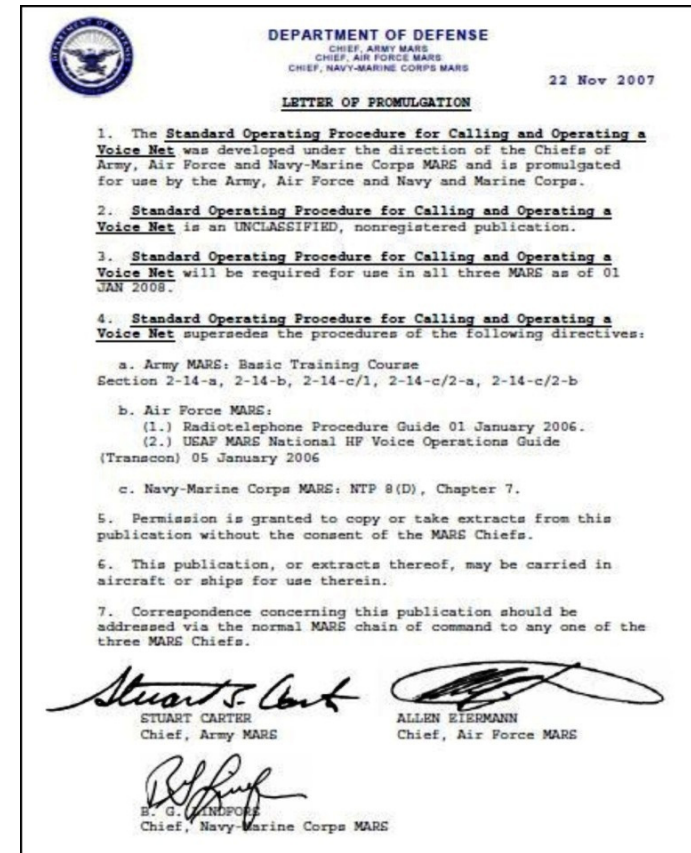




Cross - Service Collaboration

“We Are Partners”

- The DoD has directed, greater coordination, collaboration and a unified MARS mission, while maintaining separate service identities
 - Joint operational and training nets (daily / quarterly)
 - Standardized procedures for voice nets
 - Similar standardization procedures for digital nets
 - Joint operational participation would be expected in actual mission operations
 - Reasonable coordination between Chief's and HQ leadership staff





Headquarters Leadership
Scott AFB, IL



Headquarters Leadership
Fort Huachuca, AZ

Mr. David J. Stapchuk
AGA5C
Chief Air Force MARS

Mark Allen
AFN60
Natl Director of Operations



Mr. Paul English
AAA9A
Chief Army MARS

David K. McGinnis
HQ Army MARS -
Operations

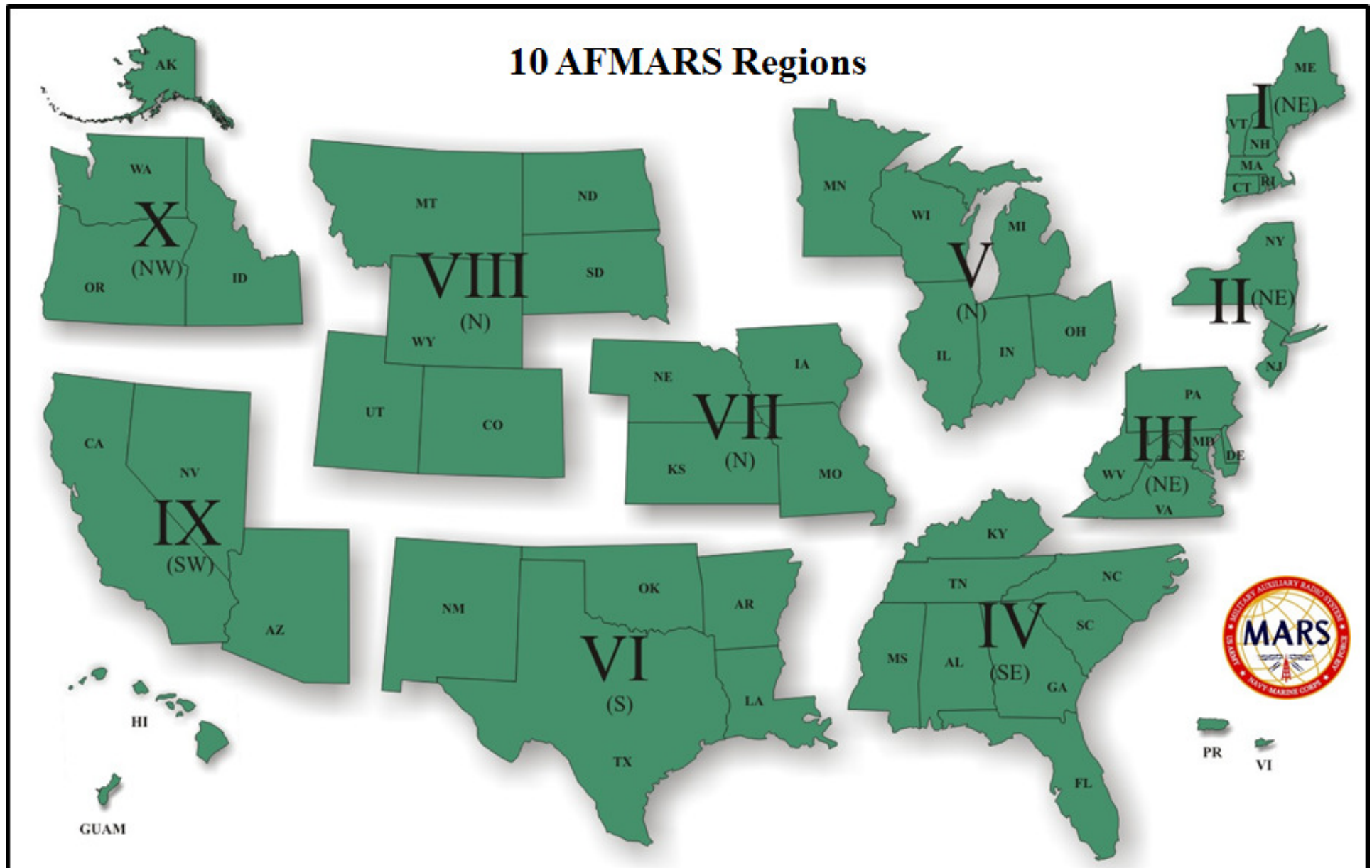
Partners in Preparedness

MARS Operations are becoming more and more Joint



Partnering in Preparedness

- Air Force & Army MARS have roughly 1,100 volunteer members (operators) each
 - A motivated, technically competent cadre of radio operators
 - Members donate their time, resources and equipment to the MARS program and provide a contingency communications capability at no cost to the Government
- MARS continues to build relationships with the active duty military units, reserves, and National Guard in 2018
 - Currently 32 licensed Air Force MARS Base Stations at active military and National Guard installations in continental US
- Greater integration of MARS with the DoD Command Structure
 - Air Force MARS participates in growing number of military communications exercises
- Through training, exercises, situational awareness and incident reporting, MARS members help the nation prepare for, and respond to, various crises and emergencies



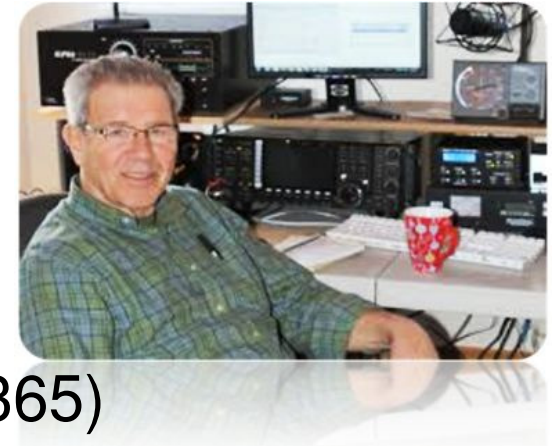
- Army and AF Regions are the same and coincide the with FEMA Regions



MARS HF Nets

(Some service specific)

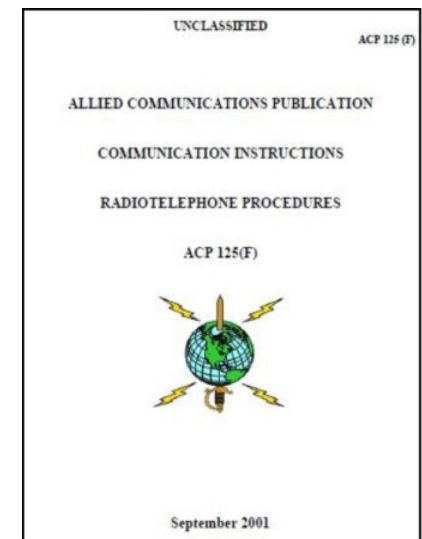
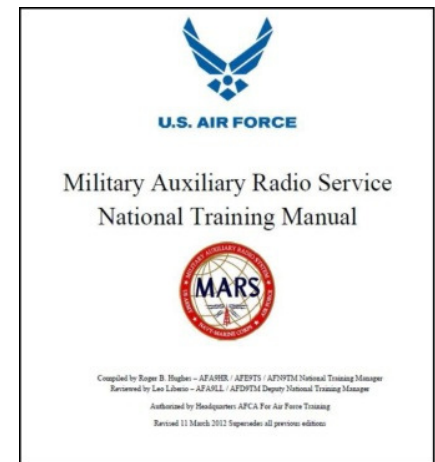
- Local Traffic Nets (daily)
- Regional Traffic Nets (daily)
- State Administrative Nets (weekly)
- COMEX (quarterly)
- MARSRADIO, Phone Patch Net (24/7/365)
- Mission Support Net (daily)
- ALE Nets (continually)
- Training Nets (daily)
- ECOM Emergency Nets (quarterly exercises and actual incidents)
- Joint Service Interoperability Nets (daily)





Air Force MARS Training Nets

- Training is continuous – it doesn't end when you get your MARS license
 - Net participation provides “on-the-air” experience in utilizing proper procedures
- Air Force MARS members operate on military frequencies, use military call signs, and are trained and tested in military communications protocols
 - Antennas to support 3-30 MHz, outside the amateur bands present their own challenges
- Training is on both voice and digital methods and procedures







HF Digital Standards

- By DoD directive, MARS services have migrated to Mil-Std-188-110A digital waveform for messaging
 - Compatible with active duty and reserve forces
 - Emphasis on encryption and secure data handling methods in light of the current global situation
- Hardware modems or a software emulation program using a sound card interface device





HF Digital Standards

Automatic Link Establishment, (ALE) is the worldwide *de facto* standard for digitally initiating and sustaining HF radio communications in changing propagation conditions

- ALE enables the radio station to make automated contact and initiate a circuit, between itself and another HF radio station or network of stations
- Typical ALE set up combines an HF SSB transceiver with a computer running an ALE controller program and sound card modem
 - When not actively in contact with another station, the HF SSB transceiver constantly scans through a wide range of established HF channels, listening for any ALE signals
 - ALE controller decodes calls and soundings sent by other stations and computes the bit error rate as a quality score for each frequency and sender-address
 - To reach a specific station, the caller enters the ALE Address
 - ALE controller:
 - Selects the best available idle channel for that destination
 - Sends a brief selective calling signal to wake up the intended recipient
 - The two stations automatically handshake to establish the link and they are ready to communicate



Quarterly MARS COMEX

- Purpose
 - Refine individual MARS operator skills
 - Refine joint operations procedures between Army and Air Force
 - Develop the working relationships at the local level between MARS operators and individual Amateur operators
- Typical Sequence
 - ALE MARS stations receive tasking from Hq Army MARS
 - Region nets convene and rebroadcast the tasking messages
 - MARS stations collect requested information
 - From METAR broadcasts or
 - By contacting local hams on amateur frequencies for infrastructure status of each county only via radio
 - Information is formatted into a military message, encrypted and sent to Region ALE station for transmission to Hq Army MARS
 - The process continues until ENDEX
- High power broadcasts on 60m where Federal and Amateur stations can communicate directly
- “BAD DAY” scenario – nothing works



COMEX 18-4 Public Release

- From 22-26 October 2018, MARS members will be supporting the DOD HF communications readiness exercise testing the ability to communicate via voice and military standard communications protocols simulating the loss of traditional forms of communication.
- Throughout this exercise, MARS members will interface with the Amateur Radio community to collect information at the county level regarding publicly available information using voice and amateur radio digital protocols.
- Additionally, MARS members will be participating in the HF ALE on the air exercise taking place from 12-22 Oct 2018.
- On 24 Oct 0001 Hrs Zulu *[23 Oct 1701 Hrs pacific]* amateur radio operators are requested to monitor 60 meter channel 1 (5330.5 KHz, upper sideband) for updated information regarding this exercise and how the amateur radio community can participate.
- During the exercise, MARS members will communicate with amateur radio operators on all five 60 meter channels, as well as the other amateur radio bands.



What is the “BAD DAY” Scenario?

MARS capabilities would likely be utilized under one of the following scenarios:

- A nuclear event affecting the homeland
- A military action affecting CONUS
- Large scale deployment of military resources OCONUS
- A cyber event of sufficient scale to affect domestic ops
- A large scale multi-state disaster
- Major regional or national training activity



AF Phone Patch Net

“MARSRADIO”

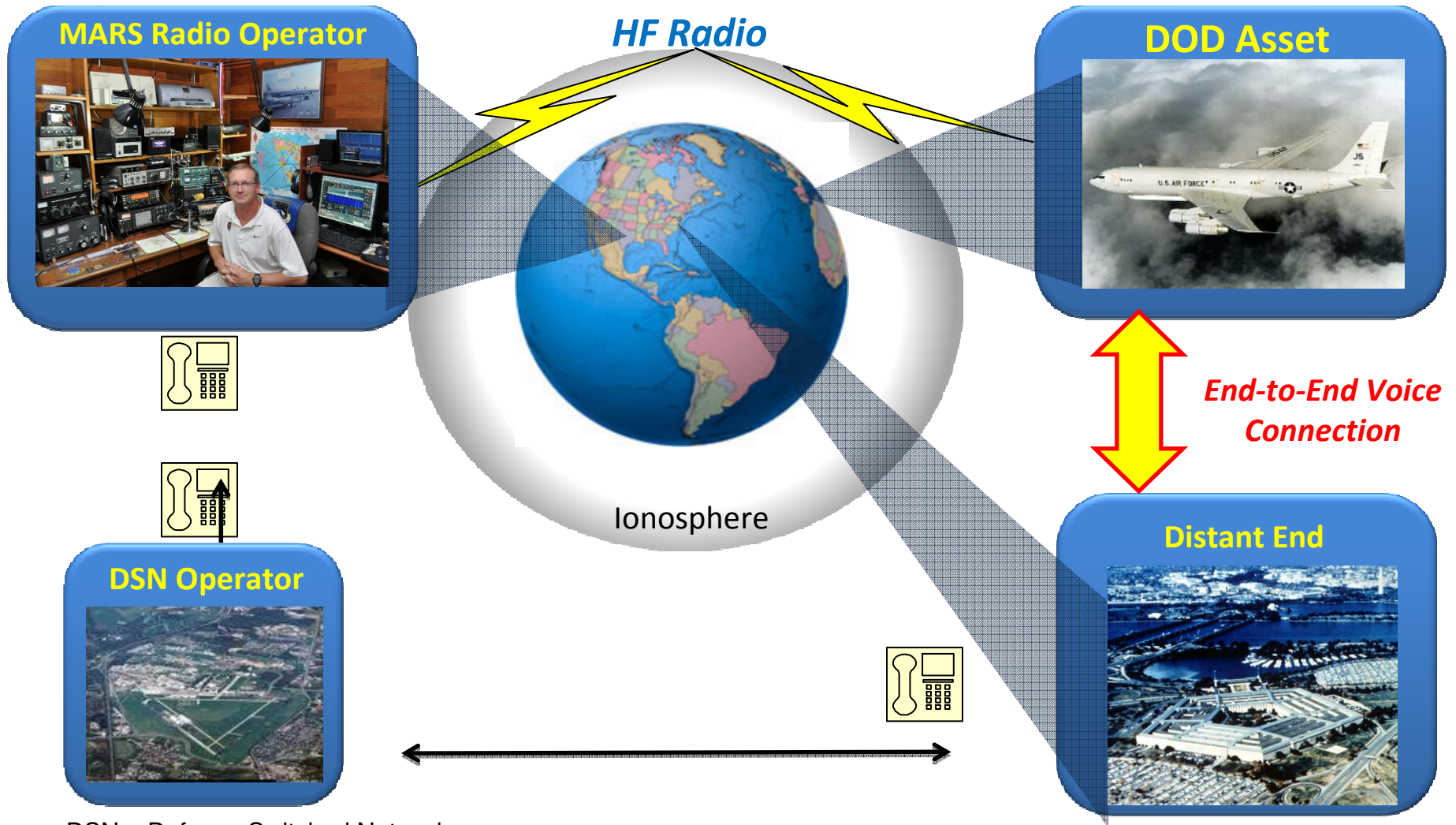
- MARSRADIO provides HF radio telephone, SELCAL, weather reporting service to military aircraft from any service.
 - Military vessels and ground deployed assets are also served.
- The net is staffed 24/7 by specialty trained AF and Army MARS members with high power stations
- *MARSRADIO operators facilitated well over 2,000 phone patches – nearly 200 a month – with more than 60 percent handling official business in support of operational activities over the last few years*

MARSRADIO handles:

Official Patch	DSN or commercial (Base Ops, Maint, Customs, etc)
Morale Patch	Personal patches to family and friends
Radio Checks	Check HF radios
SELCAL Check	Selective calling tone sequence
METAR/TAF Info	Airport weather reports and forecasts
PIREP Filings	Pilot reports of actual flight conditions to ATC
Scores	Yes, can provide sports scores, etc (Superbowl...)



Phone Patch Overview



DSN – Defense Switched Network
© Copyright Southern California USAF MARS 2018



MARSRADIO

Global PBX System



MARSRADIO operates a private PBX system

- Built in phone patch interface
- Interface to analog patch
- Nationwide and International calling
- Patch to DSN government phones
- Easy transfer of patch
- Call back Number
- No local phone line required





AF Mission Support Net

- Provides communications support to contemporary military operations, homeland security and homeland defense activities, as well as CONUS and OCONUS disaster relief missions
- Is available to support other U.S. Government operations, including space activities
- Calling frequencies are adjusted based on time of day and propagation
- Voice and digital messages are handled
- Operations include: on-the-air training support, exercise assistance, actual events, emergency communications, radio checks and message delivery





Annual Armed Forces Day Crossband Test

- Test two-way communication between radio amateurs and military stations, second Saturday in May
- Military stations transmit USB on selected military frequencies and announce the specific amateur frequencies they are monitoring; 2018 e.g.,

AGA9TR / TRAVIS AFB, CA	1600Z - 0100Z	5,346.5 7,329.0 13,996.0 14,411.0
NEPM / USS IOWA BB 61 LOS ANGELES, CA	1500Z - 2359Z	4,043.5 6,903.5 14,463.5 18,293.0

- SecDef message transmitted utilizing the MIL-STD 188-110A/B Serial PSK waveform followed by MIL-STD Wide Shift FSK (850 Hz RTTY) at scheduled times, e.g.,

Freq	1400Z	1420Z	1440Z	1500Z
13,506.5	AGA2SY	WAR	AAC	AAZ
17443.0	AAC	AGA2SY	WAR	AAZ

- LAAFB MARS station operated as AIR-2 in the 1998 crossband test

AFD Event ALE Channel Frequencies

Channel Name	Amateur TX Frequency	Military Frequency	Freq Format
X75US	3996.0 USB	4000.0 USB	Split
X60INT	5371.5 USB	5371.5 USB	Simplex
X40US	7296.0 USB	7357.0 USB	Split
X20INT	14346.0 USB	14383.5 USB	Split
X17INT	18117.5 USB	18272.5 USB	Split
X15INT	21432.5 USB	20940.0 USB	Split



MARS Collateral Partner Programs & Agencies





SHARES HF Radio Program



- MARS operators may apply to participate in the National Shared Resources (SHARES) HF Radio Program
- SHARES operates under the auspices of the DHS Office of Emergency Communications to help ensure critical connectivity between government agencies during crisis situations
 - Many Federal departments and agencies utilize HF radio communication systems to support their mission responsibilities
 - SHARES uses existing agency HF radio resources to coordinate and transmit messages
 - Provides an additional means for users with a national security or emergency preparedness mission to communicate when landline and cellular communications are unavailable
 - Available on a 24-hour basis to provide an emergency communications link to support intra- or interagency mission requirements
 - AFMARS WINLINK operations now reside with SHARES
- Civilian Government SHARES members are generally limited to states



Disaster Support

Support to Civil Disasters is Typically Limited Due to Availability of Existing Civilian Resources

- *When requested* MARS members associated with a military unit or federal, state, or local emergency response team may accompany that team to disaster scene to provide communications in support of U.S. government operations
- FEMA courses ICS-100b, ICS- 200b, ICS 700a, and ICS-800b are required
- Region 6 support of Harvey:
 - Handled over 300 pieces of official disaster related traffic
 - Excellent joint interagency operations; MARS, SHARES, FEMA, NG, CAP, State EOC





Air Force MARS at the Pentagon

- The Pentagon MARS station operates under multiple call signs
 - Air Force MARS – AGA3DC
 - Army MARS – AAN3PNT
 - Department of Defense – WAR
- Andrews AFB MARS Station – AIR
- Air Force MARS members operating at the Pentagon MARS Station have participated in communications exercises with DoD airborne assets, receiving off-line encrypted messages and delivering them to the National Military Command Center for decoding and action






SoCal AF MARS

- LAAFB Base Station
 - Two, kilowatt HF stations plus VHF repeater on San Pedro Hill
 - 7-30 MHz log periodic yagi
 - Wire antennas for region frequencies
 - Written into the War and Mobilization Plan
 - Station didn't survive demolition of Area A and not reestablished
 - San Pedro Hill VHF Repeater still in operation
 - Army MARS has two VHF repeaters in operation on Pleasants Peak and Mt Disappointment
- Worldwide Space Support Net
 - Created as backup comm for satellite tracking stations
 - MARS Stations and Official Government Stations
 - Activated for every shuttle launch and recovery
 - Transitioned to the AF Mission Support Net






- 



Region 9 Air Force

Military Auxiliary Radio System





U.S. AIR FORCE



[Joint Net Schedule](#)

TODAY

[Recent Earthquakes](#)

[CalFire Major Incidents](#)

[CHP Traffic Incidents](#)

JOIN

[Join USAF MARS](#)

[MARS Application](#)

 - [Application Guidelines](#)

DIRECTIVES

[DoD Instruction 4650.2](#)

[DoD Directive 5111.13](#)

[DoD Directive 3025.18](#)

[AFI 33-106](#)

[AFI 33-118](#)

[USAF MARS OI](#)

OTHER MARS SITES

[Hq USAF MARS](#)

[North East Area](#)

[Region Four](#)

[Mission Support Network](#)

[Phone Patch Net](#)

[Transcon Digital Network](#)

[Army MARS](#)

[Army MARS Support](#)

[MARS Software Downloads](#)

[MARS Wikipedia Article](#)

OTHER RELATED SITES

[USAF Home Page](#)

[AF Retiree Services](#)

[CAP](#)

[So Cal Repeaters](#)

[Other Links](#)

What's New	Members Only Page	MSN News	DAKT Net Controls
Arizona Info	California Info	Nevada Info	Pacific Is Info



[Joint Net Schedule](#)

08 October 2018

18:13:57 UTC

Propagation Tools



Solar-terrestrial Data - <http://www.gsnnb.com>

08 Oct 2018 1728 JDT		Current Solar	HF Conditions	
SFI	E8	CN	C	
4-24	10-20	10-20	10-20	10-20
30-40	30-40	30-40	30-40	30-40
40-50	40-50	40-50	40-50	40-50
50-60	50-60	50-60	50-60	50-60
60-70	60-70	60-70	60-70	60-70
70-80	70-80	70-80	70-80	70-80
80-90	80-90	80-90	80-90	80-90
90-100	90-100	90-100	90-100	90-100
ML	E8	16.74		



How To Join Air Force MARS

- To join Air Force MARS you must meet the following minimum requirements:
 - Be a U.S. citizen or resident alien
 - Be at least 18 years old
 - Possess a valid FCC amateur radio license
 - Have the capability to transmit on MARS HF frequencies
 - Be capable of digital messaging
- More information on the Hq AFMARS website
 - <https://www.mars.af.mil/>

MARS Serves Those Who Serve



UNCLASSIFIED