COMMUNICATIONS for SAR Incident Management Teams

Ron Nelson (NR5ON)

(April 26, 2025)

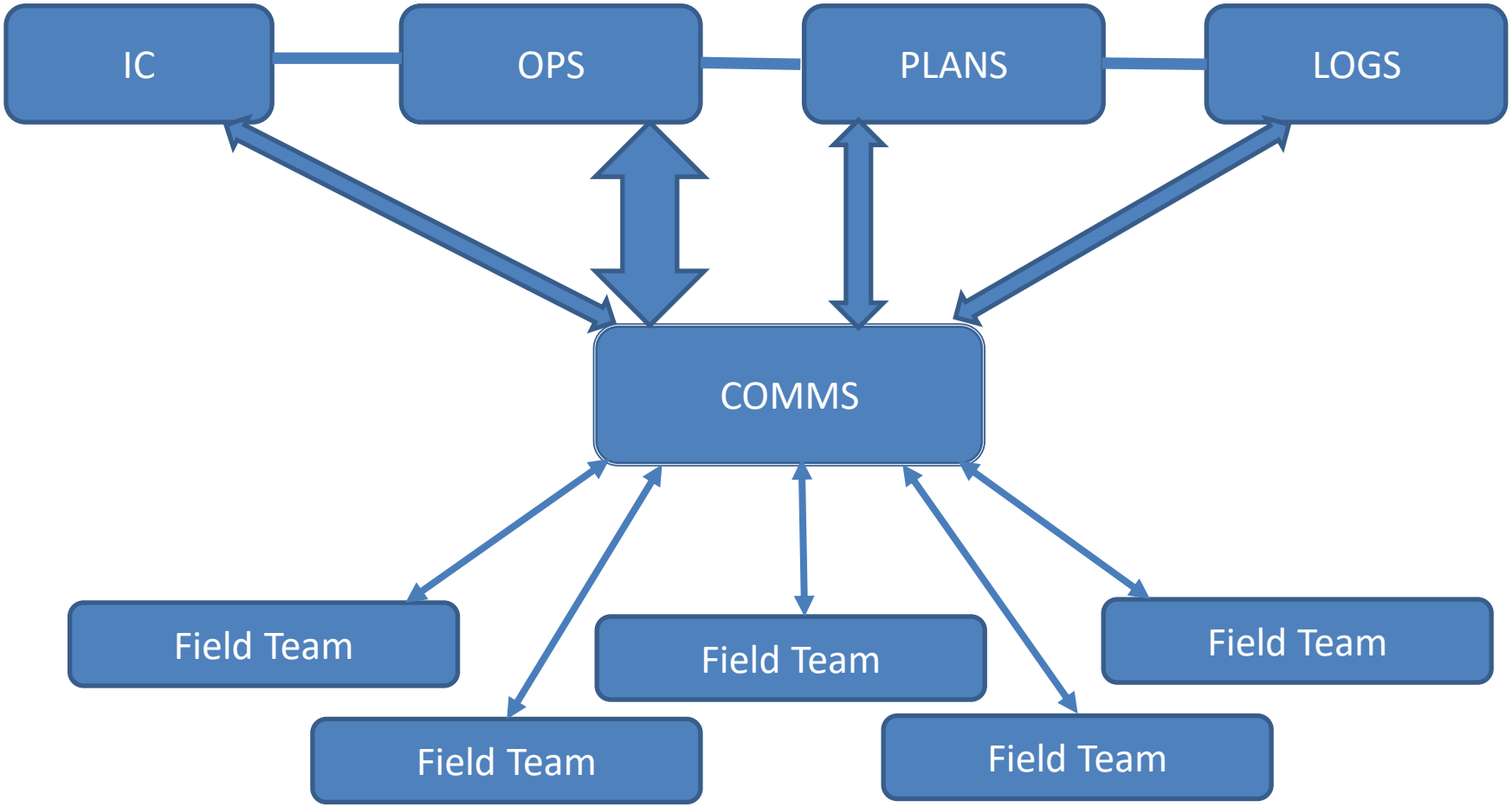
Items in this Presentation

- Incident Command System Framework
- Mission Roles and Communications
- ICS Forms
- Communications with Field Teams
- Communications with Agencies
- Communications within the IMT
- Clear and Efficient Information Transfer
- Operating Scenarios
- The COML/Radio Operator’s Roles
- Privacy Issues
- Communications Logging
- Information Flow
- Frequencies, Equipment, and Repeaters
- Special Safety Issues
- Satellite Communications

Wildland SAR Incident Management Team Communications

- Presentation intended for IB Comms personnel and IMT
- Typical operating conditions
  - In a wilderness area often far from city infrastructure and without cell phone service
  - If you didn't bring it you don't have it
  - Potential for extremes of weather, road conditions
- Provides excellent preparation for operating in many emergency situations
  - Lack of resources other than what you brought
  - Challenging radio environments – hills, mountains
  - Portable/mobile power sources only

Typical SAR Comm Unit Links in the Field



Maintaining a Manageable Span of Control

- ICS recommends 3 – 7 as a manageable number of people or teams per supervisor
- Missions can be small, medium or large – accordingly the number of teams and IMT staff using comms varies
- May need multiple radio teams to effectively communicate
  - Depends on activity levels
- What if there are 15 or 20 field teams? (Valle Vidal exercise)
  - Create a Comm Strike Team with one or more separate comm teams reporting to the Strike Team leader as needed
  - Strike teams filter traffic, spread the communications load
- What if comms staffing is limited? Recruit from available staff. Do the best you can, realize that efficiency/effectiveness will be reduced

ICS Forms for Communications

- **ICS 205 Incident Radio Communications Plan (Frequencies +)**
- **ICS 309 or NMSAR 310 Communications Log**
- **ICS 214 Unit Activity Log (for Comm assignments)**
- NMSAR 314 Resource Tracking Worksheet (Team locations)
- NMSAR 311 Mission Clue Log
- ICS 211 Incident Check-In List
- ICS 213 General Message
- ICS 205A Communications List (cell/sat phones, land lines, etc.)
- EMS Liability Release - Standard Medical Release Form

http://www.nmsarc.org/sar-forms.html

IB Communication Paperwork & Tasks

- Communications Plan (ICS 205)
  - Defines the frequencies and modes of communication to be used on a mission or training – often set by the IC
  - A subset of these are assigned to each Field Team
- Comm Log (NMSAR Form 310)
  - Used to record every exchange, the time/date and Team
- Comms team – Primary tasks
  - Communicate and log messages
  - Interface with Incident Command (IC) Team to
    - Accurately pass messages & communicate assignments
    - Transfer coordinates for mapping

ICS 205 – Communications Plan

- Often useful to include more than radio frequencies
  - Radio frequencies – teams, agencies
  - Cell phones – external contacts, subject, teams if necessary
  - Sat phones – Incident Commander
  - FRS – Incident Management Teams
  - inReach satellite messaging – teams and external as available
  - Landlines – external contacts
  - Internet – cell phone “hot spots” may provide service
- Function column – Command/Tactical/Support/Dispatch/Gnd-Air/Air-Air
- Assignment column – Branch/Division/Group/Section

Sample ICS 205 Form – NMSAR 205 requires less detail

INCIDENT RADIO COMMUNICATIONS PLAN			Incident Name: DELTA *(Example)*			Date/Time Prepared: 3/12/2006 0630		Operational Period Date/Time: 3/12/2006 0700 To 3/13/2006 0600	
Ch #	Function	Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone/NAC	TX Freq N or W	Tx Tone/NAC	Mode A, D or M	Remarks
1	COMMAND	**COMMON**	Command & General Staff	154.9500 W	None	158.7750 W	136.5	A	Repeater on High Hill
2	COMMAND	**GOLD STAR**	Command & General Staff	460.1000 W	None	465.1000 W	179.9	A	Patched to Ch. 1 via Gateway @ ICP
3	TACTICAL	**PD TAC 1**	Law Group	155.5200 W	136.5	Simplex	136.5	A	
4	TACTICAL	**FD TAC 1**	Fire Group	154.3250 W	141.8	Simplex	141.8	A	
5	TACTICAL	**EMS TAC 1**	EMS Group	(Jonesville 800 MHz. Trunked Radio System)				A	
6									
7									
8									
9									
10									
11									
12			*THIS INFORMATION IS FOR EXAMPLE ONLY*						
13									
14	EMERGENCY	**VCALL10**	ALL	155.7525 N	156.7	155.7525 N	156.7	A	EMERGENCY CONTACT
15									
16	EMERGENCY	**VCALL10**	ALL	155.7525 N	156.7	155.7525 N	156.7	A	EMERGENCY CONTACT
17									
18									
19									
20	EMERGENCY	**VCALL10**	ALL	155.7525 N	156.7	155.7525 N	156.7	A	EMERGENCY CONTACT
Prepared By (Communications Unit): J. Technical, COML (800) 555-1212 cell				Incident Location: County Johnson State NA Latitude 39-48-12 N Longitude 115-00-05 W					

The convention calls for frequency lists to show four digits after the decimal place, followed by either an "N" or a "W", depending on whether the frequency is narrow or wide band. Mode refers to either "A" or "D" indicating analog or digital (e.g. Project 25) or "M" indicating mixed mode. All channels are shown as if programmed in a control station, mobile or portable radio. Repeater and base stations must be programmed with the Rx and Tx reversed.

Communications with Field Teams

- Ops briefs teams on frequencies assigned
  - Comms may recommend changes to ICS 205 for improvements
  - IC has final say
- Radio check – best before leaving IB, can fix issues, at least perform radio check before starting an assignment
- One person designated as Comms for team, can be useful to monitor more than one frequency – may need two radios
- IB Comms - maintain calm, friendly voice and be patient – your are their link and your tone and demeanor influence them
- Typically 30 minute health & welfare checks – if team is late then Ops/Comms calls them
- Relays – teams can relay messages for one not getting through

Communications with Agencies

- Examples – NMSP, Forest Service, BLM, NPS, Pueblo, CAP, …
- Often initiated by IC – may use cell phone, sat phone, radio
- Typically requesting resources, coordination, information
- Interoperability is crucial – see National Interoperability Field Guide (NIFOG) for useful information
  - VTAC – simplex and repeater frequencies with a blanket FCC license for Public Safety use! Should be programmed in radios!
  - Fire, Law, Fed, Air, other frequencies should be in IB radios
- Forest Service operational repeaters – monitoring is essential in high fire hazard areas

Communications within the IMT

- Operations – needs team status and location updated regularly
- Logistics – coordination of resources, calls for personnel/support
- IC – may monitor frequencies, may want direct contact with a team or other resource
- Planning – contact with ORDM to assess expected resources for next op period
- Different physical situations may affect how comms within the IMT is conducted
  - Command RV or comm trailer or individual vehicles/tents
  - FRS, Cell phone, runner, personnel, WiFi…

Clear and Efficient Information Transfer

- All communications in plain English - no codes or jargon other than Delta code
- Speak slowly and distinctly, plan what you are going to say and how to say it before pressing PTT
- If message from Ops or IC is unclear to Radio operator, ask them to explain or have them write it down and ensure you understand the message before sending
- GPS coordinates – different “aids” may help, don’t worry final digit changes, ensure correct datum, be able to convert formats quickly and accurately if necessary (air lat/long vs ground)
- Legible and complete notes in comms log – typed if printer is available

Operating Scenarios – Working Together or Apart (Comms and IMT)

- Command RV or room with IMT and Comms together
  - Noise issues if too small a space – too many conversations
  - Easier sharing of information, no runner needed
- Comms separate from IMT
  - Reduces “noise” issues, but information transfer may be hindered
  - One solution is a “runner” to take coordinates/important info
  - If no runner or bad weather FRS radios can work but may slow comms
- Comms at “remote” location to improve contact with teams
  - May require relay(s)
  - Increased effort and delay in transferring information to IMT

The COML/Radio Operator's Roles

- One person – multiple roles possible
  - Radio operator
  - Scribe
  - IMT link
- Two people – preferred minimum, radio operator and scribe/runner
- More people – provide radio relief, assist as needed, for example, with coordinate plotting, technical troubles, etc.
- Situational Awareness - context is everything, if you can, having knowledge of team type and location can be important to understanding messages and enable you to ask additional questions as necessary. Given info, what else is needed? For example, clue found, what is location, circumstances, etc.

Radio Operator Advice/Tips

- Organization of gear is crucial – if you don't have it or can't find it you can't operate
- Knowledge of radio operation is crucial, have cheat sheets and manuals available. Test/use/improve your gear regularly
- Be patient, orders come from IC/Ops. Maintain contact - let teams know if decision may take a while. Assist IMT with gentle reminders of teams that are awaiting the next assignment
- Cell phone hints - moving a few feet may get a useful signal, boosters can help get cell service in weak signal areas.
- Sat phone hints - requires international plan to call in!
- inReach – Expect delays of about 5 – 10 min. between message/response

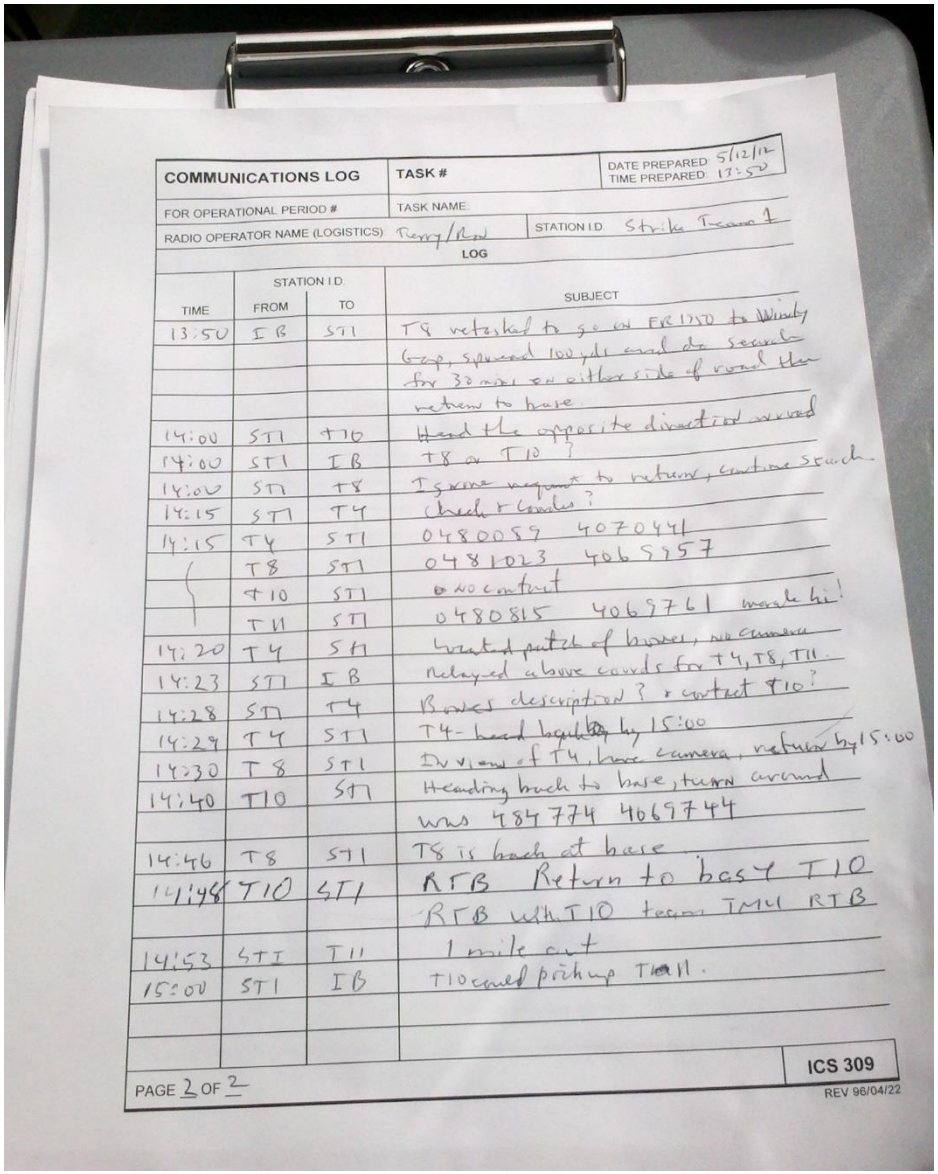
Privacy Issues

- Never use subject's names when discussing health/medical conditions, etc.
- Minimize use of MegaLink and linked repeaters that cover a broad area, especially for sensitive communications
- Be aware of family members at IB and request and insist they stay at a location other than near your radio
- IC may limit use of frequencies depending on mission issues
- Team input on decisions to continue an assignment, medical issues

Communications Logging

- Scribe
- NMSAR 310 Form
- Information
  - Accurate
  - Legible
  - Concise
  - Capture salient points
  - Flag important events or information – clues, finds, safety issues, etc.
- PC – pdf fillable forms
  - Require typing skills – not all people are up to it
  - Needs backup copy – what if PC or power fails?
- Information transfer to team of next operating period
  - Printer for paper copies
  - Flash drive if next team has PC
- Legal record – may be important documentation if events require

Sample Comms Log



COMMUNICATIONS LOG | TASK # | DATE PREPARED 5/12/12 TIME PREPARED 17:50

FOR OPERATIONAL PERIOD # | TASK NAME

RADIO OPERATOR NAME (LOGISTICS) Terry/Rod | STATION I.D. Strike Team 1

LOG

TIME	STATION I.D. FROM	STATION I.D. TO	SUBJECT
13:50	IB	ST1	T8 retasked to go on FR 1350 to Windy Gap, spread 100 yds and do search for 30 min on either side of road then return to base
14:00	ST1	T10	Head the opposite direction around
14:00	ST1	IB	T8 or T10 ?
14:00	ST1	T8	Ignore request to return, continue search.
14:15	ST1	T4	Check + Condx ?
14:15	T4	ST1	0480059 4070441
	T8	ST1	0481023 4065957
	T10	ST1	NO contact
	T11	ST1	0480815 4069761 needs hi!
14:20	T4	ST1	Located patch of bears, no cameras
14:23	ST1	IB	Relayed above coords for T4, T8, T11.
14:28	ST1	T4	Bears description ? + contact T10 ?
14:29	T4	ST1	T4- head back to base by 15:00
14:30	T8	ST1	Dr view of T4, bear camera, return by 15:00
14:40	T10	ST1	Heading back to base, turn around
			was 484774 4069744
14:46	T8	ST1	T8 is back at base
14:48	T10	ST1	RTB Return to base T10
			RTB with T10 team TM4 RTB
14:53	ST1	T11	1 mile out
15:00	ST1	IB	T10 could pick up T11.

PAGE 2 OF 2 | ICS 309 REV 96/04/22

Columns are:

- Time
- From Station
- To Station
- Message

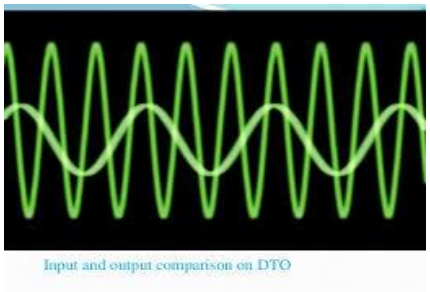
Frequencies, Equipment, and Repeaters

- Frequencies
  - LMR/Public Service
  - Ham
  - Frequency Resources
- Mobile radios – examples
- Antennas and Masts
- Batteries
- Repeaters

Ham versus SAR Frequencies

- Greater coverage area, versatility….more repeaters as well as simplex (direct) frequencies
- Must Use Your Assigned Ham Call Sign on Ham Frequencies
  - Use your tactical call, e.g. “Team 1”, and add your Ham call sign once every 10 minutes or at the end of each transmission
- Local linked repeaters can be heard over an extended area
- Mega-Link repeaters repeat your transmission all over the state! Increase chance of aid in urgent situations.
- Announce that you are engaged in a search/SAR training/etc. when using Ham repeaters, and notify when you are finished

SAR Frequencies and Typical Reference Names



- NM Search and Rescue Council (NMSARC) website http://www.nmsarc.org/Communications.html primary frequencies
  - 155.160 MHz–SAR 1
  - 151.370 MHz—SAR 2
  - 159.285 MHz—SAR 3
  - 460.250 MHz—UHF SAR 1
  - 465.250 MHz—UHF SAR 2
- FCC blanket license for interoperability use of
  - 151.1375 MHz - VTAC11
  - 154.4525 MHz – VTAC12
  - 158.7375 MHz - VTAC13
  - 159.4725 MHz – VTAC14
  - VTAC33-38 Repeaters

SAR Frequencies (Cont.)

- Examples of some NM SAR Team frequencies
  - 154.445 MHz – Los Alamos Auxiliary Fire Brigade
  - 155.205 MHz – Mtn Canine Corps, Sandia Search Dogs
  - 155.220 MHz – Santa Fe SAR
  - 155.235 MHz –Atalaya SAR
  - 155.265 MHz – Cibola SAR
  - 155.28 MHz – Abq Mtn Rescue Council, Taos SAR
  - 155.295 MHz – Dona Anna County SAR, CAP
- No call sign or other ID requirements
  - Just use your tactical call e.g. “Team 5” or your first name if not in a group or formal position
- Licensed Hams may use Ham bands & repeaters
  - Anyone can use them in a life or death situation!

Ham Repeaters for SAR Use

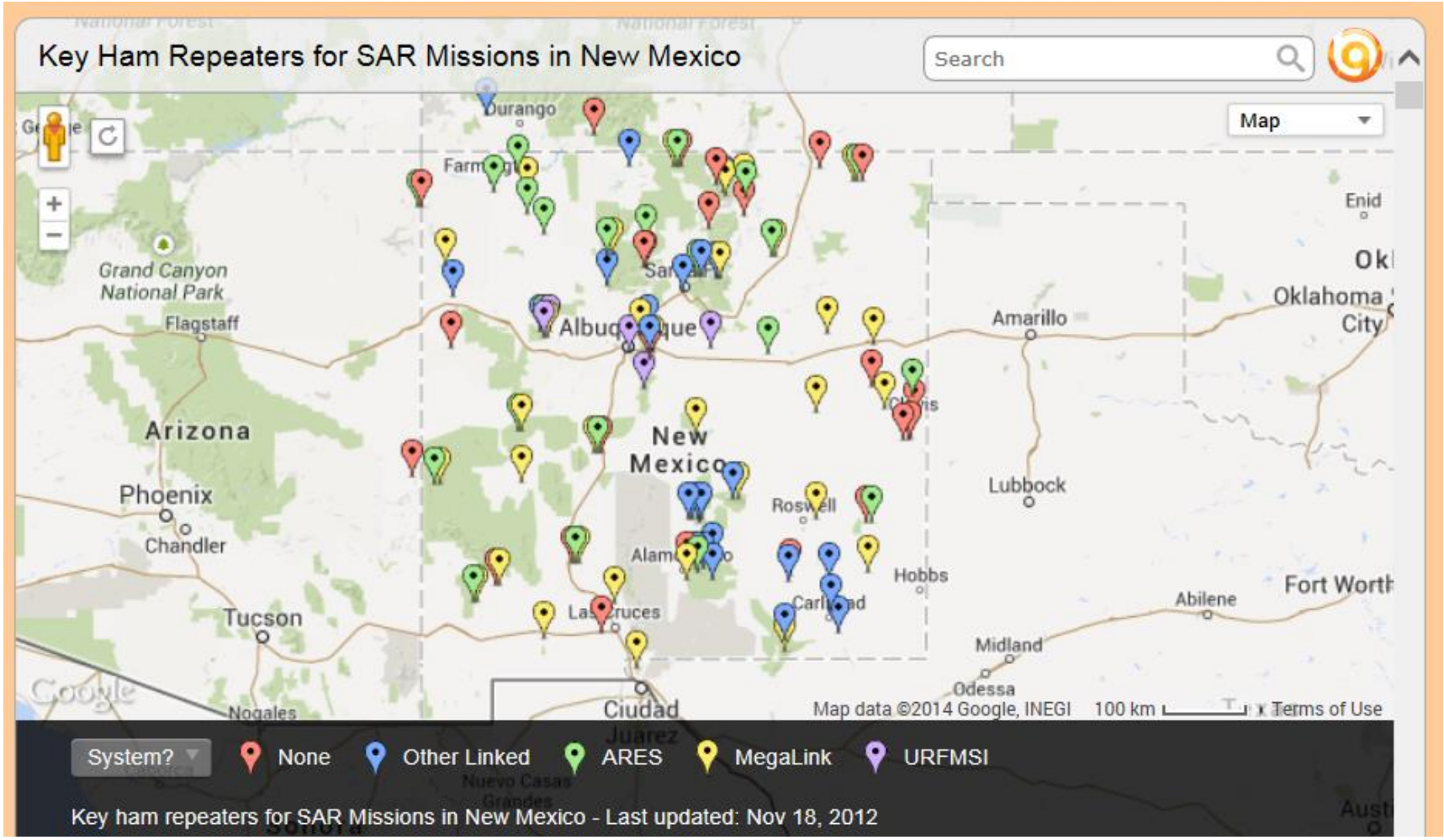
- A frequency list is available at
  - http://www.nmsarc.org/communications.html – HAM Repeaters
  - Repeater locations are given , map is being updated
  - Radio Mobile propagation model maps are planned
- New Mexico Frequency Coordination Committee
  - Lists most repeaters at https://www.qsl.net/nmfcc/index.shtml
  - CHIRP programming files are available https://www.qsl.net/nmfcc/NMFCCimportfiles.shtml

NEW MEXICO SEARCH AND RESCUE COUNCIL

NMFCC
New Mexico Frequency Coordination Committee

NMSARC Resources- Map

http://www.nmsarc.org/communications.html



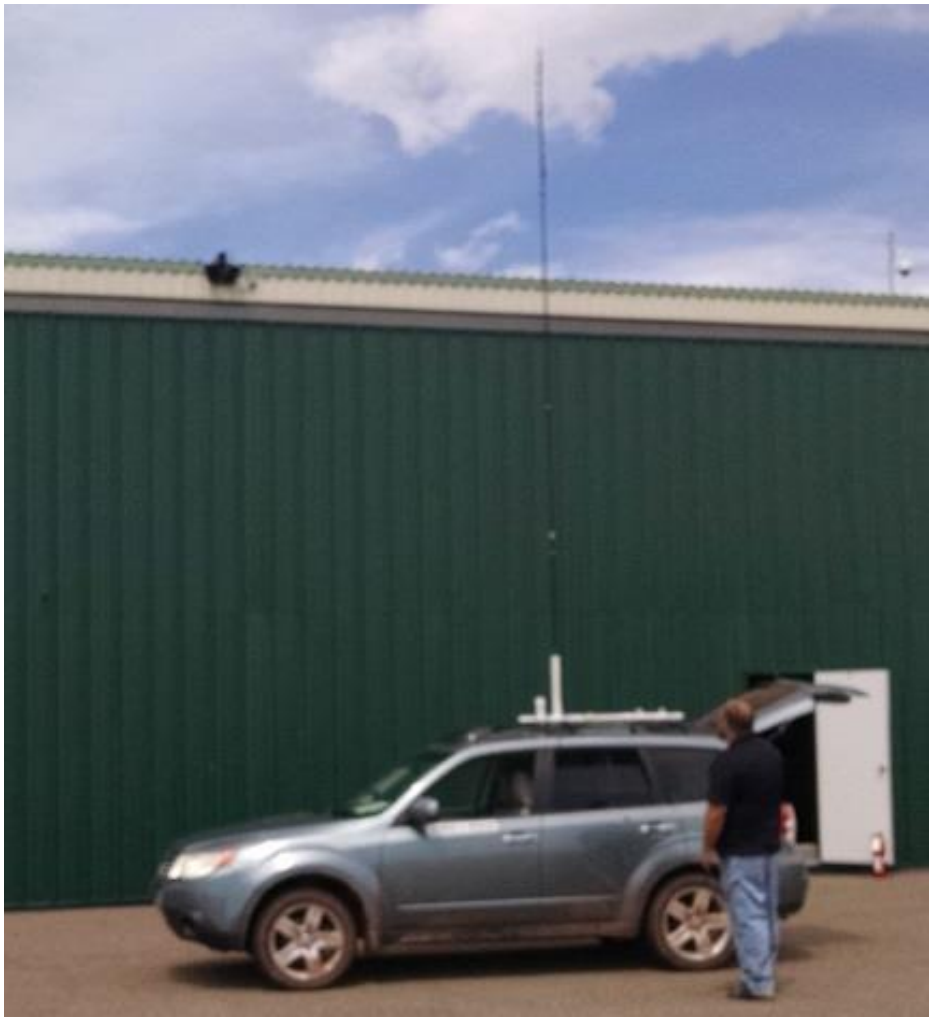
Some SAR Mobile (In-Vehicle) Radios

- Mobile Radios (FCC Part 90, dual band VHF/UHF)
  - Anytone AT-D578UV (DMR, 3 models)
  - Wouxun KG-UV920R-A - 999 channels
  - Alinco DR-638 – 758 channels
  - Powerwerx DB-750X – 750 channels

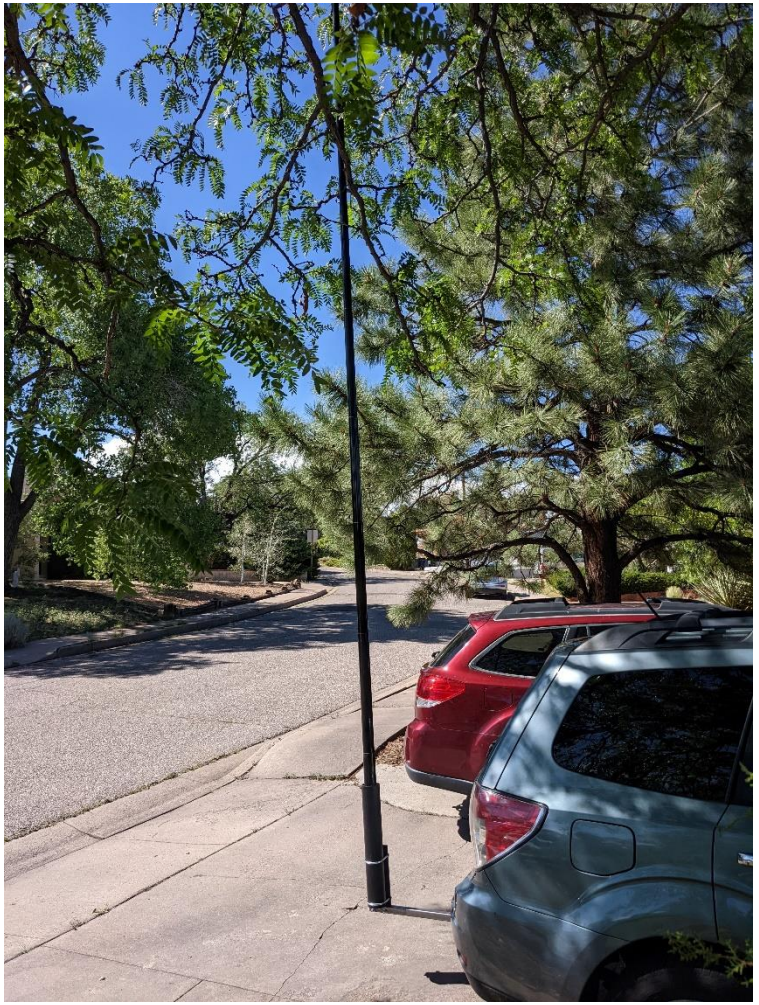
Antennas and More Antennas

Tall masts improve signal “reach” especially in forested areas.

Lightweight Mast & Wire Antenna on Cartop – excellent for hasty searches



Trailer Hitch Mount – allows repositioning vehicle easily, faster setup too



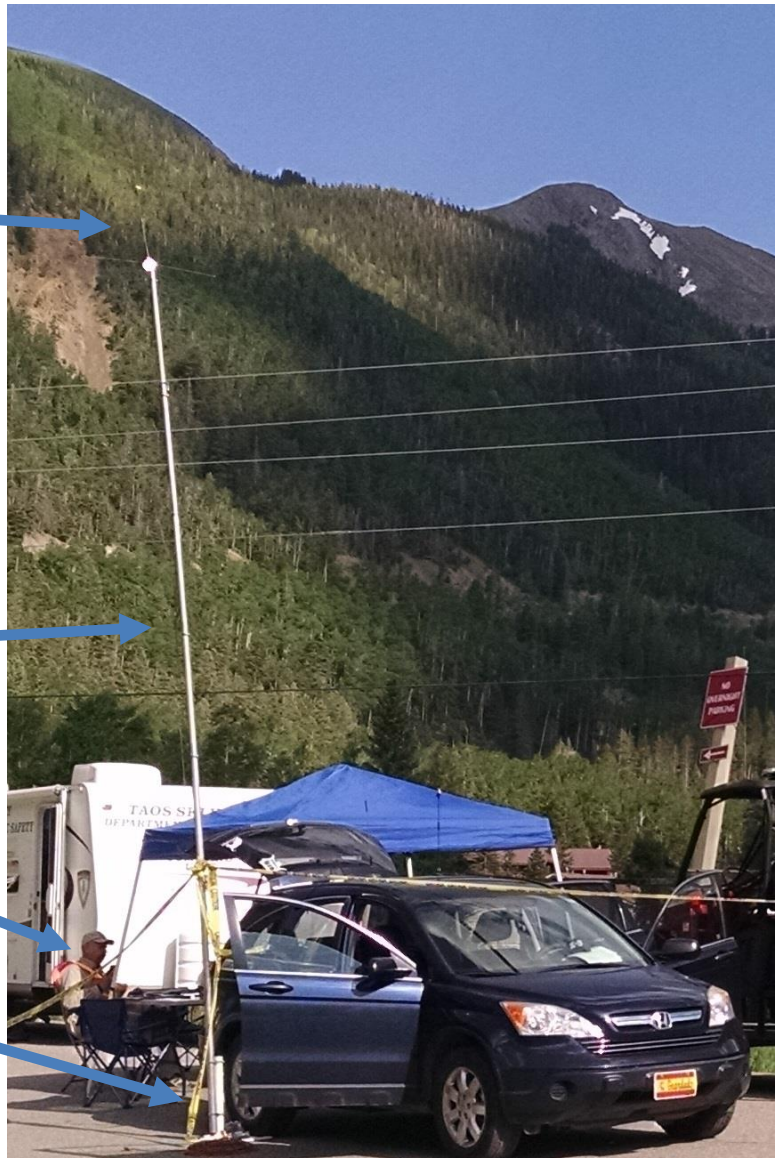
Masts and Antennas

Antenna

Fiberglass telescoping pole

Outdoor operation in good weather

Drive-over base to support mast



Issues that may affect antenna performance

- Detuning by nearby conductive objects such as metal antenna masts, mounting racks, spare tire carriers, human bodies, etc.
  - Keep some distance between antennas other items
  - Carbon fiber poles are conductive too.
- Nearby large metal objects may reflect or shield radio waves.
  - Look at your surroundings. Move is necessary.
- In the mountains, multi-path reception can create areas of low signal.
  - Moving a short distance may vastly improve reception
  - This applies to cell phone and other radio signals as well

Comms Trailers – Outfitted with Mast, Antennas, Batteries, PCs, WiFi

Better?

Batteries for Portable Operation

- LiFePO4 20 Ah and 100 Ah batteries
  - Much lighter weight than Pb-acid batteries
  - Higher capacity due to greater depth of discharge
  - Prices can be comparable to Pb-acid
  - Battery life-span is much longer – price per Ah over lifetime is lower
  - Equipped with battery protection electronics to prevent over-discharge, overcharge, etc.
  - Safe – does not contain the flammable electrolyte that other Li-ion battery chemistries use
  - 4-cells in series is compatible with nominal 12 (13.8) VDC equipment
- Li-polymer batteries with high discharge ratings are useful for conveniently jump starting vehicles

Common Radio Issues that may affect any radio

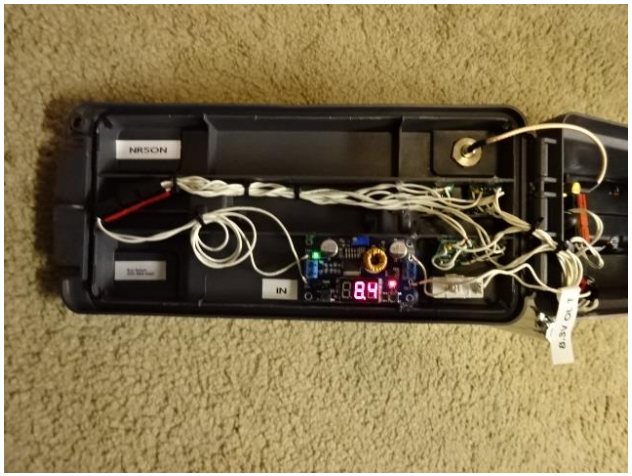
- Volume turned down
  - Check that volume is not turned down
- Squelch level set too high
  - Know how to change the squelch level
- Lock
  - Know how to unlock and relock the keypad
- Channel changed inadvertently
  - Check for correct channel regularly
- Battery low – often observed transmitting- higher power draw
  - Install a voltmeter monitor, use a battery-saver device
- Radio switched from channel mode to frequency mode
  - Know your radio and how to change modes

Issues with Radio Use at Incident Base

- Operation of mobile radios at full power in close proximity to Comms unit antennas can interfere with communications even when different frequencies are being used – called “Desense” (as in desensitizing), it prevents weaker (team) signals from being received
  - As a general rule, mobile/base station radios should not be operated at full power at IB. If teams using 5 watts can be heard, 50 or 100 W is not needed to reach them or a repeater.
  - HTs at IB likely will be overloaded and not hear such strong signals also
- Feedback squeals – turn off your radio when approaching the Comm unit to avoid feedback of your audio into their microphones

Relays & Portable/Mobile Repeaters

- Relays – effective, but ties up one or two people
  - Over a long span – tiring
- Portable repeaters
  - Do it yourself project
  - Set up and take down, power, antenna, etc.
- Mobile repeaters
  - Vehicle with cross band repeater
  - Drive to location
  - Use car battery
- Frequencies – SAR vs Ham



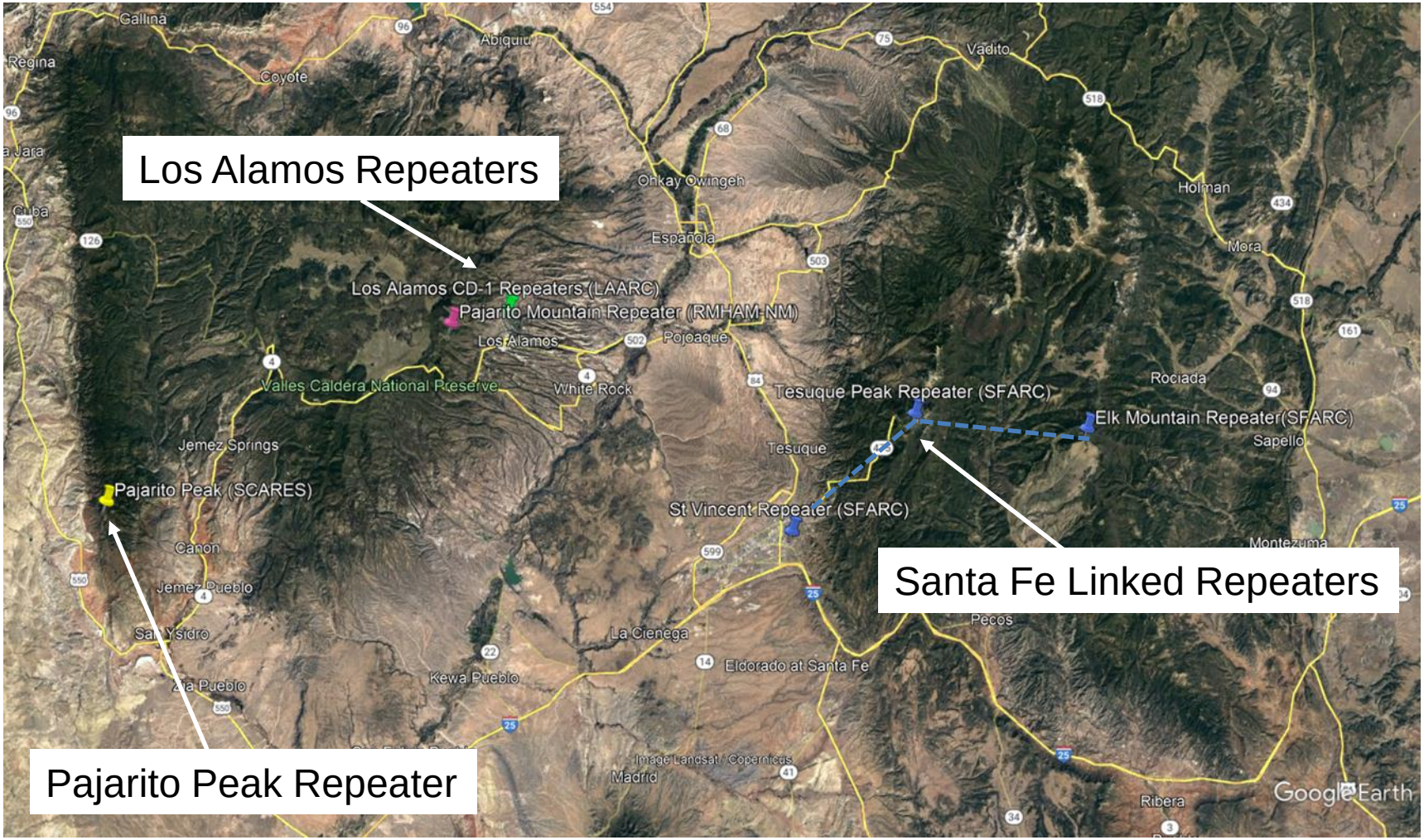
Civil Air Patrol Cross Band Repeater

- Provided by the Civil Air Patrol (CAP) on airplanes typically referred to as “High Bird”
- Uses the National Interoperability VTAC33 (as of 4/2023) repeater frequency pair – should be programmed into SAR radios
- Provides excellent coverage but only available in good flying weather
- Slight repeater delays require short pause before speaking to avoid loss of first words
- Sometimes used in combination with ground-based VTAC33 repeaters to provide continuity of communications but likely with reduced coverage when High Bird is not in the air

Portable/Mobile Cross Band Repeaters

- Used for local searches sometimes – positioned as needed and possible
- Can provide better coverage than directly from incident base – better line of sight
- Typically, field teams use SAR1 (155.16 MHz VHF) as always, IB/Comms uses USAR1 (460.250 MHz UHF)
  - Slight repeater delays require short pause before speaking to avoid loss of first words
- Other frequency pairs in use in NM SAR
  - VTAC33 (CAP and/or ground-based repeaters, blanket FCC license)
  - VTAC17 (requires FCC license)

Santa Fe Area Repeaters – linked for wider coverage



Santa Fe Amateur Radio Club Repeaters

Most VHF Repeaters PL tone = 162.2 Hz; UHF = 131.8 Hz

Pajarito Mountain
145.190 Mhz

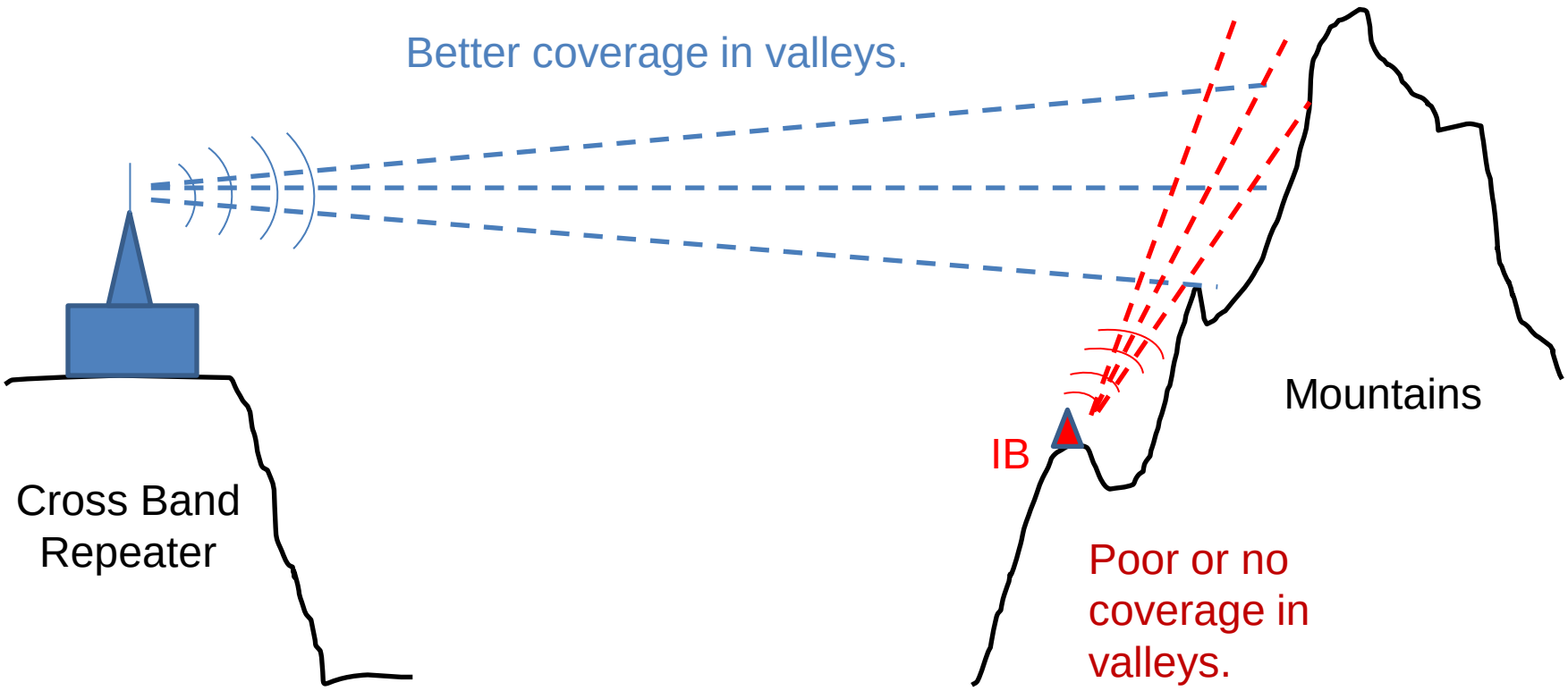
St. Vincent Hospital
147.20 Mhz

Tesuque Peak
(NB – 2 Rptrs)
VHF 146.82 Mhz
UHF 442.824 Mhz

Elk Mountain
147.30 Mhz

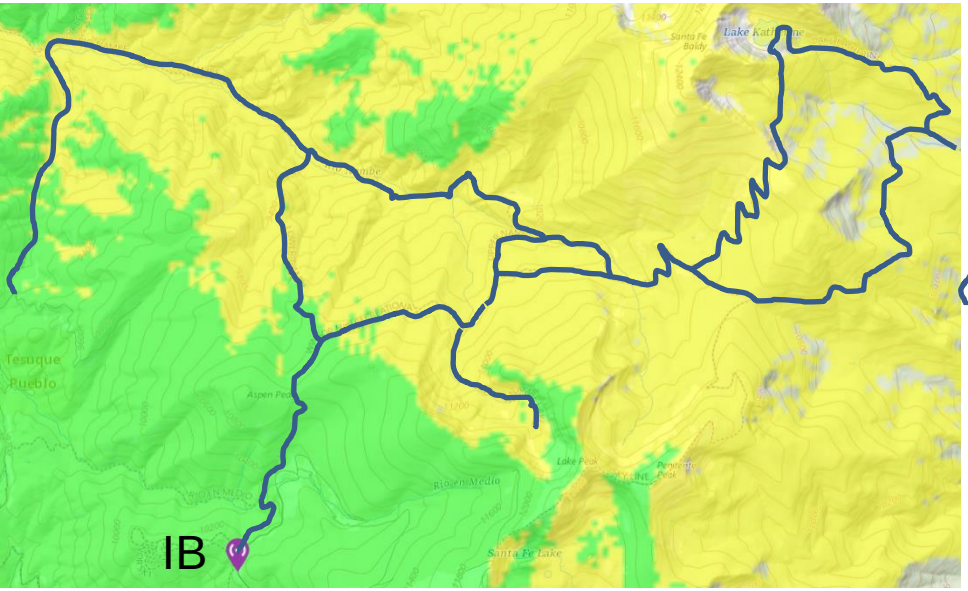
Linked repeaters!

Cross Band Repeater Gives Improved Coverage on Mountain

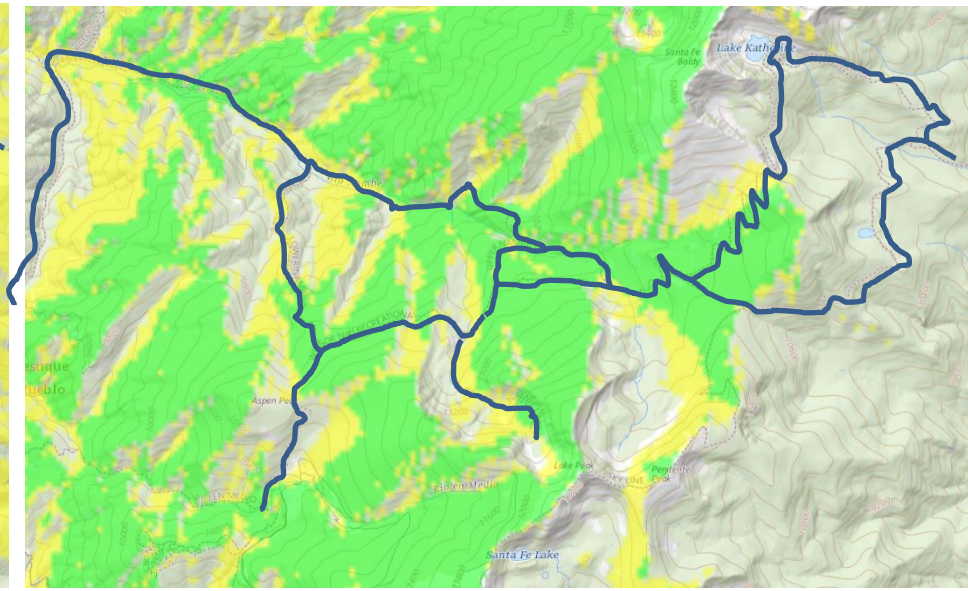


Compare Calculated Radio Coverage – A Well-Located Repeater Greatly Improves Coverage

Transmitter on mountain at IB



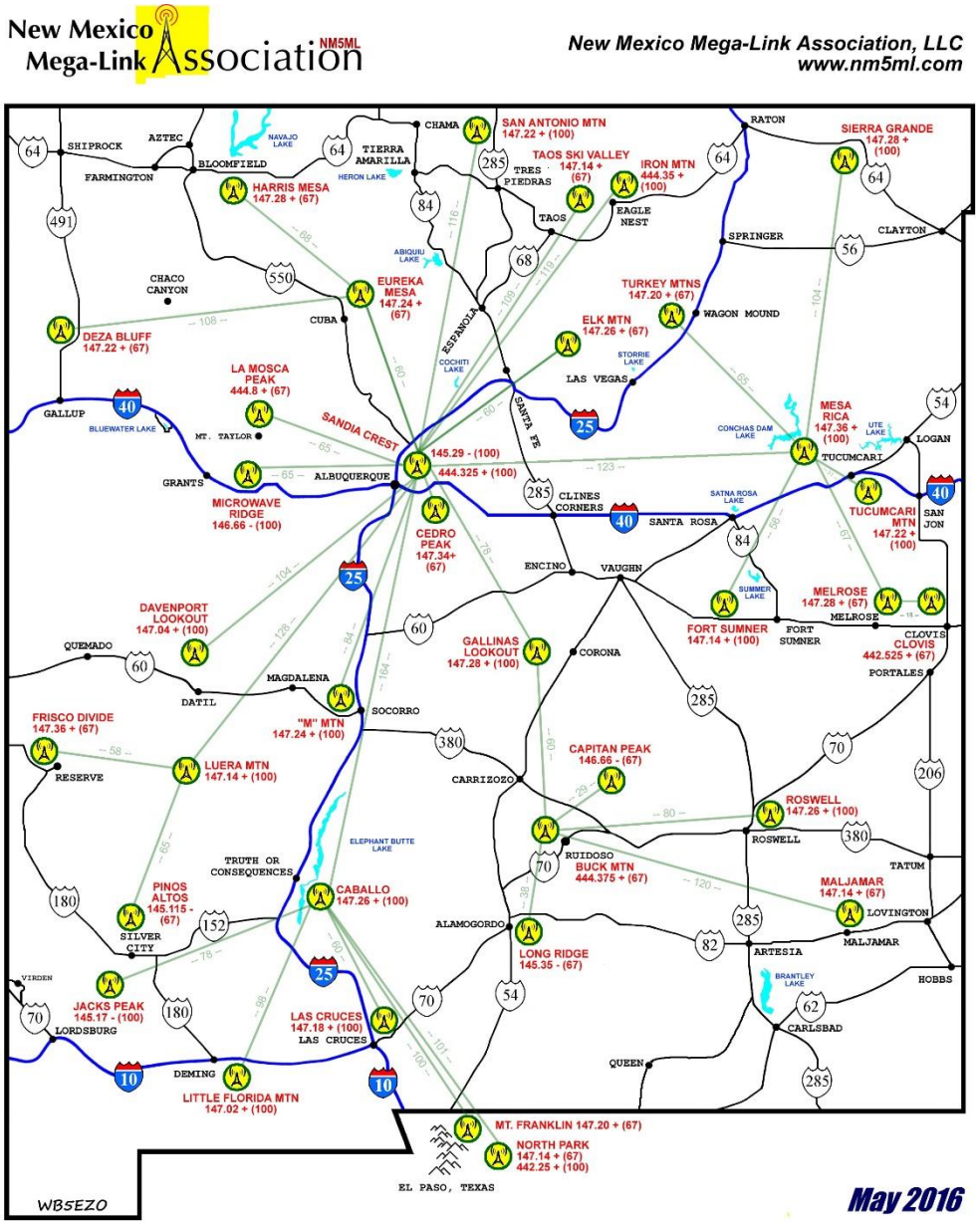
Transmitter across valley



Green – areas with good signal
Dark lines – commonly used trails

NM MegaLink Linked Repeaters - Statewide

Signal can be heard around the state – no privacy, but much greater chance of someone responding if emergency help is needed.



NMSARC Resources - List

http://www.nmsarc.org/communications.html

Key Ham Repeaters for NM SAR Missions

Updated 04 Oct. 2018

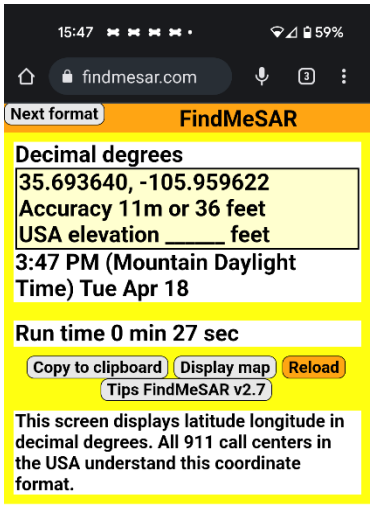
Police District	ID	Name	Frequency (MHz)	Offset (MHz)	Access Tone	Callsign	Located Near	System	UTM NAD27 Coords	Comments
1	**1-1**	**Pajarito Mt**	145.19	-0.6	162.2	W5SF	Los Alamos	None	13 S 372147 3971695	
1	**1-2**	**Tesuque**	146.82	-0.6	162.2	W5SF	Santa Fe	Other Linked	13 S 429358 3960277	SFARC Linked System - Tesuque, Elk Mt., St. Vincent Hospital, & San Antonio Mt.(Dist. 7)
1	**1-3**	**Los Alamos**	146.88	-0.6	none	W5PDO	Barranca Mesa	None	13 S 375211 3971319	
1	**1-4**	**Tesuque - ARES**	147.02	0.6	141.3	NM5EM	Santa Fe	ARES	13 S 429358 3960277	
1	**1-5**	**St. Vincent Hospital**	147.2	0.6	162.2	W5SF	Santa Fe	Other Linked	13 S 414211 3946264	SFARC Linked System - Tesuque, Elk Mt., St. Vincent Hospital, & San Antonio Mt.(Dist. 7)
1	**1-6**	**Elk Mt. MegaLink**	147.26	0.6	67	NM5ML	Cowles	MegaLink	13 S 450050 3958045	
1	**1-7**	**Elk Mt**	147.3	0.6	162.2	W5SF	Cowles	Other Linked	13 S 450050 3958045	SFARC Linked System - Tesuque, Elk Mt., St. Vincent Hospital, & San Antonio Mt.(Dist. 7)
		Repeaters in District 5 and 7 may also be useful in District 1								
2	**2-1**	**Turkey Mt. ARES**	145.37	-0.6	141.3	NM5EM	Wagon Mound	ARES	13 S 508689 3981994	
2	**2-2**	**Raton**	145.49	-0.6	100	N0DRC	Raton	None	13 S 559526 4076349	
2	**2-3**	**Sierra Grande**	146.85	-0.6	100	N5BOP	Des Moines	None	13 S 600337 4062596	
2	**2-4**	**Touch-Me-Not Mt. ARES**	147.04	0.6	141.3	NM5EM	Eagle Nest	ARES	13 S 482600 4045848	
2	**2-5**	**Sierra Grande ARES**	147.175	0.6	141.3	NM5EM	Des Moines	ARES	13 S 600337 4062596	
2	**2-6**	**Turkey Mt. MegaLink**	147.2	0.6	67	NM5ML	Wagon Mound	MegaLink	13 S 508689 3981994	
2	**2-7**	**Sierra Grande MegaLink**	147.28	0.6	100	NM5ML	Raton	MegaLink	13 S 600337 4062596	
2	**2-8**	**Angel Fire**	147.34	0.6	none	N5LEM	Angel Fire	None	13 S 479464 4025104	
2	**2-9**	**Iron Mt. MegaLink**	444.35	5	100	NM5ML	Eagle Nest	MegaLink	13 S 480527 4052406	

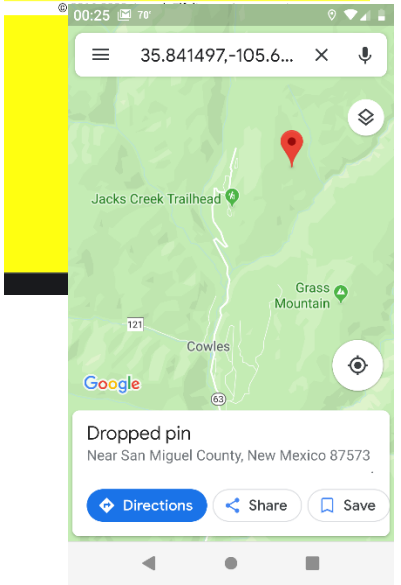
Comms Operational Safety Issues

- AC Power lines – watch out when putting up masts/antennas
- Generators – hazardous AC voltages, exhaust fumes, gasoline
- Batteries – shorts, fire, explosion hazards
- Masts & antennas – falling & lightning strikes
- Lightning – antennas and cables conduct
- RF exposure/burns – use safe antenna distances, cables
- Cables – tripping hazard if not properly routed/covered
- Fires – hot exhaust/catalytic converters on dry grass/brush
- Wildfires – Forest Service, BLM, Parks monitor frequencies

Obtaining GPS coordinates from subject's cell phone (Android or iPhone)

- FindmeSAR.com website – any smart phone, tablet or PC
  - User must hit "stop", select format, then select "copy to clipboard" and "share" to SMS or email
- Google maps "pin dropping"
  - Use "share" to text message or email coords
- SARLoc – iPad, iPhone, tracks subject on map
- CALTOPO - SMS Location Request
  - Requires internet service at present, tracks subject
- Subject must have cell data service and location service enabled. All use NAD83/WGS84
- Have subject call 911 – dispatch gets coords





Emerging Technologies and Applications

- Paper maps, logs and radios are simple and robust
- Computers and other aids can augment and enhance performance, for example with coordinate mapping, Lost Person Behavior zones, and assignment coverage tracking
  - CALTOPO is a standard for NM SAR
  - Attention to backup copies and reliable power are needed
  - Methods of transferring info to incoming teams must be ensured
  - Printers and USB flash drives are necessary
- Digital (DMR) radios – Anytone/BTech, TYT
- Satellite communications –
  - inReach, Spot X, ZOLEO, etc.

Digital Mobile Radio - DMR

- New radios from Anytone and TYT using DMR protocols are good radios and compatible with SAR needs
  - Low cost – comparable to some analog models
  - Analog mode is compatible with radios/repeaters now in use
  - Similar to Public Service type radios – use preprogrammed channels, but field changes are possible
  - GPS is available, digital messaging, emergency signaling
  - Increasing number of DMR repeaters in NM
  - DMR is not compatible with D-Star, P-25 digital modes
- Anytone D878UV model - sensitive GPS, mixed VHF/UHF dual band, many useful features
- TYT MD-UV390G model is IP67 waterproof, dual band, lower cost, fewer features
- For reviews and aids see http://miklor.com/

Satellite Comms

- Enables messaging when nothing else works
- More affordable than before ($250, + $12/mo)
- Teams and individuals are increasingly using these
- Need for units at IB
- Features and costs vary
- Some highly rated devices:
  - inReach, Spot X, ZOLEO, Somewear Labs, ACR, etc.
- Now built-in on some cell phones
- Starlink for incident base internet connectivity

Questions/Comments?

Ron Nelson (NR5ON)
RONelson99@gmail.com