

# THE HARD TRUTH ABOUT PACE

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## Introduction

A hard concept for any unit to fully grasp, and one usually thrust upon its commander, is the formulation and implementation of a primary, alternate, contingency, and emergency (PACE) plan for command and control. The truth is that many units may be more inclined to accept a thumbs-up on the matter than accept the fact they are not mission capable. This mischaracterization of readiness results from an incomplete understanding of what a PACE plan requires. Often, we operate with little to no understanding of the electromagnetic spectrum and our systems architecture, yet we expect the communications systems to work perfectly, focusing our efforts elsewhere. This deficiency, our units' problems with PACE plans, often passes down from commander to commander. Though commanders give their guidance and intent regarding PACE plans, units are still missing the mark when it comes to formulating the plan and the plans implementation. Units must focus on communications planning in the same way they focus on mission analysis and course of action development. Developing comprehensive PACE plans will allow commanders to receive, transmit, and disseminate information and orders at any time, without any loss of communications. Effective communications planning creates an environment where units—

- ◆ Become agile.
- ◆ Employ successful, simple missions in complex environments.
- ◆ Adapt effectively to uncertainty.

Maintaining communications is of utmost importance for commanders. Therefore, PACE plan development should be a top priority. Commanders should understand what a quality plan looks like and assist in PACE plan development when necessary. In doing so, command teams can field a comprehensive but simple plan that allows flexibility to address problems during operations. A PACE plan is not important to just one warfighting function or one commander; it is important to leaders at every echelon. All leaders must be able to communicate. Communications planning is a whole of staff responsibility. It does not fall exclusively on the S-6, or the commander. We, as leaders, also share the responsibility when the systems included in our plan falter. Developing the PACE plan can be one of the most complex problems a leader will face. Units who can effectively communicate though, will succeed!

## PACE Fundamentals

The operational environment is constantly changing with an influx of innovative technology and communications methods. This will continue to get more complex and impact how the Army conducts operations. Commanders must initially place a substantial emphasis on creating the PACE plan to establish redundant lines of communication. Without this emphasis, commanders are not providing proper task and purpose to their subordinate leaders. Commands that emphasize communications planning must also allow subordinate leaders to resource and train the plan's elements. The commander's emphasis, focusing on lines of communication, encompasses the radio spectrum, visible light, and at times could have a physical aspect. Commanders and subordinate leaders should consider the following recommendations as they develop their PACE plan.

**Use organic equipment while understanding how to leverage external capabilities if systems fail.** Organic equipment should always be the primary method a leader uses when assessing their options. Utilizing equipment a unit has on hand, means leaders can train, maintain, and employ systems they control. Leaders should also be familiar with other capabilities within their sphere of influence. We sometimes lose sight of other options because the equipment is assigned to someone else. Though not within our control, these capabilities can be useful if organic systems fail.

**Recognize the threat from electromagnetic warfare (EW).** Our enemies have capabilities on par with, or superior to U.S. military capabilities. We should not plan for the best-case scenario; instead, we should plan based on our weaknesses

being exploited. We cannot control what the enemy does; however, we can control how we adapt to the situation the enemy presents us. When planning, leaders should identify potential friction points the enemy will exploit with EW. Leaders who are overly reliant on one system could unintentionally foster a situation that halts progress when on the offense, limits the ability to request support during a defense, or worse, culminates in mission failure due to a lack of support.

**Understand the radio spectrum.** Radio systems operate on different frequencies. Including several radios that operate on the same frequency range does not mean you have multiple channels within your PACE plan. For example, if you have three cars which run on gasoline, and you have no gasoline to fuel the vehicles, you are down three cars. If you have three cars—one runs on gasoline, one on diesel, and one on electricity—when you run out of gasoline, you will still have two other vehicles to use. This does not negate the need for system redundancies if equipment becomes inoperable due to mechanical failure.

**Create triggers that force progression between the channels.** If one channel becomes compromised or degraded, there must be standing guidance to ensure subordinate units work through the PACE plan. Triggers can range from operating specific channels during time windows or transitioning due to terrain. Commanders must understand some echelons do not have the ability to monitor all channels simultaneously. Triggers become increasingly important the further removed a leader is from a tactical operations center setting.

**Develop and execute communications plan driven battle drills.** Units cannot let battle drills remain conceptual; training is the right place for experiential learning. Training environments allow Soldiers to become comfortable with systems and processes, and many times, Soldiers will find flaws with the plan. Leaders who build specific communications driven battle drills or scenarios can develop skilled, competent crews. These venues also serve as a proving ground for instructions.

**Remove the throwaway channels.** Of course, if we have upper-tactical internet we will use it, and if all else fails, we will send communications via courier. When leaders accept the primary channel as upper-tactical internet and the emergency channel as courier, they have effectively only two valid channels—alternate and contingency. Getting rid of the throwaway channels ensures subordinates are really doing some analysis on potential communications problems the unit may encounter.

## Getting Started

When creating a PACE plan, leaders can start with the unit's Modified Table of Organization and Equipment (MTOE)/Table of Organization and Equipment (TOE). The Army develops these documents to outline the specific organization, staffing,



An air defense battle management system operator, 38<sup>th</sup> Air Defense Artillery Brigade, assembles an omnidirectional, line of sight antenna. The antenna enabled communication with aviation assets during a unilateral joint training exercise that refined systems and concepts for enhanced tactical planning, coordination, and interoperability in a multidomain environment on Sagami General Depot, Sagamihara, Japan, September 17, 2019. (Photo by SGT Raquel Birk)

and equipment units need. When looking at this document, leaders should identify the communications equipment the Army indicates their unit needs and identify what they have on hand. Next, figure out if cross-leveling of equipment occurred because of operational necessity. Leaders must inquire with their next higher headquarters to identify the fill percentage for each communications system by line-item number. Sometimes the Army does not completely fill a unit's MTOE/TOE during equipment fielding for a variety of reasons. If the unit does not have a full complement of equipment, submit a request to fill shortages. Having a full complement of systems will increase communications options for the unit. Leaders can include projected theater provided equipment in their plan if theater alignment is in the unit's future.

### Cross-Leveling Equipment

Cross-leveling is the authority and ability to shift materiel inventory from one owner to meet the requirement of another. At the theater strategic and operational levels, it is the process of diverting en route or in-theater materiel from one military element to meet the higher priority of another within the combatant commander's directive authority for logistics. Cross-leveling plans must include specific reimbursement procedures.<sup>1</sup>

Once leaders understand the unit's assigned equipment, the next step is to check the equipment maintenance. Often, units neglect to conduct regular preventative maintenance checks and services for communications equipment. A straightforward way to check this is to look for the latest DA Form 5988, *Equipment Maintenance and Inspection Worksheet*. Odds are good that your unit is not using the DA Form 5988 for communications equipment. This can potentially lead to PACE plan failure. If commanders account for prime movers on a unit status report, why not communications systems? Communications systems enable effective operations, so units should track them as a command maintenance priority.

Finally, leaders need to know the communications capabilities of their adjacent units, higher echelon, and subordinate echelons. Leaders must nest their PACE plan with higher commands and complement their adjacent and subordinate units. Nesting is not just ensuring each echelon has the same equipment but ensuring each echelon can transmit information freely and effectively. If a commander's communications systems are incompatible with any echelon, PACE plan development or its subsequent application will not be successful. The same is true when systems and processes are ineffective. Organizations can create thorough plans for PACE communications execution, but if their systems and processes operate on different schedules, the lack of coordination will hinder mission success.

## The Basics

There are three types of PACE plans: independent, dependent, and combined. Independent plans use only a unit's organic systems that are manned and maintained by assigned personnel. Dependent plans heavily rely on, and leverage, systems not owned by the unit. For example, a commander may have no organic high-frequency radio equipment, therefore, the unit builds a relationship with an attached command to use theirs. Combined plans merge independent and dependent systems into one plan.

Leaders at every echelon must identify the type of PACE plan they can deploy and the equipment's capabilities on the radio spectrum. Leaders must understand frequency bands and wave forms on the radio spectrum because each group possesses different properties. These properties could be positive or negative depending on the unit's operational environment. Leaders who have a general understanding in this area can predict friction points, strengths, and weakness of their PACE plan. For example, 5<sup>th</sup> generation of mobile networks, commonly known as 5G, is a wave form which can transmit large quantities of data extremely fast but cannot transmit the data over distance without relays.<sup>2</sup> If a leader uses equipment which relies on this wave form, they must utilize relay stations to transmit over long distances. The trade off to this wave form is a leader can transmit massive quantities of data quickly.

To further explain why an understanding of the radio spectrum is important, look at the capabilities of amplitude modulation (AM). AM radios can send signals during the day that reach users a hundred miles away with line of sight. Line of sight meaning antenna A can see antenna B without obscuration and can send and receive signals. Using AM at night can extend the distance by hundreds of miles because of skywave propagation. Skywave propagation is when frequencies bounce off electrically charged particles in the ionosphere and refract back down to earth.<sup>3</sup> This allows leaders the ability to communicate beyond line of sight. High frequency radios can use line of sight and beyond line of sight through skywave propagation like AM radios but operate on different frequency ranges; however, these different radio types cannot communicate with one another.<sup>4</sup> Without a basic understanding of available communications systems, leaders lack the knowledge to develop comprehensive PACE plans.

Leaders with good PACE plans incorporate how they transition through the channels and regularly rehearse these transitions through battle drill execution. Leaders also need to incorporate two additional factors into their PACE plan development: EW indicators and triggers. Leaders must understand how EW affects their communications systems. Constant buzzing, static, or white noise over the radio may indicate potentially compromised equipment. A lack of communications

during peak hours or mandated transmission windows may indicate jamming. EW jamming or denial is one reason PACE plan development is so important. Every channel of the PACE plan should contain triggers—what occurrences cause a unit to move from one communications channel to another. This could be as simple as an individual encountering two out of three triggering activities causing the unit to transition from the primary communications channel to the alternate channel. For example, a leader is monitoring their PRC-160 and is unable to maintain a direct connection with the unit's higher command. The unit sends a ping to confirm a connection but does not receive a response. Each problem by itself does not pose a significant concern, but when they occur together, they force the leader to switch to another communications system. Leaders who consider the threat's EW capabilities and capture triggering events in their PACE plans are better equipped to create a functional system and process for communication. The threat is unlikely to have the EW capabilities to deny service or jam the entire radio spectrum simultaneously. Figure 1 provides an example radio spectrum PACE plan. It outlines the radio systems and where on the electromagnetic spectrum each radio operates. Additionally, the figure outlines EW indicators and triggers that force the unit to transition through the plan.

## The Next Steps

After accomplishing the basics, commanders incorporate the PACE plan into training. Specifically, they develop and implement short, scenario-based training events that allow subordinate units to transition through the PACE plan channels without assistance from their higher command. Training must incorporate less than desirable terrain and distance to fully exercise transitions. Units that can communicate effectively and consistently will adapt and overcome real world obstacles.

Thus far, the discussion has centered on developing the PACE plan's voice communications between two individuals or units. Once a unit becomes proficient in these tasks, they can determine how to incorporate the transmission of data. Commanders can also separate their plans further to have a dismounted PACE plan and a mounted PACE plan.

Digital Intelligence Systems Master Gunners have a good method for grouping PACE plan elements using the acronym SPOT: sensor, processor, output, and transport. For example, if a unit is using an RQ-11 Raven unmanned aerial vehicle in support of target identification, using the SPOT method leaders would consider the following to develop the PACE plan:

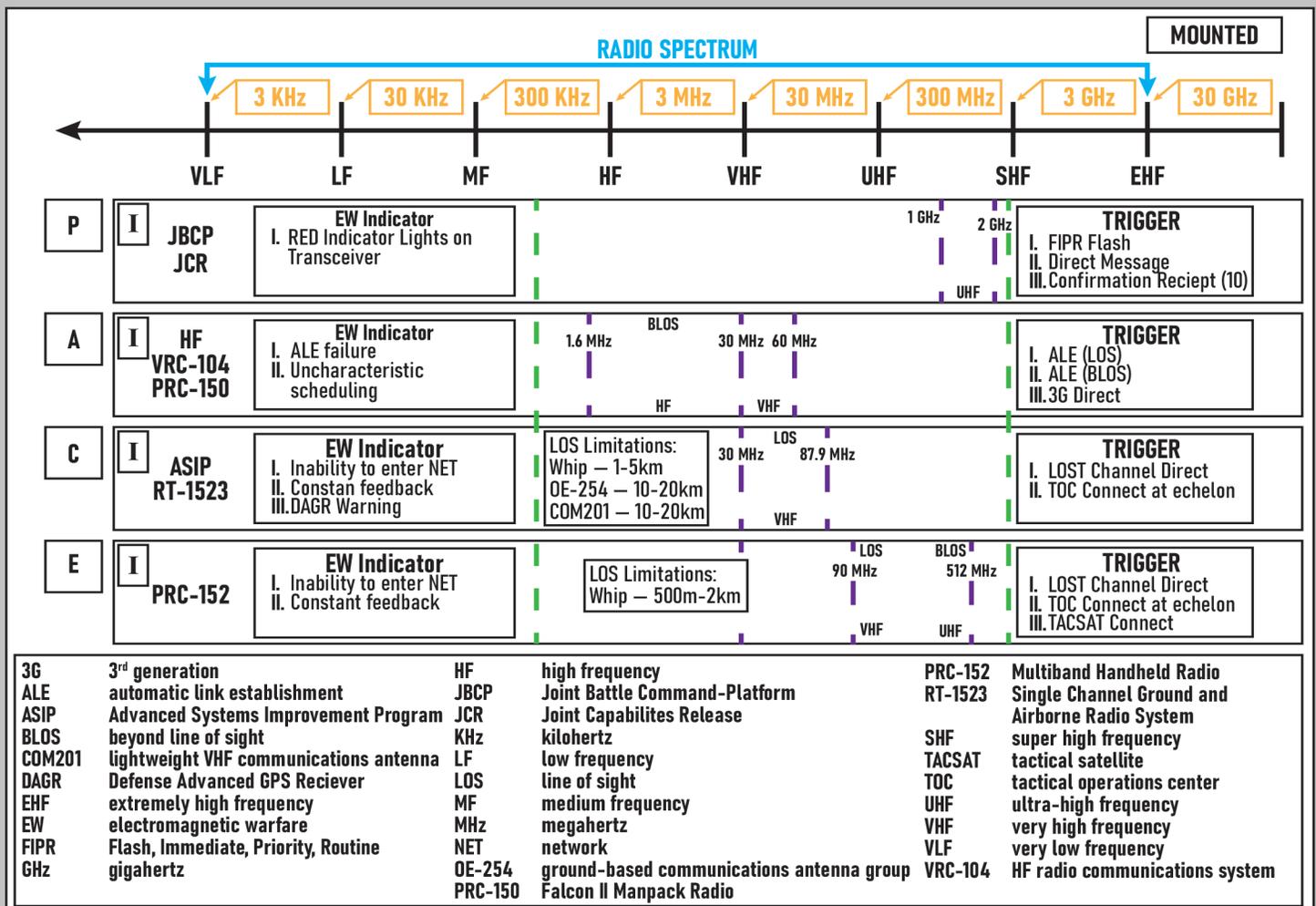


Figure 1. Team PACE Radio Spectrum

- ◆ **Sensor:** What is collecting the information? The Raven, or is the person controlling the system the sensor?
- ◆ **Processor:** How is the collected information processed for exploitation? The Raven sends video to the ground station which processes the information.
- ◆ **Output:** What product or information are you conveying? The operator sends a SALUTE<sup>5</sup> report to their higher command with the information collected.
- ◆ **Transport:** What medium is disseminating the output? The SALUTE report travels over FM radio.

Figure 2 shows an example of a unit's two separate PACE plans for sending data and voice to their higher command. Focusing on the submission of RAW data, the sensor for the primary channel is a Team. The team is the collector of information (Sensor) and will use Transverse (Processor), to capture the information for a SALUTE report (Output) and submit it through the T2C2 system (Transport).

### Conclusion

This article only breaks the surface of PACE plan development and implementation. Development of an effective PACE plan starts with the commander's understanding of the process and influencing the plan's development. Leaders at every level must incorporate PACE plan development into operational planning. Effective and reliable communications allow leaders to disseminate guidance and receive updates at any time. Leaders at all levels will undoubtedly have additional complications to contend with during hostilities, but units that can reliably communicate are able to adapt because they can maintain command and control. 

### Endnotes

1. Office of the Chairman of the Joint Chiefs of Staff, Joint Publication 4-0, *Joint Logistics* (Washington, DC: The Joint Staff, 4 February 2019), GL-6. Change 1 was published on 8 May 2019.
2. Amy Nordrum, "Millimeter Waves Travel More Than 10 Kilometers in Rural Virginia 5G Experiment," *IEEE Spectrum*, 7 Nov 2016, <https://spectrum.ieee.org/millimeter-waves-travel-more-than-10-kilometers-in-rural-virginia#toggle-gdpr>.
3. "Why AM Stations Must Reduce Power, Change Operations, or Cease Broadcasting at Night," Media Division, Federal Communications Commission, updated December 11, 2015, <https://www.fcc.gov/media/radio/am-stations-at-night#:~:text=However%2C%20during%20nighttime%20hours%20the,phenomenon%20called%20%22skywave%22%20propagation>.
4. Marcus C. Walden, "High-Frequency Near Vertical Incidence Skywave Propagation," *IEEE Antennas & Propagation Magazine*, December 2016, 16; and Harris Corporation, *Radio Communications in the Digital Age Volume One: HF Technology*, 2nd ed. (n.p.: Harris Corporation, 2005).
5. SALUTE is an Army acronym for size, activity, location, unit, time, and equipment. It is a quick way to remember what information is most important when assessing the threat.

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### Contributors

*CW3 (Retired) Miguel Tobon and the human intelligence trainers at the National Training Center, Fort Irwin, CA, provided invaluable assistance in the development of this article.*

	RAW DATA				SERIALIZED DATA			
	S	P	O	T	S	P	O	T
P	TEAM	CHAT/ TRANS- VERSE	5 W's	T2C2/ WIN-T	TEAM	ATHENA	SERIALIZED OUTPUT	T2C2/ WIN-T
A	TEAM	Direct Message	S303	JBCP 1GHz-2GHz	TEAM	SMDL	WORD	JBCP 1GHz- 2GHz
C	TEAM	PnP	9 Line	HF 1.6MHz- 30MHz	TEAM	PnP	9 Line	HF 1.6MHz- 30MHz
E	TEAM	PnP	9 Line	UHF	TEAM	PnP	9 Line	UHF
EE	TEAM	PnP	Brevity	Cell Network	TEAM	PnP	Brevity	Cell Network
GHz	gigahertz		PnP	point and [to] point	T2C2	Transportable Tactical Command Communications		
HF	high frequency		S303	enemy observation report	UHF	ultra-high frequency		
JBCP	Joint Battle Command-Platform		SMDL	Secure Mission Data Loader	WIN-T	Warfighter Information Network-Tactical		

Figure 2. PACE SPOT Reporting