Texas TAK Workshop

Event Write-Up

December 5 – 7, 2023

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Pleasant View Fire Department – Golden, Colorado
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Rev. 0

Contents

Event Overview

The Texas Department of Public Safety (TxDPS) hosted the Texas DPS Drone eXpo and TAK Workshop from December 5th through December 7th, 2023, at their Tactical Training Facility located in Florence, Texas. In total, 172 public safety and government employees were in attendance, representing 55 unique agencies. On Vendor Day, there were 41 vendors with 107 vendor related staff which brought the total number in attendance to 279. A total of 100 hours of training were conducted in two days with 30 hours of presentations and demonstrations.

Figure 1: Texas TAK Logo

The event was primarily attended by Texas public safety agencies. From Colorado, three representatives from two agencies attended:

- **Colorado Division of Fire Prevention and Control – Center of Excellence (CoE) for Aerial Firefighting**
  - Jeff Singer – Director of UAS
    - Attended UAS RPIC Courses
  - Austin Buttlar – Media Specialist
    - Attended the TAK Workshop
- **Pleasant View Fire Department**
  - Jeffrey Hong – Firefighter/EMT
    - Attended the TAK Workshop

This report is intended to compile lessons learned about the Team Awareness Kit (TAK) portion of the workshop. Thank you to TxDPS Director of UAS, Jason Day, for hosting the event and the dedicated TAK instructors for teaching and leading the well thought out course. The event was provided at no cost for public safety personnel.

Figure 2: Left: Live stream of drone imagery Center: Classroom discussion on iTAK Right: Student utilizing TAK.

TAK Workshop:

The Team Awareness Kit (TAK) workshop consisted of 36 registered students with various levels of experience with the technology. Active users included TxDPS, Texas Parks and Wildlife Department (TPWD), and CoE. TAK is a suite of software applications used by military, law enforcement, and emergency response teams for situational awareness and communication. It was developed by the United States Department of Defense and is used to track the location of team members, identify potential threats, and share real-time information about the operational environment. The TAK suite includes:

- Android Team Awareness Kit (ATAK)
- iOS Team Awareness Kit (iTAK)
- Windows Team Awareness Kit (WinTAK)

Native features vary between ATAK and iTAK. It should be noted that ATAK is the primary tool utilized by most government agencies and the application features are the most mature. iTAK currently has some incompatibility issues due to Apple's security policies as well as the limitations in development since the primary developers are working under the United States Department of Homeland Security and the United States Secret Service contracts. For the purposes of this report, ATAK, iTAK, and WinTAK will be referred to as TAK but features in between each one will vary slightly.

These applications are designed to be used on mobile devices such as smartphones and tablets and provide a user-friendly interface for team members to share data, maps, and other information in real-time. The software also includes features such as messaging, file sharing, and video streaming to support effective team collaboration. As a government open-source product, TAK allows for flexibility with integration and feature development, meaning that hardware and software plugins can be user defined to meet the user community's objectives. Examples of this include utilizing TAK with mesh radio networks, overlaying data from other applications into the platform, and toolsets specific to wide area urban searches post-disaster.

Figure 3: Students utilizing TAK during a training exercise.

The course focused on ATAK and iTAK with classroom courses followed by practical field exercises to test out the concepts learned in the classroom.

Schedule

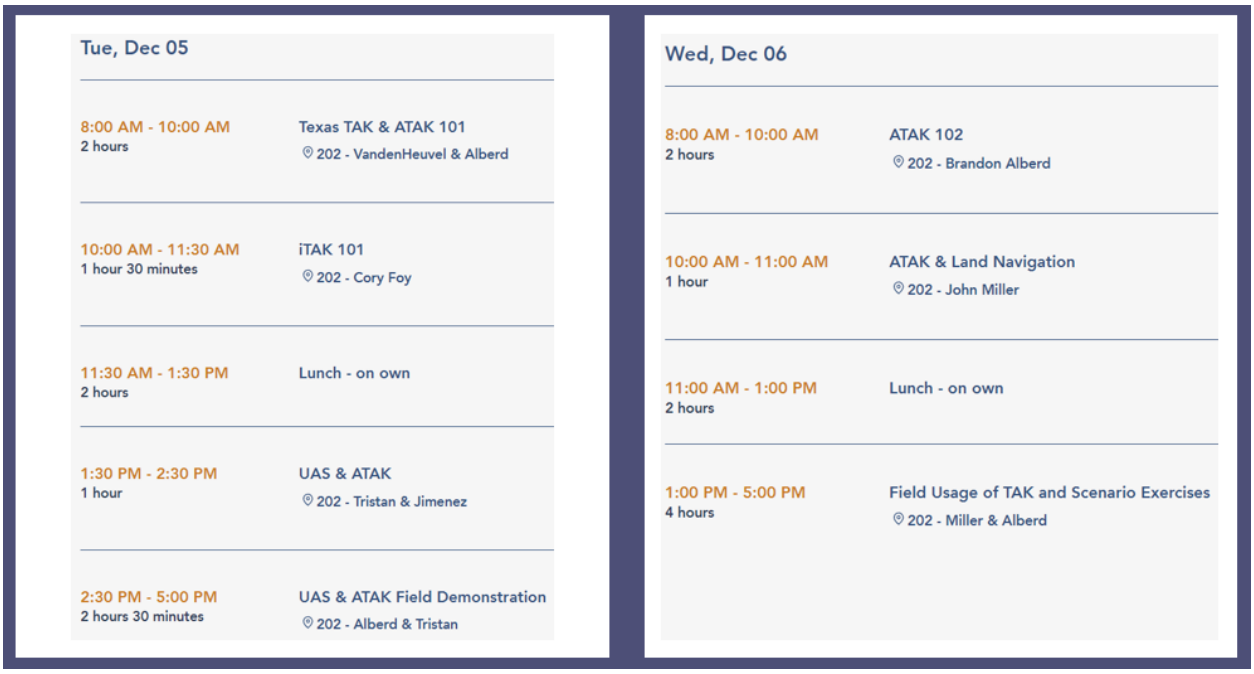

Figure 4: Day 1 and Day 2 Workshop Schedule

Instructors

Jared VandenHeuvel – TxDPS – Director of Public Safety Solutions

M. Brandon Alberd – TxDPS – Program Ops Manager for Texas Team Awareness Kit

Cory Foy – Technology Consultant; Search and Rescue Captain – North Carolina – TAK Guru

Ben Tristan – TxDPS CID Division Special Agent – Former TxDPS SWAT Operator – Drone Team

Glenn Jimenez – TxDPS Trooper - Brush Team and Drone Lead

John Miller – TxDPS SWAT Captain – Previous DoD TAK User

TAK Overview

The focus of the course was for Texas law enforcement partners. However, the team stressed the benefits of placing TAK on all user devices, even if they are not power users, for the purposes of integrating everyone as an IoT device to provide situational awareness for Incident Command.

For TAK to be an effective field tool, having a trained person within incident command and one person in the field is sufficient for platoons of soldiers, according to John Miller, and sufficient for public safety operations stateside as well.

The native features included with the TAK download can be complimented with plugins that can be downloaded from the mobile app store or from specific hardware/software manufacturers.

The native toolset included with TAK are for map reading, identifying locations of people and sensors, navigation, creating search areas, text communications, dropping markers and uploading photos and videos. Summed up, these features aid with situational awareness, understanding the area via map layers, navigation, and data sharing.

For example, during a search and rescue call-out, the dispatchers can pinpoint the caller's location which can then be shared with the rescue team. The team can then utilize aerial imagery and terrain data to navigate up to the location. While enroute, they determine that a helicopter is needed. With the assistance of the bloodhound tool, they can estimate the arrival time of the aerial assets, like from the National Guard. When establishing the landing zone, the team can easily change between decimal degrees and the Military Grid Reference System to pinpoint locations between different teams.

During an evacuation, both Incident Command and the line personnel can track which houses have been notified and evacuated. During a mass casualty incident, all units, regardless of their department, can all see where TAK members are and pertinent information such as staging location, building floorplans, and have a common operating picture. The examples of how TAK can be integrated are endless and with the customizable features and functions, agencies can adjust TAK to fit their needs.

Figure 5: Students utilizing TAK at the command post during an exercise.

Workshop Topics

The items covered below are intended to provide a high-level overview of the course content.

User Interface

The TAK user interface includes customizable options for the toolbar, color schemes, and orientation. TxDPS organizes the “favorites” menu of the toolbar with their most commonly used tools always showing on the screen. The recommended tools, from left to right, are the following: Point Dropper, Drawing Tools, Range Tools, Routes, Lasso Select, Data Packages, Bloodhound, Quick Pic, Channels, and Maps. On smaller displays, the available space for tools may be limited, and additional tools would be located in the hamburger menu on the left.

TxDPS utilizes a color scheme that is optimized for use in all-weather conditions, both day and night, and with or without night vision goggles. The icons have a green fill with a red border, which provides the contrast that works best in their operational environment. Colors are part of the customizable user settings. TAK is typically used in the landscape configuration to provide the most amount of data in the limited space available on most mobile devices. The various types of chest rigs for TAK are also standard in the horizontal orientation.

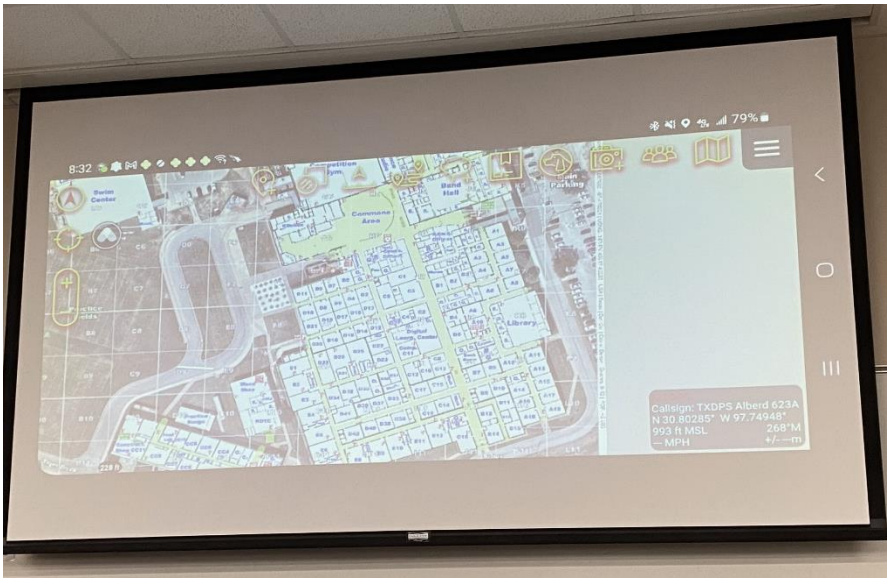

Figure 6: Sample of Texas TAK layout with school schematics overlaid.

Organization, Standardization and Administration

TxDPS hosts a TAK server for all agencies in the state to join if they so desire. Similarly, CoE also hosts a TAK server for fire departments to join. More details on organizational structure will be discussed in the Organizational Section of this report. All teams join the servers have to follow organizational procedures for interoperability to be possible.

Standardization of TAK Callsigns, team colors, and roles are important because it changes how the user is displayed to others on the same TAK server.

Callsigns

All callsigns within TAK should be organized into a certain naming convention. TxDPS utilizes the following:

[AGENCY] [SURNAME] [CALL SIGN]

TxDPS aviation assets utilize the TAK callsigns to address ground units. Similarly, during mass casualty incidents, different agencies can differentiate and call for different teams on the mutual aid channels.

Role

The vast majority of people on TAK will be considered "team members" with only a select few, such as Sergeants, Lieutenants, and Captains utilizing "Team Leader" designations. If task groups are formed, other personnel may be team leader in their own organizations should adjust their designations to reflect as team members. TxDPS has sergeants as team leaders, HQ designation for the EOC/Command Trailer, Sniper for SWAT Teams, RTO as the communications personnel, and K9 units as K9.

Team Color

Team colors appear for each person displayed on the map. The color coding helps teams differentiate between the different disciplines of personnel on the same TAK server. For example, TxDPS utilizes the symbology below.

TxDPS TAK Team Colors		
	Color	**Team**
	White	EMS
	Yellow	OEM
	Orange	SAR
	Red	Fire
	Maroon	TX Rangers
	Dark Blue	County LE
	Blue	State LE
	Cyan	Local LE
	Teal	Federal
	Green	Active Military
	Dark Green	State Military
	Brown	CID Agents

Figure 7: Texas TAK Team Colors

In situations where sensitive personnel are also tied into the TAK interface, there are options for hiding these personnel from the rest of the TAK users. For example, during a marathon event, the local community emergency response team may also be on TAK. However, the counterterrorism unit may not want to be shown to everyone. In those cases, different channels can be utilized so that privacy settings are in place. The counterterrorism unit may have access privileges to see everyone, but the volunteers from the community emergency response team would not be able to see them.

Figure 8: Texas TAK Team colors during a training exercise.

Markers

Markers are utilized by TAK users to indicate areas of interest. Since these are adopted from the NATO APP-6A affiliation standards, the markers or "affiliations" are meant to represent the relationship of the TAK user to the operational object represented. For example, if law enforcement discovers an article of clothing during a manhunt, they can document the location of that clothing for the K9 unit to navigate to. The standard "yellow popcorn", "green square", "red diamond" and "blue rectangle" are the primary markers on the display menu. Additional markers can also be utilized, but during expeditious activities, but these four are the most used in the field. TxDPS utilizes the markers for the following purposes:

TAK Markers	
Type	**Meaning**
Yellow Popcorn	Unknown/Unassigned
Green Square	Good/No Hazards
Red Diamond	Hazards Around
Blue Rectangle	EMS or Medical

Figure 9: Texas TAK Marker definitions

All TAK users intending to open the app should be trained to utilize and understand the call signs, team colors, and marker symbology. Those who only need to have TAK installed to serve as a "dot on the map" may not need to learn the details and will only need to have the app running in the background.

Advanced TAK Features

Advanced TAK features refer to users who will be importing data into TAK for other TAK users to act upon, beyond the Quick Picture, Drop Marker, Viewshed, and Blood Hound Features. Although not specifically referred to as “advanced features” these features best used by someone with bandwidth rather than a field team member who may be actively engaged in other tasks. During the workshop, the instructors discussed the following:

- Gridded Reference Graphic (GRG): Partitions out geographic areas of interest.
- Geofence: Alerts users whether someone on TAK enters or exits an area.
- Create Data Packages: Create snapshots of current situation to share with users. This feature is not a living document. The data packages can be shared with teams on the same server or through QR codes.
- Adding Additional Data: Additional data can come in multiple forms, whether it is georeferenced PDFs, drone live feed streams, or backend route planning.

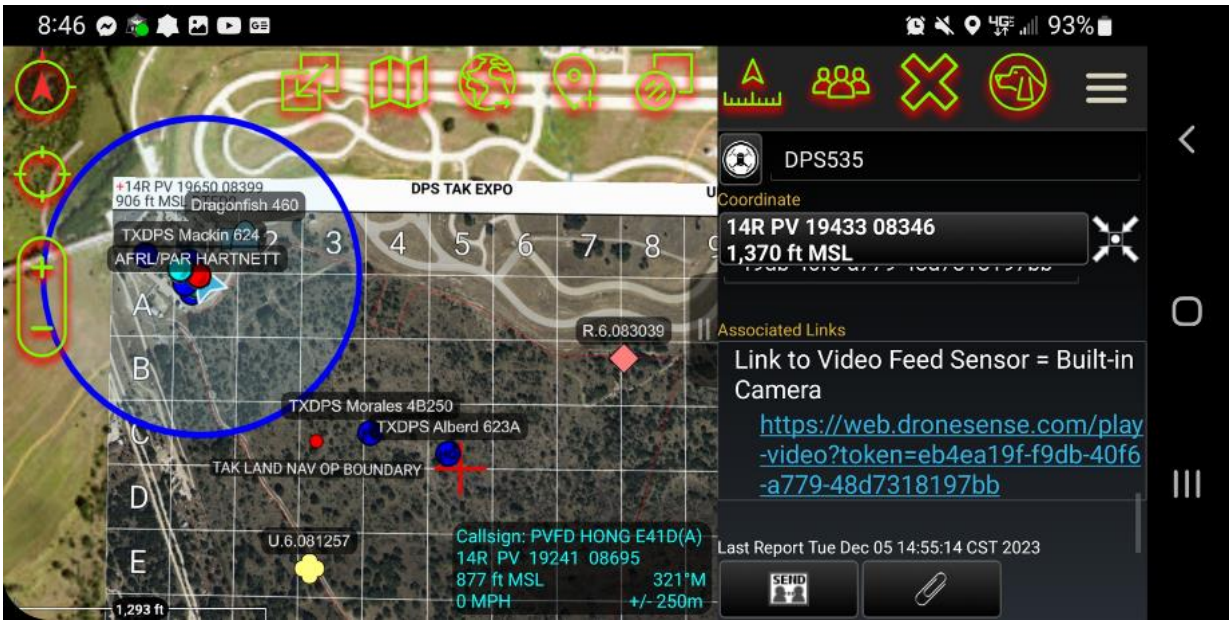

Figure 10: TAK with drone feed via DroneSense linked with drone in the details menu.

In dynamic environments, a TAK user may be assigned to populate the TAK devices with relevant information so resources in the field remain focused on the tasks at hand. This role oftentimes also translates over post-operation documentation as well. TAK features can be used for conducting after action reviews and personnel information can be located, tracked, and analyzed. Live updates through Data Sync can also be used during these situations to provide the most up to date information for teams on the ground.

Some more advanced TAK features for operations support were not covered in this course because they are designed for more administrator level personnel who would be creating the data packages, creating channels, managing credentials, managing TAK servers, hosting various data layers (e.g., base maps and geo PDFs), and integrating plugins.

Data Sync

Data Synchronization is a plugin for ATAK and a standard feature for iTAK. It allows for synchronization of multiple TAK devices on the same channel to receive updates and changes in real-time. Active incidents can benefit this feature and TxDPS highly recommends it.

During the workshop, Data Sync was discussed but not used. Instead, to push updates with markers and images, the team sent out the updates via the "send" function to the other students on the exercise TAK channel.

Land Navigation

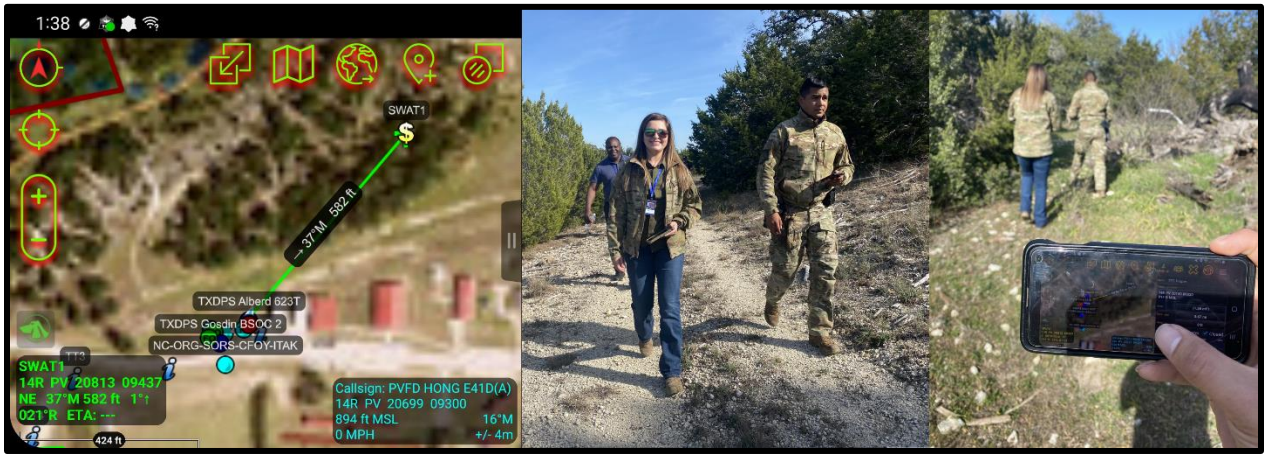

Figure 11: Left: Bloodhound tool for navigation to a point Center: Students during the field exercise Right: Point personnel in background with navigator in foreground with TAK open.

The TAK workshop placed heavy emphasis on land navigation concepts and understanding of the coordinate systems and entering the data to establish navigational points. This section was taught by the Captain of TxDPS SWAT and was intended to provide the TAK participants the understanding of how fieldcraft is the vital backbone for technological implementation. Texas law enforcement routinely works in the backcountry and dedicated Brush Teams operate in this space to catch smugglers, cartel members, illegal immigrants, and other bad actors. A 12-hour version of the land navigation course is provided to the Texas State Trooper Trainees.

The land navigation workshop covered the following topics:

- **Geographic Coordinate Expressions:** [Decimal Degrees], [Degrees, Minutes, Seconds], [Military Grid Reference System]. The workshop covered the differences between each one and the magnitude of errors resulting from readback or communications mistakes.
- **Map Usage:** Reading layer tined maps, shaded relief maps, and contour interval maps. Each type of map provides clues as to the expected vegetation, difficulty of navigating, pinch points, cover/concealment areas, and ambush locations. Viewsheds set at the height of 5 feet gives cover and concealment clues for the assault team. The same concepts apply for backcountry rescue or for wildland firefighting for navigating to objectives with the least terrain resistance.
- **Landforms:** Landforms, shown in *Figure 12* below, help provide clues as to what vegetation may be in the area. For example, draws are seasonal courses of water heading to the valley and are typically laden with heavy vegetation.

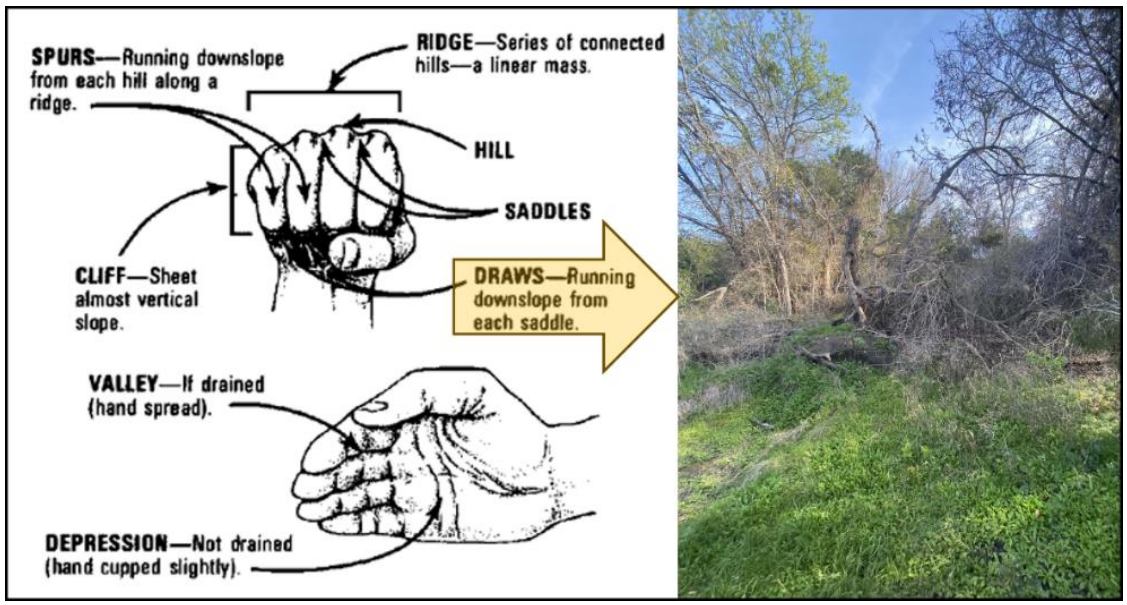

Figure 12: Left: Land navigation guide from Army Study Guide. Right: Draw and associated vegetation identified during the field navigation exercise.

- **Pace Counting:** Pace counting provide a foundation for being situationally aware. Numerous factors affect pace count including how equipment is carried, the terrain, and level of training. Pace counting provide a foundation for dead reckoning.
- **Reading terrain and trails:** Identifying patterns in the terrain and potential rat trails that stray off the main path can help teams follow the path of least resistance. In addition, identifying "handrails," "catching features," and "attack points" help with maintaining situational awareness by reducing the amount of time a team needs to look at TAK for navigational aid.

Figure 13: Land navigation overview on how to navigate between features.

Plugins

TAK plugins are features not included in the standard deployment of TAK and must be downloaded. Many plugins are available for different purposes. Some plugins are software only and others are a combination of hardware and software to create mesh networks, track K9s, check airspace, and more. Texas DPS utilizes the following TAK plugins:

Type	Name	Purposes
HW	ATOS	K9 Tracking System
SW	Compass Nav	Orienteering Compass
SW	Data Sync	Live Documents, Layers, and Markers
HW	goTenna	Mesh networking radio communications
SW	GRG Builder	Customizable Gridded Reference System
SW	Multi-video	View videos within TAK
SW	PDF	View PDFs within TAK
HW	Somewear	GPS Pucks for tracking teams
SW	ATAK GeoCam	Better version of Quick Pic Tool
SW	VNS	Vehicle Navigation System
SW	Voice	Tool for servers with voice
SW	WAVE	Radio communications through TAK
SW	WASP	Wide Area Search Plugin - Building Tagging
SW	Wickr	Secured communications through AWS
SW	TAK UAS	View drone live streams
Type Key: HW - Hardware + Software | SW - Software Only		

Figure 14: TxDPS standard plugins.

Integration

TAK is designed to be customizable. Agencies utilizing CalTopo, for example, can integrate CalTopo data into TAK through the flow-based, low-code development tool Node-RED. The open-source nature of TAK allows power-users to create tools and feature sets to increase the functionality of the system.

Organizational Management

TxDPS has an organizational portal dedicated to TAK (takmanager.dps.texas.gov) where connected users can access the resources including base maps and data packages. Jared VandenHeuvel is the Director of Public Safety Solutions and TAK falls under his purview. M. Brandon Alberd is the Program Ops Manager for Texas TAK.

Hosting TAK

Texas TAK is hosted by TxDPS. Although hosting servers was not discussed in detail during the workshop, the class discussed the ability to work on multiple servers simultaneously. In Colorado, fire units can be on both COTAK as well as the local servers, such as JeffCom's jTAK.

Companies such as Amazon are also providing opportunities for departments to use TAK as-a-service for providing a more integrated and packaged solution for a fee.

Data Security

Access to Texas TAK is restricted and users have to reauthenticate their credentials every 30 days to access the server. The reauthentication procedure is designed to keep unauthorized or inactive users off the system. All member agencies, such as Texas Parks and Wildlife Department – Law Enforcement Division, utilize the Texas TAK website to reauthenticate their certificates.

Data Retention

TxDPS retains data transmitted via TAK for 70 days. This data includes everything from chats to breadcrumbs. Once the 70-day period is up, the data is overwritten. During the exercise, teams were advised to transmit only pertinent mission data due to the 70-day retention policy set by TxDPS.

Resources and Further Reading

JeffCom and COTAK both have resources that each member agency within JeffCom should tap into to further develop each agency's use cases for TAK. jTAK is available currently available for beta testing. COTAK is also available to JeffCom members as a free tool for public safety agencies within Colorado to increase interoperability. TxDPS recommends power users to join Slack to keep up to date on the latest TAK happenings and learning about integrating other programs into TAK.

TAK Community: https://www.civtak.org/community-tak-server/

Slack: https://atakendusers.slack.com/join/shared_invite/zt-285ehsn0z-CxWU98AMkeORdxnpLN7FDg

Texas TAK: https://takmanager.dps.texas.gov/login

Texas TAK Training Videos: Google Drive Link Pending

COTAK: https://cotak.gov/guest/guest-home

jTAK: https://cad.jeffcom911.org

Concluding Remarks

Figure 15: Left to Right - Rose, Hong, Day at the TxDPS Drone eXpo and TAK Workshop.

The report is a high-level overview of the topics covered in the workshop. Notes from the course can be provided upon request.

A special thank you goes out to JeffCom's Senior GIS Analyst, Adrien Hoff, for passing along the conference information and sharing about jTAK with Pleasant View. Another big thank you goes out to the Texas Public Safety Team for welcoming me back to train with them. I met Brandon Rose, Chief Pilot TPWD, and the now-retired Chief Pilot of TxDPS at a conference in 2016. I met Jason Day in 2017 and he is now the Director of UAS at TxDPS. We have made it a habit to take this photo every time we run into each other. Two photos down, hopefully many more to go.

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