



# VIRTUAL ACCOMPANY KITS RETURN TO BAGHDAD

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A View from the Front Lines.

BY MAJOR CHRISTOPHER THIELENHAUS AND MAJOR ERIC ROLES

## THE RETURN TO BAGHDAD

On a muggy August night in Baghdad, a C-130 touched down; the Remote Advise and Assist project team is delivering the newest Virtual Accompany Kit prototypes directly to the front lines of the war against the Islamic State, capping off a year-long effort to get these new equipment suites funded and delivered to the troops on the ground who need them. This is a return to a battlefield they only recently left in 2015 to attend the Naval Postgraduate School. The VAKs they helped develop at NPS are the newest form of two-way communication suites that will allow special operators to connect to their partner forces in ways that were never before possible. Intended to “provide operational forces the ability to track, communicate and transmit relevant information while in an austere environment despite operational restraints and limitations,” these VAKs are compilations of off-the-shelf phones, tablets, Wi-Fi, cellular and satellite communications technologies that

allow U.S. and partner forces to “see” the battlefield with a speed and clarity that older technologies simply cannot match.<sup>01</sup> Together, these technologies provide a possible solution for a problem that has plagued U.S. forces throughout the battle with the Islamic State in Iraq: how can U.S. forces effectively assist Iraqi partners when they cannot accompany them into the fight? Given the situation in Baghdad and Iraq in August 2016, the time was ripe for this expanded capability.

As the project team arrived in Baghdad, there was a small opportunity to reflect upon the process that brought them there. The group was composed of four members: the authors Maj. Eric Roles, the original developer of the kits, Maj. Christopher Thielenhaus, a NPS student project partner, Mr. Michael Stevens, a representative from the NPS Defense Analysis departments CORE Lab, and Sgt. 1st Class Steven Connor, a representative from Special Operations Command Central and equipment tester. For the authors, a tremendous amount of change had occurred since

the last time the two were in Iraq in 2015. The Islamic State has been pushed to Haditha in the West of the country and the Iraqi military has seized Qayarah in the North, which opened the way to Mosul. This is a far cry from the situation in 2014. As the progenitor of the virtual accompany kits in 2014, Maj. Roles was present in Baghdad during the relentless assault of the Islamic State in 2014, when the fall of Baghdad seemed like a distinct possibility. He and his team of special operators devised of the virtual accompany kit concept as a way to positively affect the battlefield when the rules were very strict about how much U.S. forces were allowed to assist Iraqi partners. Maj. Thielenhaus was also present during the initial struggles the special operators faced in retaking the cities of Tikrit and Baiji in early 2015. The change in situation for the enemy has led to a golden opportunity for Iraqi partners to fully take advantage of new technology, especially in the form of enhanced communications and partnering ability.

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A look at a Virtual Accompany kit. These kits provide a vital common operating picture to commanders throughout the battlefield.

U.S. ARMY PHOTO

## THE ROAD BACK TO BAGHDAD

The design, development and ultimate creation of the VAK phase II prototypes began in earnest in mid-2015, when Brig. Gen. Crytzer, Deputy Commander of SOCCENT and out-going Commander of Special Operations Joint Task Force –Iraq, visited NPS on an official visit. During his tour of the facility, he talked with the authors, whom he knew from his tenure as a Special Operations Commander in Iraq. It was his initial suggestion to both students and to the NPS faculty that the virtual accompany systems become a Capstone project that the NPS students and faculty could take on as a way to truly affect the fight on the ground in Iraq. His tacit support led to an official SOCCENT memorandum supporting the project.

With this sponsorship from SOCCENT, the faculty at NPS was motivated and excited to begin work on this new project. The first challenge that the students and faculty faced; however, was securing a sufficient funding source for the project. The students and faculty approached a number of government organizations for support, gaining it from the Defense Advanced Research Projects Agency that considered the project to be a worthy successor to earlier work regarding new mapping and communications technologies and elected to fund the project for approximately \$1.3 million. With these funds, the NPS project team moved forward.

Funding secured, the next step was initial testing of some off-the-shelf technologies combined together. This testing occurred in San Francisco Oct. 26-29, 2015 with help from Dr. Alex Bordetsky and the NPS Center for Network Innovation and Experimentation. With direct help from Harris Company technical experts, the project team tested the capabilities of combining a satellite-on-the-move communications package combined with a local server hosting Android phones running the Android Tactical Assault Kit platform, a moving map software application designed for situational awareness and mission planning.<sup>02</sup>

The initial testing indicated that the satellite on-the-move package functioned well after a few minor tweaks, and even allowed the test team to use personal cell phones to get on the network after specific security and encryption protocols allowed them to join. This initial test acted as a back-drop for further development efforts.

Between the testing in October 2015 and the eventual completion of a new prototype, the NPS faculty was able to spread the word about the VAK capabilities in ways that were simply not possible for the student project leaders to do alone. This entailed a brief to the staff members of the Senate Armed Services Committee as well as a brief to General Raymond Thomas, commander, U.S. Special Operations Command. In addition to these briefs, the project team was also able to get input from General Joseph Votel as he took command of U.S. Central Command in early 2016. NPS further supported the interactions of the project team with important government agencies, such as DARPA, the Federal Bureau of Investigation, the Joint Improvised-threat Defeat Agency and the Defense Threat Reduction Agency, bringing each one's unique insight into the project development process. Among the efforts' high points was the NPS brief to Congressional representatives and members of the House Armed Services Committee in August 2016. The NPS project team provided a briefing directly from Iraq, which included participation from Australian special operators who were preparing to employ a new VAK in upcoming operations.

In May 2016, the advanced prototype development at the WinTek Arrowmaker Prototype Manufacturing Facility in Tampa, Florida,

was complete. Initial testing of the new prototypes immediately followed in June 2016. The purpose of the testing was to achieve the following capabilities:<sup>03</sup>

- U.S. forces capable of providing direction, advice, and assistance while not physically present with partner-nation forces.
- U.S. forces capable of receiving PN still imagery and geographic location supporting 'positive identification' requirements
- PN enabled to provide mutual support to other PN elements.
- Able to operate in austere environment lacking reliable power, communications and/or network infrastructure.
- Components compliant with ITARs restrictions.
- Able to be operated by PN forces not accompanied by U.S. forces

Over five days of testing between June 6-10, 2016, the project team and DARPA testers collaborated with representatives from U.S. Army Special Operations Command, Marine Corps Special Operations Command, the Canadian Special Operations Regiment, the Defense Threat Reduction Agency, the Defense Security Service and several other industry partners to tentatively achieve these results in the simulation testing environment in Tampa. The project team now had a total of four kits developed, three which were considered "low visibility" kits and one "high visibility" kit. The difference between the two kits being that the "high visibility" kit included a 4G LTE capability through a GNOMAD, which is a satellite on the move system that creates a cellular network capable of supporting speeds of up to 2 megabytes per second through a vehicle-portable telescoping mast. This

**VAKS ARE THE NEWEST FORM OF TWO-WAY COMMUNICATION SUITES THAT WILL ALLOW SPECIAL OPERATORS TO CONNECT TO THEIR PARTNER FORCES ... PROVIDING THE ABILITY TO TRACK, COMMUNICATE AND TRANSMIT RELEVANT INFORMATION WHILE IN AN AUSTERE ENVIRONMENT.**

GNOMAD system vastly extends the range of the kit itself as well as the bandwidth for the potential users, allowing up to 400 users if needed. The “low visibility” kits, in comparison, include a local Wi-Fi network connected to a broad global area network system, which provides about 500 kilobytes per second speed. This kit can support 10 users by design, but works best with about 5 users. With these prototypes built and the tests completed, the next phase would be active deployment of the equipment in support of actual operators in Iraq.

## THE NEW VAK PROTOTYPES EXPLAINED

The Virtual Accompany Kits delivered on this trip were a far cry from the improvised kits assembled in late 2014. The original prototype kits developed at Special Operations Command-Central were a collection of Android cell phones paired with a BGAN in an ad hoc functionality to provide real time communications with the Iraqi Special Operations units. Although functional, these kits suffered from a few significant limitations, such as inability to control bandwidth, low transmission speed and limited range. These kits are still in Iraq, but have been seriously degraded after heavy use, lack of sustainment, and multiple rotations of operators. Unlike their predecessors, the new Phase II prototype kits included equipment that had been

inherently designed or modified to support integration with each other. The new kits include three basic divisions: software components, “data island” components and end-user devices.

The software components of the kit consist of three government developed Geospatial Information Systems or moving maps software application operating on different platforms. The Android Tactical Assault Kit and the Android Team Awareness Kit, the partner-nation releasable edition operate on Android-based smartphones. Spyglass Touch, which is similar to ATAK, operates on the included laptop pre-installed with MS Windows Operating System.<sup>04</sup>

The “data island” components consist of an integrated suite of components, which includes a Satellite Communications on the Move terminal, Wi-Fi router, and 4G network in the larger kit. The primary use of the Data Island is to provide a data network in an environment that lacks cellular infrastructure. A server is included in both versions, which runs a Tactical Assault Kit server and a Web map service to serve localized map data for the phones.<sup>05</sup>

The End User Devices are smartphones running ATAK-PN and have sensors and apps installed onto them for enhanced communication. Three primary smartphone devices are integrated and included in the kit. A commercial Laser Range Finder is included to help the partner forces point to a specific area that is not

easily accessible. The LRF is paired via Bluetooth with the Smartphone and automatically calculates the point on the map for the devices.<sup>06</sup>

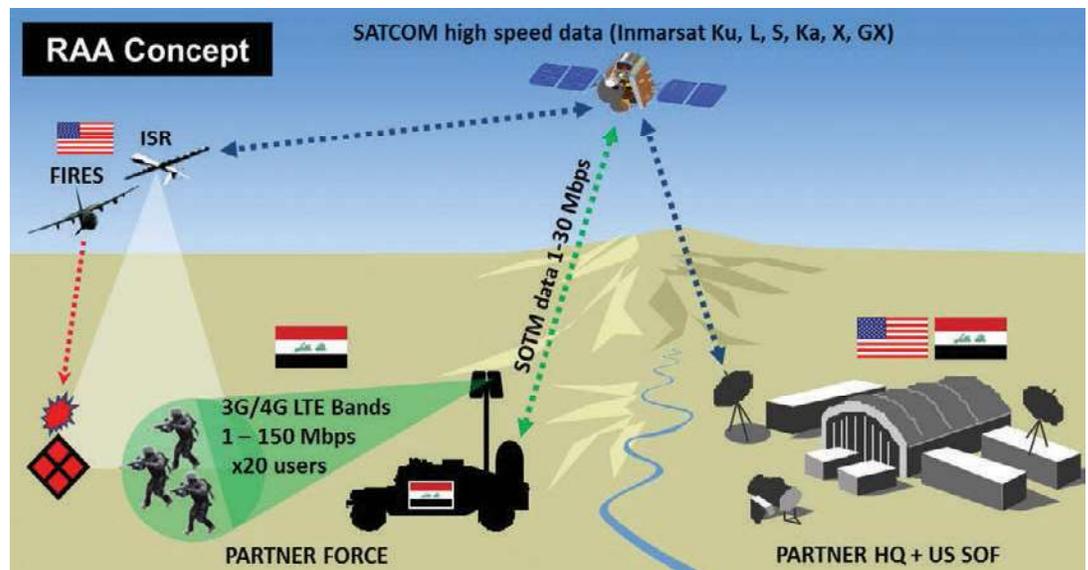
Together, these components form the whole of the virtual accompany kit, and operate in tandem to send information to and from the combined joint operation center.

## DELIVERING THE VAKS AND STARTING THE TRAINING

Arriving to the Baghdad Diplomatic Support Complex, the project team immediately moved to link-up with the commander of Army Special Forces troop, which are partnered with the Iraqi Counter-Terrorism Force. The commander told the team that he was fully on board with the new kits and was excited about their use in upcoming operations. He had already identified Special Forces Soldiers who were excited about using the kits to better partner with the Iraqi special operators and had the technical “know-how” to really dive into the kits’ capabilities. At the same time, the project team made contact with the Australian Commando detachment that was present in Baghdad as well. The commander of this detachment was also present in 2015 while the original ad hoc virtual accompany kits were still in use. He was just as excited to get to work with the new phase II prototype kits, and had also identified a small team of Soldiers who would train on the

01 The VAKs make it possible for Remote Advise and Assist missions to be accomplished through the use of technology. U.S. forces are able to provide direction, advice and assistance while not physically present with Partner Nation forces. PN forces can send imagery and geographic locations and provide mutual support to other PN elements in austere environments where such functions would normally be impossible due to the lack for infrastructure.

02 ARSOF Soldiers partner with the Iraqi Counter-Terrorism Force to try out the new Virtual Accompany Kits, conducting joint training and putting them to use in joint operations. U.S. ARMY PHOTO



kits to gain enough understanding to put them to good use as soon as possible. Together, these two units would form the “core” group of operators who would get the initial training on the use of the kits.

The first phase of the training began with simple familiarization and testing of the kits on the ground. Since this was the first time the kits had been operationally deployed, there were bound to be some quirks that the operators would identify as the training and familiarization proceeded. Thankfully, the manufacturers and designers of the kits were always on hand by either phone call or e-mail and were able to solve simple communications problems easily. This phase also included adapting the smartphones to the specifications of the users to make them as easy to use as possible. This entailed showing the operators how to set up pre-mission graphics and planning tools. Once the operators from both the U.S. Special Forces troop and Australian Commando detachment had kits that they were comfortable using, the training and setup proceeded to the next phase.

The next phase focused on the establishment of a local tactical server at the Combined Joint Special Operations Task Force–Iraq level. This piece of the setup was key to making sure that on-going operations where the VAKs were being used could be tracked by the actual special operations commanders on the ground, leading to the enhanced higher level support that the team envisioned and the operators preferred. This required working with the CJSOTF-I J6 to make sure that the proper security and failsafe architecture was in place so that the kits could be both as operationally useful as possible while also supporting operational security efforts. At the time of this writing, the J6 staff was devising solutions so that the VAK information could be easily



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transported onto U.S. Secret Internet Protocol systems for the best use of the information. In addition to this functionality, this next phase also included the incorporation of some auxiliary sensors, including individual Spot trackers and the SHOUT Nano system that was in the issue process to the Iraqi forces (known colloquially as the “Iraqi National Tracking System” or INTS).<sup>07</sup> These efforts led to the prototype kits being as ready for operations as possible, with the users’ operational creativity able to drive the employment.

## CONCLUSION

These kits are already having an effect on the battlefield. As operations supporting the seizure of Mosul proceeded, the Virtual Accompany Kits were on the battlefield, connecting Iraqi and U.S. commanders in new ways. Although specific details of the kits’ employment are currently classified, the initial reaction and enthusiasm of the Special Operations Command is evidence enough that this idea is one that truly supports the SOF mission in Iraq, and could potentially be expanded to other global hot spots with

similar restrictions. In any case, the Virtual Accompany Kit project team is tremendously honored to have had the chance to support SOF operators directly on the battlefield. The delivery of these kits represents a true cross-organizational effort to support the U.S. and Coalition mission in Iraq. The Virtual Accompany Kits provided a vital common operating picture to commanders throughout the battlefield. 

## ABOUT THE AUTHORS

**Maj. Christopher Thielenhaus** is a Special Forces Officer currently serving as a student at the Naval Postgraduate School. He has served and deployed with 101st Airborne Division, 1st Special Forces Group, and numerous other Special Operations Task Forces.

**Maj. Eric Roles** is a Special Forces Officer currently serving as a student at the Naval Postgraduate School. He has served and deployed with the 101st Airborne Division, 75th Ranger Regiment, 3rd Special Forces Group, and numerous Special Operations Task Forces.

**NOTES** **01.** Wintek-Arrowmaker, Virtual Assessment Kit Phase II Prototype Manual, Document No. PROJ-VA User Guide, June 2016, p. 9. **02.** Eric Roles, “Remote Advise and Assist Field Experiment Report,” prepared for Defense Analysis Department, Naval Postgraduate School, October 2015. **03.** Wintek-Arrowmaker, “Product Test Plan and Report (PTPR) For Remote Advise and Assist (RAA) Virtual Accompany Kit (VAK),” prepared for Defense Advanced Research Projects Agency, 20 June 2016, p. 8. **04.** Wintek-Arrowmaker, Virtual Assessment Kit Phase II Prototype Manual, Document No. PROJ-VA User Guide, June 2016, p. 9. **05.** Ibid. **06.** Ibid., p. 10. **07.** This information is based on the following document: *Response to Congressional Inquiry*, RFI 16-136, 19 May 2016. The Senate Armed Services Committee staff requested information from USSOCOM on RAA capabilities and funding solutions in early May, 2016, and received this document as a response, indicating that Shout NAND was SOCOM’s interim tracking solution.