Derived from Publicly Available Information (PAI)

Red Six Solutions, LLC

Monthly Roll Up

Summary of Worldwide UAS Incidents

Disclaimer: Red Six Solutions, LLC, takes the greatest care to ensure the accuracy of the information in our reports. The analysis contained in this report is based on raw information derived primarily from third party sources, news sites, and social media platforms, as well as the experience of Red Six Solutions' subject matter experts. We will note instances where the veracity of a source is in question and will provide follow-up reporting whenever the presumed factual content of a report is later proved incorrect.

Red Six Monthly Roll Up (MR) Report #MR014
1 January 2020

All information in this document is derived from PAI.
Analysis is conducted by Red Six Solutions subject matter experts and does not reflect the position of any government or clients. All reporting and associated analysis is intended for specific clients and should not be shared without coordination with Red Six Solutions.

Red Six Solutions Monthly Roll Up Summary of Worldwide UAS Incidents

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Executive Summary

This is the Red Six Solutions, LLC, Monthly Rollup of UAS Events from December 2019 which was a very busy month for UAS incidents. The month's events included three separate opportunities to see some of the components inside small UAS used by terrorist organizations. One was the recovery of a Houthi-Movement *Rased* UAS which Red Six sent out this month as Flash Report #009 (See Item 6, this report). The other two drones belonged to *Hayat Tahrir Al-Sham* (HTS) which were recovered in Syria (See Items 18 and 20).

Figure 1 – Local militia showoff HTS drone recovered in Suqaylabiyah, Syria (photo: Syria Arab News Agency)

There were also multiple stories and incidents relevant to the challenges law enforcement faces in addressing criminal and improper drone use. Item 11 describes an incident in Russia where ex-convicts used a drop device and trigger mechanism like ones observed in the Donbass Region conflict to attempt to smuggle contraband into a prison colony in Bryansk. More worrisome, Item 16 describes on incident in Zhaozhou, China, where criminal gangs are using UAVs to drop material contaminated with the African swine fever virus to extort legitimate farmers.

At the end of the month, Red Six analysts discovered a post on Twitter of militants in the Middle East attempting to build a turbine jet, remote control aircraft. While this particular aircraft is unflyable, it clearly shows the intent by some to deliver larger, very fast UAS to terrorist organizations and irregular military forces.

Figure 2 - Man working on building turbine drone (Twitter/T.A. Bugharsa)

During the month, there was a decrease in incidents in Eastern Europe's Donbass Region where Ukraine and Russian-backed insurgents confront one another. This could be an anomaly or be due to weather conditions. Throughout the rest of the world, threatening drone incidents continue to happen at a steadily growing rate.

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Item 1 – Update: USAFRICOM Confirms Loss of U.S. Drone to Russian System

Date: 21 November & 7 December 2019

Summary: On 21 November 2019, U.S. Africa Command (USAFRICOM) reported losing an unmanned aircraft over the skies of Libya for unspecified reasons but it was widely speculated the aircraft was brought down by the Libya National Army (LNA) (See Red6 Report #MR013). On 7 December, the Commander, USAFRICOM, confirmed it was a U.S. aircraft in a statement to Reuters, and that the drone was defeated by a Russian-made air defense system. The incident occurred the day after the downing of an Italian MQ-9A Predator-B drone in the same proximity (source 1). USAFRICOM said when the aircraft was lost, it was monitoring the ongoing security situation and violent extremist activity. At the time, an unidentified official with the LNA said, the U.S. drone was shot down after being mistaken for a Turkish Bayraktar II (TB2).

Analysis: The statement by U.S. Army General Stephen Townsend, Commander, USAFRICOM, reflected the operators of the air defenses at the time "didn't know it was a U.S. remotely piloted aircraft when they fired on it (source 2)." GEN Townsend added, "But they certainly know who it belongs to now and they are refusing to return it. They say they don't know where it is but I am not buying it," The U.S. assessment, which has not been previously disclosed, concludes that either Russian private military contractors or fighters with the Libyan National Army were operating the air defenses at the time the drone was reported lost. Notwithstanding the USAFRICOM remarks, Mohammed Ali Abdallah, an advisor for U.S. affairs in Libya's Government of National Accord, said the U.S. drone had come down near the pro-LNA stronghold of Tarhunah, 65 km (40 miles) south-east of Tripoli. There is still no official word what type of aircraft the U.S. lost but there is some speculation it was an MQ-9 Reaper.

Geolocation: Africa (Tarhunah, Libya) **Importance:** High

Sources:

1. U.S. Africa Command, *RPA lost over Tripoli, incident under investigation*, https://www.africom.mil/media-room/pressrelease/32380/rpa-lost-over-tripoli-incident-under-investigation/ [26 December 2019]
2. Reuters, *U.S. says drone shot down by Russian air defenses near Libyan capital*, 7 December 2019, https://www.reuters.com/article/us-usa-libya-russia-drone-exclusive-idUSKBN1YB04W/ [30 November 2019]

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Item 2 – Update: Turkish UAS Identified in Syria

Dates: 29 November 2019

Summary: On 29 November, a Twitter post showed an image of a UAV that was supposedly downed by the Syrian Arab Army in the vicinity of Qamishli, Syria (See Red Six Report #MR013). Due to time constraints, Red Six was unable to identify the aircraft before publishing our November report. Red Six now assess the aircraft is the Turkish-made Serçe-1 (Sparrow) which is produced by the defense firm Aselsan.

Figure 3 - Turkish Drone shot down by Syrian Army (photo: SANA News) (left) and Serçe-1 UAV (photo: Aselsan)

Analysis: As indicated in an Aselsan brochure, the range of a Serçe – 1 is 5 km, with a flight duration of 30 mins and it can carry a 1 kg payload (i.e., camera). At 6.5 kg (13.3 lb.) the aircraft is relatively heavy (source 2). The primary purposes of the Serçe-1 UAS are surveillance and intelligence gathering.

Geolocation: Middle East (Qamishli, Syria) **Importance:** Medium

Sources:

1. Yemen General Peoples' Congress (Twitter account), *Resistance fires down a Houthi drone*, 3 November 2019, *https://twitter.com/YemenMotamar/status/1191092199410286592/* [28 November 2019]
2. Aselsan (brochure), *Aselsan Serçe-1 UAS*, 24 December 2019, https://drive.google.com/file/d/1jykXFEaGWQY0l8gZp2GdxqWH8W8y23mH/view/ [26 December 2019]

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Item 3 – UAS Activity in Syria

Dates: 29 November & 1, 4, 6, 10, 22 (two events), 23, 24 December 2019

Summary: Red Six tracked nine separate UAS events in Syria during December. The majority of the events occurred in and around the cities of Homs and Hama. Several of these incidents provided an opportunity to analyze the internal components of the drones being used by the terrorist organization Hayat Tahrir al-Sham (HTS) (See Items 11, 17 and 19). In the Analysis portion of this Item, are summaries of the Syrian events.

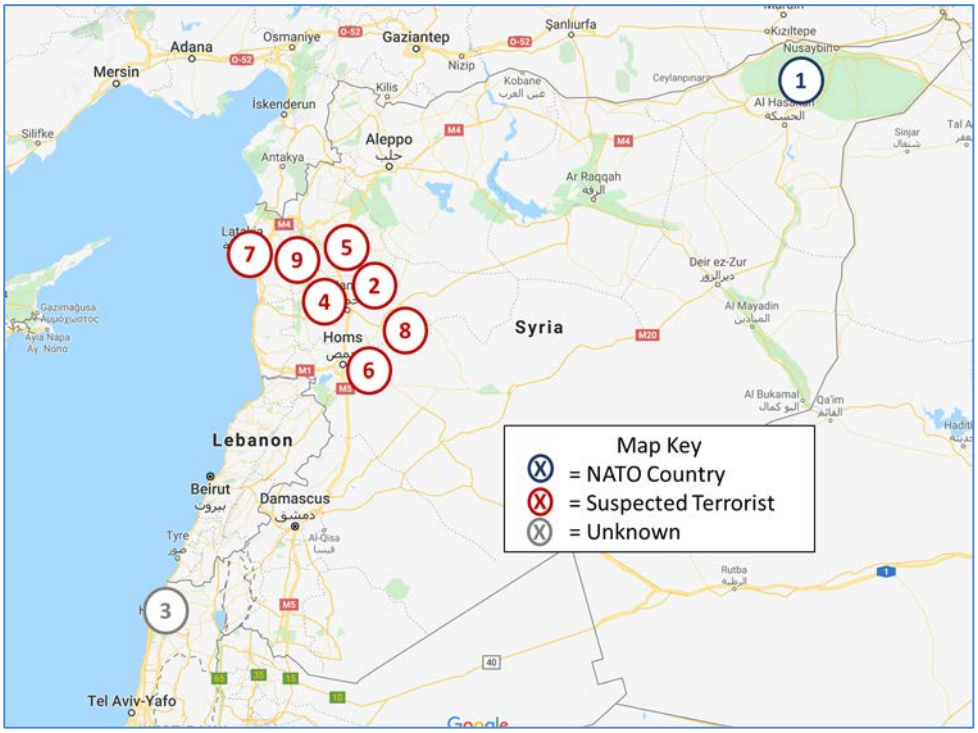

Figure 4 – Noteworthy UAS events within Syria during December 2019. The numbers correspond to the event summaries (below)

Analysis:

1. **29 November (loc: Qamishli):** The Syrian Arab Army recovered a Turkish-made Serçe – 1 multirotor UAV which they claimed to shoot down [Note: See Item 2, this report for event summary.]
2. **1 December (loc: Hama):** Russian media widely reported an attempt by HTS Islamists to attack the Hama military airbase where Syrian and Russian air force units are co-located. Air defense guns and missiles were used by the Russian forces. Video accompanying the reports indicated the attack occurred at night (sources 1 and 2).

Figure 5 - Syrian air defenses engage militant drones (photo: Sami Khalil)

3. **4 December (loc: Shlomi, Israel):** According to the Israeli Defense Force, a drone flying from Lebanon entered into Israeli airspace in the vicinity of town of Shlomi in Western Galilee and returned. The aircraft was observed from the ground by Israeli soldiers. The IAF scrambled jets but did not engage the unmanned aircraft (source 3).
4. **6 December (loc: Hama):** An unidentified drone was spotted by Syrian Arab Army ground reconnaissance elements near Zahra, west of Aleppo. The drone was reportedly defeated with small arms fire (source 4).
5. **10 December (loc: Hama):** Near the town of Al-Fraika, in the northwest of the governate of Hama, the Syrian Arab Army shot down an HTS drone before it reached its intended target (source 5)
6. **21 December (loc: Homs):** Three near-simultaneous attacks at Syrian oil production facilities were attributed to an Islamic State drone attack by the Britain-based war-monitoring group, Syrian Observatory for Human Rights. [Note: See Item 16, this report for event summary.]
7. **22 December (loc: Khmeimim airbase):** The Russian military intercepted two HTS drones overnight that were targeting the Khmeimim military airbase in the governorate of Latakia (see source 6)
8. **22 December (Salmiya):** A series of Twitter posts showed an image of a UAV, which was supposedly downed by the Syrian Arab Army in the vicinity of Salmiya, Syria. An analysis of photos the drone provided some details related to its components. [Note: See Item 17, this report for event summary.]
9. **24 December (Suqaylabiyah):** A Twitter post showed an image of a UAV that was recovered by local militia in the city of Suqaylabiyah which is in Northwest Syrian under the control of the government in Damascus. The aircraft is a custom-made drone with a design consistent with drones built by the Islamist terrorist organization HTS [Note: See Item 19, this report for event summary.]

Geolocation: Middle East (various, Syria) **Importance:** High

Sources:

1. TASS (Russian), *Syrian air defenses repelled an attack by drones at a military airfield in Hama,* 1 December 2019, https://tass.ru/mezhdunarodnaya-panorama/7239301/ [18 December 2019]
2. Sami Khalil (Twitter account), *Right now*, 1 December 2019, https://twitter.com/samisami967/status/1201220991394992128/photo/1/ [28 December 2019]
3. Y-Net, *IDF: Lebanon drone violates Israeli airspace,* 6 December 2019, https://www.ynetnews.com/articles/0,7340,L-5524169,00.html/ [28 December 2019]
4. Al Mashed Yemen, *A Plane Shot Down in the Sky over Hama*, 6 November 2019 http://www.almshhadalyemeni.net/130809/ [18 December 2019]
5. Yemeni Scene, *A plane shot down in the sky of Hama*, 10 December 2019, http://www.almshhadalyemeni.net/130809/ [30 December 2019]
6. Observatory, *Russian soldiers repel drone attack on Hmeimim base*, 22 December 2019, https://newsobservatory.com/russian-soldiers-repel-drone-attack-on-hmeimim-base/ [30 December 2019]

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Item 4 – Houthis Bring Down Saudi-led Coalition Wing Loong II

Date: 30 November 2019

Summary: Late on 30 November 2019, the Houthi-Movement in Yemen (officially *Ansar Allah*) announced their air defenses had shot down a Chinese-made Wing Loong II medium-altitude long-endurance drone in the Hiran district.

Figure 6 – Houthi-Movement rebels inspect wreckage of Wing Loong (Photo: Ansar Allah))

Analysis: The Houthi-movement have demonstrated the capability to bring down medium-altitude long-endurance UAS multiple times in the past year using surface-to-air missiles. On 19 April, they downed a Wing Loong II in northern Yemen (Red6 Report #MR006). On 20 August, the rebels downed a U.S. MQ-9 Reaper UCAV with a surface-to-air missile near Dhamar, Yemen (Red6 Report #MR010). Following that incident, the U.S. Central Command issued a statement in which the command said, it was “investigating reports of an attack by Iranian-backed Houthis forces on a U.S. UAS operating in authorized airspace over Yemen.” The command’s spokesperson further stated, “Iran's provocative actions and support to militants and proxies, like the Iranian-backed Houthis, poses a serious threat to stability in the region and our partners."

The Saudi Air Force purchased an unknown number of Wing Loong UAS in 2018. The Wing Loon is manufactured by CAIG, China. It has a length of 9.34 m., a wingspan of 14 m., and weighs just over a ton. It has a ceiling of 5,300 m and a range of 4,000 km, with an endurance of 20 hrs.

The Wing Loon was initially developed to conduct reconnaissance and surveillance; however, later design enhancements enabled it to carry a variety of weapons, to include: AKD-10 air-to-surface anti-tank missile, BRMI-90 90mm guided rocket, FT-7/130 small 130kg bomb, FT-9/50 50kg bomb, FT-10/25 25kg bomb, GB-7/50 50kg precision-guided munition (PGM), and GB-4/100 PGM. In the released images, a man is carrying what appears to be the nose of an AKD-10 missile.

Independent military analysts have reported that Houthi Movement rebels have modified captured Russian made air-to-air missiles, such as the Vympel R27 medium range and Vympel R73 short range, into improvised surface-to-air missiles (Red6 #MR006)

Geolocation: Arabian Peninsula (Hiran, Yemen) **Importance:** High

Source: Harry Boone (Twitter account), Confirmed Houthis shoot down a Saudi "Wing Loong" UAV in Yemen Hiran district, 2 December 2019, https://twitter.com/towersight/status/1201212653382852615?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1201212653382852615&ref_url=https%3A%2F%2Ffighterjetsworld.com%2Flatest-news%2Faircraft-crash%2Fyemens-houthi-claims-to-shoot-down-saudi-wing-loong-uav-over-yemen%2F19425%2F/ [27 December 2019]

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Item 5 – Iranian Navy Unveils Small VTOL Drone

Date: 30 November 2019

Summary: At a military exposition, Iran displayed its new Pelican 2 UAS, a vertical takeoff and landing (VTOL) UAS designed to support Iranian naval and maritime operations.

Figure 7 – Iranian Pelican 2 Drone (photo: Almaalomah)

Analysis: The Pelican 2 uses 5 engines (four of which are vertical lift and one for horizontal propulsion). It is designed to land on the water in emergency conditions. A mission of the Pelican 2 will be to use its sensors to detect and report the location of submarines. Beyond surveillance, Iran purports the Pelican 2 is capable of carrying antisubmarine weapons and fire control systems. The Pelican 2 is further evidence of the increased demand for UAS with VTOL capabilities for military operations.

Geolocation: Middle East (Tehran, Iran) **Importance:** Medium

Source: Almaalomah News, *The Iranian navy unveils a drone and two torpedo and monitoring systems*, 30 November 2019, https://www.almaalomah.com/2019/11/30/440639/ [18 December 2019]

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Item 6 – Houthi-Movement Rebels Rased UAV Brought Down in Yemen

Dates: 4 December 2019

Summary: On 4 December 2019, Yemen Now posted an image showing the inside of a Houthi Movement *Rased* Unmanned Aerial Vehicle (UAV) which was recovered in Al-Jawf, Yemen. [Note: Red6 sent this incident as Flash report #FR009 on 4 December 2019.] The Houthi's use the *Rased* UAVs primarily for observation and surveillance; however, photos posted on social media sometimes show them armed with explosives or carrying small packages. Ordinarily, pictures posted online of Houthi aircraft provide little information about their components. What is useful about this image is it provides a good view of aircraft's autopilot, battery, and wiring, as well as some aspects of its overall design.

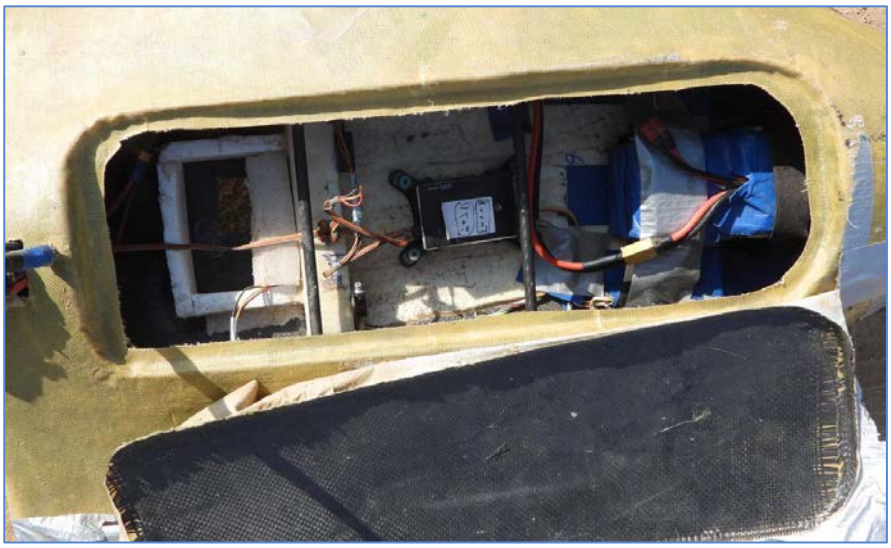

Figure 8 - Inside compartment of recovered Rased UAV (photo: Yemen Now)

Background: Houthi-Movement rebels, officially *Ansar Allah*, copied the design of the *Rased* from the Skywalker X8 drone which is a remote control (RC) aircraft manufactured by Skywalker Technology Co. Ltd., China. The Rased uses a flying wing design. With a wingspan of a little over seven ft. wide, the aircraft is small. It is just a fraction of the size of similarly shaped drones used in the attacks conducted against the Abqaiq-Khurais petroleum infrastructure in Saudi Arabia this past September.

The post on Twitter did not include a complete picture of the aircraft. As such, any context for where the aircraft was when the picture was taken or what might have happened to

the aircraft is absent. For reference, the image below is a picture of a complete *Rased* which was recovered in September 2018 (Source 2). This particular Rased was setup with a mechanism to enable it to carry a weapon (not shown).

Figure 9 - Houthi Rased UAV recovered in September 2018 (photo: Lost Weapons)

Analysis: Before describing the components of the Rased which was recovered this week, a couple of notes on its composition. While the Chinese manufactured Skywalker X8 is made of Expanded Polyolefin foam (EPO), the recovered *Rased* is made of Kevlar synthetic fiber. Kevlar is lighter and more durable than EPO. It also has a smaller radar cross section than EPO. Whoever made this *Rased* and others recovered in Yemen, probably built a mold using a Skywalker X8 fuselage then, made multiple copies of it using Kevlar instead of EPO. A close look inside the fuselage of the *Rased* does show some pieces of EPO. Those pieces of EPO are there to provide anchor points to attach the components and wiring to the aircraft and possibly to provide some vibration dampening. The image below of the *Rased* is labeled to make it easier to follow the discussion.

Figure 10 - Labeled components of the Rased UAV

1. **Flight controller:** The aircraft used a PixHack autopilot for its flight controller. The PixHack is marketed toward commercial manufacturers of drones. It is based on the PixHawk-project open hardware design and is fully compatible with both PX4 and ArduPilot firmware. The flight controller is recognizable as a PixHack, even though the product label was removed, because of the location of the small LED light used display the controller's status (see small red circle inside circle a.).
2. **Radio receiver:** The *Rased's* remote control receiver was removed from the aircraft. What remains are the wires which would have connected it to the flight controller. A likely radio receiver for this type aircraft is something like the RMILIC NB20 UHF system. While there is no indication of what type of radio receiver the aircraft had, the NB20 is exemplative because it is a 20 channel radio with a selectable 5W output that can transmit at 433 MHz enabling it to communicate at the long ranges necessary for UAS operations in open, desert environments.
3. **Telemetry module (absent):** The aircraft was setup without a telemetry capability meaning it was flown using first person view (FPV) and was incapable of autonomous flight. Had there been a telemetry module, there would be a ribbon coming from the right-side of the flight controller. The ribbon would be connected to a software defined radio (SDR) to either communicate with the ground station or to accept a preset flight plan. A common SDR in this type of configuration would be the RFD900 Radio Modem, which is designed for long range, serial communication on ISM bands.

4. **Video antenna:** The video antenna enables the pilot at the ground station to see through the FPV camera and fly the aircraft.
5. **GPS (absent):** The GPS for the aircraft was also removed with only the connector wires remaining.
6. **Arming switch:** The arming switch is a safety feature that enables the pilot to start or stop the motor independent of the electronic speed controller (ESC).
7. **Batteries:** The blue tape wrapped around the batteries indicates they were removed from their original shrink wrapping and reconfigured. This may have been done because their original shape was unable to fit inside the fuselage or to enable the aircraft builder to add additional battery cells to the configuration. Also noted: There is piece of silver duct tape underneath the blue taped batteries which appears to be securing additional batteries. The combined stored energy of all these batteries would enable the *Rased* to stay in the air a long time, easily an hour and probably longer.
8. **ESC connector:** This is the main connector from the batteries to the motor.
9. **Deans connector (unused):** There are wires and an unused Deans connector coming from the batteries. This connector could be used to power an external payload, such as a surveillance camera or drop harness for an explosive device.

Geolocation: Arabian Peninsula (Al Jawf, Yemen) **Importance:** High

Sources:

1. Yemen Now (Twitter account), The National Army in al-Hesam brigade border guards down a militia Houthi drone, 4 December 2019, https://twitter.com/ALyemennow/status/1202242301071908865/ [accessed: 4 December 2019]
2. Lost Weapons (Twitter account), 1st complete Houthi Skywalker, 16 September 2018, https://twitter.com/lostweapons/status/1041417125934456832/ [accessed: 4 December 2019]

SUBJECT: Red Six Report #MR014

Item 7 – L.A. KABC TV Helicopter Collides with Drone, Lands Safely

Dates: 4 December 2019

Summary: In the early evening hours a news helicopter used by the KABC television network in Los Angeles, CA, collided in midair with an unidentified drone. The drone punctured the right wing of the aircraft.

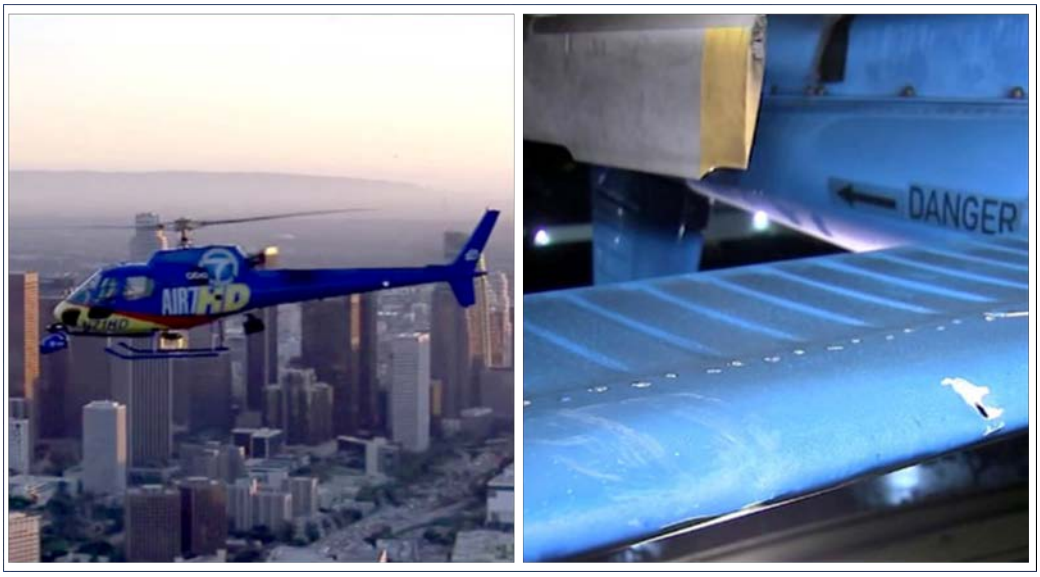

Figure 11 – KABC TV Helicopter (left) and damaged wing (right) (photos: ABC7 Los Angeles)

Analysis: The pilot of the UAV violated FAA and local ordinances, as well as risked the lives of the people onboard the helicopter. The FAA restricts UAS flights near stadiums and sporting events, airports, security sensitive airspace, restricted or special use airspace, and Washington, DC. The incident occurred at approximately 1,100 ft. AGL, above the FAA and the city of Los Angeles limits of 400 ft.

Geolocation: North America (Los Angeles, CA) **Importance:** Medium

Source: Los Angeles Daily News, *LA's KABC-7 TV news helicopter struck by drone, lands safely*, 4 December 2019, https://www.dailynews.com/2019/12/04/los-angeles-tv-news-helicopter-struck-by-drone-lands-safely/ [28 December 2019]

SUBJECT: Red Six Report #MR014

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Item 8 – U.S. Navy Seizes Iranian Missile Parts Headed to Yemen

Dates: 4 December 2019

Summary: U.S. officials reported the USS Forrest Sherman, a Navy guided missile frigate, seized a "significant cache" of suspected Iranian guided missile parts headed to rebels in Yemen. The boarding team which made the seizure was from the U.S. Coast Guard (source 1).

Figure 12 – USS Forrest Sherman (photo: U.S. Navy)

Analysis: The United States has previously implicated the Iranian government of smuggling weapons and material to Houthi-Movement rebels fighting the Yemeni government. The route across the Arabian Gulf is one leg of the smuggling route which extends from Iran to rebel controlled parts of Yemen. In a March 2017 report about Iran's technology transfers to Yemen this past, the nonprofit group, Conflict Armaments Research (CAR), analyzed drone parts confiscated by the UAE in Yemen which had been transported overland from Oman (source 2). CAR's analysis demonstrated components of the drones came from Iranian national stockpiles.

Geolocation: Arabian Peninsula (Marib, Yemen) **Importance:** Medium

Sources:

1. NBC News, U.S. Navy seizes significant Iranian missile parts, 4 December 2019, https://www.nbcnews.com/news/military/officials-u-s-navy-seizes-suspected-iranian-missile-parts-set-n1096096/ [18 December 2019]
2. CAR, Iranian technology transfers to Yemen, March 2017, https://www.conflictarm.com/perspectives/iranian-technology-transfers-to-yemen/ [28 December 2019]

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Item 9 – Commercial Satellite Imagery of Chinese Drones

Date: 8 December 2019

Summary: Analysis by Tyler Rogoway shown in The Warzone section of The Drive describes a lineup of Chinese military UAS as seen on the tarmac at the Chinese Malan airbase which is a center for UAS development. The image was first posted on the Twitter account of Oedo Soldier.

Figure 13 – Chinese UAS on display at Malan airbase, China (Photo: Oedo Soldier)

Analysis: Rogoway's analysis of the image describes the observed UAS, as follows: Green arrows: Devine Eagle and Soar Eagle (high-altitude long-endurance), Blue arrows: Wing Loong (medium-altitude long endurance), Blue arrows: Rainbow (remotely piloted vehicle), Red arrows: Sharp Sworn and Tian Tang (stealth aircraft), Black arrows: Cloud shadow (jet powered), Yellow arrows: Tengden TB001 twin boom (medium-altitude long endurance), Pink: Rocket assisted or catapult-launched drones, Brown: Two groups of swarming drones, Gray: Drone helicopter, Orange: Very high speed WZ-08.

Geolocation: Asia (Malan Airbase, China) **Importance:** Medium

Sources:

1. Oedo Soldier (Twitter account), PLA drone, 8 December 2019, https://twitter.com/OedoSoldier/status/1203571795615309824/ [29 December 2019]
2. The Drive, The Warzone Section, *Highly impressive lineup of Chinese air combat drones*, 17 December 2019, https://www.thedrive.com/the-war-zone/31378/highly-impressive-lineup-of-chinese-air-combat-drone-types-caught-by-satellite/ [29 December 2019]

SUBJECT: Red Six Report #MR014

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Item 10 – Counter UAS System Protects Southeast Asia Games.

Date: 10 December 2019

Summary: The director for security of the for the Southeast Asia Games, which were held in the Philippines, stated his personnel used counter UAS systems to defeat seven drones posing a danger during the games opening ceremonies. The incident happened minutes before the arrival of the Philippines' president and the Sultan of Brunei. The drones were defeating using electronic means. Three drones were taken down before the leaders' arrival while four drones in the flight path of the president's helicopter were simultaneously taken down (source 1).

Figure 14 – DroneShield Operator surveilling defensive sector (Photo: Sheppard Media)

Analysis: The Counter UAS system at the Games' opening ceremony was DroneShield. According to the company, the combined elements of the Presidential Security Group and the Games' Safety & Security Counter-Drone Team from Safer PH Innovations disabled seven commercial drones during the incident. The four drones, which were in the flight path of the Presidential helicopter, were mitigated due to concern the unmanned systems might collide with the rotor blades of the helicopter. The counter UAS system for the operation included DroneShield's RfPatrol RF detection element, and DoneNode for situation awareness, and the DroneGun, which was used to neutralize the errant drones.

Geolocation: Pacific Ocean (Ciudad Victoria, Philippines) **Importance:** High

Sources:

1. GMA News (Philippines), *7 unidentified drones shot down at SEA games*, 11 December 2019, https://www.gmanetwork.com/news/sports/content/718866/7-unidentified-drones-shot-down-at-sea-games-opening-authorities/story/ [18 December 2019]
2. Shepard Media, *DroneShield systems protect Southeast Asian Games,* 10 December 2019, https://www.shephardmedia.com/news/uv-online/droneshield-systems-protect-southeast-asian-games/ [30 December 2019]

SUBJECT: Red Six Report #MR014

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Item 11 – Ex-convicts Attempt to Smuggle Phones into Russian Prison

Date: 11 December 2019

Summary: UFSIN, Russia's Federal Penitentiary Service, reported three ex-convicts of the Bryansk Corrective Colony no. 1 were arrested by soldiers and prison personnel as they attempted to use a drone to smuggle a package containing three cell phones, a charger, a USB cable, and a headset into the prison.

Figure 15 – Debris recovered from Russian-separatist drone (photo: UFSIN)

Analysis: Bryansk, like other collective colonies in Russia, combines penal detention with compulsory work. The colony is approximately 300 km southwest of Moscow. In the photo provided to the media by the UFSIN, a green plastic bottle, which contains the contraband material, is connected to a DJI Phantom UAS by a string. A closer look at the picture indicates the drone was modified with a custom made drop mechanism to enable the pilot to drop the contraband at a designated point.

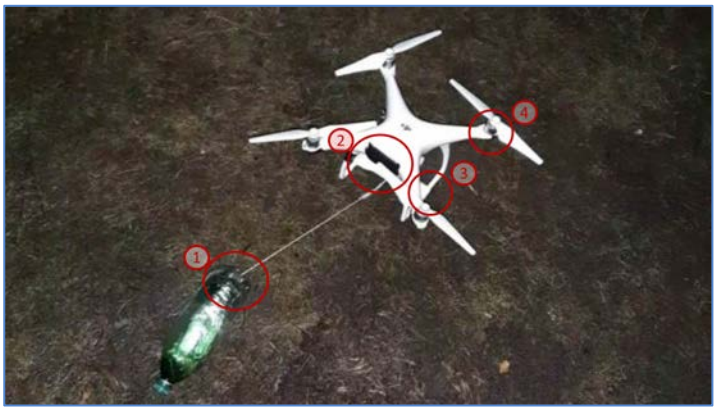

Figure 16 - Highlighted aspects of trigger mechanism (photo: USFIN)

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Red Six analysis notes are, as follows: 1. String connected to green plastic bottle (payload) and aircraft, 2. Black tape covers the battery's LED lights to conceal aircraft during low visibility operations, 3. The string is attached to a white strip connected to the leg of the drone. This is the drop device. 4. The landing lights are also masked with tape.

The trigger mechanism for the prison smuggling drone is similar to those being seen used by Russian-backed separatist forces in the Donbass Region of Ukraine. The mechanism's simple design leverages the technology on board the aircraft itself. It works by using the DJI Phantom's onboard lights which are masked to prevent them from detecting light. The circuit for the trigger passes through the lights and a photocell that is wired to a control board. When the photocell is activated, it triggers a servo which engages the drop device and releases the payload.

Geolocation: Russia (Briansk, Russia) **Importance:** Medium

Source: Bryansk News, *Near the colony, three Bryansk men were caught with a drone and cell phones for convicts*, 11 December 2019, https://www.bragazeta.ru/news/2019/12/11/vozle-kolonii-troix-bryancev-pojmali-s-dronom-i-mobilnikami-dlya-zekov/ [18 December 2019]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 12 – Custom-Made CUAS System in Iraq

Date: 12 December 2019

Summary: The ShittyTechnicals account on Reddit posted a picture of a CUAS system mounted on a technical vehicle, allegedly somewhere in Iraq (source 1). [Note: Red6 sent this incident as Flash report #FR010 on 24 December 2019.] The installation appears to be a radio frequency (RF) jammer with some similarities to more advanced Western systems. The implementation of the system on a technical might be an adaptation of imported technology or even possibly, a custom made jammer using commercial-off-the-shelf (CoTS) components and parts.

Figure 17 - Personnel pose with custom-made CUAS system (photo: ShittyTechnicals)

Background: RF jammers work by using a strong RF signal to electronically block the communications link between the UAS operator and the UAS. A "technical" is a type of improvised fighting vehicle, typically a civilian or military non-combat vehicle, modified to provide an offensive or defensive capability similar to a purpose-built tactical vehicle. In this instance, the technical vehicle was modified to carry a relatively large CUAS system. With only the picture and no context, Red Six is unable to verify where and when the picture was taken or the organization of the men in the picture. At the height of the Islamic State's insurgency against the Republic of Iraq, repurposed commercial UAS where widely used by all combatants: the Islamists, the Iraqi government, militias, and others. An RF jammer CUAS system would have applicability within such an operational environment.

Analysis: Red Six assesses the pictured CUAS system could be effective against close-in UAS operating in the 2.4 and possibly 5.8 GHz frequencies of the ISM bands; the same bands which many consumer and commercial drones use for their command links. Regardless of whether the system is adopted technology or custom-made, Red Six assesses the system less operationally effective than a state-of-the-art CUAS system, primarily because it is a stand-alone system, unable to leverage the detect, tract and identify components which comprise sophisticated CUAS systems that combine electronic-scanning radar target detection, electro-optical/infrared (EO/IR) tracking, classification and directional RF jamming (note 2). Additionally, the electrical power generation system on a technical might be considerably less than what would be available most military vehicles: less power would translate into a shorter effective range for the jammer.

Despite the limitations mentioned, the system illustrates how irregular military forces can acquire needed technology or with an appropriate degree of technical ability, use CoTS to build it themselves. What follows is a brief explanation of the components of the custom-made system. The picture below labels the components to make it easier to follow the discussion.

Figure 18 - Labeled components of the custom-made CUAS system

1. **Top antenna:** There appears to be two antennas for the system (nos. 1 & 2). The top antenna, which looks somewhat like a hedge trimmer is a Yagi–Uda antenna, commonly known as a Yagi antenna. Yagi antennas have medium to high gain with a narrow beam and is typically used for fixed-frequency applications. The one pictured is likely tuned for 2.4GHz.
2. **Lower antenna:** A white radome protects the lower antenna and prevents its positive identification. Red Six assesses the lower antenna is either another Yagi antenna or possibly a long periodic antenna (LPA), sometimes referred to as a log periodic dipole array/antenna, LPDA). An LPA antenna might be used, instead of a Yagi, to increase the antennas bandwidth. Without seeing the antenna element spacing and size, Red Six cannot assess its intended frequency; however, 5.8 GHz would make sense.

3. **Aiming site:** While the system appears to have a crude sight, it is probably unnecessary or intended for another purpose. The antennas' primary lobes or beam-widths are likely 20 degrees or greater making an aiming site unnecessary. A magnifying site could possibly enable the operator to acquire targets beyond visual range but binoculars would work better. The site might possibly be used for assessing target effects caused by the jammer.
4. **Weapon mount:** The form of the system (i.e. shape, size, dimensions, and weight) make using it as a man portable system impractical and necessitates the use of a pedestal weapon mount.
5. **Power Source and Signal Electronics:** The system's power source and signal electronics appear to be contained in the tan metal box at the front of the pickup's bed. The maximum effective range is difficult to assess; however, the configuration indicates the range could exceed visual line of sight.

Geolocation: Middle East (Iraq) **Importance:** High

Source and Note:

1. Source: ShittyTechnicals (Reddit account), Anti-drone technical with jamming 'gun' in Iraq, 12 December 2019, https://www.reddit.com/r/shittytechnicals/comments/e99cv7/antidrone_technical_with_jamming_gun_in_iraq/ [24 December 2019]
2. Note: An example of a sophisticated RF jamming CUAS system produced in the United States is the AUDS, anti UAV defense system, produced by Liteye: https://liteye.com/products/counter-uas/auds/

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 13 – Turkish Bayraktar UAS Shot Down in Libya

Dates: 13 December 2019

Summary: Photographs (source 1) and video (source 2) posted online showed what appears to be a Turkish-made Bayraktar TB2 unmanned combat aviation vehicle (UCAV) shot down by the Libyan National Army (LNA). The LNA, which is led by Khalifa Haftar, is fighting the UN backed Government of National Accord (GNA).

Figure 19 – Photo of the crashed TB2 (left) and an undamaged TB2 (right)

Analysis: Turkey is providing Bayraktar TB2 support to the UN-backed Government of National Accord (GNA) which controls the areas in Libya where most Libyans live to include Tripoli. The Bayraktar provides the GNA with both an intelligence collection and a precision attack platform. The LNA has encircled GNA forces after initiating an offensive early in the year. It was unclear what caused the aircraft's crash. In the past month, an Italian MQ-9 Reaper and a large U.S. drone were both brought down by Russian-made counter UAS systems. It is critical to assess the potential vulnerability of slower moving UAS and UCAV aircraft to counter UAS systems because of the role these aircraft have in other conflict areas, such as the Donbass Region and Arabian Peninsula.

Geolocation: Africa (Tripoli, Libya) **Importance:** High

Sources:

1. Katoxic News (Greek), Haftar drops Turkish Bayraktar 2 UAV like flies, 13 December 2019, https://katohika.gr/diethni/san-tis-myges-katevazei-o-chaftar-ta-tourkika-uav-

bayraktar-2/?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+katohika+%28%CE%9A%CE%B1%CF%84%CE%BF%CF%87%CE%B9%CE%BA%CE%AC+%CE%BD%CE%AD%CE%B1%29/ [26 December 2019]

2. Colonel Cassad (Live Journal), Haftar Troops shot Duwn Turkish Bayraktar UAV, 13 December 2019, https://colonelcassad.livejournal.com/5495777.html/ [26 December 2019]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 14 – Unidentified Drone Flies within 10-feet of Luxury Jet

Date: 16 December 2019

Summary: An unidentified drone flew dangerously close, within 10 ft, to a jet airplane which was attempting a landing at London's Luton airport.

Figure 20 - London's Luton Airport arrival terminal

Analysis: The aircraft involved in the incident was a 14 seat GL 600S Bombardier luxury jet *en route* to London from Nice, France. In recent years there have been multiple incidents of close calls with drones among the major airports servicing London and the larger United Kingdom. Most routes serviced by Luton International Airport are for destinations in Europe. While it's smaller than Heathrow or Gatwick, Luton is still a very active airport with over sixteen million passengers per year.

Geolocation: Europe (London, UK) **Importance:** Medium

Source: Express UK, Midair horror as jet comes within 10 ft of crashing into drone, 17 December 2019, https://www.express.co.uk/news/uk/1218245/UK-news-drone-collision-luton-airport-befordshire-Gatwick-drone-airport-christmas/ [28 December 2019)

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 15 – Drone Crash in Burkina Faso

Date: 16 December 2019

Summary: Wakat Será, a newspaper in the West African country of Burkina Faso reported a mid-sized, fixed-wing drone crashed into a store in the country's western city of Bobo-Dioulasso after its takeoff from an airport.

Figure 21 - – Crash site of Friendly Drone in Burkina Faso (photo: WakatSerá)

Analysis: Red Six assesses the drone was designed and built by an organization with a high-degree of design and engineering expertise with access to advanced technology. The aircraft's size appears slightly smaller than the U.S. Army's Shadow UAS, falling somewhere inside DoD's the Group 2 and 3 size categories (between 55 and 1,320 lbs.). The fuselage, fiberglass composition and rear landing gear look similar to aircraft manufactured by Mugin UAV in China. The fuel tank also looks the same as Mugin models; however, it is not a Mugin. The wings of the UAV in the photo appear mounted beneath the fuselage which is different from Mugin design. The front landing gear uses a direct drive servo which is also different from Mugin UAS. Red Six assesses the engine on the aircraft appears to a version of a remote control RC model engine produced by DLE Engine, China; most likely it is a DLE 111 or 120. It is unknown whether the aircraft was part of a military or nongovernment organization.

Geolocation: Africa (Bobo-Dioulasso, Burkina Faso) **Importance:** High

Sources *WakatSerá, Burkina: drone crashes in Bobo-Dioulasso*, 15 December 2019, https://www.wakatsera.com/burkina-un-drone-secrase-a-bobo-dioulasso/ [28 December 2019]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 16 – Chinese Criminal Gangs Use Drones to Spread Swine Fever

Dates: 20 December 2019

Summary: A pig farm operated by Heilongjiang Dabeinong Agriculture & Pastoral Foods in Zhaozhou, China, was ordered by the government to surrender counter UAS jamming equipment which the company installed to protect its livestock. The farm in northeast China was using the system to jam the navigation systems of drones being flown overhead by criminal gangs. The gangs were reportedly using drones to spread African swine fever virus by dropping infected items into pig farms.

The jamming device was discovered in October, after pilots complained of losing their GPS signals when in the proximity of the nearby Harbin airport. In some instances, the jamming caused the failure of the aircrafts' ADS-B tracking technology which determines an aircraft's position via satellite navigation. The jamming was traced back to the farm in Zhaozhou. Chinese state media has reported that gangs are exploiting the African swine fever crisis in the country by deliberately spreading the disease using drones to drop infected items on to pig farms. The farmers are then forced to sell meat cheaply to the gangs, who then resell it as healthy stock.

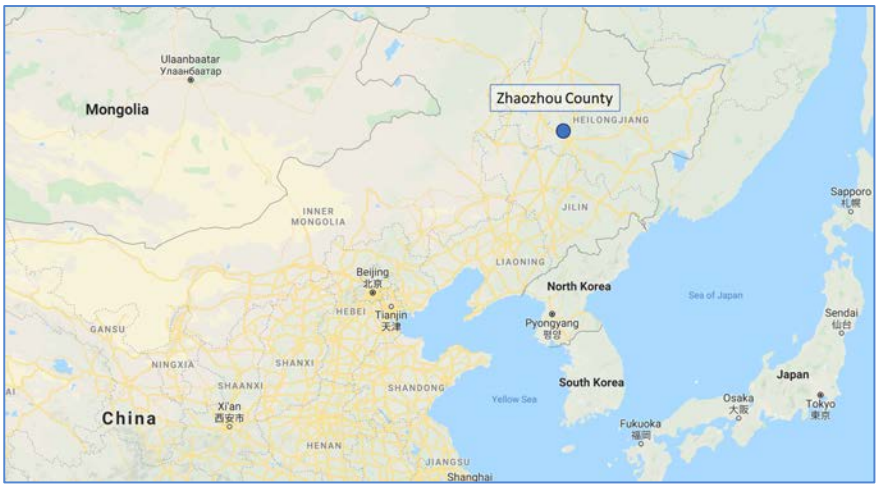

Figure 22 – Map indicating the approximate location of the Zhaozhou incident in China

Analysis: The incident in Zhaozhou highlights a number of policy and planning issues related to protecting industry and civilian targets from criminal drone threats. While most observed incidents of criminal drone activity are related to small-scale illicit trafficking and surveillance, this time, the criminal gangs were using drones to gain access to protected areas which were otherwise, beyond their reach. The GPS jamming system employed by the farm would have been illegal in the United States too. This shows the tension that will exist as policymakers try to balance the competing needs of the transportation industry with other sectors of the

economy. In this instance, the criminals were using infected items to spread African swine fever virus or at least instill fear. It is imaginable a more malign group could weaponize drones with contaminants to terrorize civilians.

Geolocation: Asia (Zhaozhou County, China) **Importance:** High

Source: South China Morning Journal, *China flight systems jammed pig farms African swine fever*, 20 December 2019, https://www.scmp.com/news/china/society/article/3042991/china-flight-systems-jammed-pig-farms-african-swine-fever/ [29 December 2019]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 17 – Mixed Blame for Drone Attacks on Oil Facility

Date: 21 December 2019

Summary: Three near-simultaneous attacks at Syrian oil production facilities were attributed to an Islamic State drone attack by the Britain-based war monitoring group, Syrian Observatory for Human Rights. There was no public claim of responsibility for the attack which struck one of the country's two oil refineries and two natural gas facilities in different parts of Homs province (source 1). In subsequent reporting (source 2), the Syrian foreign ministry blamed the attack on U.S. drones which they claimed flew from the U.S. expeditionary base at Al Tanf, Syria.

Figure 23 – Firefighters Respond to Drone Strike in Syria (photo: SANA News Agency)

Analysis: There is insufficient information in online reporting to determine whether the attack was made by the Islamic State, U.S. forces, or other competing actors in the Syrian war. In the past six months, Red Six has seen next to no reporting of Islamic State drone activity. A coordinated, successful attack against critical infrastructure would be a significant development.

Geolocation: Middle East (Homs, Syria) **Importance:** High

Sources:

1. Times of Israel, *Syria says three oil and gas facilities hit in possible drone attacks*, 21 December 2019, https://www.timesofisrael.com/syria-says-3-oil-gas-facilities-hit-in-possible-drone-attacks/ [23 December 2019]

2. Middle East Discourse, *Syrian foreign minister: U.S. was behind drone attack*, 25 December 2019, https://mideastdiscourse.com/2019/12/25/syrian-foreign-ministry-u-s-was-behind-drone-attack-on-homs-oil-facilities/ [28 December 2019]

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 18 – Syria Arab Army Downs Militant's Drone

Date: 22 December 2019

Summary: A series of Twitter posts showed an image of a UAV that was supposedly downed by the Syrian Arab Army in the vicinity of Salmiya, Syria. An analysis of photos the drone provided some details related to its components.

Figure 24 – Image of rebel drone shot down by Syrian Arab Army

Analysis: Most of the images Red Six finds of terrorist drones in Syria on social media are stripped of their components and wiring. In this instance, the wooden access cover, on the top of the fuselage is open and provides an unfocused glimpse inside the aircraft (see below). Based on the positioning of the GPS puck and the arrangement of wiring coming from the top of the flight controller, Red Six assesses the flight controller for this aircraft is probably an ArduPilot APM 2.8 autopilot which is an Arduino-based, opensource autopilot. Using downloadable software, the APM 2.8, and previous versions, allows users to turn any fixed, rotary wing or multirotor vehicle into a fully autonomous unmanned system with the capability to perform programmed GPS missions with waypoints using Google maps. As an aside, the water bottle is the aircraft's fuel tank.

Figure 25 - GPS puck and autopilot

Geolocation: Middle East (Salmiya, Syria) **Importance:** High

Source: Y.M.M.S. (Twitter account), Syria Arab *Army units down a terrorist drone,* 22 December 2019, https://twitter.com/ynms79797979/status/1208803696848580609/ [23 December]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 19 – Update: The U.S. Blames Iran for September Drone Attack

Date: 23 December 2019

Summary: In reporting by Reuters, the United States said, analysis of evidence from weapons debris recovered from the September attack on Saudi oil facilities indicated the strike likely came from the north, reinforcing its earlier assessments Iran was behind the attack (source 2). The attacks targeted the huge Abqaiq refinery complex and Khurais oil field which are in Eastern Saudi Arabia near the Persian Gulf. It was made with a mix of at least seventeen cruise missiles and large UAVs. Damage from the attack temporarily caused a disruption in Saudi oil production. While initially claimed by the Houthi-Movement, officially *Ansar Allah*, according to the U.S. government, the attacks on Khurais and Abqaiq originated from Iranian territory. The report follows and rebuts a statement earlier in the month, when the UN Secretary General stated, United Nations has not been able to independently corroborate that the cruise missiles and drones used in attacks earlier this year on an airport and oil facilities in Saudi Arabia "are of Iranian origin (source 1)."

Analysis: The information provided by Reuters did not reflect the origination point of the drone and missile strike against the Saudi's critical infrastructure. The attribution to Iran was based on analysis of debris and knowledge of the flight route of one of the drones. In the Reuters article, the U.S. concluded the engines from some of the drones recovered from the attack where the same as those used in Iran's Shahed-123 (see image above). Additionally, the U.S. determined at least one of the attacking UAVs travelled approximately 200 km north of its target in Saudi Arabia before the attack. This distance, in addition to the 900 km distance between Yemen and the target zone was considered well beyond the maximum range of any Houthi-Movement drones.

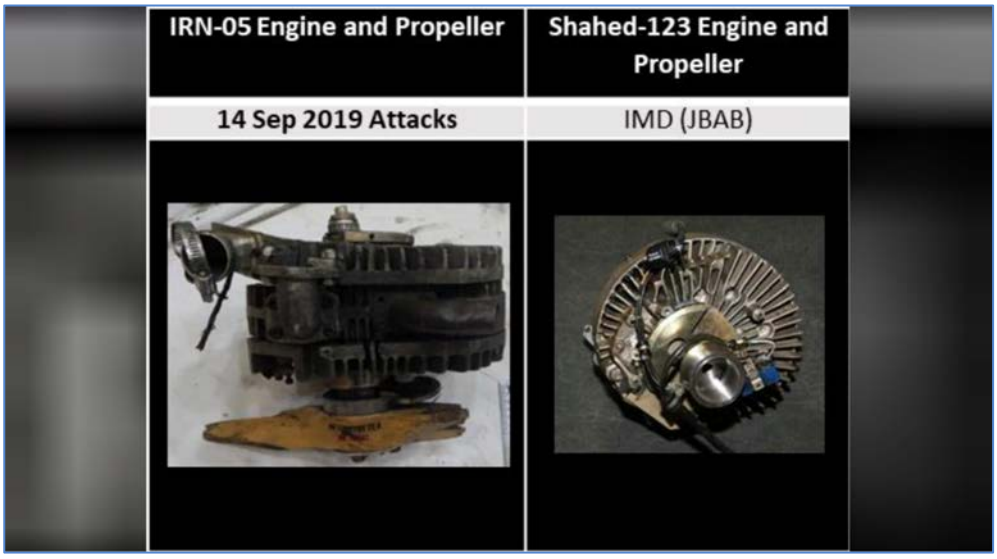

Figure 26 –Visual comparison of the IRN-05 Engine and the Shahed 123 (photo: U.S. Government)

Red Six studied a handout provided to Reuters by the U.S. Government of Iranian UAV engines (see above). We are uncertain why the IRN-05 is showed side-by-side with the Shahed-123. It might be because both engines are Iranian produced rotary engines; however, the IRN-05 engine is considerably larger than the Shahed-123. Also, the wing design of the two aircraft are considerably different. The unmanned aircraft used in the Abqaiq operation had a low-observable radar profile while the Shahed-123 looks more like a winged missile (see image below).

Figure 27 – Debris from low observable UAS used for Abqaiq attack and a Shahed 123 recovered by Saudi Arabia (photos: KSA)

Geolocation: Arabian Peninsula (Abqaiq, Saudi Arabia) **Importance:** Medium

Sources:

1. Associated Press, UN can't confirm weapons used in Saudi attacks were Iranian, 13 December 2019, https://apnews.com/e6e60441b9d0427bafe8042f3c1a85d9/ [29 December 2019]
2. Reuters, *U.S. probe of Saudi oil attack shows it came from north - report*, 23 December 2019, https://www.reuters.com/article/us-saudi-aramco-attacks-iran-exclusive-idUSKBN1YN299/ [23 December 2019]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 20 – UAV Shot down in Syria by Suqaylabiyah Militia

Date: 24 December 2019

Summary: A Twitter post showed an image of a UAV recovered by local militia in the city of Suqaylabiyah, which is in Northwest Syria under the control of the government in Damascus. The aircraft is a custom-made drone with a design consistent with drones built by the Islamist terrorist organization Hayat Tahrir al-Sham (HTS). Video and photos posted online provide some information related to the aircraft's construction, motor, GPS and flight controller, as well as its explosive grenade payload.

Figure 28 – Image of custom-made UAV shot down by Suqaylabiyah militia (photo: Mikhail Voskresensky)

Analysis: As stated, the aircraft's characteristics are consistent with many UAS attributed to HTS and its predecessor organization, the Al-Nusra Front: gas powered engine, wooden fuselage, and square tail-boom. Red Six analysis notes are, as follows:

- **Numbering system:** The wings, fuselage and tale are numbered A1020 indicating the aircraft is shipped as a kit for later assembly. This suggests the aircrew flying the aircraft is different from its builder.
- **Propulsion:** The engine is likely the same or extremely similar to converted grass trimming, gasoline engines sold online in India for remote control aircraft. An example

is shown side-by-side with the recovered HTS drone (below). It is a Grass Hopper26 RC WeedCutter Engine, sold online for 6,000 Indian rupees (approx., $84): http://www.rchyderabad.com/remote-control-planes/rc-petrol-engine-india/26cc-grass-cutter-engine-rc-plane.html/. There is a lot of reverse engineering and counterfeiting of small engines throughout the world which makes a precise attribution difficult. However, Red Six identified multiple similarities between the two engines to include: the angled spark plug and magneto being in the same place and matching shroud mounts. [Note: The HTS drone does not use a shroud.]

Figure 29 - HTS engine (lift) and Grasshopper 26cc engine (right)

- **GPS and flight controller:** The GPS antenna is the same type as the GPS recovered this month in Salmiya, Syria (See Item 16). Red Six's assessment is the GPS is from a type used for older APM ArduPilot autopilots, such as the AMP 2.8. The indicator is the two wires coming out of the antenna which was the design for the older version 7 Ublox GPS module. The newer version 8, made to be compatible with PixHawk flight controllers, has only one connector. Note: In later pictures of the aircraft, the GPS antenna is removed.

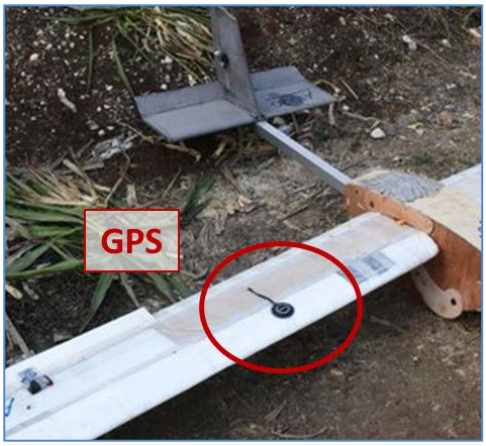

Figure 30 - GPS antenna

- **Munition:** The munitions for the aircraft appear to be point detonating grenades which have been de-linked from an ammunition belt. The grenades appear to have been modified with bomb fins to improve their reliability, so the point aims downward, and improves precision. The uniformity of the bomb fins suggest they were professionally made, with a plastic injection mold or possibly with a 3D printer.

SUBJECT: Red Six Report #MR014

Figure 31 - Grenades recovered from HTS drone

Geolocation: Middle East (Suqaylabiyah, Syria) **Importance:** High

Sources:

1. Al Exhibaria (YouTube video), *Syria - Hama countryside Anti-army forces down a terrorist plane*, 24 December 2019, https://www.youtube.com/watch?v=MF2IBKMFUHU
2. Sukhoi SU57 Felon (Twitter account), *Militant unmanned aerial vehicle captured,* 24 December 2019, https://twitter.com/I30mki/status/1209699366451085313 / [28 December 2019]
3. Syria Arab News Agency, *Anti-army forces down a terrorist plane in Suqaylabiyah*, 24 December 2019, https://www.sana.sy/?p=1077851/ [29 December 2019]

SUBJECT: Red Six Report #MR014

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 21 – Middle East Insurgents Building Turbine Driven UAS

Date: 26 December 2019

Summary: On Twitter, a short video post with audio showed two men assembling a jet turbine remote control aircraft. They are speaking Arabic and their location is somewhere in the Middle East (exact location unknown). During the video, the distinctive sound of a turbine engine can be heard.

Figure 32 – Image of turbine UAS being built at undisclosed location (photo: T.A. Bugharsa)

Analysis: The video was probably made to deliver using Telegram messaging app. The audio indicates the speaker is introducing their effort to someone on Telegram and that this aircraft is a model designed by Ahmad Bawadir Abeidi. He calls the aircraft AMD, a derivation of

Ahmad; it is the first of ten models they plan to produce. The speaker hopes this model could be useful to foreign countries who are interested in such aircraft and hopes to receive requests of purchase. Note: The audio continues from here but the speaker's voice is drowned by the turbine's noise.

While the video is very grainy, the aircraft looks crudely built. Red Six assesses the aircraft is unflyable because it does not appear to have any control surfaces (e.g. wing flaps, ailerons, rudders, and elevators). Since the aircraft lacks control surfaces, it probably does not have a flight control system or flight controller either. That said, the video is important because it reflects the desire of terrorist organizations to acquire very fast, larger, fixed-wing UAS. Also, from the speaker on the video, there appears to be a market for high performance aircraft. It is understandable that terrorist groups and irregular forces would desire a turbine drone capability. This is because the design of turbine aircraft with the fuel tank behind the turbine make them a potent weapon by themselves. Unlike an electrically powered or gas driven UAS, which requires an explosive payload to cause significant damage, a turbine is a flying bomb. When a turbine crashes into a surface, the heat from the engine ignites the fuel and causes a fiery explosion.

Geolocation: Middle East (unknown location) **Importance:** High

Source: T.A. Bugharsa (Twitter account), *Sir, I believed the that the Qamines Military Industries Complex had developed a flying plane,* 26 December 2019, https://twitter.com/TAbugharsa/status/1210283324738088961/ [28 December]

All information in this document is derived from PAI. Analysis conducted by Red Six Solutions, LLC

Item 22 - Other Notable Events

a. Turkish Army Receives First Phoenix Medium-Altitude Long Endurance UAS

- **Date:** 3 December 2019
- **Summary:** The Turkish defense company, Tusac, announced it was prepared to deliver the Akigur, medium-altitude long endurance UAS to the defense ministry. As its currently configured, the Akigur will be used for long range surveillance operations.

Figure 33 - Akigur MALE UAS developed by Turkey (photo: Tusac)

- **Geolocation:** Middle East (Istanbul, Turkey)
- **Source:** Soshals News (Turkish), *Turkey Unveils A New Model Drone*, 5 December 2019, https://www.soshals.com/politics/28929/ [18 December 2019]

b. Iranian Drones Surveilling U.S. Positions in Iraq

- **Date:** 4 December 2019
- **Summary:** U.S. officials told reporters with *Newsweek* such activity indicates that Iranian aligned militias in Iraq with guidance from the Iranian Revolutionary Guards Corps were conducting reconnaissance potentially in preparation for future attacks using "suicide drones." The Newsweek article did not indicate whether an attack was imminant or this was preparation for a later contingency operation. However, a U.S. civilian contractor was killed and several others wounded on 27 December in the vicinity of Kirkuk, Iraq in a rocket attack that may be linked to an Iranian proxy force, possibly Hezbollah. Whether the surveillance and the attack occurred at the same location cannot be verified at this time.
- **Geolocation:** Middle East (Baghdad, Iraq)

- **Source:** Newsweek, *Iran Uses Suicide Drones to Surveil U.S. Positions*, 4 December 2019, https://www.newsweek.com/iran-suicide-drone-surveil-us-military-positions-threat-attack-1475562/ [18 December 2019]

c. Missile Fired from Drone at the Home of Shiite Religious Leader

- **Date:** 7 December 2019
- **Summary:** A missile was fired from an unidentified UAS at a home of the Iraqi Shia cleric Muqtada al-Sadr in Najaf, Iraq. At the time of the incident, al-Sadr was reportedly in Qom, Iran. While there is little information available about the incident, the event shows how armed UAS can be used a means for assassination.

Figure 34 - Debris from missile fired at Al Sadr's Residence

- **Geolocation:** Middle East (Baghdad, Iraq))
- **Source:** Kurdistan 24, *Unidentified drone fires missile at home of firebrand Iraqi cleric Sadr*, 7 December 2019, https://www.kurdistan24.net/en/news/6f20a007-06df-4388-9477-00d7ee3286f0/ [18 December 2019]

d. Pentagon Seeks to Focus CUAS Effort

- **Date:** 11 December 2019
- **Summary:** Ellen Lord, the Defense Undersecretary of Defense for Acquisition and Sustainment, said her recent visits to the Middle East and elsewhere had confirmed her belief that there needs to be a continued to focus on counter-UAS systems and strategies. While she noted the Army was recently made executive agent for counter UAS capabilities, Secretary Lord said her office will continue to help guide developments across the Department of Defense. Her objective is to identify three-to-five systems that are “tailored” to address different types of threats, and which will enable the Government to benefit from economies of scale.
- **Geolocation:** North America (Washington, DC)

- **Source:** C4ISR, *Pentagon seeks to streamline CUAS focus,* 11 December 2019, https://www.c4isrnet.com/unmanned/2019/12/11/pentagon-wants-to-streamline-its-counterdrone-focus/ [18 December 2019]

e. DPR Claims to Produce New CUAS System but Ukraine Calls it a Subterfuge

- **Date:** 13 December 2019
- **Summary:** The self-proclaimed Donetsk Peoples' Republic (DPR) claimed to intercept in one week, five UAVs flown by Ukraine using an EW system designed and built at the Terrikon-M2N complex which is inside the DPR. The complex was heavily damaged in 2014 during the heaviest fighting between Ukraine and the Russian-backed insurgents. The DPR claims the complex was reconstituted (source 1); however, Ukraine media calls the story propaganda (source 2) used to coverup the illegal use of Russian air defense systems by the separatists.
- **Geolocation: Eastern Europe** (Donbass Region, Ukraine)
- **Sources:**
  - RIA Novosti (Russian), *In the DPR, they said that they intercepted five UAVs of security forces in a week*, 13 December 2019, https://informnapalm.org/en/militants-cover-up-russian-ew-assets-in-donbas/ [26 December 2019]
  - Inform Napalm, Militants coverup Russian EW assets in Donbass, 13 December 2019, https://informnapalm.org/en/militants-cover-up-russian-ew-assets-in-donbas/ [26 December 2019]

f. Russian-backed Separatists in Luhansk Defeat Ukraine Drones with EW Systems

- **Date:** 15 December 2019
- **Summary:** The Information Center for the Luhansk Peoples' Republic (LPR) reported their forces had defeated fifty Ukrainian drones in the past year. To accompany the announcement, the LPR released a video showing their Triton M1 EW system simulating operations against threating UAS.
- **Geolocation:** Eastern Europe (Luhansk, Ukraine)
- **Source:** VKontakte (VK) (Russian social media), *LPR People's Militia destroyed over 50 strike and reconnaissance UAVs,* 16 December 2019, https://m.vk.com/wall-76474527_911892/ [26 December 2019]

g. Turkey's New Songar Drone Comes with Machine Gun Mount

- **Date:** 15 December 2019
- **Summary:** Turkeys military announced they would acquire an unspecified number of Songar UAS which are produced by the Turkish manufacturer Asisguard. The Songar is an antipersonnel UAS capable of carrying approximately 200 rounds of ammunition and launching grenades. The UAS weighs approximately 25 kg. It has four arms; each has two coaxially mounted propeller blades.

Figure 35 – Songar UAV (photo: Asisguard)

- **Geolocation:** Middle East (Ankara, Turkey)
- **Source:** Daily Mail, *Turkey acquires new military drone with a machine gun mount that can fire bursts of 15 bullets and is braced by robotic arms to offset weapon recoil*, 15 December 2019]. https://www.dailymail.co.uk/sciencetech/article-7786347/Turkey-acquires-new-military-drone-machine-gun-mount-fire-bursts-15-bullets.html/ [18 December 2019]

h. Yemeni Army Defeats Houthi Drone

- **Date:** 16 December 2019
- **Summary:** The Yemeni Army claimed to shoot down a Houthi-Movement drone in the vicinity of Dhali. The images accompanying many of the online articles regarding the incident showed discarded pieces of a fired 9M113 *Konkurs* antitank guided missile, known in NATO as an AT5 *Spandrel*, which was produced by the former Soviet Union. It is improbably the Yemeni Army was using a Spandrel to shoot down drones. It is more likely the missile parts came from a Houthi-Movement weapons system. In 2016, the Houthis posted a YouTube video showing them engaging a moving vehicle with a *Konkurs* ATGM. Additionally, in 1991, Iran purchased a license to produce *Konkurs* and in 2000 began producing the missile under the name *Towsan*,

Figure 36 - Parts retrieved from 9M113 Konkurs ATGM missile

- **Geolocation:** Arabian Peninsula (Dhali, Yemen)
- **Source:** Kamal al Nomani (Twitter account), *In Pskov tested a unique concept to defeat drones*, 9 December 2019, https://twitter.com/kamal_ALNomani/status/1206661054710853632http://pravdapskov.ru/media/0011142?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews/ [18 December 2019]

i. France Deploys MQ-9 Reaper Drones to Africa's Sahel Region

- **Date:** 28 November and 23 December 2019
- **Summary:** The French military announced it would deploy U.S.-built MQ-9 Reaper drones to the Sahel region of West Africa to support its ongoing counterterrorism operations (source 1). The aircraft conducted pre-operational exercises in Niger, Africa, where the U.S. already maintained and operated a UAS capability. France has a 4,500-strong force called Operation Barkhane (Dune) supporting several Sahel countries fighting extremist groups. On 23 December, the French announced they had completed their first airstrike with the drones, killing upwards of thirty-three militants of the Macina Liberation Front.
- **Geolocation:** Africa (Niamey, Niger)
- **Sources:**
    - Deutsch World, France deploys armed drones to Sahel region, 18 December 2019, https://www.dw.com/en/france-deploys-armed-drones-in-the-sahel-region/a-51744023 [20 December 2019]
    - SF Gate, France says it carries out first armed drone strike, 23 December 2019 https://www.sfgate.com/news/world/article/France-says-it-carries-out-1st-armed-drone-strike-14927503.php/ [26 December 2019]

j. Criminals Use Drones to Surveil Targets in New Zealand

- **Date:** 23 December 2019

- **Summary**: In an interview with the New Zealand Herald, the former criminal, Adrian Pritchard, claimed thieves in New Zealand have begun using drones to stakeout properties they are considering burgling. While drone pilots, flying small aircraft (under 55 lbs.) need permission to overfly private property, there is no licensing requirement in the country.
- **Geolocation:** Pacific Ocean (Hamilton, New Zealand)
- **Source:** New Zealand Herald, *Drones the new tool in the burglars' arsenal*, 18 December 2019, https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12294553/ [30 December 2019]

k. Yemeni Militia Downs a Houthi-Movement Rebel Drone

- **Date:** 24 December 2019
- **Summary:** Houthi-movement rebels claimed to shoot down a UAV of the Saudi-led coalition near Muraba al-Shabakah area in Najran province. The Houthi's claimed this was there seventh successful intercept in December.
- **Geolocation:** Middle East (Narjan, Yemen)
- **Source:** Uprising Today, *Yemeni air defenses shoot down drone,* 28 December 2019, https://www.uprising.today/yemeni-air-defences-shoot-down-drone-in-najran-2/ [24 December 2019]

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