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2021

Hammes, T. X. (2021). Defence dominance : advantage for small states. RSIS
Commentaries, 151-21.

<https://hdl.handle.net/10356/155347>

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Defence Dominance: Advantage for Small States

By T. X. Hammes

SYNOPSIS

Emerging technologies are leading to a period of defensive dominance on the battlefield. Small states can take advantage of the new small, smart, and numerous weapons systems to create highly lethal, survivable forces that can deter larger powers.

COMMENTARY

EMERGING TECHNOLOGIES are dramatically changing the international security environment. Of particular interest to small states is the emerging operational environment of pervasive global surveillance paired with large numbers of long-range precision weapons.

Pervasive surveillance is a direct result of the massive expansion of commercial space assets. Today firms offer high resolution satellite imagery to include interpreted 4-metre resolution imagery of the entire planet daily and, on request, it can photograph objects as small as 50 centimetres.

Changing the Environment

San Francisco-based Capella Space offers on-demand, interpreted, 50 cm resolution Synthetic Aperture Radar (SAR) imagery of any location on the planet. Like all radar, SAR works at night and through weather. The commercial firm Hawkeye360 can locate a specific radio frequency signature within 3 kilometres. By mid-2022, a Hawkeye satellite will pass over the target every 20 minutes.

In effect, the planet is being imaged by visual, infrared, radar, and electromagnetic sensors virtually continuously. This family of long-endurance, commercial surveillance

drones can provide affordable intelligence-surveillance-reconnaissance (ISR) assets for even small states.

Simultaneously, long-range autonomous drones and cruise missiles are being produced by numerous nations globally. Several of these systems are being built into standard shipping containers that can be easily transported and blend into the commercial traffic globally. Many have much greater operational range than current fighter/bomber aircraft and they require no airfields.

Further changing the environment are advance manufacturing techniques. Automated factories, robotics, and artificial intelligence can be combined to dramatically reduce the cost of these emerging autonomous systems. In 2014, an aeronautics professor designed and 3D-printed a drone. By adding a small electric motor, two batteries, and a cell phone, he created a hand-launched, autonomous drone with a range of 50 km.

Once the design was refined, the production process took about 28 hours. Today's 3D printers are over 100 times faster. A plant with 100 modern 3D printers could produce 10,000 of these drones per day. By incorporating AI and robotics, the final assembly could be automated. Thus drone swarms of thousands of autonomous hunters are possible today.

Favouring Defence

An obvious question is why these developments should favour the defence. Simply put, if you create a signature, you will be attacked. By definition, an offensive force creates numerous signatures by the act of moving toward an objective. These signatures will allow a defender to identify the approaching force and determine when and how it wants to engage.

In contrast, a defensive force, if properly configured, equipped, and trained, can avoid creating any signature until the moment it fires its weapons. However, to achieve this, the defenders need to disperse from fixed facilities, minimise emissions, blend into the environment, and seek overhead cover.

To minimise electronic emissions, the defenders can rely on passive sensors as well as small drones and commercial sources. Defenders can also employ existing low probability of intercept and/or commercial communications systems that blend into civilian activity. To hide in plain sight, defending forces can mount their weapons on commercial vehicles or in standard shipping containers.

Then they can make use of commercial garages, truck parks, container yards, etc. to hide them. While their vehicles can be seen when moving, the attacker will have to sort them from the numerous similar vehicles and containers that are present in even small communities.

Autonomous Missiles, Landing Drones & Lasers

In the ground domain, hundreds of autonomous drones will make vehicular movement extremely costly. An explosively formed projectile weighing as little as 150 grams can penetrate over 1 cm of steel. This is sufficient to achieve a mobility kill on most wheeled

vehicles. In addition to very small drones, there is a rapidly growing family of autonomous missiles and vertical take-off and landing drones that can kill even armoured vehicles at ranges out to hundreds of kilometres.

At sea, containerised weapons can turn any oceangoing ship into a warship. So even small states can field significant naval forces. They can be reinforced by mobile, land-based, long-range anti-ship ballistic and cruise missiles as well as long-range drones. Large weapons can sink ships but even small ones carry warheads sufficient for mission kills.

Missiles and even some drones now outrange many tactical fighter aircraft. This means the fighters must either operate from airfields within missile/drone range or must have sufficient tanker support to fly from outside that range. The fact that most manned aircraft require large, easily targeted and hard-to-defend airfields make these very expensive platforms highly vulnerable to mobile missile systems.

As directed energy weapons – lasers and microwaves – are fielded, they will increase the power of the defence. Both systems require large power supplies. A land-based defender has access to the entire national power grid. Just as important, the land-based defender can hide its weapons in the natural clutter so they cannot be detected until they fire.

Small Satellites Shifting the Balance in Space

The advent of small satellites is also shifting the balance in space to the defence. The sheer number of small satellites in orbit and the increasing ability to rapidly replace them means that degrading space capabilities is both more difficult and expensive than attacking them.

Cyber and the electromagnetic spectrum will remain contested environments but, to date, have not demonstrated the ability to defeat an enemy by themselves. In short, the ability to see potential opponents at great range and engage them with accurate but relatively cheap weapons can provide a major but affordable boost to small state defences.

If wielded by forces that are difficult to locate and target, these cheap weapons can provide a much greater deterrent to larger powers. Currently, large powers can be fairly confident in locating potential enemy defensive forces and severely degrading them before their own forces are within range.

Fortunately, small states can now alter that reality. By fielding long-range, autonomous, precision weapons that blend into their societies and exploiting pervasive surveillance, small powers can deter larger powers with the knowledge that they will suffer significant damage in violating the small state's sovereignty.

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