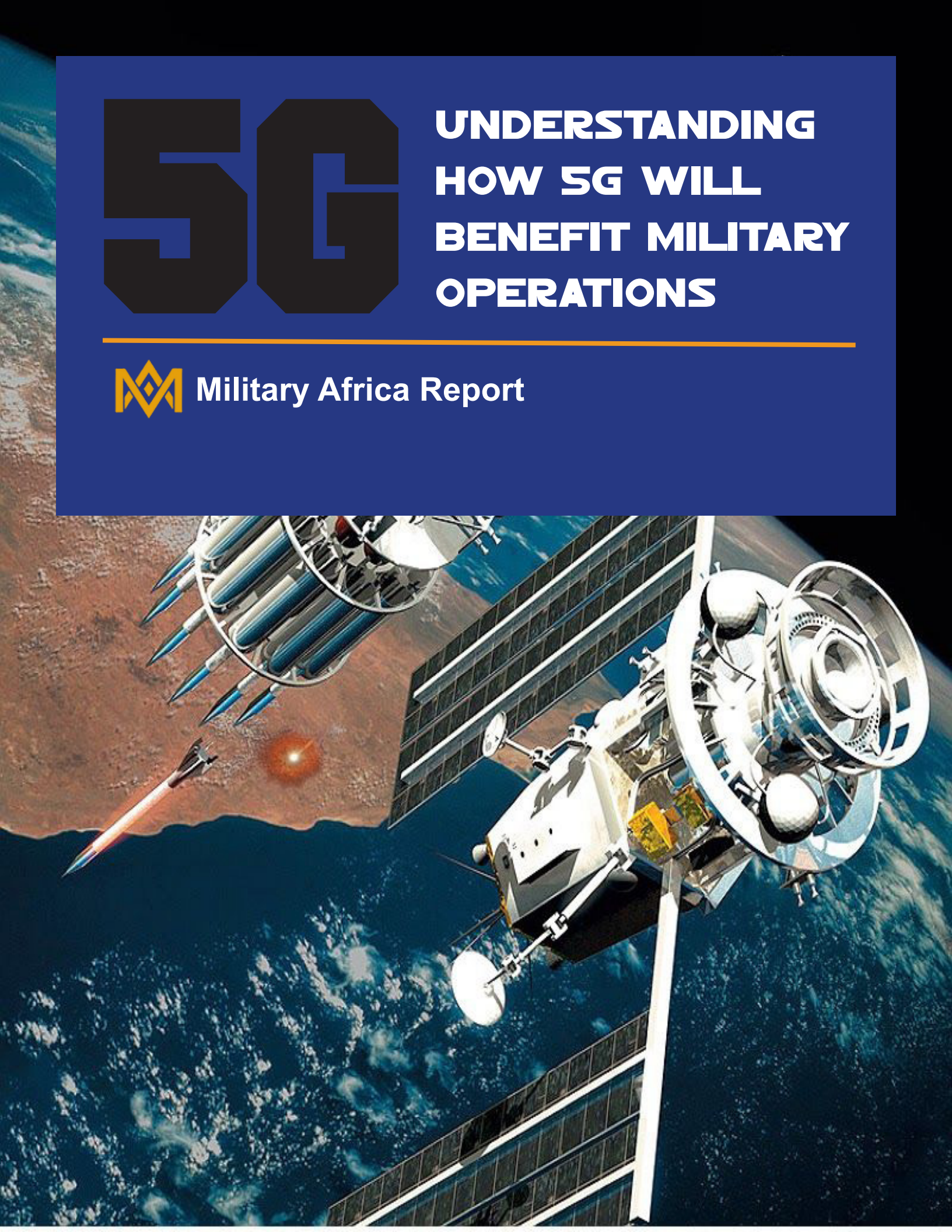


# 5G

## UNDERSTANDING HOW 5G WILL BENEFIT MILITARY OPERATIONS

 Military Africa Report







## HOW 5G WILL BENEFIT MILITARY OPERATIONS

**I**magine a field commander able to instantly access intelligence imagery and data of his immediate operational environment down to several miles away; receive information on multiple threat vectors as they develop, and process this information to guide his decision-making.

Or a smart warehouse able to ship out vital spares to the frontiers of allied forces' operations before it is even needed. And even driverless electric-powered trucks commute between industrial clusters and the forward operating bases. With faster speeds, superior reliability, and lower latency, 5G will expand the military operations into new realms.

A more stable and faster cellular connectivity enables more than just video conferencing and reliable internet. More sensors, lots of data, will offer the possibilities of better security, Artificial Intelligence, self-driving vehicles, drones, and improved asset management. All these will be transformed by 5G.

Robust cellular connectivity will improve the usefulness of those things by integrating these technologies in a fast and reliable communication network and can be differentiators providing strategic and tactical advantages on the battlefield. For a long time, communication is an integral part of military activities and must be reliable, fast, and secure.

5G is a fifth-generation wireless technology that introduces speed, lower latency, and more bandwidth (able to connect a lot more devices at once). It is unquestionably one of the fastest, most robust technologies the world has ever seen.

## History of 5G

The first generation of mobile technology, 1G, was about voice. Introduced in the 1980s, 1G delivered an analog voice. 2G introduced a short-messaging layer that formed the basis of today's texting features. Unveiled in the early 1990s, 2G introduced digital voice (e.g. CDMA- Code Division Multiple Access). Third generation – 3G ushered in mobile data (e.g. CDMA2000) in the early 2000s, pioneering the necessary network requirements for smartphones connectivity. 4G LTE introduces in the 2010s with superior data transfer speed ushered in the era of mobile broadband, giving rise to many of the connected devices and services that we rely on today.

## How fast is 5G?

Based on IMT-2020 requirements, 5G network can deliver peak data rates up to 20 Gbps, some technology like Qualcomm® Snapdragon™ X65 has achieved up to 10 Gbps in downlink peak data rates.

Besides blazing speed, 5G offers much more network capacity or bandwidth by using newer frequently spectrum, such as millimeter Wave (mmWave).

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# ADVANCING MILITARY MOBILITY

In addition, even when users are in motion, 5G with its lower latency will still keep the data rates consistently high especially since the 5G network is based on a Gigabit LTE.

## How 5G can help the military

Military Drones, self-driving vehicles, Artificial Intelligence, and other applications that depend on instantaneous response and data analysis can now live up to their potential.



- **5G and Drones**

Experts believe that the future of drones would be cellular, and not just radio frequency as previously expected. More sensors connected to a more robust cellular network will communicate and enabled much better teaming with ground robotics.

In no distant time, smart drones will also become even more adaptable and will be

able to monitor and control their flight path.

To put things in context, today's smart drones require smart sensors connected to an onboard synthetic vision system and artificial intelligence (AI)-powered technologies to detect objects on its path.

However, 5G technology will enable the smart drone to better cope with today's complex environmental conditions, particularly with the rapid growth in AI and powerful algorithms.

5G network owing to its high-speed capacity could be used to transfer sensor data between multiple drones to enable swarming (i.e., cooperative behavior in which drones autonomously coordinate to achieve a task). Fighter Pilots could use augmented-reality goggles to control drones launched off the aircraft.

Finally, with 5G comes 4K video, object recognition, faster data processing, and artificial intelligence offer improved reconnaissance capacity, providing militaries with real-time and accurate pictures of the belligerent's information.

- **5G, Logistics and maintenance**

The biggest gainer of 5G technology in the military is the integrated logistic support personnel who will now know the exact location and condition of every asset.

5G technologies could lower latency in data-intensive activities in logistics and maintenance. Military logistical support personnel will know beforehand which asset will require maintenance or overhaul.



- **5G and Autonomous electric vehicles**

Connectivity enables a new approach to logistics and resupply, as autonomous electric vehicles will deliver much-needed spare parts and other essential material to forward-deployed points while relying on sophisticated navigational and control systems. Autonomous military vehicles could potentially store maps in the cloud.

With autonomous trucks conducting supply runs, 5G connectivity will open up the possibility of eliminating human casualties from vulnerable convoys/

And pairing autonomous vehicles with electric propulsion will cut out periodic refueling stops thereby saving time.

- **5G and Data**

Warehouses with distributed sensor arrays will improve the management of items inside, and those large data flows, which will help to better predict when items would be needed.

The entire supply chain will benefit from 5G and its ability to connect and communicate with different nodes. Sensor suites connected to artificial intelligence and machine learning will aggregate the data at the software level and the user interface level, thereby enhancing predictive inventory control. Now warehouse managers will quickly and easily detect anomalies at scale.

Speed is everything on the battlefield, and 5G's

lower latency and higher capacity will help militaries share more data, such as real-time maps and photos of battlefield scenarios, as well as to conduct computer simulations faster and realistically.

- **5G, Command and Control (C2), and ISR**

5G could also be used to analyze, process, and transfer information from battlefield sensors, essentially providing field commanders with timely access to actionable intelligence data to improve operational decision-making.

Also, command and control (C2) points could benefit from the reduced latency and blazing speed capability of 5G communication. For example, most modern militaries currently use satellite links for their long-distance communications. However, due to the long distance, a signal needs to travel, these can significantly increase latency thereby causing delays in executing military operations.

The high frequency, short-wavelength 'millimeter-wave' spectrum that allows the 1Gbps+ speeds over 5G is perfect for making smart military bases and command posts a reality. Command posts and vehicles can communicate with each other in real-time.

- **5G and smart soldier system**

One important feature of 5G is the mMTC (massive Machine Type Communications) capability, which can enable up to a million connected devices per square kilometer. Several of those connected devices could be biometric wearables for infantry, which can monitor and share their vital statistics like geographical position, heart rate, blood pressure, and fatigue via encrypted 5G network.

5G would also make it possible for connected augmented reality devices streaming real-time data to command nodes and other forward-deployed units.

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# Challenges preventing military adoption of 5G technology

Adoption 5G confronts militaries with complicated new requirements for technology development and procurement.

Essentially, militaries still prefer radio and satellite communications in battlefield contexts because they can easily control the hardware.

5G signals will operate in the millimeter-wave range which will require many more fixed-site and mobile antennas and towers than 3G and 4G cell services requirements necessitate significant investments.

Also, 5G frequency bands do not penetrate walls, rain, or foliage very well so they need a lot of towers or radiators. The military will have to pay for many more base stations to get the complete 5G network coverage.

## Conclusion

5G network is regarded as critical infrastructure, its speed could likely shape the competition for 21st-century dominance.

5G is already here today, the technology is now available in more than sixty countries. There's a faster adoption rate for 5G when compared to

the previous generation 4G. But 5G goes beyond speed, the technology also provides the capability for mission-critical services, enhanced mobile broadband, and seamless communication.

As an investor, 5G offers a whole lot of opportunities, particularly in the following sectors chipmakers, telecom, mobile broadband, and cell tower companies. Fifth-generation wireless technology, or 5G, is poised to emerge in a big way into the defense market.

With 5G adoption occurring all around the world, electronic warfare (EW) and spectrum-management applications could also see an evolution following the implementation of 5G architectures. The use of 5G and its incorporation into intelligence, surveillance, and reconnaissance (ISR) systems could indelibly alter how the military gathers actionable intelligence, ranging from how the DoD detects/is detected to further opening vast avenues of data collection.

For the military, 5G technologies allow for the operation of several potential applications to include C2 [command and control], logistics, maintenance, training, AI [artificial intelligence], augmented and virtual reality, and ISR systems – all of which can benefit from improved data speeds and lower latency.

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