

## **SOLVING TERRORISM SECURITY CHALLENGES USING SENSOR NETWORK TECHNOLOGY**

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### **Abstract**

*Terrorism is a global concern that is demanding the attention of both developed and developing countries. In particular, Nigeria as a nation had witnessed a major devastating terrorist attacks in the northern region in the recent years. Solving security challenges is always a top priority government function as much fund is budgeted on year basis. This paper proposes a Security System Architecture using wireless integrated network sensor (WINS) which will consist of Remote Sensing Video Cameras, a hybrid combination of Passive Infrared (PIR) and Ultrasonic Sensors technology, among others to track and curb solve security challenges caused by terrorism activities. The study used Sambisa forest as case study*

**Keywords:** *Surveillance, Sensors technology, Security, Wireless integrated Sensors.*

### **INTRODUCTION**

Security is the degree of resistance to or protection from harm. It applies to any vulnerable and valuable asset, such as a person, dwelling, community, nation or an organization. Security is very paramount in everyday life and also the first assignment of any governing body as nothing could be done under insecurity of lives and property. Security has come to presume increase importance in the world today as the rate of crimes have also grown in magnitude especially since the end of the wars and start of Globalization (Akinyemi, 2013).

Boko-Haram is a terrorist group as evident in killings and bombing in the northern part of Nigeria, in which their ideology against the western education. According to (Onapajo, 2017) Boko Haram continues to pose a threat to Nigeria and the West African sub-region, contrary to claims that it has been defeated. In order to solve this security challenges, a ICT based framework is proposed which could leverage on the fact that Nigeria has been identified as third fastest growing telecoms nation in the world and the fastest growing nation in Africa (Ayo and Oni, 2011).

The rest of the paper is presented as follows: Section 1 is introduction; section describe the demography

### **LITERATURE REVIEW**

#### **Demography of Sambisa Forest**

It is in the southwestern part of Chad Basin National Park, about 60 kilometres (37 mi) southeast of Maiduguri, the capital of Borno State. It is elevated at 359 metres (1,178 ft), with

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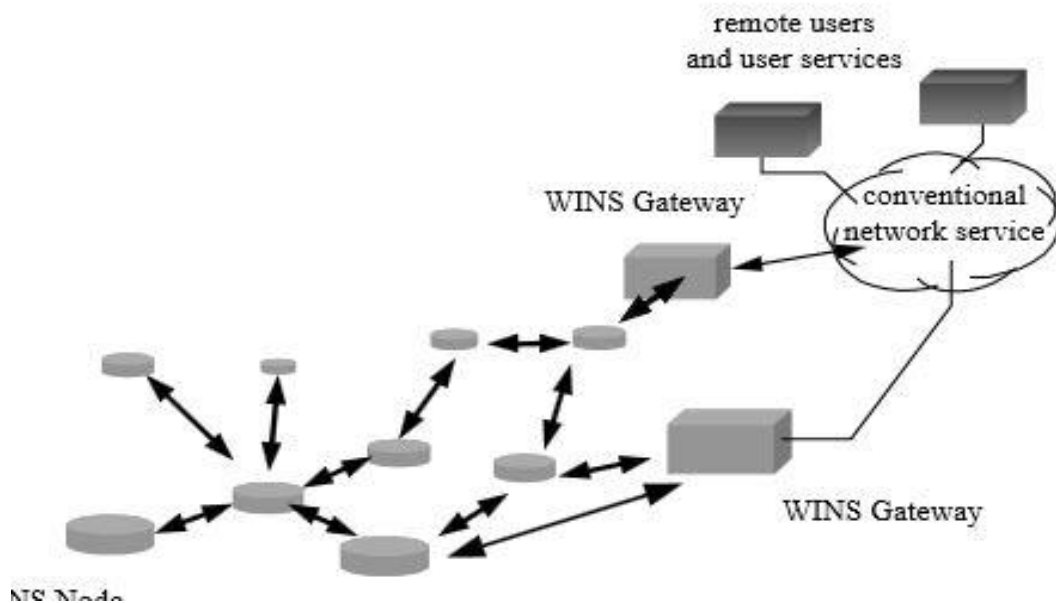
coordinates: 11° 15' 0" N, 13° 25' 0.12" E covering an area stretching approximately 60,000 square kilometers. The climate is hot, dry and wet with minimum temperatures of about 21.5 °C and 48 °C and average temperatures of about 28-29 °C. The dry season is from November to May and the wet season is between May and September/October with annual rainfall of about 190 mm. The Sambisa forest, especially the mountainous region of Gwoza near the Cameroon border, is used as shelter and base center by the jihadist Boko Haram group.

**Wireless Integrated Network Sensors (WINS)**

A sensor is an electronic device that detects/measures events or changes in quantities and provides a corresponding output, generally as an electrical or optical signal, that is, sensors are devices that translate aspects of physical reality into representations understandable and can be processed by computers (Goran, 2010). Sensors convert physical parameter, for example; temperature, speed, humidity etc. into a signal that can be measured electrically (Osvaldo 2011). A sensor's sensitivity indicates how much changes occur during output when the quantity input being measured changes; it is therefore defined as the ratio between output signal and measured property.

Wireless Integrated Network Sensor provide distributed network and Internet access to sensors, controls and processors that are deeply embedded in equipments, facilities and environment. It helps in controlling and monitoring capability of applications in field like transportation, manufacturing, healthcare, environment monitoring, safety, security etc. (Pottie 2002). WINS development was initiated in 1993 under Defense advance research project agency (DARPA) in US. In 1998, WINS introduced for wide variety of applications such as multihop, self-assembled, wireless network algorithms for operating at micro-power levels.

Networks under WINS also provide local control, sensing and embedded intelligent systems in structures, environment and material. It contains micro sensor technology, low power, and low cost wireless networking capability in compact system. The compact geometry and low cost allows WINS to be implemented and distributed at a quarter of the cost of using wire sensors and processing of WINS at source would exceed reduce the cost, management and computational burden on communication components, network and ICT staff (Pottie, 2002). WINS technology was announced by the House Science Committee as one of the nation's technology breakthroughs in the "Great Advances in Scientific Discovery During the 105th Congress" on 24 September 1998.



*Figure 1:* Wireless integrated network sensor node ( Pottie & Kaiser, 2000).

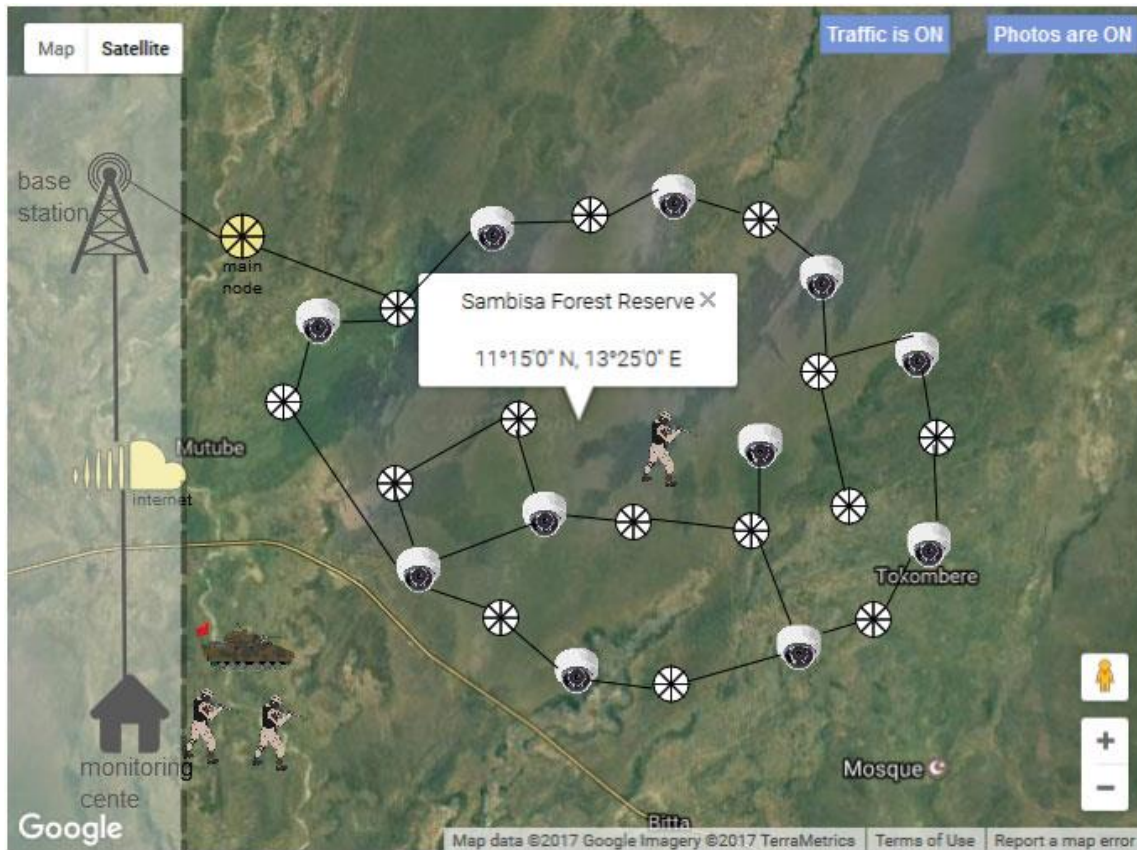
### PROPOSED ARCHITECTURE

The proposed frame work in figure 2 will be an unstructured wireless integrated network sensor security system with pre-planned deployment and low network maintenance setup around selected areas in 23166.13 square mile of the Sambisa forest along the borders of Nigeria. This system will consist of remote sensing video cameras, a hybrid combination of Passive Infrared (PIR) and Ultrasonic Sensors technology wirelessly distributed or networked in an unstructured manner and ultimately connected to a control or main node. The sensors are smart. This refers to the ability of the sensor to transmit data (either collected or requested by its control) through the available network, without any intervention from its control. The main node communicates with the Base Station (gateway) which sends captured data to the cloud for onward monitoring by the security team. It is important to note that there could be several gateways pending on the preplanned deployment strategy.

The security system uses passive infrared with ultrasonic sensors that have transmitter and receiver part. The ultrasonic transmitter periodically emits ultrasonic signals into an open area in front of it, if the signal ever hits a physical object, it will be reflected back and, the receiver part of the sensor will then capture it. The object considered is detected at its position with the integrated remote sensing digital video cameras. The recorded feeds from numerous cameras allow video playback of any camera at any time. The forest will be divided into different regions that each contain a node or number of nodes with the main node residing over them. Each node will be in contact with the main node and the noises produced and the movement of the footstep of extremist group or solders will be gathered using sensors. The sensed signal collected will then be transformed into power spectral density (Pankaj Kumar Sa, 2010).

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With Various Sensor nodes and cameras on the Wireless integrated network sensor, transmitting data to a main node, that is then transmitted to a monitoring system with at least 10 monitors transmitting live digital feeds each with instant playback and security personnel on ground to responds to alert and threats. Upon object detection, an alert (with measured parameters) is sent to the monitoring system office containing the exact time, exact location and live feeds of when the security alert was triggered.



*Figure 2:* Proposed system Architecture.

**CONCLUSION**

The government of any country could be said to be effective if it has attained, among others, security that is, protection of life and properties using efficient systems and structures. (Ayo et al., 2015). A sensor network security system has been proposed through this paper to provide essential framework to solving the terrorism security issues. The proposed design possesses competitive features to many of the security system already deployed at various part of the world as it is an improved version of an already implemented security at the United State Border Security System. With proper implementation of the proposed framework, the potential to use these sensors security information provided to the monitoring team is only limited by their imagination; basically the security team would be forewarned and forearmed.



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