AN EFFICIENT WSN BASED SOLUTION FOR BORDER SURVEILLANCE

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Abstract: *For an extended time, the integrity of physical boundaries has been a challenge. In fact, governments should facilitate travel and trade in order that economies can thrive while preventing the entry of dangerous companies. For this purpose, many traditional methods are utilized in recent times to secure borders. However, given the vastness of the sector, such solutions require serious human involvement and high operating costs. It suggested the utilization of latest technologies like wireless sensor networks (WSN) to scale back costs and improve the efficiency of cross-border monitoring systems. Although the utilization and combination of those methods is completed in various existing solutions, some important aspects like energy efficiency, load balancing and redundancy elimination must be considered. during this paper, we first propose a multilevel hybrid architecture supported cameras, scalar sensors, radars and UAVs to make a boundary closed-circuit television . Then, an in depth deployment strategy is discussed. Finally, an activation scheduling strategy supported load balancing and energy saving is addressed. The simulation results indicate that our solution not only detects intrusion across the border, but also improves other solutions by effectively managing the network and increasing its lifetime.*

Keywords: Wireless sensor network, TCP/IP, SENSCAR device

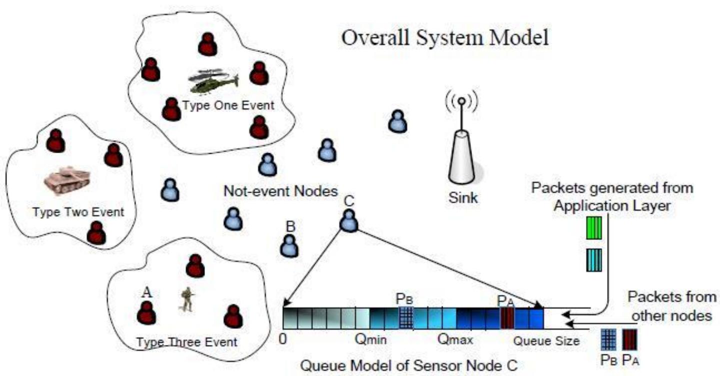
I. METHODOLOGY

This paper gives the fundamentals of wireless sensor networks and network simulator. For understanding, we should havea sound knowledge on the following topics.

WIRELESS SENSOR NETWORKS

Wireless sensor networks have recently gained prominence as they need the potential to revolutionize our economy and lots of areas of life, from environmental monitoring and protection to manufacturing and commercial property management, to automation in the transportation and healthcare industries. The design, implementation and operation of sensor networks require the confluence of the various disciplines, including signal processing, networking and protocols, embedded systems, information management and distribution algorithms. Such networks are often used in a resource environment, such as nodes running without batteries. These obstacles suggest that sensor network problems can be best addressed by taking into consideration the physical, networking and application layers and creating key design tradeoffs in the layers. Wireless technology has expanded our global boundaries. With this invention, people are given the freedom to work from their desk or even outside. The new freedoms that people began to enjoy with their computers began to create a mixed world of technology and nature. Wireless sensor networks are the next step in this technology-nature integration. Despite being young technology, the apps promise to be more diverse and more diverse. These networks are collections of small devices called dots with limited computational power. Each MOT comprises about 1–100th of a PDA's computing power, but when combined with hundreds of other dots, they combine to form a high-efficiency system.

Wireless sensor networks or WSNs are utilized in scientific studies to enable better data collection, create simpler strategic military defenses, determine the source of firearms, and monitor factory machines. All these uses rely on the ability to collect data such as light, vibration, humidity, temperature, and more, as well as the ability to communicate with each other. This ultimate capability makes it a very powerful collection of mods at any given time. Sensor networks deepen the existing Internet into the physical environment. The resulting new network is more dynamic and dynamic than the current TCP / IP network, and it is now generating a completely new type of traffic that is different from what we find on the Internet. Information gathered and transmitted through sensor networks describes physical weather , as an example , temperature, humidity or vibration, and requires advanced query interfaces and search engines to effectively support user-level tasks. The sensor network can inter-network with the IP core network through a variety of gateways. The gateway commands user queries or appropriate nodes on the sensor network. It also guides data from sensors, which sometimes collects and captures users who have requested or intend to use the information. In addition to data logging on each sensor, a data repository or storage service may be at the gateway.



II. WSN WITH MOBILE SENSCAR DEVICE

In WSN with Mobile Sensor, determining how the mobile sensor goes about collecting sensor data is a fundamental issue. Among the many ideas introduced for energy conservation approaches in wireless sensor networks [10], [14]. Some policies have the advantage of saving energy on a single-channel, but the network should also benefit multi-hop networks. We have basically two methods for collecting data from sensor nodes using sensor devices in wireless sensor networks

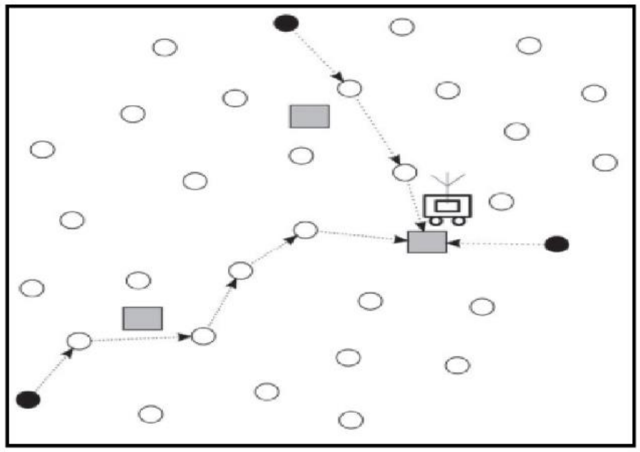
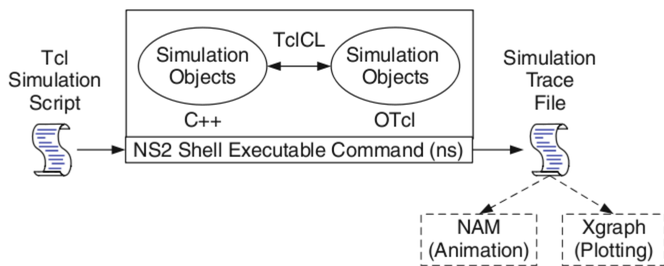


Fig.2. Mobile Senscar device with WSN

III. SIMULATION AND SPECIFICATION

Network Simulator (version 2), widely known as NS2, is just an event-based simulation tool that has proven useful for studying the dynamic nature of communication networks. Wired as well as wireless network functions and protocols (eg, algorithms, routing algorithms, TCP, UDP) can be simulated using NS2. In general, NS2 provides users with a way to specify such network protocols and simulate their associatedbehavior



A. Packets

It is the collection of data, whether header is called or not,all header files where present in the stack registers.

Cmn header
Ip header
Tcp header
Rtp header
Trace header

Fig.4. Stack Register of Packet

B. Turn on tracing

Trace packets on individual link Trace file format

event	time	from node	to node	pkt type	pkt size	flags	fid	src addr	dst addr	seq num	pkt id

```
r : receive (at to_node)
+ : enqueue (at queue)          src_addr : node.port (3.0)
- : dequeue (at queue)          dst_addr : node.port (0.0)
d : drop    (at queue)
```

```
r 1.3556 3 2 ack 40 ------- 1 3.0 0.0 15 201
+ 1.3556 2 0 ack 40 ------- 1 3.0 0.0 15 201
- 1.3556 2 0 ack 40 ------- 1 3.0 0.0 15 201
r 1.35576 0 2 tcp 1000 ------- 1 0.0 3.0 29 199
+ 1.35576 2 3 tcp 1000 ------- 1 0.0 3.0 29 199
d 1.35576 2 3 tcp 1000 ------- 1 0.0 3.0 29 199
+ 1.356 1 2 cbr 1000 ------- 2 1.0 3.1 157 207
- 1.356 1 2 cbr 1000 ------- 2 1.0 3.1 157 207
```

Fig 5.2 Trace of a packet

C. Creating network topology (physical layer)

The physical layer is the first and lowest layer in a seven-layer OSI model of a computer layer. The implementation of this layer is often called PHY.The physical layer covers the network's basic hardware transmission methods. This is the basic layer that underlies the logical data structures of high-level functions in the network.Due to the abundance of hardware technologies available with a wide variety of features, this is probably the most critical layer in OSI architecture.The physical layer defines the means of transmitting raw bits instead of logical data packets through a physical link that connects networking nodes.Bit streams can be classified as code words or symbols and can be physically transmitted over hardware.

D. Transport connection (transport layer)

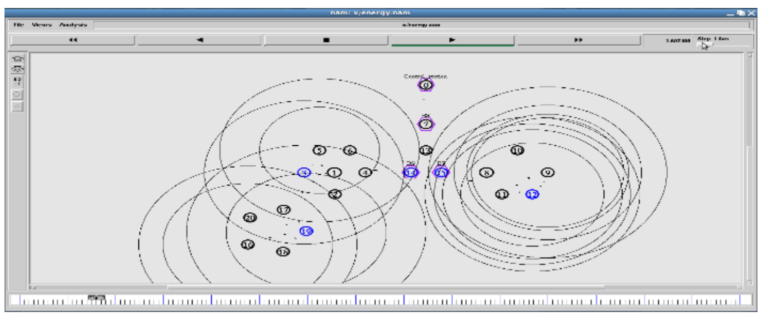
The transport layer is embedded in both TCP / IP, which is the foundation of the Internet and the OSI model of general networking. The definition of the transport layer is slightly different in these two models. This article mainly addresses the TCP / IP model, in which TCP is widely intended to be a convenient application-programming interface for Internet hosts, in contrast to the OIS model of the definition interface. The most famous is the Transport Protocol (TCP). This gave the title of the entire Internet Protocol Suite TCP / IP. It is used for connection-based broadcasting, while the connectionless User Datagram Suite (UDP) is used for general messaging. TCP is a more complex protocol due to the inclusion of reliable streaming and data stream services.

E. Generate traffic (application layer)

In TCP / IP, the application layer encompasses all protocols and modes of process-to-process communication over the Internet Protocol (IP) network using the Transport Layer Protocol to establish the underlying host-to-host connection. Come. In the OSI model, its application is narrow within the definition of the layer, with two additional levels of transparency on the transport layer: the Session Layer and the Presentation Layer OSI specifies the strict modular separation of functionality at these layers and provides a protocol that rules each layer.

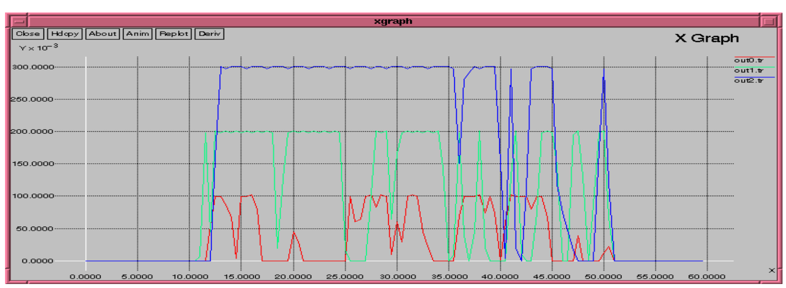
IV. NETWORK ANIMATOR

Network Animator (NAM) provides packet level simulation output graphically. Network Animator is an animation tool for viewing network simulation traces and real-world packet traces. It supports topology layout, packet level animation and various data checking tools. Before you can start using NAM, a trace file needs to be created. This trace file is usually generated by NS. It contains topology information, e.g. Nodes and links, as well as packet traces. During the simulation, user topology configuration, layout information and packet traces can be generated using events in NS. Once the trace file is generated, NAM can be used to animate it as shown in Figure 5.1. Initially, NAM reads the trace file, creates the topology, pops up the window, layout if necessary, and then pauses for the time being. 0. Through its user interface, NAM provides control over many aspects of animation.



Xgraph

Provides the throughput comparison based on a graph which will be generated automatically based on the TCL coding



V. RESULT

In this paper, a WSN-based solution to identify and monitor boundaries against intrusion is introduced. In this case, an effective multilevel hybrid architecture is proposed and discussed. The proposed framework combines multidirectional cameras, scalar sensors (UGS), radars and

UAVs to reduce the cost of deployment and operation of surveillance. These tools work together to provide an effective solution. Simulation results comparing our solutions with existing methods are reported and show the potential of the proposed approach. Future research will inspire us to expand deployment and activation strategies for new features so that different requests can be solved simultaneously and deal with node failures.

VI. REFERENCES

1. *1. [1] D. Papademetriou and E. Collett, A new architecture for border management, Management Policy Institute, Washington, DC-USA, MAR 2011.*
2. *2. [2] G. Loney, Border intrusion detection: thinking outside the perimeter, 41st Annual IEEE International Carnahan Conference on Security Technology, pp. 0106, Oct 2007.*
3. *3. [3] E. Systems, Unattended ground sensors network (USGN), http: /defense-update.com/newscast/0608/news/news1506 ugs.htm, Copyright 2016 Defense-Update.*
4. *4. [4] T. Damarla, A. Mehmood, and J. Sabatier, Detection of individuals and animals using non-imaging sensors, 14th International Conference on Information Fusion, Chicago-Illinois, USA, vol. 09, no. 03, pp. 468 477, Jul 5-8 2011.*
5. *5. [5] K. K.B.Madhavi and G. RishikeshM, Border security using wins, International Journal of Advanced Trends in computing and Engineering, vol. 03, no. 01, pp. 112116, Feb 2014.*
6. *6. [6] R. Ramzi Bellazreg, N. Boudriga, K. Trimche, and S. An, Border surveillance : A dynamic deployment scheme for wsn-based solutions, Wireless and Mobile Networking Conference (WMNC), 6th Joint IFIP, vol. 01, pp. 2325, Apr 2013.*
7. *7. [7] J. Robert and P. Gervasio, An unattended ground sensor architecture for persistent border surveillance, Proc. SPIE 6980, Wireless Sensing and Processing III, vol. 6980, pp. 69 800A69 800A8, Apr2008.*
8. *8. [8] S. Babu Nr, A. Swaminathan, and D. C. JoyWinnieWise, Boarder analysis with ensora and doa using wireless sensor networks, Sixth International Conference on Emerging trends in Engineering and Technology, pp. 7683, 16-18 Dec 2013.*
9. *9. [9] J. Blazakis, Border security and unmanned aerial vehicles, Congressional Research Service, Report for Congress, vol. RS21698, pp. 0106, Jan 2004.*
10. *10. [10] C. Haddal and J. Gertler, Homeland security: unmanned aerial vehicles and border surveillance, Congressional Research Service, Report for Congress, vol. RS21698, pp. 0110, JUL 2010.*
11. *11. [11] D. Bein, W. Bein, A. Karki, and B. Madan, Optimizing patrol operations using unmanned aerial vehicles, 12th International Conference on Information Technology - New Generations, pp. 479484, 13-15 Apr 2015.*
12. *12. [12] K. Kalyanam, P. Chandler, M. Pachter, and S. Darbha, Optimization of perimeter patrol operations using unmanned aerial vehicles, Journal of Guidance, Control, and Dynamics, vol. 35, no. 02, pp. 434441, Apr 2012.*

13. *13. [13] A. R. Girard, A. S. Howell, and J. K. Hedrick, patrol and surveillance missions using multiple unmanned air vehicles, in Decision and Control, 2004. CDC. 43rd IEEE Conference on, vol. 01, no. 10.1109/ITNG.2015.83, pp. 620625, 14-17 Dec 2004.*
14. *14. [14] B. Hayes and M. Vermeule, Borderline the eus new border surveillance initiatives, assessing the costs and fundamental rights implications of eurosur and the smart borders proposals, Proposals: a Study by the Heinrich Bll Foundation, Jun 2012.*
15. *15. [15] t. m. s. c. Inmarsat, Border Surveillance Systems, Blighter scanning radar and sensor solutions, http://www.inmarsat.com/ wpcontent/ uploads/2015/12/Blighter e.pdf, Jul 2015.*