

the BIT

the Bulletin of Information Technology

FEB - MAR 2009



Department of Information Technology
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY
Rajagiri Valley, Cochin - 39

MAC Protocol specific for sensor networks



NITHYA JOY
LECTURER, DIT

Improvements in hardware technology have resulted in low-cost sensor nodes, which are composed of a single chip embedded with memory, a processor, and a transceiver. Low sensing ranges result in dense networks and thus it becomes necessary to achieve an efficient medium-access protocol subject to power constraints. Various medium-access control (MAC) protocols with different objectives have been proposed for wireless sensor networks. Unlike other wireless networks, it is generally difficult or impractical to charge/replace exhausted batteries. That is why the primary objective in wireless sensor networks design is maximizing node/network lifetime, leaving the other performance metrics as secondary objectives.

To design a good MAC protocol for wireless sensor networks, the following attributes must be considered. The first attribute is energy efficiency and the other important attributes are scalability and adaptability to changes. Other important attributes such as latency, throughput, and bandwidth utilization may be secondary in sensor networks. We can reduce the energy waste caused by idle listening by sleep schedules. One of the protocols that utilize this property is Sensor Mac.

Sensor - MAC

Locally managed synchronizations and periodic sleep-listen schedules based on these synchronizations form the basic idea behind the Sensor-MAC (S-MAC) protocol. Neighboring nodes form virtual clusters so as to set up a common sleep schedule. If two neighboring nodes reside in two different virtual clusters, they wake up at the listen periods of both clusters. A drawback of the S-MAC algorithm is this possibility of following two differ-

ent schedules, which results in more energy consumption via idle listening and overhearing. Schedule exchanges are accomplished by periodic SYNC packet broadcasts to immediate neighbors. S-MAC also includes the concept of message passing, in which long messages are divided into frames and sent in a burst. With this technique, one may achieve energy savings by minimizing communication overhead. Periodic sleep may result in high latency, especially for multihop routing algorithms, since all intermediate nodes have their own sleep schedules. The latency caused by periodic sleeping is called sleep delay. In that technique, the node that overhears its neighbor's transmissions wakes up for a short time at the end of the transmission. Hence, if the node is the next-hop node, its neighbor could pass data immediately. The end of the transmissions is known by the duration field of the RTS/CTS packets.

“As a rule, software systems do not work well until they have been used, and have failed repeatedly, in real applications.”

– Dave Parnas

WiseMAC

WiseMAC is a novel energy efficient medium access control protocol based on synchronized preamble sampling. The data channel is accessed using TDMA, whereas the control channel is accessed by CSMA. WiseMAC protocol uses non-persistent CSMA (np-CSMA). In the preamble sampling technique, a preamble precedes each data packet for alerting the receiving node. All nodes in a network sample the medium with a common period, but their relative schedule offsets are independent.

If a node finds the medium busy after it wakes up and samples the medium, it continues to listen until it receives a data packet or the medium becomes idle again. The size of the preamble is initially set to be equal to the sampling period. However, the receiver may not be ready at the end of the preamble, due to factors such as interference, which causes the possibility of over-emitting-type energy waste. To reduce the power consumption incurred by the predetermined fixed-length preamble, WiseMAC offers a method to dynamically determine the length of the preamble.

That method uses the knowledge of the sleep schedules of the transmitter node's neighbors. The nodes learn and refresh their neighbor's sleep schedule during every data exchange as part of the acknowledgment message. In that way, every node keeps a table of the sleep schedules of its neighbors.

Based on the neighbors' sleep schedule tables, WiseMAC schedules transmissions so that the destination node's sampling time corresponds to the middle of the sender's preamble. To decrease the possibility of collisions caused by that specific start time of a wake-up preamble, a random wake-up preamble is advised.

IPsec Process

IPsec (Internet Protocol Security) is a framework of open standards for protecting communications over Internet Protocol (IP) networks through the use of security service. It involves many component technologies and encryption methods. In IPsec, OAKLEY/Diffie-Hellman techniques are used by two devices to come up with a common shared key, to be used for DES or 3DES encryption. ISAKMP (Internet Security Association and Key Management Protocol) is the packet

format and protocol used by IPsec to manage keys. The process of exchanging keys for IPsec is referred to as IKE (Internet Key Exchange). IPsec's operation can be broken down into five main steps. The five steps are summarized as follows:

Step 1: Defining Interesting Traffic

Traffic is deemed interesting when the IPsec security policy configured in the IPsec peers starts the IKE process. Determining what type of traffic is deemed interesting is part of formulating a security policy for use of a VPN (Virtual Private Network). The policy is then implemented in the configuration interface for each particular IPsec peer.



USHA BASTIN
LECTURER, DIT

Step 2: IKE Phase One

The basic purpose of IKE phase one is to authenticate the IPsec peers and negotiates IKE SAs (Security Association, an agreement between two devices (parties) as to how to go about doing encryption) during this phase and to set up a secure channel between the peers to enable IKE exchanges.

Step 3: IKE Phase Two

The purpose of IKE phase two is to negotiate IPsec SA parameters protected by an IKE SA to set up the IPsec tunnel. It also establishes IPsec security associations and periodically renegotiates IPsec SAs to ensure security.

Step 4: IPsec Encrypted Tunnel

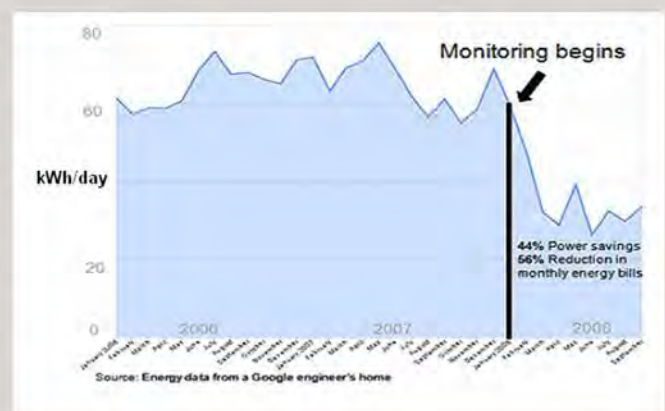
After IKE phase two is complete and quick mode has established IPsec SAs, information is exchanged by an IPsec tunnel. Packets are encrypted and decrypted using the encryption specified in the IPsec SA.

Step 5: Tunnel Termination

IPsec SAs terminate through deletion or by timing out. An SA can time out when a specified number of seconds have elapsed or when a specified number of bytes have passed through the tunnel. When the SAs terminate, the keys are also discarded. When subsequent IPsec SAs are needed for a flow, IKE

Google power Meter...a tool helps to reduce energy usage.

Google is planning to develop software that help consumers track their home energy usage and thereby lower demand and the global warming emissions that come from producing electricity. Google said it is developing a smart grid tool called Google PowerMeter that will show home energy consumption almost in real time on a user's computer. Smart grid describes a more efficient, less costly method of moving electricity along long-distance transmission lines to local power lines and end-users in homes and businesses.



“Programming without an overall architecture or design in mind is like exploring a cave with only a flashlight: You don’t know where you’ve been, you don’t know where you’re going, and you don’t know quite where you are.”
– Danny Thorpe

ARCHOS Launches Intel Atom Powered Mini Laptop

ARCHOS, award winning technology innovator and leader in the portable media player market, announced the launch of its first mini laptop. The small, light and functional ARCHOS 10 provides a complete out-of-the-box solution and gives people a new way to stay connected, productive and entertained while on the go. It boasts a range of communication technologies, including 802.11b.g wireless and an Ethernet LAN, and is USB 3G ready. In addition, ARCHOS mini laptop pairs a 1.3M pixel webcam with Skype software for free voice and video calling or instant messaging any time, from anywhere.



Microsoft Rolls Out Customized Language Computing Solutions

In an effort to overcome language barrier to computing, Microsoft India showcased a host of custom made solutions for the Indian market. The solutions and tools include Language Interface Packs (LIPs) in 12 Indian languages—Assamese, Bengali, Gujarati, Gurmukhi, Hindi, Kannada, Konkani, Malayalam, Marathi, Oriya, Tamil and Telugu, for MS Office and Windows. A total of 45 additional soft (virtual) keyboards, which are free to download, are also available in these 12 languages. The language barrier is an added challenge towards providing access to information to a huge number of Indians. Microsoft, under its global Unlimited Potential effort, aims to deliver computing through accessible, relevant and affordable solutions. Localization issues are a huge factor where



accessibility is concerned, and as a global industry leader, we believe Microsoft has a responsibility and the resources to make some difference. For the developers, the vendor has introduced Captions Language Interface Pack (CLIP) in Hindi, Malayalam, Oriya, and Tamil.

“Standards are always out of date. That’s what makes them standards.”

Alan Bennett



PARVATHY.B
ASE(T), TCS

Down the memory lane.....

It was one fine afternoon I got a call from my class teacher in RASET, Lakshmi Ma'am.. A call from her after a long time surprises me and I was immensely happy. But the reason for the call gave me a shock. She wanted me to write an article in the college bulletin. God!!! I was totally taken aback because I haven't so far written a single article in my life.. But I couldn't tell her a NO. I sat in my cubicle wondering what to write.....

My mind travelled four years back, my first day in RASET, when I first stepped in with my parents and my brother. We were all proud to see the college and were happy that we made the right decision during the entrance counseling...I had a picture of a professional college painted in my mind after listening to my brother's experiences in his college. But the speech by our Principal Dr.Mathai on the induction gave a totally different picture about the college, I am into. My parents were so happy to hear about the series exams, assignments, Open houses....but to be frank, I was not so. During the initial days, it was very hard to cope up with the new environment, with lots of rules and restrictions, new subjects. Even though, we had called all those rules stupid, it made me more systematic and disciplined unaware. It made me do things in a professional way... Experiences in my college made me strong to face any challenges that come across my life...Today, I am sitting in the cubicle of a most reputed software company – thanks to my college's placement cell...

HATS OFF TO VARKEY SIR & HIS TEAM!! KEEP GOING!!!!
I am able to catch up with the speed of the environment here because my college made me very flexible and hardworking in those long four years...It gifted me lots of good friends, close to my heart...A big thanks from the bottom of my heart to all my beloved teachers who have tirelessly and willingly helped me and urged me to surge ahead towards my goal.

So my dear juniors enjoy each and every moment in your college life because these days never come again. The formulae and the theories you study in college won't help much but the qualities and the experiences you get from your college help a lot in your life. All the twists in the kaleidoscope of life help us to come out as a matured and balanced professional. Cherish them forever. At the same time, don't forget the purpose to be in the college. It is a golden opportunity to study in one of the most reputed colleges in Kerala which many students are looking for. So utilize it to the maximum. Remember, your future is in your hands- you make it or break it. Wishing you all rajagirians, a great future ahead!!!!



NITHIN BOSE
S8, IT

CUBIC CHIPS

In 1965, Intel's Gordon Moore stated what has come to be known as Moore's Law — that the number of transistors on a chip will double about every two years. But as chips get smaller, engineers are already facing problems in trying to cram innumerable transistors into decreasing space.

This led to the development of the Rochester

the chip that's been designed vertically, bottom up, specifically to maximize the main functions of a chip by the use of several layers of processors. However this '3D' chip is unlike the 'stacking' idea where present-day chips are merely stacked one on top of another. This one is built so that each layer interacts with each other while performing different functions. The Rochester chip is designed simultaneously to deal with the different speeds and power requirements of these processes.

The design of this cubic chip is purportedly the first to integrate each layer in such an optimally seamless and efficient manner. Piling several integrated circuits together made it necessary to first ensure an effective insulation between each chip and then drill thousands of perforations in the insular layer to allow vertical connectivity. The prototype of this 'cube' is already functioning at the University of Rochester at a speed of 1.4 gigahertz. Since the entire layers act like a single system, the Rochester chip functions like a folded up circuit board. The motherboard of a computer could be shrunk to the size of a Rubik's cube. Besides, the architecture of the cube is such that it could increase the speed of your iPod or cell phone by up to ten times that of chips today. More height means less width, so finally perhaps, we'll have flatter CPUs, smaller printers, miniscule iPods etc.



Department of IT organized a talk on Future of IT & Entrepreneurship by S.R Nair, entrepreneur, CEO of team Frontline

ELECTIVE COURSE ON COMPUTER HARDWARE

Department of Information Technology offered an elective course, 'Foundation on computer hardware' for the fourth semester CS & IT students on 9th February 2009.

Clapping hands on ConfER 2009

On 11th of March the CSI student convention was inaugurated at Chavara Hall by Dr. N.D Inasu, Pro-vice chancellor, CUSAT. The venue also saw the release of the proceedings of the student conference CD by Rev. Fr. Jose Alex CMI to N.D Inasu. The other dignitaries included Mr. Suresh Narayan, FA Lead Reliance Communication and Miss Mini Ullanat, regional student coordinator. The inaugural ceremony was followed by the keynote address by Mr. Suresh Narayan, F A Lead Reliance Infocom.

On the second day, we had eminent personalities Mr. Dorai Thodla, Entrepreneur iMorph Inc., USA and Rev Fr. Varghese Panthalukaran, Director of Rajagiri Research Center as invited speakers who shared their ideas on 'How to Think and Learn' and 'Trans-disciplinary Software Engineering'. Cipher Decoding and Web Designing contest were also held with paper presentations involving outstanding participation by students from various colleges. A total of 15 student papers were presented on that day.



C
o
n
f
e
r

2
0
0
9

C
o
n
f
e
r

2
0
0
9



The Second National Conference on Education and Research, ConfER2009 (13th and 14th of March, 2009), was inaugurated formally on 13th March, 2009 by Prof. K K Aggarwal, CSI President in the presence of other dignitaries Prof. H. R. Viswakarma, Chairman, CSI Division V. The venue also saw the release of the proceedings of the ConfER2009 CD by Rev. Fr. Jose Alex CMI to Prof. Viswakarma. The audience was enlightened by the distinguished lectures of personalities from various organizations all over India. The invited speakers were Mr. Om Prakash Dua (Managing Director, Keltron) , Mr. H.R. Viswakarma (Senior Professor, School of Computing Sciences, VIT), Prof Ritu Gupta (GGS Indraprastha Unty, New Delhi), Mr. Waman Javedkar (IS & IT Consultant, New Delhi) and Dr. Mrs. Baby (Professor, HOD, Dept. of Library & Information Science, Rajagiri School of Social Science, Kalamaserry), Dr. K. Subramanian (Professor and Director Advanced Center for Informatics and Innovative Learning, IGNOU) Mr.S.N. Raghu Kumar(AIIMS, New Delhi), and Mr. Prince Joseph (NPOL), S Ananda Narayanan (NPOL Director). The audience witnessed selected 35 paper presentations by eminent personalities all over India. A workshop conducted by Mozilla and Google were also the prime focus of the conference.

The conference was very informative and received overwhelming response from the research and students community all over India. It touched the various fields of science and society.

On Desk: Prof.A.J.Kuttyamma, Jyothyraj S, Lakshmi K.S, Saranya S.K