



# Thomas Valerrian Pasca Santhappan

## *Curriculum Vitae*

### Education

- From 2013 **Doctor of Philosophy in Computer Science and Engineering**,  
Indian Institute of Technology (IIT) Hyderabad, India  
CGPA – 8.5/10.  
Dissertation Title : LTE Wi-Fi Radio Level Integration  
Advisor : Asst Prof. Bheemarjuna Reddy Tamma
- 2011–2013 **Master of Engineering in Computer and Communication**,  
Sri Sivasubramaniya Nadar (SSN) College of Engineering, Chennai, India  
CGPA – 8.85/10.  
Thesis Topic : Energy efficient sleep/wake scheduling of stations in Wireless Networks  
Advisors : Asst Prof. Premkumar Karumbu and Asst Prof. Srividhya
- 2007–2011 **Bachelor of Technology in Information Technology**,  
K.S.Rangasamy College of Technology, Tiruchengode, India  
CGPA – 9.1/10.  
Project Title : Virtual Classroom using Wi-Fi

### Achievements

- 2013 University Rank holder, secured 6<sup>th</sup> rank in Master of Engineering (Anna University, Chennai)
- 2011 Received best project award in B.Tech for the project titled “VIRTUAL CLASSROOM USING WI-FI”

### Publications

- International Conferences **Thomas Valerrian Pasca S**, Badrinaaraayanan Akilesh, Arjun V Anand and Bheemarjuna Reddy, "A NS-3 Module for LTE UE energy Consumption" in Proc. of IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), November 2016, Bangalore, India

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Prasanth Sharma, Ajay Brahmakshatriya, **Thomas Valerrian Pasca S**, Bheemarjuna Reddy and Antony Franklin, "LWIR: LTE-WLAN Integration at RLC Layer with Virtual WLAN Scheduler for Efficient Aggregation" in Proc. of IEEE Global Communications Conference (GLOBECOM): Selected Areas in Communications: Access Networks and Systems, December 2016, Washington, DC USA

Sreekanth Dama, **Thomas Valerrian Pasca**, Vanlin Sathya, Kiran Kuchi, "A Novel RACH Mechanism for Dense Cellular-IoT Deployments" in Proc. of IEEE WCNC 2016 Workshop on International Workshop on Mobile Edge Computing and IoT, Doha, Qatar

Prasanth Sharma, **Thomas Valerrian Pasca S**, Naveen Kamath and Bheemarjuna Reddy Tamma, "Velocity Based Dynamic Flow Mobility in Converged LTE/Wi-Fi Networks " in Proc. of NCC, March 2016, IIT Guwahati, India

**Thomas Valerrian Pasca**, Srividya, and K. Premkumar, "Energy Efficient Sleep/Wake Scheduling of Stations in Wireless Networks," International Conference on Communication and Signal Processing (ICCSP), Chennai, India, April 2013

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## Ph.D.Work

### Research Area

Title LTE WI-FI RADIO LEVEL INTEGRATION (LW-RLI): ARCHITECTURE, CHALLENGES AND SOLUTION

Description A tighter coupling of LTE and Wi-Fi interfaces can be achieved by integrating them at the radio protocol stack. LTE and Wi-Fi Radio level Integration with IPsec tunnel (LWIP) is the term coined by 3GPP for one such tighter level of LTE-Wi-Fi interworking at IP layer. This tighter level of interworking replaces the traditional way of cellular-Wi-Fi interworking through a packet gateway, and it can react to the dynamic changes in the wireless link quality. The research challenges with respect to LWIP such as (1) Effective Downlink steering between LTE and Wi-Fi interfaces (2) Optimal uplink data steering through LWIP and (3) Handover optimization in LWIP, has to be addressed. For evaluating the LWIP performance, we have implemented LWIP module in NS-3 by extending LTE and Wi-Fi modules. We have proposed an LTE Wi-Fi integration architecture using Link aggregation layer for effectively utilizing LTE and Wi-Fi interfaces. As a proof of concept we have developed a variant of LWIP prototype and made commercial UE (Nexus 5) to readily work with the LWIP. The developed LWIP testbed uses OpenAirInterface (OAI) for LTE network and Cisco Access Point/Atheros device with Hostapd as Wi-Fi interface. We have also shown the LWIP performance improvement using UDP transmission over both LTE and Wi-Fi links. Also, the video transmission over LWIP unveils the potential of this link level aggregation. Packet level split with LWIP creates a fall in TCP growth. We have addressed the problem of Out-Of-Order delivery in TCP. Proposed lead to throughput improvement by 3X times as compared to no-reordering solution.

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## Masters Thesis

Title ENERGY EFFICIENT SLEEP/WAKE SCHEDULING OF STATIONS IN WIRELESS NETWORKS

Description A wireless device is constrained by battery power, and hence, there is always a need to conserve battery power in order to keep the device alive for a long time. We consider a wireless network consisting of an access point (AP) and a wireless node, which is limited by energy, and we seek scheduling algorithms that conserve battery power at the wireless node. Since the packet arrivals are stochastic, communication happens only during the time slots when packets are available. Hence, keeping the receiver ON at all times is wasteful of resources. However, when the receiver is turned OFF, a packet, on arrival, is stored in a buffer (at the AP) which incurs a holding cost. We propose sleep/wake scheduling at the wireless node with an objective of minimizing the power spent (at the receive node) and the queuing delay at the AP, while maintaining the stability of the queue. We note here that this energy optimum scheduling is a distributed problem in which the queue-length information at the transmitter is not known at the receiver. We have shown that the optimum wake process at the receiver follows closely as that of the arrival process of the packets at the AP. We have also evaluated the optimum scheduler, based on the energy and queuing delay performance.

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## Computer skills

Programming Languages C, C++, JAVA  
Web Programming HTML, JAVASCRIPT, JSP  
Application Development J2ME, ANDROID  
Simulator Environment MATLAB, NS3

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## References

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Assistant Professor,  
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**Dr. Antony Franklin,**  
Assistant Professor,  
Department of Computer Science & Engg, IIT Hyderabad, India.

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