

Curriculum Vitae

Summary of Major Achievements

The following is a summary of my major achievements during my tenure at the Computer Engineering department at King Fahd University of Petroleum and Minerals:

1. Taught 10 different *undergraduate* courses and 4 different *graduate* courses that are mostly related to the areas of **security** and **networking**.
2. Published 9 journal papers and 22 refereed conference papers that are mostly related to the areas of **security** and **networking**.
3. Granted 3 US patents.
4. Supervised/Co-supervised 9 Masters students. Currently, supervising one Ph.D. student and one Masters student.
5. Completed 4 funded research projects in the areas of cloud computing, network security, Internet resiliency, and integration of heterogeneous networks.
6. Completed 1 consultation project and 2 shortcourses with the industry in the areas of sub-channel scheduling for Mobile WiMAX, next generation networks (NGN), and migration to IPv6.
7. Established a Network Resiliency Laboratory for the purpose of conducting research.
8. Key member of the department's ABET committee and the Curriculum committee.

Curriculum Vitae

Personal Data:

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University Education:

Doctorate of Philosophy: Electrical & Computer Engineering, Texas A&M University, May 1995.

Thesis Title: "Asynchronous failure location and agreement algorithms for fiber-optic and for traditional networks with Byzantine links"

Masters of Engineering: Electrical & Computer Engineering, Texas A&M University, December 1991.

Thesis Title: "Algorithms to locate switching faults in general synchronous fiber-optic networks"

Bachelor of Science: Computer Engineering, Kuwait University, May 1989.

Professional Experience:

Sept 2003–Present: Associate Professor, Computer Engineering Department, King Fahd University of Petroleum and Minerals

- Taught 10 *undergraduate* courses and 4 *graduate* courses.
- Responsible for the COOP coordination in the Computer Engineering department.
- Supervised/Co-supervised 9 Masters students. Currently, supervising one Ph.D. student and one Masters student.
- Completed 4 funded research projects in the areas of cloud computing, network security, Internet resiliency, and integration of heterogeneous networks.
- Completed 1 consultation project and 2 shortcourses with the industry in the areas of sub-channel scheduling for Mobile WiMAX, next generation networks (NGN), and migration to IPv6.
- Collaborating with several research groups within the department and across departments.
- Contributing to the university community through committees work and services.

Jan 1998-Aug 2003: Senior Technical Advisor for Wireless Network Engineering, Nortel Networks, USA

- Designed, planned, and optimized wireless data and voice networks.
- Successfully designed and deployed several wireless data and voice systems for major commercial customers.
- Conducted several workshops related to wireless data and voice network designing, planning, and optimization.
- Designated as one of top-talent employees in Nortel Networks (top 5% of employees and key contributions to the line of business).

June 1995-Dec 1997: Wireless CDMA System Design Architect, Nortel Networks, USA

- Designed the wireless CDMA inter-system soft handoff feature and generated three patents.
- Authored guidelines for provisioning wireless data and voice networks.
- Primed performance monitoring for customer's wireless data and voice networks.
- Interacted and cooperated with product line management, standards groups, and other systems groups.

Jan 1992–May 1995: Lecturer, Electrical Engineering Department, Texas A&M University, USA

- Complete responsibility for teaching 2 undergraduate courses while pursuing my Ph.D. degree.

Scholarly Experience:

International Journal Refereeing:

- International Journal of Internet Protocol Technology (IJIPT)
- Peer-to-Peer Networking and Applications (PPNA)

Technical Program Committees and Reviews for International Conferences:

- International Symposium on Emerging Ubiquitous and Pervasive Systems (EUPS-10) in conjunction with the 13th International Conference on Network-Based Information Systems (NBiS-2010), September 14-16, 2010, Takayama, Gifu, Japan.
- International Symposium on Emerging Ubiquitous and Pervasive Systems (EUPS-09) in conjunction with the 12th International Conference on Network-Based Information Systems (NBiS-2009), August 19-21, 2009, Indianapolis, IN, USA.

Research Proposals Refereeing:

- King Abdulaziz City for Science and Technology (KACST)

Membership in Professional Societies:

- Institute of Electrical and Electronic Engineers (IEEE)

Academic Awards and Recognition:

- University Award for the category of Patents, King Fahd University of Petroleum & Minerals, 2010-2011 and 2013-2014.
- Distinguished innovation project, King Fahd University of Petroleum & Minerals, 2005-2006.

1 Teaching Experience

My teaching interests include, but not limited to, teaching undergraduate and graduate courses in the areas of computer and network security, computer networking, and data communications. My objective as a teacher is to empower my students with skills, knowledge, and values needed for them to be internationally competitive professionals in their field, and to contribute to the development and advancement of their respective countries. My teaching philosophy and accomplishments in the area of teaching are summarized in the following points:

- I taught a total of 14 different courses: 10 at the *undergraduate* level and 4 at the *graduate* level.
- I taught a variety of core and elective courses for both graduate and undergraduate students.
- Continuously update my courses contents and material.
- Present in the classroom real-life examples and applications to the students to enrich and reinforce the classical textbook material such as hardware, demos, YouTube videos, etc.
- I efficiently utilize the available modern and Internet based techniques for delivering the course material and its related work (quizzes, assignments, demos, etc.). I dedicate a separate webpage for each course offering. Communication media such as Blackboard, electronic discussion forums, and email are used in the course delivery.
- State of the art simulation tools such as Matlab, OPNET, Packet Tracer, etc. are utilized heavily in my course offering.
- For the purpose of promoting self-learning and diversity, I encourage the undergraduate students in the 300 and the 400 level courses to explore and investigate technical topics of their choice that are related to the course material, and, consequently, submit term papers and essays.
- I consider students feedback during the course offering to achieve an optimal learning experience for the students.
- While most of my teaching assignments are related to my area of specialization, I also taught courses that are not in my area such as Digital Logic Design (COE 202), Computer Organization (COE 301), Computer Architecture (COE 308), and Numerical Methods (CISE 301).

1.1 Courses Taught at KFUPM

The following table lists the courses I taught at KFUPM.

Semester	Course Code	Course Title	Undergrad (U) or Graduate (G)	Course Evaluation (out of 10)
'16-1	COE 301/ICS 233	Computer Organization	U	9.23
	COE 202	Digital Logic Design	U	9.08
'15-2	COE 344	Computer Networks	U	9.96
	CISE 301	Numerical Methods	U	9.28
'15-1	COE 451	Computer and Network Security	U	9.38
	SEC 521	Network Security	G	9.47
'14-2	COE 344	Computer Networks	U	9.40
	COE 451	Computer and Network Security	U	8.99
'14-1	COE 451	Computer and Network Security	U	9.86
	COE 547/CSE 552	Network Management	G	9.74
'13-2	COE 444	Internetwork Design/Management	U	9.71
	COE 451	Computer and Network Security	U	9.28
	COE 546/CSE 550	Computer Network Design	G	9.09
'13-1	COE 202	Digital Logic Design	U	9.27
	COE 344	Computer Networks	U	9.25

'12-2	COE 344	Computer Networks	U	9.20
	COE 444	Internetwork Design/Management	U	9.92
'12-1	COE 202	Digital Logic Design	U	8.93
	COE 344	Computer Networks	U	9.37
'11-2	CISE 301	Numerical Methods	U	8.74
	COE 202	Digital Logic Design	U	8.97
'11-1	COE 341	Data and Computer Communications	U	9.06
	COE 353	Fundamentals of Computer Communication	U	8.76
'10-2	COE202	Digital Logic Design	U	9.50
	COE 444	Internetwork Design/Management	U	9.44
	CSE 550	Computer Network Design	G	8.63
'10-1	COE 202	Digital Logic Design	U	8.58
	COE 344	Computer Networks	U	9.36
'09-2	COE 344	Computer Networks	U	9.25
	COE 444	Internetwork Design/Management	U	8.85
'09-1	COE 344	Computer Networks	U	9.26
	COE 444	Internetwork Design/Management	U	9.27
'08-2	COE 344	Computer Networks	U	9.05
	COE 540	Computer Networks	G	9.15
'08-1	COE 202	Digital Logic Design	U	9.29
	COE 341	Data and Computer Communications	U	9.17
'07-2	COE 344	Computer Networks	U	9.13
	COE 499	Spec Topics in Comp. Eng. (Wireless Sensor Networks)	U	9.46
'07-1	COE 202	Digital Logic Design	U	8.63
	COE 202	Digital Logic Design	U	8.65
'06-2	COE 341	Data and Computer Communications	U	8.71
	COE 344	Computer Networks	U	9.40
'06-1	COE 202	Digital Logic Design	U	8.46
	COE 341	Data and Computer Communications	U	8.24
'05-2	COE 344	Computer Networks	U	8.57
	CSE 550	Computer Network Design	G	9.13
'05-1	COE 442*	Computer Networks	U	8.60
	COE 442*	Computer Networks	U	8.36
	COE 390	Seminar	U	N.A.
'04-2	COE 342**	Data and Computer Communications	U	8.74
	COE 442*	Computer Networks	U	8.97
'04-1	COE 308	Computer Architecture	U	8.50
	COE 342**	Data and Computer Communications	U	8.87
'03-2	COE 308	Computer Architecture	U	8.78
	CSE 550	Computer Network Design	G	8.39
'03-1	COE 308	Computer Architecture	U	8.49
	COE 308	Computer Architecture	U	9.06

* New course number: COE 344

** New course number: COE 341

1.2 Research and Thesis Supervision

The following table lists the M.Sc. theses that I was involved in at KFUPM.

No.	Student Name	Degree	Thesis Title	Role	Graduation Date
1	Ahmad Shawahna	M.Sc.	EDoS Attack Defense Shell (EDoS-ADS): An Enhanced Mitigation Technique Against Economic Denial of Sustainability (EDoS) Attacks for Controlling the Access to Cloud Resources	<i>Supervisor</i>	Apr 2016
2	Tariq Abu Amria	M.Sc.	Data Collection Energy Efficient Routing Protocol for Energy Harvested Based Wireless Sensor Network	Committee Member	Dec 2015
3	Khalid Bin Afif	M.Sc.	DDBS: Distributed Discovery and Bridging Service for DDS over WAN	Committee Member	Sep 2015
4	Emad Aldalu	M.Sc.	Energy Harvesting Aware Routing Based on Ad-Hoc On-Demand Distance Vector Protocol	Committee Member	May 2015
5	Ahmad Abo Naser	M.Sc.	Performance Evaluation of a Software Defined Network Based Architecture for a 4G EPC Network	Committee Member	Apr 2015
6	Anas Abu-Dagga	M.Sc.	Bittorrent Discovery and Performance Enhancement Using DDS QoS Policies	Committee Member	Dec 2014
7	Farid Binbeshr	M.Sc.	Controlled Access to Cloud Resources for Mitigating Economic Denial of Sustainability (EDoS) Attack	Committee Member	May 2014
8	Mohammed Al-Mehdhar	M.Sc.	Performance Evaluation of IPv6 BGP Based Solutions For Malicious ISP Blocking	<i>Supervisor</i>	Dec 2013
9	Saeed Alsowail	M.Sc.	Evaluating the EDoS-Shield Mitigation Technique Using an Experimental Testbed	Committee Member	Dec 2013
10	Mahmoud Al-Saba	M.Sc.	Two Layers Peer-To-Peer (P2P) Domain Name System (DNS)	<i>Co-Supervisor</i>	May 2013
11	Abdallah Rashed	M.Sc.	Efficient Computation of Distribution Function for Sum of Lognormal Random Variables & Application to CDMA Data Network	Committee Member	Dec 2012
12	Amer AlGhadhban	M.Sc.	Prototyping and Evaluating BGP-Based Solutions to Overcome Malicious ISP Blocking	<i>Co-Supervisor</i>	Dec 2011
13	Bandar Sulaimani	M.Sc.	Performance analyses of VoIP over IEEE 802.16 best-effort class	Committee Member	Dec 2011
14	Abdulaziz Al-Baiz	M.Sc.	Internet denial by higher-tier ISPs: A NAT-based solution	<i>Supervisor</i>	Jan 2011
15	Naeem Firdous	M.Sc.	Anomaly Detection Technique for HoneyNet Data Analysis	Committee Member	Jan 2011
16	Mohammed Abdul Khadir Asif	M.Sc.	Tunneling based solution to bypass Internet access denial by International Internet Service Providers	<i>Supervisor</i>	Dec 2010
17	Fahd Abdulhameed	M.Sc.	Dynamic round-robin peer-to-peer (P2P) domain name system (DNS)	<i>Supervisor</i>	Nov 2010
18	Mohammed Farooqi	M.Sc.	Adapting Tabu Search to Accommodate Online demand variations in a Data Network	Committee Member	May 2010
19	Abdul-Aziz Al-Helali	M.Sc.	Performance Evaluation of Mobility Solutions for Integrated WLAN/3G Networks	Committee Member	Feb 2010
20	Ahmad AlRefai	M.Sc.	BGP based Solution for International ISP Blocking	<i>Co-Supervisor</i>	Dec 2009
21	Hafiz Muhammad Asif	M.Sc.	Video Transport over Mobile Ad Hoc Networks	Committee Member	Sep 2006
22	Md. Golam Kaosar	M.Sc.	VOIP In Ad-Hoc Network	Committee Member	Aug 2006
23	Louai Adnan Al-Awami	M.Sc.	A Framework for Reliable and Fault-Tolerant Network Management Architecture	Committee Member	Jun 2006
24	Mohammed Aijaz Mohiuddin	M.Sc.	Optimizing Weights for OSPF to improve Utilization using Modern Heuristics	Committee Member	Sep 2005
25	Abdul Subhan	M.Sc.	Designing of Cellular Mobile Networks Using Modern Heuristics	<i>Supervisor</i>	Jun 2005

1.3 Courses/Labs Developed

- Network Resiliency Laboratory – It was developed as part of the funded research project [FRP2] as listed in section 2.6, and was used for research purposes. More specifically, it was used in an M.Sc. thesis by Amer AlGhadhban (M.Sc. thesis number 11 in the table of section 1.2), and in the publishing of three conference papers [C1], [C2], and [C3] as listed in section 2.2.

1.4 Senior Design Projects/Summer Training/COOP

- Supervised many undergraduate senior design projects in the areas of computer and network security, wireless networks, heterogeneous networks integration, Bluetooth security, etc.
- Supervised and evaluated undergraduate summer training (8 weeks) projects and COOP (18 months) projects.
- Responsible for coordinating the Computer Engineering (COE) department summer training and COOP programs.

1.5 Short/Community Courses

- Next Generation Networks (NGN) – Closed short course offered for Saudi Telecom Company (STC). Offered during November 2008.
- Migration to IPv6 – Closed short course offered for Saudi Telecom Company (STC). Offered during March 2010.

2 Scholarly Activities

2.1 Publication in Refereed International Journals

- [J1] M. E. S. Elrabaa, M. Al-Asli, and **M. Abu-Amara**, “Securing Client Data in the Cloud Using FPGAs,” *IEEE Transactions on Cloud Computing*, Nov. 2016, Submitted.
- [J2] A. Shawahna, **M. Abu-Amara**, A. Mahmoud, and Y. Osais, “EDoS-ADS: An Enhanced Mitigation Technique against Economic Denial of Sustainability (EDoS) Attacks,” *IEEE Transactions on Cloud Computing*, Aug. 2016, Submitted.
- [J3] M. Sqalli, S. Alsowail, **M. Abu-Amara**, Z. Baig, and K. Salah, “An Experimental Evaluation of the EDoS-Shield Mitigation Technique for Securing the Cloud,” *Arabian Journal for Science and Engineering (AJSE)*, pp. 1–11, 2015.
- [J4] **M. Abu-Amara**, “A Combined Solution for the Internet Access Denial Caused by Malicious ISPs,” *Security and Communication Networks (SCN)*, John Wiley, Volume 7, Issue 11, pp. 2078–2095, October 2014.
- [J5] M. Sqalli, S. Firdous, K. Salah, and **M. Abu-Amara**, “Classifying Malicious Activities in Honeynets using Entropy and Volume-based Thresholds,” *Security and Communication Networks (SCN)*, John Wiley, Volume 6, Issue 5, pp. 567–583, May 2013.
- [J6] **M. Abu-Amara**, A. Al-Baiz, A. Mahmoud, M. Sqalli, and F. Azzedin, “A Scalable NAT-Based Solution to Internet Access Denial by Higher-tier ISPs,” *Security and Communication Networks (SCN)*, John Wiley, Volume 6, Issue 2, pp. 194–209, February 2013.
- [J7] A. Mahmoud, A. Alrefai, **M. Abu-Amara**, M. Sqalli, and F. Azzedin, “Qualitative analysis of methods for circumventing malicious ISP blocking,” *Arabian Journal for Science and Engineering (AJSE)*, Volume 37, Issue 7, pp. 1911–1928, October 2012.
- [J8] S. Mahmoud and **M. Abu-Amara**, “The use of Radon Transform in Handwritten Arabic (Indian) Numerals Recognition,” *WSEAS Transactions on Computers*, Volume 9, Issue 3, pp. 252–267, March 2010.
- [J9] T. Sheltami, A. Mahmoud, **M. Abu-Amara**, “An Ad hoc Wireless Sensor Network for Telemedicine Applications,” *Arabian Journal for Science and Engineering (AJSE)*, Volume 32, No. 1B, pp. 131-143, April 2007.
- [J10] T. Sheltami, A. Mahmoud, **M. Abu-Amara**, “Telecare Monitoring System Based on Wireless Sensor Network,” *International Journal of Computer Science and Network Security (IJCSNS)*, Vol. 5, No. 12, pp. 66-74, December 2005.
- [J11] H. Sayeed, **M. Abu-Amara**, H. Abu-Amara, “Optimal Asynchronous Agreement and Leader Election Algorithm for Complete Networks with Byzantine Faulty Links,” *Distributed Computing*, Vol. 9, Issue 3, pp. 147-156, 1995.
- [J12] S. Sarwar and **M. Abu-Amara**, “Functional Languages: A Performance Study,” *Journal of Systems and Software*, Volume 20, Number 2, pp. 163-167, February 1993.

2.2 Publication in Refereed International Conferences

- [C1] A. Al-Ghadhban, A. Mahmoud, **M. Abu-Amara**, F. Azzedin, and M. Sqalli, “Interdomain Traffic Engineering Techniques to Overcome Undesirable Connectivity Incidents,” *Proceedings of the 11th IFIP International Conference on Network and Parallel Computing (NPC)*, pp. 618-622, Ilan, Taiwan, September 18-20, 2014.
- [C2] A. Al-Ghadhban, **M. Abu-Amara**, “Prototyping and Evaluating a Tunnel-Based Solution to Circumvent Malicious IISP Blocking,” *Proceedings of the 2012 International Conference on Communications and Information Technology (ICCIT)*, pp. 286-290, Hammamet, June 26-28, 2012.
- [C3] A. Al-Ghadhban, A. Mahmoud, **M. Abu-Amara**, F. Azzedin, and M. Sqalli, “Prototyping and Evaluating BGP-Based Solutions to Overcome Malicious IISP Blocking,” *Proceedings of the 2011 International Conference on Networking and Information Technology (IPCSIT)*, Vol. 17, pp. 134-143, Singapore, November 25-27, 2011.

- [C4] **M. Abu-Amara**, M. Asif, M. Sqalli, A. Mahmoud, and F. Azzedin, "Resilient Internet Access Using Tunnel-Based Solution for Malicious ISP Blocking," The 3rd IEEE International Conference on Communication Software and Networks, pp. 85-89, Xi'an, China, May 27-29, 2011.
- [C5] **M. Abu-Amara**, F. Azzedin, F. Abdulhameed, A. Mahmoud, and M. Sqalli, "Dynamic Peer-to-Peer (P2P) Solution to Counter Malicious Higher Domain Name System (DNS) Nameservers," The 24th Canadian Conference on Electrical and Computer Engineering, pp. 001014-001018, Niagara Falls, Ontario, Canada, May 8-11, 2011.
- [C6] A. Al-Baiz, **M. Abu-Amara**, A. Mahmoud, M. Sqalli, and F. Azzedin, "Internet Access Denial by Higher-tier ISPs: A NAT-Based Solution," The 24th Canadian Conference on Electrical and Computer Engineering, pp. 001004-001008, Niagara Falls, Ontario, Canada, May 8-11, 2011.
- [C7] M. Sqalli, S. Firdous, K. Salah, and **M. Abu-Amara**, "Identifying Network Traffic Features Suitable for HoneyNet Data Analysis," The 24th Canadian Conference on Electrical and Computer Engineering, pp. 001044-001048, Niagara Falls, Ontario, Canada, May 8-11, 2011.
- [C8] A. Mahmoud, A. Al-Helali, **M. Abu-Amara**, T. Al-Kharobi, T. Sheltami, "Comparative Performance Study for Integrated 3G/WLAN Networks Using Mobile IP, SIP, and m-SCTP Protocols," 2010 IEEE 71st Vehicular Technology Conference (VTC 2010-Spring) , pp. 1-5, May 2010.
- [C9] S. Mahmoud and **M. Abu-Amara**, "Recognition of Handwritten Arabic (Indian) Numerals using Radon-Fourier-based Features," Proceedings of the 9th WSEAS International Conference on Signal Processing, Robotics and Automation, pp. 158-163, Cambridge, UK, February 2010.
- [C10] **M. Abu-Amara**, A. Mahmoud, T. Sheltami, A. Al-Shahrani, K. Al-Otaibi, S.M. Rehman, T. Anwar, "Performance of UMTS/WLAN Integration at Hot-Spot Locations Using OPNET," Proceedings of 4th IEEE-GCC Conference, 5 pages, Bahrain, November 11-14, 2007.
- [C11] S. Asadullah, A. Mahmoud, **M. Abu-Amara**, T. Sheltami, "Vertical Handoff Characterization for SIP and mSCTP Based UMTS-WLAN Integration Solutions," Proceedings of 4th IEEE-GCC Conference, 5 pages, Bahrain, November 11-14, 2007.
- [C12] T. Landolsi and **M. Abu-Amara**, "CDMA Access Channel Performance under Idle-Mode Ping-Pong Effect in Inter-MSR Handoffs," Proceedings of the 3rd International Symposium on Wireless Communication Systems (ISWCS), pp. 584-586, Valencia, Spain, September 5-8, 2006.
- [C13] **M. Abu-Amara**, S. Sait, Abdul Subhan, "A Heuristics Based Approach for Cellular Mobile Network Planning," Proceedings of the 2006 International Wireless Communications & Mobile Computing Conference, p. 79, Vancouver, Canada, July 3-6, 2006.
- [C14] A. Mahmoud, **M. Abu-Amara**, T. Sheltami, E. Rahman, J. Jaffar, "WLAN Integration For Future Generation Mobile Network Operators - A Case Study," Proceedings of 18th National Computer Conference (NCC 18), pp. 47-54, Riyadh - Saudi Arabia, March 26-29, 2006.
- [C15] T. Sheltami, A. Mahmoud, **M. Abu-Amara**, "Warning and Monitoring System using Sensor Networks," Proceedings of 18th National Computer Conference (NCC 18), pp. 63-68, Riyadh - Saudi Arabia, March 26-29, 2006.
- [C16] A. Mahmoud, T. Sheltami, **M. Abu-Amara**, "Wireless Sensor Network Implementation for Mobile Patient," Proceedings of 3rd IEEE-GCC Conference, Bahrain, March 19-22, 2006.
- [C17] A. Mahmoud and **M. Abu-Amara**, "Performance of Inter-Base Station Soft Handoff for 3G CDMA Networks," Proceeding of the First International Conference on Modeling, Simulation and Applied Optimization, Sharjah, U.A.E., February 2005.
- [C18] **M. Abu-Amara**, "Minimum Traffic Inter-BS SHO Boundary Selection Algorithm for CDMA-Based Wireless Networks," Proceedings of the 2004 IEEE Radio and Wireless Conference, pp. 51-53, Atlanta, Georgia, September 2004.
- [C19] **M. Abu-Amara**, "Asynchronous Failure Location Algorithm for Fiber-Optic Networks," Proceedings of the Seventh IEEE Symposium of Parallel and Distributed Processing, pp. 690-693, San Antonio, Texas, October, 1995.

- [C20] H. Sayeed, **M. Abu-Amara**, H. Abu-Amara, “Asynchronous Agreement and Leader Election Algorithms for General Networks with Byzantine Faulty Links,” Proceedings of the ISCA Eighth International Conference on Parallel and Distributed Computing Systems, pp. 177-182, Orlando, Florida, September, 1995.
- [C21] H. Sayeed, **M. Abu-Amara**, H. Abu-Amara, “Optimal Asynchronous Agreement Algorithm for Complete Networks with Byzantine Links,” Proceedings of the ISCA/IEEE Seventh International Conference on Parallel and Distributed Computing Systems, pp. 593-596, Las Vegas, Nevada, October, 1994.
- [C22] **M. Abu-Amara** and H. Abu-Amara, “Locating Switching Faults In General Synchronous Fiber-Optic Networks,” Proceedings of the ISCA/IEEE Seventh International Conference on Parallel and Distributed Computing Systems, pp. 761-766, Las Vegas, Nevada, October, 1994.

2.3 Patents and Patent Disclosures

- [P1] **M. Abu-Amara**, F. Abdulhameed, F. Azzedin, A. Mahmoud, and M. Sqalli, “Peer-to-Peer DNS Network Method,” US Patent # 8,612,618 (also published as US20130111049), 2013.
- [P2] **M. Abu-Amara**, “Reducing the Rate of Registration in CDMA-based Mobile Networks,” US Patent # 7,769,380, 2010.
- [P3] **M. Abu-Amara**, S. Sides, A. Jalali, J. Boppana, S. Doctor, “CDMA Inter-Mobile Switching Center Soft Hand-Off,” US Patent # 6,173,183, 2001, US Patent # 5,930,714, 1999, European Patent Office # WO/1998/018282, 1998.

2.4 Technical Reports/Books/Book Chapters

- [TRB1] A. Mahmoud, **M. Abu-Amara**, T. Sheltami, “Wireless Local Area Networks Integration for Mobile Network Operators,” Final report for King Fahd University of Petroleum & Minerals (KFUPM), Fast track project number FT 2005-12, March 2012.
- [TRB2] M. Sqalli, K. Salah, **M. Abu-Amara**, Z. Baig, F. Azzedin, T. Alkharobi, H. Adiche, “Saudi Honeynet Project,” Final report for King Abdulaziz City for Science and Technology (KACST), NSTIP project number 08-INF101-4, November 2011.
- [TRB3] **M. Abu-Amara**, A. Mahmoud, F. Azzedin, M. Sqalli, “Internet Access Denial by International Internet Service Providers: Analysis and Counter Measures,” Final report for King Abdulaziz City for Science and Technology (KACST), NSTIP project number 08-INF97-4, October 2011.
- [TRB4] A. Mahmoud, **M. Abu-Amara**, T. Sheltami, “WiMAX Broadband Access for Residential Areas,” Final report for Saudi Telecom Corporation (STC), Project number CCCR2224, Research Institute, King Fahd University of Petroleum & Minerals (KFUPM), December 2008.

2.5 Professional Consultations

- [PC1] Consultancy: Mobile WiMAX and OFDMA Scheduling, **Saudi Telecom Company (STC)** – Nov. 2007-Nov. 2008; Co-Investigator.
- [PC2] Consultancy: CDMA Inter-Mobile Switching Center Soft Hand-Off, **Sprint PCS (USA)** – 1996/1998 – Through Nortel Networks – Principle Investigator.

2.6 Funded Research Projects

- [FRP1] Project Title: “Modeling and Mitigation of Economic Denial of Sustainability (EDoS) Attacks in Cloud Computing,” King Abdulaziz City for Science and Technology (KACST NSTIP-11-INF1609-04), March 2012-February 2014 – Co-Investigator. **(Completed)**
- [FRP2] Project Title: “Internet access denial by international Internet Service Providers: Analysis and Counter Measures,” King Abdulaziz City for Science and Technology (KACST NSTIP-08-INF97-4), September 2009-August 2011 – Principle Investigator. **(Completed)**
- [FRP3] Project Title: “Saudi Honeynet Project,” King Abdulaziz City for Science and Technology (KACST NSTIP-08-INF101-4), September 2009-August 2011 – Co-Investigator. **(Completed)**

- [FRP4] Project Title: “Wireless Local Area Networks Integration for Mobile Network Operators,” King Fahd University of Petroleum & Minerals, Fast Track FT 2005-12, September 2006-March 2008 – Co-Investigator. **(Completed)**
- [FRP5] Project Title: “E-Tourism Promoter – An Internet Assisted Location Tracker and Map Reader for Tourists” – Business Innovation Project, KFUPM College of Computer Sciences and Engineering, June 2005-March 2006 – Co-Investigator. Project won best business innovation project award. **(Completed)**

2.7 Summary of Citations of Journal/Conference Papers and Patents

The following is a summary of the citations of the journal/conference papers and patents (excluding self-citations). The detailed citations can be found at <http://scholar.google.com/citations?user=99vsLk4AAAAJ&hl=en>.

Paper/Patent	Number of Citations
J4	1
J8	4
J9	5
J11	57
C5	2
C8	6
C9	5
C10	8
C11	9
C12	3
C13	8
C15	11
C16	4
P1	3
P2	5
P3	61

2.8 Technical Presentations Delivered

The following is a summary of the technical presentations delivered locally, regionally, and internationally.

Presentation Title and Location	Date
Title: A Computer and Network Security Primer. Location: King Fahd University of Petroleum & Minerals (KFUPM), Dhahran, KSA.	May 2016
Title: Deliberate Denial of Internet Access by International Suppliers of Internet Services: Analysis, Countermeasures, and Achievements. Location: King Abdul Aziz City for Science and Technology (KACST), Riyadh, KSA.	June 2013
Title: Internet Access Denial by Higher-tier ISPs: A NAT-Based Solution. Location: The 24th Canadian Conference on Electrical and Computer Engineering, Niagara Falls, Ontario, Canada.	May 2011
Title: Dynamic Peer-to-Peer (P2P) Solution to Counter Malicious Higher Domain Name System (DNS) Nameservers.	May 2011

Location: The 24th Canadian Conference on Electrical and Computer Engineering, Niagara Falls, Ontario, Canada.	
Title: Identifying Network Traffic Features Suitable for HoneyNet Data Analysis. Location: The 24th Canadian Conference on Electrical and Computer Engineering, Niagara Falls, Ontario, Canada.	May 2011
Title: Overview on IPv6 basics. Location: Saudi Telecom Company (STC) Training Center Theater, Riyadh, KSA.	March 2010
Title: IPv6 Transition Mechanisms. Location: Saudi Telecom Company (STC) Training Center Theater, Riyadh, KSA.	March 2010
Title: IPv6 Quality of Service. Location: Saudi Telecom Company (STC) Training Center Theater, Riyadh, KSA.	March 2010
Title: QoS guidelines for deploying VoIP services. Location: Holiday Inn, Khobar, KSA.	November 2008
Title: Securing VoIP systems. Location: Holiday Inn, Khobar, KSA.	November 2008
Title: Traffic Engineering in MPLS Core. Location: Holiday Inn, Khobar, KSA.	November 2008
Title: Session Initiation Protocol (SIP) security. Location: Holiday Inn, Khobar, KSA.	November 2008
Title: A Heuristics Based Approach for Cellular Mobile Network Planning. Location: The 2006 International Wireless Communications & Mobile Computing Conference, Vancouver, Canada.	July 2006
Title: Minimum Traffic Inter-BS SHO Boundary Selection Algorithm for CDMA-Based Wireless Networks. Location: The 2004 IEEE Radio and Wireless Conference, Atlanta, Georgia, USA.	September 2004

2.9 Extra Curriculum Activities

- Supervised two graduate students' paper submissions and presentations at the Saudi Scientific Conference for Graduate and Undergraduate Students:
 - M. Asif, "Resilient Internet Access for KSA using Tunnel-Based Solution," Second Scientific Conference for Graduate and Undergraduate Students, Jeddah, Kingdom of Saudi Arabia, 28-31 March, 2011.
 - F. Abdulhameed, "Dynamic Round-Robin P2P DNS to Improve Internet Access Resiliency at KSA," First Scientific Conference for Graduate and Undergraduate Students, p. 96, Riyadh, Kingdom of Saudi Arabia, March 2010.

3 Statement of Research Contribution

The research interests for the applicant include two major areas; Area-I: Computer and Network Security and Resiliency, and Area-II: Wireless Communications and Networking. The work and contribution in each of these areas is highlighted below.

Area-I: Computer and Network Security and Resiliency

Research work conducted in the area of Computer and Network Security and Resiliency can be grouped into three sub-areas as detailed below.

Subarea A: Cloud Computing Security [J2], [J3], [FRP1]

Cloud computing is one of the fastest growing areas in information technology (IT). However, benefits foreseen through a cloud-based provisioning of services bear several unaddressed issues of high importance, especially with regards to the level of security that is provided by a cloud computing service model. Security concerns associated with the cloud service model have hindered the ready and smooth acceptance of this technology by organizations preventing them from moving critical corporate IT resources to the cloud.

One specific security concern is associated with the fact that cloud computing allows the scaling of servers in magnitude and availability in order to provide service to a greater number of requests from end users. As such, adopters of the cloud service model are charged based on a pay-per-use basis of the cloud's server and network resources. With this model, a conventional DDoS attack on the server and network resources is transformed in a cloud environment to a new breed of attack that targets the cloud adopter's economic resource, namely Economic Denial of Sustainability attack (EDoS). EDoS occurs when zombie machines that are part of a botnet send a large amount of undesired traffic towards the cloud, exploiting the cloud's elasticity, to chalk up an exorbitant amount of cost on a cloud adopter's bill, leading to large-scale service withdrawal or bankruptcy.

Accordingly, a funded research project [FRP1] was conducted to address the EDoS attack. The project's team proposed, implemented, and evaluated a number of techniques for mitigating EDoS attacks, namely, EDoS Attack Defense Shell, EDoS-Shield, Enhanced EDoS-Shield, and EDoS Defender. More specifically, the EDoS Attack Defense Shell technique utilizes the concepts of user trust factor and URL redirection to service incoming requests originated by legitimate users while blocking malicious users. The technique is robust to handle scenarios where both the legitimate and the malicious users belong to the same Network Address Translation (NAT)-based network [J2]. On the other hand, the EDoS-Shield technique classifies the incoming requests to the cloud to whitelisted and blacklisted based on the source of the request; legitimate or bot. This is achieved using a verifier node which creates the whitelist and the blacklist, and a virtual firewall is used to block all the requests that come from the blacklisted sources. The EDoS-Shield technique was enhanced to mitigate the attack in case the attacker uses spoofed IP addresses. The enhanced technique was referred to as the Enhanced EDoS-Shield. On the other hand, the EDoS Defender technique was devised to limit the rate of arrival of requests from malicious users who are involved in an EDoS attack. The rate-limiting scheme prevents suspect requests from being granted service before passing further investigative tests. Subsequently, the project's team used simulation, analytical modeling, and experimentation [J3] to evaluate the proposed techniques. It was shown that the proposed techniques can improve considerably the behavior of a cloud under EDoS attacks.

As part of our future work, the applicant intends to further analyze the aforementioned proposed EDoS attack solutions and their performance when the service provider and the network-level parameters are varied, to accurately reflect the behavior of an EDoS attacker against cloud-based services. Moreover, the applicant plans to deploy diverse application scenarios, wherein a variable number of cloud resources will be scaled up and down according to pre-defined criteria, and its impact on the performance of the proposed solutions will be studied. Furthermore, the applicant proposes to incorporate network-level dynamics so as to help emulate a real computer network within the cloud providers' end, and study the resulting effects on the performance of the proposed solutions.

Subarea B: Network Resiliency [J4], [J6], [J7], [C1], [C2], [C3], [C4], [C5], [C6], [P1], [FRP2], [TRB3]

As the Internet is becoming critically important to many countries, the research area addresses the problem of Internet access denial by higher-tier Internet service providers (ISPs). The Internet access denial problem can occur at the application level and/or at the routing level. When a higher-level domain name system (DNS) server denies a specific country or region access to DNS services, then that specific country or region will lose access to the many Internet applications that are highly dependable on DNS services such as HTTP, and an **application level Internet access denial** takes place. On the other hand, when a malicious higher-tier ISP filters transit traffic for the purpose of dropping packets that belong to a specific country or region, then a **routing level Internet access denial** occurs.

As a result, a funded research project [FRP2] was conducted to devise solutions for both types of Internet access denial. Specifically, one solution based on the concept of peer-to-peer (P2P) networks was developed to solve the application level Internet access denial problem and is outlined in [C5] and [P1]. The developed solution is highly scalable and robust as a direct result of using a P2P approach for the solution. Hence, the solution is suitable to be deployed in a country or a region. Likewise, three different solutions based on border gateway protocol (BGP) tuning, tunneling protocols, and network address translation (NAT) routers were proposed to bypass the routing level Internet access denial problem. The BGP tuning-based solution as outlined in [J7] directs the traffic belonging to a specific country or region around the malicious higher-tier ISP, and thus protects the traffic from being dropped by that malicious higher-tier ISP. Alternatively, the tunneling protocol-based solution that is described in [C4], and the NAT-based solution that is explained in [J6] and [C6] aim to hide the identity of the traffic belonging to a specific country or region so that the malicious higher-tier ISP will be misled into routing that traffic normally since its identity is hidden. A solution that combines the tunneling protocol-based solution and the NAT-based solution was most recently proposed in [J4]. Furthermore, the BGP tuning-based solution and the tunneling protocol-based solution were evaluated using experimental prototypes built in the established Network Resiliency laboratory. The results of the evaluation were published in [C1], [C2], and [C3].

To the best of the applicant's knowledge, this is the *first* work to address the problem of Internet access denial by higher-tier ISPs that targets an entire region. The cited work is *likely to open the door* for further research directions into network resiliency. Moreover, the developed solutions should prove to be beneficial in achieving robust Internet access for ISPs and regulators, carriers, and local businesses and institutions in any region.

Subarea C: Network Security [J5], [C7], [FRP3], [TRB2]

Honeynets have recently gained a considerable amount of interest as a proactive system to diffuse hostile activities in a network. A key feature of Honeynets is the ability to attract, control, and monitor activities of cyber attackers. A Honeynet is a network designed to gather information on security threats, and it can be used by organizations to proactively improve their network security. Hence, a Honeynet can assist system administrators in identifying malicious traffic in the enterprise network.

As such, a funded research project [FRP3] was carried out to lay the ground for a platform that provides information surrounding security threats and vulnerabilities currently active in the networks of the Kingdom of Saudi Arabia. One of the major contributions of the project is in proposing and developing new techniques for the analysis of the Honeynet traffic, and thus automating and simplifying some of the tasks related to analyzing Honeynet traffic. To this effect, the work in [J5] and [C7] used entropy to evaluate different applicant features and used the best ones and their corresponding threshold levels to classify the different malicious activities or anomalies seen in Honeynets.

The above work is the first to *extend* the use of entropy and volume-based thresholds to the problem of detecting and classifying malicious activities and anomalies in an enterprise network. The *novel* proposed approach helps in reducing the time it takes to identify security threats in a network.

Area-II: Wireless Communications and Networking

Research work conducted in the area of Wireless Communication and Networking can be grouped into three sub-areas as detailed below.

Subarea A: Integration of Heterogeneous Networks and Vertical Handoff Characterization [C8], [C10], [C11]

Some realizations of advanced future networks involve the integration of heterogeneous networks. The chief concern in such integrated networks is the ability to offer the user seamless transition between the involved networks and ubiquitous services. As such the evaluation of network overhead during the execution of these transitions, referred to by vertical handoff, is one of the key performance figures for such integrated networks. Most of the previous work has focused on the architectures needed to integrate the networks of concern with very few studies focusing on the evaluation of the vertical handoff delay as a key performance metric. Therefore, the early work in [C10] and [C11] explore a simplified scenario for an integrated network and attempt to evaluate the vertical handoff delay. Utilizing the newly standardized integration architecture, the work in [C8] builds an elaborate simulation platform for 3G/WLAN integrated networks and employ it to evaluate the performance of the overall network assuming that Mobile IP is used as the basis for supporting mobility. Furthermore, the work provides an evaluation for the three possible solutions for mobility support.

The work in this subarea fills a gap in terms of providing a comprehensive evaluation of a key performance metric for integrated networks that was missing from the literature. The work is based on the newly standardized architectures and accounts for the detailed signaling procedures as per the standard documents and the corresponding RFCs. Finally, it is the first work to provide a *detailed view* of the composition of the involved overhead which allows designers to identify performance bottlenecks and propose enhancements.

It is worth mentioning that one of the *significant* outcomes in this work is the development of the elaborate simulation model for testing and evaluating mobility protocols. The applicant and the other co-authors of the aforementioned work continuously receive emails and inquiries regarding the model and its implementation.

Subarea B: Wireless Sensor Networks and Applications [J9], [J10], [C16]

Driven by the recent growth in ubiquitous and pervasive computing the applicant has also recent interest in the capabilities of wireless sensor networks and the associated applications. In the area of telemedicine, the applicant participated in designing, implementing, and analyzing the performance of a telemedicine application as documented by [J9], [J10], and [C16]. The work proposed a layered network consisting of sensor nodes (SNodes) at the first layer whose responsibility is to measure, collect, and communicate, via wired or wireless interfaces, readings. The second layer consists of deployed microcontrollers to process incoming readings and report to a central system, the third level, via their WiFi interfaces. The implementation involved designing some of the interfaces and the data processing algorithms. The studies include mathematical modeling accounting for message priorities to predict the performance of such applications in terms of number of patients (or load) that can be processed by the system for given delay threshold for data. The *novelty* of the work lies in the use of hierarchical structure to facilitate the communications between the different components and also in the use of the analytical tool to predict the capacity of the designed sensor nodes system.

Subarea C: CDMA Networks [C12], [C13], [C17], [C18], [P2]

I have observed throughout my early work in the R&D division of Nortel Networks that the capacity of CDMA networks is greatly affected by the selection of the location of the borders of adjacent CDMA networks. Thus, the applicant participated in studying the effect of the border selection on the capacity of CDMA networks as documented by [C12], [C13], and [C17]. Subsequently, the applicant devised *novel* solutions to improve the capacity of CDMA networks by properly selecting the location of the borders of adjacent CDMA networks, and by reducing the amount of registrations required by the CDMA users at such borders as outlined in [C18] and [P2], respectively.

4 University, Departmental and Public Service

The following table summarizes the main committees the applicant has contributed to in the past 5 years.

Please note that the following acronyms are used for committee level: **U** = University, **Co** = College, **D** = Department. For the role within a committee, the following are used: **M** = Member, **C** = Chairman or Coordinator. Committee types are: **S** = Standing and **A** = Ad-hoc.

	Committee	Academic Year	Formed by	Role	Type
CM-1	Curriculum Committee	2015-2017	D	M	S
CM-2	Exam Policy at KFUPM Development Committee	2014-2015	U	M	A
CM-3	University Islamic Affairs Committee	2013-2014	U	M	S
CM-4	Ph.D. Steering Committee	2013-2014	D	M	A
CM-5	Graduate Committee	2010-2014	D	M	S
CM-6	4 th Student Scientific Conference KFUPM Steering Committee	2012-2013	U	M	A
CM-7	CCSE Joint MS Program in Computer Networks Committee	2012-2014	Co	M	A
CM-8	Academic Textbooks Committee	2011-2012	U	M	S
CM-9	Faculty Search Committee	2009-2011	D	M	S
CM-10	ABET Committee	2013-2016 2006-2010	D	M	S
CM-11	Committee to Benchmark and Design an MS Program in IT Engineering Management	2009-2010	D	M	A

4.1 Contributions to committees and public service

The main contributions to the above listed committees and public services are summarized below.

CM-1: Curriculum Committee

- Periodic review of the COE undergraduate program (both courses and labs).
- Evaluation of undergraduate students petitions/requests, and dealing with relevant memos.
- Develop a plan to minimize the petitions of undergraduate students.
- Advising the COE chairman on related issues.

CM-2: Exam Policy at KFUPM Development Committee

- Review the current policy for conducting exams at KFUPM.
- Review relevant best practices by benchmarking international academic institutions.
- Compile a comprehensive policy for conducting exams at KFUPM.

CM-3: University Islamic Affairs Committee

- Oversee the religious events and activities in the university.
- Improve the procedures for maintaining the on-campus religious facilities.
- Liaise with the Deanship of Students Affairs in overseeing the activities of the permanent youth centers at the university.
- Liaise and oversee the activities of the Women's Committee and the Women's Cultural Center.

CM-4: Ph.D. Steering Committee

- Formulate policies for the Ph.D. comprehensive exam (eligibility, registering, withdrawing, criteria for passing, conditional passing, etc.).
- Propose and implement a process for regular exam offering, proctoring, grading, and result announcement.

CM-5: Graduate Committee

- Update the M.Sc. Program to reflect market demands and international standards.
- Evaluate new M.Sc. and Ph.D. applications and review graduate students' petitions.
- Update the Graduate Student Guide.
- Monitor graduate students' progress.
- Prepare publicity material regarding the Graduate Program in Computer Engineering.

CM-6: 4th Student Scientific Conference KFUPM Steering Committee

- Represent the Computer Engineering department in the university steering committee.
- Select papers contributed by the Computer Engineering students to be submitted to the conference.
- Hold a students' presentations day so as to provide a timely feedback to the students regarding their submitted papers.

CM-7: CCSE Joint MS Program in Computer Networks Committee

- Evaluate new M.Sc. applications to the Computer Networks program and review graduate students' petitions.
- Review the Computer Networks M.Sc. theses proposals submitted by students and provide recommendations for approvals.
- Update the M.Sc. in Computer Networks Program to reflect market demands and international standards.

CM-8: Academic Textbooks Committee

- Review the recommendations of academic textbooks by the academic departments to ensure the conformity of the textbook and its contents to the religious and cultural norms of the country and to ascertain the suitability of the textbook and its scientific and academic merits, and then recommend the adoption of such textbooks to the Rector of the University.
- Review the textbooks authored by KFUPM faculty and judge, by whatever means deemed appropriate, the quality of the textbook and its suitability for adoption.
- Ascertain the need and justification for adopting a certain book as a textbook.
- Oversee the ordering, acquisition and inventory control of the University textbooks.
- Adopt good management practices of textbook resources, and the judicious distribution of textbooks to students and faculty; and recommend policies in this regard.

CM-9: Faculty Search Committee

- Suggest various methods of promoting the department with the aim of attracting excellent applicants.
- Contact prominent scholars for spending sabbatical leaves in the department or joining the University on a long-term basis.
- Summarize the evaluation of new applicants for faculty positions by appropriate faculty members in the area.
- Report to the department council on the main activities of the committee in departmental meetings.

CM-10: ABET Committee

- Design the indirect assessment tools and plan and schedule the indirect assessment process.
- Design the direct assessment tools and supervise the direct assessment process.
- Contribute extensively to the write-up and the organization of the Computer Engineering ABET Self Study Report (SSR) in preparation for the ABET visit.
- Guarantee the availability of the following items in the Computer Engineering department display room:
 - Program Outcome Achievements.
 - Course Files.
 - Student work demos based on physical experiments, video clips, and student presentation.
 - Textbooks for each Computer Engineering core or elective course with its syllabi.
 - All Computer Engineering Council Meeting Minutes in connection with major Accreditation issues.
 - Rubrics Assessment Data for all the Computer Engineering Program Objectives arranged by semester.
 - Minutes of the Industrial Advisory Committee meetings and discussion sessions.
 - Sample surveys and detailed data surveys.

CM-11: Committee to Benchmark and Design an MS Program in IT Engineering Management

- Benchmark and design an MS Program in IT Engineering Management to be offered by the Computer Engineering department. The program is specifically tailored to focus on the essential IT management needs of the local industry from an engineering perspective.
- Submit a report reflecting the committee's findings and recommendations to the Computer Engineering department office.