

## Curriculum Vitae



### **SALEH FARUQUE, PH.D.**

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#### **EDUCATION**

- **Ph.D.**, Electrical Engineering, University of Waterloo, Waterloo, Ontario, Canada, 1980
- **MS**, Electrical Engineering, University of Waterloo, Waterloo, Ontario, Canada, 1976
- **MS**, Applied Physics, Dhaka University, Dhaka, Bangladesh, 1970
- **BS**, Physics, Dhaka University, Dhaka, Bangladesh, 1969

#### **PROFESSIONAL EXPERIENCE**

*August 2002 - Present:*

##### **UNIVERSITY OF NORTH DAKOTA, Grand Forks, ND**

###### **Associate Professor, Dept. of Electrical Engineering**

- **Teaching:** Undergraduate and Graduate Courses. Supervise Masters and Ph. D students.  
**Courses Taught:** Communications Engineering, Electronics-I & II, Circuit Theory, Fiber Optics, Cellular Communications.
- **Research Interest:** Wireless Communications, Microwave, VLSI and Nano-Technology

##### **NORTHCOAST PCS, Melville, NY, June 2001 - Aug. 2002**

###### **Regional Manager.**

- Management responsibility for a group of engineers, contractors, and cell site acquisition teams.
- Responsible for full-scale deployment of CDMA-2000 systems throughout the states of NY, NJ and CT. This involves supervision of multi disciplinary projects such as propagation studies, link budget, coverage prediction, traffic engineering, code planning, capacity and growth planning, antenna engineering, cell site engineering and optimization.

##### **METRICOM INC., Plano, Texas, Feb. 2000 -Feb 2001**

###### **Principal Engineer and Member of the CTO.**

- Technical management responsibility for a group of more than 30 engineers, contractors, and managers. Established interactions and provided technical directions to regional engineering teams for the Nation-wide deployment of wireless Internet access product - **Ricochet** - a high-speed wireless internet access technology. Provided technical guidance to the Chief Technology Officer (CTO) for strategic planning and advance development. Implemented a patent incentive program for the company and served in the patent review board.

##### **NORTEL NETWORKS, Richardson, Texas, 1994-2000**

###### **Manager, Radio Architecture Planning:**

- Managed a group of wireless technology experts in developing physical layer architecture of broadband wireless systems. Designed a multi-carrier multi-code CDMA system for wireless broadband multimedia communications.

- Developed CDMA Cable Modem (Patent Pending) and Optical CDMA (Patent pending). Responded to RFP and developed a physical layer simulation platform for a Ka-band satellite communication system. Functioned as a member of the patent review board. A number of patents were granted for these efforts.
- Provided technical management to a group of RF Engineers in formulating, planning and developing IS-54, IS-136 and IS-95 cellular deployment process and guidelines, developed a number of frequency reuse plan and deployment methodologies for digital cellular products and provided customer support in turnkey projects. Formulated training programs for the company and offered pilot courses to customers. Secured several patents for the company.

**Concurrently with:**

**Adjunct Professor, Electrical Engineering. University of Texas at Dallas, Dallas, Texas**

- Taught graduate level telecommunications courses, conducted funded research and co-supervised a post-doctoral fellow.

**NORTEL NETWORKS, BRAMPTON, Ontario, Canada, 1990-1994**

**Senior Engineer, RF Engineering.**

- Supervised a group of RF engineers in formulating RF deployment and optimization plan for cellular base station products. Provided technical marketing support and sales presentation to several markets. Developed RF planning and deployment guidelines for IS-54 TDMA and offered training courses to customers in Canada, U.S.A and Mexico. The course is now a standard for Nortel training department. Credited with several patents.

**CANADIAN MARCONI, MONTREAL, Quebec, Canada, 1984-1989**

**Systems Engineer.**

- Designed and analyzed a frequency hopping spread-spectrum radio for US defense. Developed a frame and synchronization protocol for the radio. Performed Anti-Jam (AJ) and Low probability of Intercept (LPI) analysis for the radio.

**Concurrently with:**

**Adjunct Assoc. Professor, Electrical Engineering. Concordia University, Montreal, Canada**

- Taught under graduate courses and supervised Graduate students. Obtained research funds from the National Research Council of Canada and conducted post-graduate research

**NORTEL NETWORKS, OTTAWA, Ontario, Canada, 1982-1984**

**Member of the Scientific Staff.**

- VLSI design and layout of a PCM Voice Codec

**Ecole Superieur De Electronic Et Electrotechnique, Paris, France, 1981-1982**

**Visiting Professor, Electrical Engineering.**

- Taught undergraduate Electrical Engineering Courses
- Developed VLSI design Lab

**DHAKA UNIVERSITY**, Dhaka, Bangladesh, 1972-1973

**Lecturer, Applied Physics**

- Taught undergraduate and graduate courses.

## **PATENTS GRANTED**

### **US Patents:**

1. 6,801,495, *High Capacity Robust Modem for Multiple Classes of Services*, Granted, October 5, 2004
2. 6,748,171, *Method and System for Providing Multiple Classes of Services in Dense Wavelength Division Multiplexing Optical Networks*, Granted, June 8, 2004
3. 6,744,984, *Method and System for Alternative Transmission Traffic Routing in Dense Wavelength Division Multiplexing Optical Networks*, Granted, June 1, 2004
4. 6,647,059, *Code Division Multiple Access Cable Modem*, Granted, Nov.11,2003
5. 6,208,615, *Broadband wireless access based on code division parallel access*, Granted, march 27, 2001
6. 6,198,719, *Bi-orthogonal code division multiple access system*, March 6, 2001
7. 6,128,497, *High capacity cell planning based on fractional frequency reuse*, Granted, Oct. 3, 2000
8. 6,085,093, *Frequency transition process for capacity enhancement in a cellular network*, Granted, July 4, 2000
9. 5,970,411, *N=4 directional frequency assignment in a cellular radio system*, Granted, Oct. 19, 1999
10. 5,883,889, *Directional Pseudonoise Offset Assignment in a CDMA cellular radiotelephone system*, Granted, Mar. 16, 1999
11. 5,850,608, *Directional frequency assignment in a cellular radio system*, Granted, Dec. 15, 1998
12. 5,815,813, *Multipath tolerant cellular communication system and method*, Granted, Sept. 29, 1998
13. 5,802,474, *Directional frequency allocation in an N=6 cellular radio system*, Granted, Sept. 1, 1998
14. 5,734,983, *Frequency assignment in a cellular radio system*, Granted Mar. 31, 1998
15. 5,483,667, *Frequency plan for a cellular network*, Granted, Jan. 9, 1996.

### **Canadian Patents:**

1. 2291001, *Bi-Orthogonal Code Division Multiple Access System*
2. 2155538, *Frequency Plan for a Cellular Network*
3. 2104800, *Non-Interfering Frequency Plan For Cellular Communication System*

### **BOOKS:**

#### **Authored:**

1. "Cellular Mobile Systems Engineering", Published by Artech House Inc., ISBN:0-89006-518-7, 1996.

**Co-Authored:**

2. "Wireless Network Deployments", Edited by R. Ganesh and K.Pahlavan, Kluwer Academic Publishers, ISBN: 0-7923-7902-0, 2000.
3. "Encyclopedia of Electrical and Electronics Engineering", Edited by John G. Webster, Published by John Wiley & Sons, Inc. ISBN: 0-471-13946-7, 1996.

**LIST OF PUBLICATIONS****Refereed Journals**

1. **S. Faruque** "Broadband Communications Based on Code Division Parallel Access (CDPA)", Published by the International Engineering Consortium (IEC), Annual Review of Communications, Vol-57, ISBN: 1-931695-28-8, Nov. 2004.
2. **S. Faruque**, "Cellular Control Channel Capacity", Canadian Journal of Electrical and Computer Engineering, Vol.19, No. 1, pp. 13-15, Jan. 1994.
3. M. Nikodem, B.B. Bhattacharyya and **S. Faruque**, "SC Simulation of Hopfield Type Neural Networks", IEEE Trans.on Ckts.&Syst., 1990.
4. R. Raut, B.B. Bhattacharyya and **S. Faruque**, "A Discrete Fourier Transformer using Switched-Capacitor Circuits in Systolic Array Architecture", IEEE Trans. on Ckts.& Syst.,pp.1578-1580, Dec. 1990.
5. R. Raut, B.B. Bhattacharyya and **S.M. Faruque**, "Systolic Array Architecture Implementation of Parasitic Insensitive Switched-Capacitor Filters and Digital Filters", IEE Proc., U.K, 1990.
6. T.S. Rathore, **S. Faruque** and B.B. Bhattacharyya, "A Stray Insensitive Single Switched-Capacitor Ladder Realization of an Arbitrary order Lowpass Filter", IEEE Proc., Vol.75, No.1, pp.168 - 189, January 1987.
7. T.S. Rathore, **S.M. Faruque** and B.B. Bhattacharyya, "A Stray Insensitive Switched-Capacitor Biquad with reduced number of Capacitors", Journal of the Institution of Electronics and Telecommunication Engineers, Vol.33, No.3, pp.75-81, 1987.
8. **S.M. Faruque**, M.Vlach, J. Vlach, K.Singhal and T.R. Viswanathan, "FDNR Switched-Capacitor Filters Insensitive to Parasitic Capacitance's", IEEE Trans. on Ckts. & Syst., Vol. CAS-29, No. 9, pp. 589-596, Sept. 1982.
9. **S.M. Faruque**, "Switched-Capacitor FIR- Cell for N-Path Filters", "Electronics Letters, Vol.18, No.10, pp.431-432, May 1982.
10. T.R. Viswanathan, **S.M. Faruque** and J. Vlach, "Digital Q-Measurement of Audio Frequency Inductors", IEEE Trans. on Inst. & Measurements., Vol. IM-30, No.4, pp.301-303, Dec. 1981.
11. **S.M. Faruque**, J. Vlach and T.R. Viswanathan, "Switched-Capacitor Inductors and their use in LC Filter Simulation", IEE Proc., Vol. Pt.G. No.4, pp.227-229, August 1981.
12. T.R.Viswanathan, **S.M. Faruque**, K. Singhal and J. Vlach, "Switched-Capacitor Transconductances and Related Building Blocks", IEEE Trans. on Ckts. and Systems, Vol.27, No.6, pp. 502-508, June 1980.

13. T.R. Viswanathan, **S.M. Faruque**, K. Singhal and J. Vlach, "MOS Switched Capacitor Amplifiers", Electronics Letters, Vol 15, No. pp. 634-635, 1979.

### Conference Proceedings

1. **Saleh Faruque**, "Error Control Coding Based on Orthogonal Codes", Wireless Proceedings, Volume: 2, Pages: 608-615, 2004
2. **Saleh Faruque**, "Multipath Tolerant Digital Phase-Locked Loops", Wireless Proceedings, Volume: 1, Pages: 316-319, 2003
3. **Saleh Faruque**, "Directional PN Offset Reuse Planning for CDMA Networks", Wireless Proceedings, Volume: 2, Pages: 553-559, 2003.
4. **Saleh Faruque**, "Investigation of Error Control Properties of Orthogonal Codes", MILCOM-2003 Proceedings, Pages: 791-795, 2003.
5. **Saleh Faruque**, "Science, Engineering and Art of Cellular Network Deployment", Proceedings, PIMRC 1998. IEEE International Symposium, Boston, Massachusetts, September 1998
6. **Saleh Faruque**, "Directional Frequency Reuse in Cellular", Proceedings, Techcon 1998.
7. **Saleh Faruque**, "High Capacity Cell Planning Based on Fractional Frequency Reuse With Optimum Trunking Efficiency", Proceedings, VTC'98, pp1458-1460.
8. **Saleh Faruque**, "Directional Frequency Reuse in Hexa-Cellular Platform", Proceedings, ICUPC 1997.
9. **Saleh Faruque**, "Directional Frequency Reuse for Cellular Communicationjs", Proceedings, ICUPC 1997
10. **Saleh Faruque**, "Directional PN-Offset Reuse for CDMA Deployment", Proceedings, ICPWC 1997
11. **Saleh Faruque** "Site Specific Radio Link Design Methodology Based on Okumura-Hata and Walfisch-Ikegami Models", IEEE, Bi-Annual Telecommunications Symposium, Acapulco, Mexico, pp.167-171, 1996.
12. **Saleh Faruque** and M.Maragoudakis"CDMA overview and Deployment Considerations", IEEE, Bi-Annual Telecommunications Symposium, Acapulco, Mexico, pp.93-97, 1996.
13. **Saleh Faruque**, "Propagation Prediction based on Environmental Classification and Fuzzy Logic Approximation", ICC'96, Dallas, Transactions, pp.272-276, 1996.
14. **Saleh Faruque** and M. Maragoudakis, "A Cost-Effective PCS Deployment Methodology", IEEE, Transactions, The Fourth International Conference On Universal Personal Communications", Tokyo, Japan, 1995. pp. 868-872.

15. **Saleh Faruque**, "N=4 Tri-Cellular Plan with Alternate Channel Assignment", IEEE MILCOM'95, Proceedings, pp. 1244-1247.
16. **Saleh Faruque**, "A Three Ray Propagation Model for PCS and Micro cellular Services", IEEE MILCOM'95, Proceedings, pp. 1239-1243.
17. **Saleh Faruque**, "A Classical Method of Evaluating Co-Channel and Adjacent Channel Interference in Digital FM", IEEE MILCOM'95, Proceedings, pp. 399-401.
18. **Saleh Faruque**, "A Three Ray Propagation Model for Line Of Sight PCS and Microcellular Services", IEEE, Transactions, PIMRC'95, Toronto, Canada, 1995, PP. 388-391.
19. **Saleh Faruque**, "Evaluation of Cellular Control Channel Performance in Noise and Interference", ISITA '94, Sydney, Australia, Nov. 20-25/94.
20. **Saleh Faruque**, "PCS Micro-Cells Insensitive to Propagation Medium", Transactions, IEEE GLOBECOM '94, San Francisco, California, Nov. 27- Dec. 2, 1994, vol.1, pp 32-36.
21. **S.M. Faruque**, "Spectrally Efficient Modulation Technique for PCS and Data Communication", Transactions, IEEE ICSPAT, Dallas, Texas, Oct. 18-21, 1994, vol.1, pp. 345-348
22. **S.M. Faruque**, "The N=9 Frequency Plan: A Modified Technique to Enhance C/I Performance and Capacity", Proceedings, IEEE 2nd International Conference on Universal Personal Communications, Ottawa, Ont. Canada. pp. 718-722. 1993
23. **S.M. Faruque**, "An Automated Reverse-Path Radio Survey", Proceedings, Wireless '93, Fifth International Conference on Wireless Communications, Calgary, Canada, pp. 377-381, 1993.
24. **S.M. Faruque**, "N=3 Frequency Plan: An Efficient Channel Utilization Technique for Cellular Communications", Proceedings, Wireless '93, Fifth International Conference on Wireless Communications, Calgary, Canada. pp.95-105, 1993.
25. **S.M. Faruque**, "Cellular Control Channel Capacity: Evaluation and Enhancement", IEEE MILCOM-92, Sandiego, California. OCT. 11-14, 1992.
26. **S.M. Faruque**, "Cellular Control Channel Performance in Noise, Interference and Fading", IEEE International Conference on Selected Topics in Wireless Communications, Proceedings, p328-331, 1992.
27. M. Nikodem, B.B. Bhattacharyya and **S.M. Faruque**, "Switched-Capacitor Hopfield Type Neural Networks", Proc. IEEE Int. Symp. on Ckts. and Syst., Vol.1, pp.507-509, 1990.
28. **S.M. Faruque**, "Exclusive Binary Modulation for Suppression of Interference", IEEE Military Comm. Conf. , Monterey, CA., 1990.

29. **S.M. Faruque** et. al., "Synthesis of Digital Filters by means of Modified Bilinear Transformation", Proc. IEEE Int. Symp. on Ckts. & Syst., New Orleans, Louisiana, May 1990.
30. R. Raut, B.B. Bhattacharyya and **S.M. Faruque**, "An Application of Systolic Array Design Architecture to Switched-Capacitor Filter Circuits", Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing, Glasgow, Scotland, U.K., Vol.4, pp.2401-2404, May 1989.
31. R. Raut, B.B. Bhattacharyya and **S.M. Faruque**, "A New Architecture for Efficient Implementation of Parasitic Insensitive Switched-Capacitor Filters in LSI/VLSI Technology", Proc., IEEE Int. Conf. on Ckts. & Syst., China, pp.568-571, 1989.
32. **S.M. Faruque** et. al., "A Modified Bilinear Integrator", Proc. IEEE Int. Symp. on Ckts. & Syst., 1989.
33. **S.M. Faruque** et. al., "SC-Resistors as Logic Circuits", Proc. 31st Midwest Symp. on Ckts. & Syst., 1988, pp.124-125.
34. M.H. Khan, T. Le-Ngoc, V.K. Bhargava and **S.M. Faruque**, "AFEC Scheme Using Double Coding Technique", Proc., IEEE Montech, Montreal, Canada, 1988.
35. **S.M. Faruque** et al., "Pseudo N-Path Filters Based on FIR Cell", Proc., Int. Symp. on Electron Dev., Ckts. & Syst. (ISELDECS-87), Indian Institute of Technology, Kharagpur, India, pp.860-863, 1987.
36. **S.M. Faruque** et. al., "Digitally Programmable State Variable Analog Filters", Proc., Int. Symp. on Electronics Dev., Ckts. & Syst. (ISELDECS-87), Indian Institute of Technology, Kharagpur, India, pp.571-576, 1987.
37. **S.M. Faruque** et. al., "Frequency De-Warping by Means of Mixed LDI-Bilinear Transformations", Proc. Int. Symp. on the Mathematical Theory of Networks and Systems (MTNS), Phoenix, Arizona, 1987.
38. T.S. Rathore, B. B. Bhattacharyya and **S.M. Faruque**, "A SC Based D to A Converter, Proc. Int. Symp.. on Instrumentation, India, 1987.
39. **S.M. Faruque** et. al., "Digitally Programmable SC-Filters Compatible with Semi-Custom VLSI", Proc. IEE Int. Symp. on Ckts. & Syst., pp. 339-341, 1987
40. **S.M. Faruque**, S. Rafique, M.H. Khan and T. Le-Ngoc, "Exact Design of SC-Filters Using LDI-Bilinear Integrators", Proc. 29th Midwest Symp. on Ckts. and Syst., pp.586-589, 1986.
41. **S.M. Faruque** and T. Le-Ngoc, "Weighted Frequency SC-DAC Compatible with Semi-Custom VLSI", Proc. 13th Biennial Symp. on Comm., June 1986, pp. c.217-c2.20,
42. **S.M. Faruque** et. al., "A Lossless Composite Integrator (LCI) Based on Mixed LDI-Bilinear Transformations", Proc. IEEE Int. Symp. on Ckts. & Syst., pp.653-654, 1986.
43. **S.M. Faruque** et. al., "Considerations for VLSI Implementation of Switched Capacitor Filters", Proc. 28th Midwest Symp. Ckts. & Syst., pp.629-632, 1985.

44. **S.M. Faruque**, "Layout Automation in Switched-Capacitor Filters", IEEE Proc. Int. Symp. on Ckts. & Syst. Kyoto, Japan, pp.777-780, 1985.
45. T.R.Viswanathan, **S.M. Faruque**, K. Singhal and J. Vlach, "Switched-Capacitor Transconductances and Related Building Blocks", Proc. IEEE Symp., Ckts. and Syst., PP. 981-984, 1980.

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#### **AWARDS**

- Received 1997 Nortel President's award of excellence for innovation
- Received Award from IEEE Mexico-Brazil Branch, 1997

#### **PROFESSIONAL AFFILIATION**

- 28 years continuous affiliation with IEEE communications society
  - At present, Senior Member, IEEE
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