Detailed Curriculum Vitae of Frank Koperda

Expertise

- Data Communications Protocols (TCP/IP, Wi-Fi, DOCSIS, ADSL, PON)
- Hardware Design (ICs, circuits, RF, Systems)
- Standards Development (IEEE, ETSI, ITU)
- Networking hardware (Switches, Routers, Telco, CableTV)
- Software (14 Programming Languages, System Design, Code Analysis)
- Big Data (Natural Language Processing-NLP, machine learning, untagged data)
- Intellectual Property (patenting useful technology, patent litigation, patent office IPRs/PGRs)

Professional Summary

My technical expertise is in computer systems and data communications. The breadth of this expertise includes hardware design, software development, communications protocols, and "big data". As identified below, I have depth in each of these areas and this unique combination allows valuable insight into creating cutting edge products, helping companies solve difficult problems, and help in patent litigation issues.

Development experience includes hardware design of integrated circuits, circuit boards, and complex systems. I program in a number of computer languages and have applied this to operating systems, device control, data networking, and natural language processing. During my career, there are over 60 patents/applications in which I am a named inventor.

Current research and development is related to "big data" processing systems that enable the computer to automatically learn all technical areas using untagged data and natural language. This work involves sophisticated algorithms that automatically identify important information, can find related material, and can provide automatic grouping of related documents given examples of document in various such classifications.

Consulting services also include various aspects relating to Intellectual Property. I assist companies in identifying core technologies that should be protected, performing patent searches, testifying in Federal District courts for patent infringement cases, and providing opinions before the US Patent office relating to IPRs and PGRs.

Practice Areas

- Communications: ADSL, VoIP, Cable modems, Telephony, Wireless (e.g. Wi-Fi, IEEE 802.11, cell phone), Fiber Protocols
- Engineering: VLSI, digital, analog, RF, system, and card design
- Software: Communications, DSP, embedded systems, operating systems, compilers, NLP algorithms, proficiency in many languages (e.g. C#, C++, JAVA)
- Standards/Forums: CableLabs, ADSL Forum, FSAN, IEEE 802.11, ANSI X3T9, T1A1, WINForum
- Expert Witness: Patent analysis, claim charts, tutorials (including Markman hearings), trial testimony, IPRs, PGRs, and identification of technology in commercial products

Data Communications Experience

- Wireless data communications including LANs and working with FCC to get the PCS spectrum
- ADSL Deployment in Digital Loop Carrier Systems
- Fiber communications including passive optical networks (PONs) such as APON, GPON, EPON, G.983, G.984, G.987, and the Fibre Channel Standard
- Developed products, systems and protocols to support data and telephony over the CableTV plant (e.g. DOCSIS, PacketCable, CableHome)
- Communication Protocols VoIP, SIP, TCP/IP, ATM, Frame Relay, X.25, Fibre Channel, FDDI, HIPPI, LANs
- Standards Participation in IEEE 802.11 (Wireless), IEEE 802.14 (Cable modem), ANSI X3T9.3 (Fibre Channel), FSAN (fiber system definition by 10 Telcos), ADSL Forum, UAWG

Software Experience

- System design: function partitioning, code sizing, testing, problem determination
- Systems programming: operating system design, device drivers, compilers, communications
- Device control: disk controllers, DSP, printers, data acquisition, speech recognition

Hardware Experience

- System design: function partitioning, fault tolerance, cooling, power systems, safety, servicing
- Product design: 2 Gb/s communications router / switch, workstations, printers
- Digital: VLSI design and simulation, card design and manufacture
- Analog: Transducers, interfaces, preamplifiers, power amplifiers
- RF design (holder of First Class Radiotelephone and Technician Class Amateur licenses)

Employment History

From: 1999 **NextGen Datacom, Inc.**
To: Present
Position: *Owner*
Working with a variety of customers on creating new datacom products, helping investors evaluate opportunities, and patent protection for products. The product development has included, Home Networking (CableHome), Wireless (IEEE 802.11), Voice over IP (VoIP) transport products, ADSL, and big data.

From: 2010 **DocuNOWledge, LLC**
To: 2014
Position: *CTO / Co-owner*
The company provided the marketing and licensing of the document search/classification. This patented technology developed by NextGen Datacom implemented “big data” searching of USPTO Utility patents, patent applications, European patents, and publicly

available Defense Department documents (DTIC). Experiments were conducted showing the algorithms worked effectively on documents written in other human languages (e.g. French, German, Spanish).

From: 1998 **Hayes Microcomputer Products**
To: 1999

Position: *Director of Research and Systems Engineering*
Responsible for defining future products, determining the key technologies required for the future and establishing relationships with other companies. This group was also responsible for determining standards participation, reviewing Intellectual Property issues and ensuring common, interoperable features across all product lines including ADSL, Remote Access servers, and Home LANs.

From: 1996 **BellSouth Telecommunications**
To: 1998

Position: *Distinguished Member of Technical Staff -Exploratory Development*
I helped develop the Passive Optical Network (PON) fiber delivery systems within FSAN (15 international telcos), a hybrid fiber-wireless system, and network computing. Part of the job involved understanding how the technologies are likely to evolve, new business opportunities enabled by the technologies and which ones will become cost effective for this environment.

From: 1994 **Scientific-Atlanta Inc.**
To: 1996

Position: *Chief Architect for Data Communications*
Lead System Architect for Data over CATV. Worked with customers to develop product and system requirements. Developed new data protocols, did performance analysis, scheduling, cost estimating, staffing, and the IEEE 802.14 standards. Was awarded several US patents for the data-over-cable architecture.

From: 1977 **IBM**
To: 1994

Position:

- (1990-1994) *Communications Architecture*:
  Modified Fibre Channel Standard (ANSI X3T9.3) to allow multimedia packets using Q.2931
  Modified MPEG-2 DSMCC protocol to allow more flexibility
  Designed wireless protocols and worked with IEEE, created industry association, lobbied FCC
  Writing LAN Access Agent for BBNS (ATM network)
- (1989-1990) *Communications Concentrator*:

Hardware project lead of 2 Gb/s fast packet switch
Switch had SONET, T1, T3, HiPPI, RVX, LAN, FDDI, X.25 links
Received patents for design to multicast packets through network

- (1986-1989) *3471 / 3476 Terminal*:
  VLSI design of integrated micro, CRT ctlr, keyboard cntrl, 1.5 mb/s com link
  Programming to recognize brain waves for control of CRT cursor
  Programming to recognize facial muscle movement for control of PC
- (1984-1986) *3472/Infowindow*: (first IBM multimedia terminal)
  Design of PC card to attach to phone line, record & playback speech, speech recognition
  Programming of speech recognition (parameter extraction, word boundary, template matching)
  Application programming
- (1983-1984) *Integrated Telephone/Terminal*:
  Project lead and programming of SNA type 2 terminal emulation
  Communications programming of SDLC and BISYNC
  Application programming
- (1982-1983) *PBX Advanced Call Processing*: (first IBM PBX)
  Software design of advanced call processing using Series/1 attached to PBX
  Project lead and programming of custom operating system for PC attaching to PBX
- (1980-1982) *4975 Printer*: (first IBM desktop printers)
  Card design of microprocessor based printer including power drivers for printhead and motors
  Programming of motor control, printhead control and BISYNC communications using 8085
  Design of new technique for determining printhead position using magnetic delays
- (1979-1980) *System/23*: (first IBM desktop computer)
  Hardware design and programming of floppy disk subsystem
  Standardization within IBM of diskette information formats
  Concept and design of first IBM PC (68000 based)
- (1977-1979) *Series/1*: (first IBM minicomputer)
  Hardware design and programming of I/O card for hard disk drive
  Hardware design and programming for magnetic bubble and CCD storage
  Operating System programming

Education

Year	College/University	Degree
1976	Case-Western Reserve University, Cleveland, OH	MS, Computer Engineering
1974	State University of New York, Plattsburgh, NY	BA, Physics & BA, Chemistry

Patents / Patent Filings

Patent Number	Date Issued	Title
U.S. 8,838,614	September 2014	Method And System For Document Classification Or Search Using Discrete Words
U.S. 8,316,030	November 2012	Method And System For Document Classification Or Search Using Discrete Words
PCT/US2011/050037	August 2011	Method And System For Document Classification Or Search Using Discrete Words
U.S. 6,983,327	July 2006	System and Method for providing Statistics for Flexible Billing in a Cable Environment
U.S. 7,028,088	April 2006	System and Method for providing Statistics for Flexible Billing in a Cable Environment
US Patent filing	July 2004	Enhanced Apparatus for an Electronic Mascot Sound Simulator
Taiwan Patent TW589838	June 2004	Method And System For Simplifying Wiring In A Modular Communications Gateway
Taiwan Patent TW573411	January 2004	Method and Systems for A Modular Residential Gateway
World Patent WO 02085086	October 2002	Method and Systems for A Modular Residential Gateway
China Patent CN 1427613	July 2003	Method And System For Simplifying Wiring In A Modular Communications Gateway
Australia Patent 2002326800	March 2003	Method And System For Simplifying Wiring In A Modular Communications Gateway
World Patent WO 03021797	March 2003	Method And System For Simplifying Wiring In A Modular Communications Gateway
US Patent filing 20030021080	January 2003	Method And System For Simplifying Wiring In A Modular Communications Gateway
Germany DE69331310T	August 2002	Function Distribution in a Packet Switched Network
U.S. 6,467,091	October 2002	Constant Bit Rate Transport in a Contention based Medium Access Control
US Patent filing 20020065935	May 2002	Method and Systems for A Modular Residential Gateway
Austria AT210907T	December 2001	Function Distribution in a Packet Switched Network
U.S.6,230,203	May 2001	Method for providing Statistics for Flexible Billing in a Cable Environment

Patent Number	Date Issued	Title
US Patent filing	December 2000	Method for Providing Proper Addressing in the Presence of a Network Address Translator (NAT) When Using Security Protocols
US Patent filing 09/689,071	October 2000	An Independent Central Office Connected To Customers Via Packet Switched Transport Systems
US Patent filing 09/552,055	April 2000	An Independent Central Office Connected To The Public Switched Telephone Network Via Alternative MAN Transport Systems
Germany DE69325957T	March 2000	Methods and Apparatus for Routing Packets in Packet Transmission Networks
US Provisional Application	February 2000	Transmission of Modem Signals over a Universal Digital Loop Carrier System
US Patent filing 60/177,972	January 2000	Method to Provide Virtual Firewall Functionality from a Remote Service Provider
Spain 2136118T	November 1999	Methods and Apparatus for Routing Packets in Packet Transmission Networks
U.S.5,966,163	October 1999	Providing Constant Bit Rate Upstream Data Transport In A Two Way Cable System By Scheduling Preemptive Grants For Upstream Data Slots Using Selected Fields Of A Plurality Of Grant Fields
Austria 183349T	August 1999	Methods and Apparatus for Routing Packets in Packet Transmission Networks
US Provisional Application	May 1999	Digitizing the Transmission of a 56 kbit/s Modem Signals over a Universal Digital Loop Carrier System
US Provisional Application	June 1999	Method and Apparatus for Transmission of Digital Voice Band Modem Signals over a Universal Digital Loop Carrier System
Great Britain Patent GB2321373	July 1998	Constant Bit Rate Transport in a Contention based Medium Access Control
U.S. 5,790,806	August 1998	Cable Data Network Architecture
World Patent WO9737493	October 1997	Cable Data Network Architecture
Australia Patent 2219597	October 1997	Cable Data Network Architecture
World Patent WO9716895	May 1997	Constant Bit Rate Transport in a Contention based Medium Access Control
Australia Patent AU7464296	May 1997	Constant Bit Rate Transport in a Contention based Medium Access Control

Patent Number	Date Issued	Title
Japan JPH6216942 / JP2959659	1997	Function Distribution in a Packet Switched Network
Korea 9614986	1996	Methods and Apparatus for Routing Packets in Packet Transmission Networks
US. Provisional Application	October 1995	Priority Preempt Mechanism in a Mini-Slot Control Contention Based Medium Access Control
European Patent EP0598671	May 1995	Function Distribution in a Packet Switched Network
Canada CA2100539	May 1994	Function Distribution in a Packet Switched Network
Spain ES2168093T	May 1994	Function Distribution in a Packet Switched Network
Canada CN2094405	May 1994	Methods and Apparatus for Routing Packets in Packet Transmission Networks
China CN1032109	July 1994	Function Distribution in a Packet Switched Network
U.S. 5,309,433	May 1994	Methods and Apparatus for Routing Packets in Packet Transmission Networks
China CN1081056	January 1994	Methods and Apparatus for Routing Packets in Packet Transmission Networks
European Patent EP 0579567	January 1994	Methods and Apparatus for Routing Packets in Packet Transmission Networks
Australia AU3838993	December 1993	Methods and Apparatus for Routing Packets in Packet Transmission Networks
Japan JPH0662053 / JP2739023	1992	Methods and Apparatus for Routing Packets in Packet Transmission Networks
US Patent filing 19920978609	November 1992	Function Distribution in a Packet Switched Network
Germany DE3072189D	March 1991	Serial Storage Interface Apparatus for Coupling a Serial Storage Mechanism to a Data Processor Input/Output Bus
European Patent EP 0031031	July 1981	Serial Storage Interface Apparatus for Coupling a Serial Storage Mechanism to a Data Processor Input/Output Bus
Canada CA1163724	March 1984	Serial Storage Interface Apparatus for Coupling a Serial Storage Mechanism to a Data Processor Input/Output Bus

Patent Number	Date Issued	Title
U.S. 4,344,132	August 1982	Serial Storage Interface Apparatus for Coupling a Serial Storage Mechanism to a Data Processor Input/Output Bus
Japan JPS56087154	1981	Serial Storage Interface Apparatus for Coupling a Serial Storage Mechanism to a Data Processor Input/Output Bus
US Patent filing 60/159,032	October 1999	Method and Apparatus to Bypass a Local Exchange Carrier using an Independent Central Office having LAN Technology for providing Data and Telephony Services
US Patent filing 60/159,052	October 1999	Method and Apparatus to Bypass a Local Exchange Carrier Using Packet Transfer Technologies to Connect a Customer to the Public Switched Telephone Network
US Patent filing 60/159,061	October 1999	Method and Apparatus to Bypass a Local Exchange Carrier Using an Independent Central Office Having Wireless Transport to the Residence.
US Patent filing 60/159,591	October 1999	Method and Apparatus to Bypass a Local Exchange Carrier using an Independent Central Office having Customer Provisioned Services
US Patent filing 60/159,525	October 1999	An Independent Central Office which provides Local and Long Distance Calling Services to Existing Residential and Commercial Developments
US Patent filing 60/159,591	October 1999	Method and Apparatus for Installing and Monitoring Residential Water Utility Services
US Patent filing 60/159,593	October 1999	Method and Apparatus for Installing and Monitoring Residential Natural Gas Utility Services
US Provisional Application	October 1999	Method and Apparatus for Installing and Monitoring Residential Electricity Utility Services
US Provisional Application	October 1999	Method and Apparatus for installing and monitoring Residential Utility Services

Publications

F.R. Koperda
Cable Modem: Old Protocols for a new Paradigm
National Cable Television Association Technical Papers, May 1996

F. Farhan, F.R. Koperda.
Challenges with Transmission of Data over CATV Networks
National Cable Television Association Technical Papers, May 1995

A.L. Bond, D.W. Davenport, F.R. Koperda.
Mechanism for Non-Disruptive Dynamic Testing of a Communications Network
IBM Technical Disclosure Bulletin, Vol 34 No 7A, pages 239-240 December 1991

F.R. Koperda, D.K. Popken
Automatic Compensation of Skin Conductance in Electromyographic Sensing
IBM Technical Disclosure Bulletin, Vol 34 No 4B, pages 124-126 September 1991

F.R. Koperda, ***Extraction of the Electric Fields of the Brain in a Noisy Environment***,
IBM Technical Disclosure Bulletin, V32: No 7. 1989.

R.A. Schulz, F.R. Koperda, ***Position Determination Using Pulse Delays***
IBM Technical Disclosure Bulletin, V27:2385, 1984.

F.R. Koperda, ***Ultrasonic Position Locator,***
IBM Technical Disclosure Bulletin, V27:1670, 1984.

F.R. Koperda
Voice Recognition
The McGraw-Hill Computer Handbook, pp 30.1 - 30.24, McGraw-Hill 1983.

F.R. Koperda
Position Detection in Printers
IBM Technical Disclosure Bulletin, V25:4673, 1983.

F.R. Koperda
Voice Recognition
Microprocessor Applications Handbook, pp 14.1, McGraw-Hill 1982.

J.D. Dixon, R.F. Farrel, F.R. Koperda, G.U. Merckel
Parity Mechanism for Detecting both Address and Data Errors
IBM Technical Disclosure Bulletin, V24:794, 1981.

F.R. Koperda
Bubble Memory Resynchronization Mechanism
IBM Technical Disclosure Bulletin, V22:450, 1979.

F.R. Koperda, F.I. Parke
Interactive Design of Visual Aids
Proceedings 1977 Annual Conference, Association for Computing Machinery, pp 434, 1977