

# Tal Lavian, Ph.D.



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## Telecommunications, Network Communications, Mobile Wireless, and Internet Technologies Expert

Scientist, educator, and technologist with over 30 years of experience. He has co-authored over 25 scientific publications, journal articles, and peer-reviewed papers. Dr. Lavian served as an expert in network communications and telecommunications, including Internet protocols, streaming media, and mobile wireless technologies. He is an inventor of over 120 patents; over 60 prosecuted *pro-se*. He served as Principal Investigator (PI) for three US Department of Defense (DARPA) projects.

### EDUCATION

- **Ph.D.**, Computer Science specializing in networking and communications, UC Berkeley
- **M.Sc.**, Electrical Engineering, Tel Aviv University
- **B.Sc.**, Mathematics and Computer Science, Tel Aviv University

### EXPERTISE

Network communications, telecommunications, Internet protocols, and mobile wireless:

- **Communication networks:** Internet protocols; TCP/IP suite, TCP, UDP, IP, Ethernet, 802.3, network protocols, network software applications, data link, network, and transport layers (L2, L3, L4), packet switching, data center network architecture
- **Mobile wireless:** Wi-Fi, 802.11, Bluetooth, MAC, PHY, Wireless LAN (WLAN). Cellular systems, SMS, instant messaging (chat), mobile devices, smartphone
- **Internet/cloud:** Internet Technologies, Web applications, HTTP, e-mail, SMTP, POP, IMAP, Java, C/C++, file transfer FTP, client-server, cloud computing, distributed computing
- **Routing/switching:** LAN, WAN, VPN, routing protocols, RIP, BGP, MPLS, OSPF, multicast, DNS, QoS, network infrastructure, network communication architectures
- **VoIP/Streaming Media:** PSTN, circuit switching, IP telephony, VoIP, SIP, RTP, SS7, SONET, TDM, video/audio conferencing, streaming media

Dr. Lavian has extensive experience in software development of network protocols, design, architecture, configurations, installation, and networks testing. He has academic and hands-on experience in the above fields, including technology products from different companies, implementations, related standards, designs, hardware, systems, and software technologies.

### EXPERT WITNESS

Dr. Lavian served as an expert witness in over 140 patent-related cases where he wrote expert reports and testified in over 80 depositions. He has testified in Federal courts, in front of judges and juries, USPTO PTAB IPR, and the ITC. The cases involved leading companies including Amazon, LinkedIn, Avaya, T-Mobile, AT&T, Ericsson, Sprint, Cisco Systems, Juniper Networks, Polycom, Motorola, HP, LG, WhatsApp, Instagram, Microsoft, Google, Huawei, Facebook, Samsung, and Apple.

## ACCOMPLISHMENTS

- Served as Principal Investigator (PI) for three US Department of Defense (DARPA) projects
  - Directed networking computation project for the US Air Force Research Lab (AFRL)
  - PI of a wireless research project for an undisclosed US federal agency
- Led and developed the first network resource scheduling service for grid computing
- Managed and engineered the first demonstrated transatlantic dynamic allocation of 10Gbs Lambdas as a grid service
- Development and successful demonstration of the first wire-speed active network on commercial hardware
- An inventor of over 120 patents, over 60 prosecuted *pro-se* in front of the USPTO
- Created and chaired Nortel Networks' EDN Patent Committee

## PROFESSIONAL EXPERIENCE

**The University of California, Berkeley**, Berkeley, California 2000-2019  
**UC Berkeley SkyDeck, Industry Fellow, Lecturer, Visiting Scientist, Ph.D. Candidate, Nortel's Scientist Liaison**

*Some positions and projects were concurrent, others sequential*

- UC Berkeley SkyDeck startups - advanced technology research, development, business, and market
- Industry fellow and lecturer at the Sutardja Center for Entrepreneurship and Technology (SCET).
- Conducted research projects in data centers (RAD Labs), telecommunication infrastructure (SAHARA), and wireless systems (ICEBERG)
- Acted as a scientific liaison between Nortel Research Lab and UC Berkeley, providing tangible value in advanced technologies
- Developed long-term technology for the enterprise market, integrating communication and computing technologies
- Studied network services, telecommunication systems and software, communications infrastructure, and data centers
- Earned a Ph.D. in Computer Science with a specialization in communications and networking

**TelecommNet Engineering, Inc.** Sunnyvale, California 2006-Present  
**Principal Scientist**

- Consulting in the areas of network communications, telecommunications, Internet protocols, and smartphone mobile wireless devices
- Providing system architecture and technology analysis for computer networks, mobile wireless devices, and Internet web technologies projects
- Providing expert witness services in network communications' patent infringement lawsuits

**CRadar.Ai**, UC Berkeley, California 2018-2019  
**CTO / Principal Investigator**

- CRadar.Ai improves the Radar wireless RF signal phase noise purity by 100x
- Accurate Radars are paramount for self-driving car safety. Radars "see" where Cameras and LiDars are "blind" (fog, rain, snow, direct sunlight, and darkness)

- The superior wireless RF signal quality provides a clean signal for high Radar accuracy
- Improving Radar accuracy and resolution enables genuine redundancy, sensory fusion and puts the Radar into the sensory spearhead

**Aybell** (VisuMenu Inc.), UC Berkeley, California

2016-Present

**CEO/CTO**

- Aybell transforms smartphones into visual menu systems, making the phone a frictionless point for user interactions with all customer service platforms' features. Empowers consumers to reach the right agents in call centers, overcoming customer service barriers. Aybell is a branding and marketing of VisuMenu advanced technologies.
- Architecture, design, and implementation of a cloud data center for connecting any smartphone user to any company and service by digitizing interactive voice systems and exposing through cloud-service APIs to other applications
- The system was deployed as a cloud networking and cloud computing service on Amazon Web Services (AWS) and Google Cloud Platform (GCP)
- Technologies include Data Science analytics, Machine Learning (ML), Artificial Intelligence (AI), and Statistical Learning (SL). Building an NLP Parser using Python, NLTK, SpaCy, and other NLP libraries and modules

**VisuMenu, Inc.**, Sunnyvale, California

2010-2016

**Co-Founder and Chief Technology Officer (CTO)**

- Led the software design and development of a visual IVR system for smartphones and mobile devices, based on an innovative use of wireless and network communications technologies
- Design of a search engine for IVR / PBX using Asterisk, SIP, and VoIP
- The system was deployed as a cloud networking and cloud computing service on Amazon Web Services (AWS) and Google Cloud Platform (GCP).
- VisuMenu advanced technologies rebranded as Aybell.

**Ixia**, Santa Clara, California

2008 - 2008

**Network Communications Consultant**

- Researched and developed advanced network communications testing technologies:
- IxNetwork/IxN2X —IP routing and switching devices and broadband access equipment. Provided traffic generation and emulation for the full range of protocols: OSPF, RIP, EIGRP, BGP, IS-IS, MPLS, unicast, multicast, broadcast, layer 2/3 VPNs, IPSec, carrier Ethernet, broadband access, and data center bridging. Tested and validated IEEE, ITU, and IETF RFC standards compatibility
- IxLoad — quickly and accurately modeled high-volume video, data, and voice subscribers and servers to test the real-world performance of multiservice delivery and security platforms
- IxCatapult — emulated a broad range of wireless access and core protocols to test wireless components and systems that, when combined with IxLoad, provides an end-to-end solution for testing wireless service quality
- IxVeriWave — employed a client-centric model to test Wi-Fi and wireless LAN networks by generating repeatable large-scale, real-world test scenarios that are virtually impossible to create by any other means
- Test automation — provide simple, comprehensive lab automation to help test engineering teams create, organize, catalog, and schedule execution of tests

**Nortel Networks**, Santa Clara, California

1996 - 2007

*Employed initially by Bay Networks, which was acquired by Nortel Networks*

**Principal Scientist, Principal Architect, Principal Engineer, Senior Software Engineer**

*Held scientific and research roles at Nortel Labs, Bay Architecture Labs, and in the office of the CTO*

### **Principal Investigator for US Department of Defense (DARPA) Projects**

- Conceived, proposed, and completed three research projects: active networks, DWDM-RAM, and a networking computation project for Air Force Research Lab (AFRL)
- Led a wireless research project for an undisclosed US federal agency

### **Academic and Industrial Researcher**

- Analyzed new technologies to reduce risks associated with R&D investment
- Headed research collaboration with leading universities and professors at UC Berkeley, Northwestern University, University of Amsterdam, and University of Technology, Sydney
- Evaluated competitive products relative to Nortel's products and technology
- Proactively identified prospective business ideas, which led to new networking products
- Predicted technological trends through researching the technological horizon and academic sphere
- Designed software for switches, routers, and network communications devices
- Developed systems and architectures for switches, routers, and network management
- Researched and developed the following projects:
  - Data-Center Communications: network and server orchestration 2006-2007
  - DRAC: SOA-facilitated L1/L2/L3 network dynamic controller 2003-2007
  - Omega: classified wireless project for undisclosed US Federal Agency 2006-2006
  - Open platform: project for the US Air Force Research Laboratory (AFRL) 2005-2005
  - Network resource orchestration for Web services workflows 2004-2005
  - A proxy study between Web/grids services and network services 2004-2004
  - Streaming content replication: real-time A/V media multicast at edge 2003-2004
  - DWDM-RAM: US DARPA-funded program on agile optical transport 2003-2004
  - Packet capturing and forwarding service on IP and Ethernet traffic 2002-2003
  - CO2: content-aware agile networking 2001-2003
  - Active networks: US DARPA-funded research program 1999-2002
  - ORE: programmable network service platform 1998-2002
  - JVM platform: Java on network devices 1998-2001
  - Web-based device management: network device management 1996-1997

### **Technology Innovator and Patent Leader**

- Created and chaired Nortel Networks' EDN Patent Committee
- Facilitated continuous stream of innovative ideas and their conversion into intellectual property rights
- Developed intellectual property assets through invention and analysis of existing technology portfolios

**Aptel Communications**, Netanya, Israel

1994-1995

**Software Engineer, Team Leader**

*Start-up company focused on mobile wireless CDMA spread spectrum PCN/PCS*

- Developed a mobile wireless device using an unlicensed band - Direct Sequence Spread Spectrum (DSSS); FCC part 15 - unlicensed transmitters
- Designed and managed a personal communication network (PCN) and personal communication system (PCS), which were the precursors of short text messages (SMS)
- Designed and developed network communications software products in C/C++
- Invented and implemented a two-way paging product

**Scitex Ltd.**, Herzeliya, Israel

1990-1993

**Software Engineer, Team Leader**

*Software and hardware company acquired by Hewlett Packard (HP)*

- Developed system and network communications in C/C++
- I provided IT services, System Administration, and network administration.
- I worked on Unix systems, including IBM AIX, HP, and SUN Unix.
- Invented Parallel SIMD Architecture
- Participated in the Technology Innovation group

**Shalev**, Ramat-HaSharon, Israel

1987-1990

*Start-up company*

**Software Engineer**

- Developed real-time software and algorithms in C/C++ and Pascal

## **PROFESSIONAL ASSOCIATIONS**

- IEEE senior member
- IEEE CNSV co-chair, Intellectual Property SIG (2013)
- President Next Step Toastmasters (an advanced TM club in the Silicon Valley) (2013-2014)
- Technical co-chair, IEEE Hot Interconnects 2005 at Stanford University
- Member, IEEE Communications Society (COMMSOC)
- Member, IEEE Computer Society
- Member, IEEE Systems, Man, and Cybernetics Society
- Member, IEEE-USA Intellectual Property Committee (2012)
- Member, ACM, ACM Special Interest Group on Data Communication (SIGCOM)
- Member, ACM Special Interest Group on Hypertext, Hypermedia, and Web (SIGWEB)
- Member, IEEE Consultants' Network (CNSV)
- Global Member, Internet Society (ISOC)
- President Java Users Group – Silicon Valley Mountain View, CA, 1999-2000
- Toastmasters International

## **FORMER ADVISORY BOARDS POSITIONS**

- Quixey – search engine for wireless mobile apps
- Mytopia – mobile wireless social games
- iLeverage – Israeli Innovations

## **PROFESSIONAL AWARDS**

- Top Talent Award – Nortel
- Top Inventors Award – Nortel EDN
- Certified IEEE-WCET - Wireless Communications Engineering Technologies (2012)
- Toastmasters International - Competent Communicator (twice)
- Toastmasters International - Advanced Communicator Bronze

## **PERSONAL**

- USA FIT – San Jose Marathon running club (2017-2020)
- Hiking Bateva – hiking club
- A dancer for 45 years

## Patents and Publications

*(Not an exhaustive list)*

### Patents Issued

<a href="#">US 9,690,877</a>	<a href="#">Systems and methods for electronic communications</a>	<a href="#">Link</a>
<a href="#">US 9,660,655</a>	<a href="#">Ultra-low phase noise frequency synthesizer</a>	<a href="#">Link</a>
<a href="#">US 9,184,989</a>	<a href="#">Grid proxy architecture for network resources</a>	<a href="#">Link</a>
<a href="#">US 9,521,255</a>	<a href="#">Systems and methods for visual presentation and selection of IVR menu</a>	<a href="#">Link</a>
<a href="#">US 9,083,728</a>	<a href="#">Systems and methods to support sharing and exchanging in a network</a>	<a href="#">Link</a>
<a href="#">US 9,021,130</a>	<a href="#">Photonic line sharing for high-speed routers</a>	<a href="#">Link</a>
<a href="#">US 8,762,963</a>	<a href="#">Translation of programming code</a>	<a href="#">Link</a>
<a href="#">US 8,762,962</a>	<a href="#">Methods and apparatus for automatic translation of a computer program language code</a>	<a href="#">Link</a>
<a href="#">US 8,745,573</a>	<a href="#">Platform-independent application development framework</a>	<a href="#">Link</a>
<a href="#">US 8,731,148</a>	<a href="#">Systems and methods for visual presentation and selection of IVR menu</a>	<a href="#">Link</a>
<a href="#">US 8,688,796</a>	<a href="#">Rating system for determining whether to accept or reject objection raised by a user in social network</a>	<a href="#">Link</a>
<a href="#">US 8,619,793</a>	<a href="#">Dynamic assignment of traffic classes to a priority queue in a packet forwarding device</a>	<a href="#">Link</a>
<a href="#">US 8,572,303</a>	<a href="#">A portable universal communication device</a>	<a href="#">Link</a>
<a href="#">US 8,553,859</a>	<a href="#">Device and method for providing enhanced telephony</a>	<a href="#">Link</a>
<a href="#">US 8,548,131</a>	<a href="#">Systems and methods for communicating with an interactive voice response system</a>	<a href="#">Link</a>
<a href="#">US 8,537,989</a>	<a href="#">Device and method for providing enhanced telephony</a>	<a href="#">Link</a>
<a href="#">US 8,341,257</a>	<a href="#">Grid proxy architecture for network resources</a>	<a href="#">Link</a>
<a href="#">US 8,161,139</a>	<a href="#">Method and apparatus for intelligent management of a network element</a>	<a href="#">Link</a>
<a href="#">US 8,146,090</a>	<a href="#">Time-value curves to provide dynamic QoS for time-sensitive file transfer</a>	<a href="#">Link</a>
<a href="#">US 8,078,708</a>	<a href="#">Grid proxy architecture for network resources</a>	<a href="#">Link</a>
<a href="#">US 7,944,827</a>	<a href="#">Content-aware dynamic network resource allocation</a>	<a href="#">Link</a>
<a href="#">US 7,860,999</a>	<a href="#">Distributed computation in network devices</a>	<a href="#">Link</a>

<a href="#"><u>US 7,734,748</u></a>	<a href="#"><u>Method and apparatus for intelligent management of a network element</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,710,871</u></a>	<a href="#"><u>Dynamic assignment of traffic classes to a priority queue in a packet forwarding device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,580,349</u></a>	<a href="#"><u>Content-aware dynamic network resource allocation</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,433,941</u></a>	<a href="#"><u>Method and apparatus for accessing network information on a network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,359,993</u></a>	<a href="#"><u>Method and apparatus for interfacing external resources with a network element</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,313,608</u></a>	<a href="#"><u>Method and apparatus for using documents written in a markup language to access and configure network elements</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,260,621</u></a>	<a href="#"><u>Object-oriented network management interface</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,237,012</u></a>	<a href="#"><u>Method and apparatus for classifying Java remote method invocation transport traffic</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,127,526</u></a>	<a href="#"><u>Method and apparatus for dynamically loading and managing software services on a network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,047,536</u></a>	<a href="#"><u>Method and apparatus for classifying remote procedure call transport traffic</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 7,039,724</u></a>	<a href="#"><u>Programmable command-line interface API for managing operation of a network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,976,054</u></a>	<a href="#"><u>Method and system for accessing low-level resources in a network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,970,943</u></a>	<a href="#"><u>Routing architecture including a compute plane configured for high-speed processing of packets to provide application layer support</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,950,932</u></a>	<a href="#"><u>Security association mediator for Java-enabled devices</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,850,989</u></a>	<a href="#"><u>Method and apparatus for automatically configuring a network switch</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,845,397</u></a>	<a href="#"><u>Interface method and system for accessing inner layers of a network protocol</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,842,781</u></a>	<a href="#"><u>Download and processing of a network management application on a network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,772,205</u></a>	<a href="#"><u>Executing applications on a target network device using a proxy network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,564,325</u></a>	<a href="#"><u>Method of and apparatus for providing multi-level security access to a system</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,175,868</u></a>	<a href="#"><u>Method and apparatus for automatically configuring a network switch</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 6,170,015</u></a>	<a href="#"><u>Network apparatus with Java co-processor</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,687,777</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,681,951</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>



<a href="#"><u>US 8,625,756</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,594,280</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,548,135</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,406,388</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,345,835</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,223,931</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,160,215</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,155,280</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,054,952</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,000,454</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>EP 1,905,211</u></a>	<a href="#"><u>A technique for authenticating network users</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>EP 1,142,213</u></a>	<a href="#"><u>Dynamic assignment of traffic classes to a priority queue in a packet forwarding device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 9,001,819</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,949,846</u></a>	<a href="#"><u>Time-value curves to provide dynamic QoS for time-sensitive file transfers</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,929,517</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,903,073</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,898,274</u></a>	<a href="#"><u>Grid proxy architecture for network resources</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,880,120</u></a>	<a href="#"><u>Device and method for providing enhanced telephony</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,879,703</u></a>	<a href="#"><u>System method and device for providing tailored services when a call is on-hold</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,879,698</u></a>	<a href="#"><u>Device and method for providing enhanced telephony</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,867,708</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,787,536</u></a>	<a href="#"><u>Systems and methods for communicating with an interactive voice response system</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 8,782,230</u></a>	<a href="#"><u>Method and apparatus for using a command design pattern to access and configure network elements</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>CA 2,358,525</u></a>	<a href="#"><u>Dynamic assignment of traffic classes to a priority queue in a packet forwarding device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>CA 2,989,752</u></a>	<a href="#"><u>Ultra-low Phase Noise Frequency Synthesizer</u></a>	<a href="#"><u>Link</u></a>

<a href="#"><u>US 10,598,764</u></a>	Radar target detection and imaging system for autonomous vehicles with ultra-low phase noise frequency synthesizer	<a href="#"><u>Link</u></a>
<a href="#"><u>US 10,404,261</u></a>	Radar target detection system for autonomous vehicles with an ultra-low phase-noise frequency synthesizer	<a href="#"><u>Link</u></a>
<a href="#"><u>US 10,348,313</u></a>	Radar target detection system for autonomous vehicles with an ultra-low phase-noise frequency synthesizer	<a href="#"><u>Link</u></a>
<a href="#"><u>US 10,205,457</u></a>	RADAR target detection system for autonomous vehicles with an ultra-low phase-noise frequency synthesizer	<a href="#"><u>Link</u></a>
<a href="#"><u>US 10,764,264</u></a>	Technique for authenticating network users	<a href="#"><u>Link</u></a>
<a href="#"><u>EP 3,311,493</u></a>	<a href="#"><u>An ultra-low phase-noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 9,831,881</u></a>	<a href="#"><u>Radar target detection system for autonomous vehicles with ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 9,762,251</u></a>	<a href="#"><u>Ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 9,705,511</u></a>	<a href="#"><u>Ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>

## Patent Applications Published and Pending

(Not an exhaustive list)

<a href="#">US 20150058490</a>	<a href="#">Grid Proxy Architecture for Network Resources</a>	<a href="#">Link</a>
<a href="#">US 20150010136</a>	<a href="#">Systems and Methods for Visual Presentation and Selection of IVR Menu</a>	<a href="#">Link</a>
<a href="#">US 20140379784</a>	<a href="#">Method and Apparatus for Using a Command Design Pattern to Access and Configure Network Elements</a>	<a href="#">Link</a>
<a href="#">US 20140105025</a>	<a href="#">Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device</a>	<a href="#">Link</a>
<a href="#">US 20140105012</a>	<a href="#">Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device</a>	<a href="#">Link</a>
<a href="#">US 20140012991</a>	<a href="#">Grid Proxy Architecture for Network Resources</a>	<a href="#">Link</a>
<a href="#">US 20130080898</a>	<a href="#">Systems and Methods for Electronic Communications</a>	<a href="#">Link</a>
<a href="#">US 20130022191</a>	<a href="#">Systems and Methods for Visual Presentation and Selection of IVR Menu</a>	<a href="#">Link</a>
<a href="#">US 20130022183</a>	<a href="#">Systems and Methods for Visual Presentation and Selection of IVR Menu</a>	<a href="#">Link</a>
<a href="#">US 20130022181</a>	<a href="#">Systems and Methods for Visual Presentation and Selection of IVR Menu</a>	<a href="#">Link</a>
<a href="#">US 20120180059</a>	<a href="#">Time-Value Curves to Provide Dynamic QOS for Time Sensitive File Transfers</a>	<a href="#">Link</a>
<a href="#">US 20120063574</a>	<a href="#">Systems and Methods for Visual Presentation and Selection of IVR Menu</a>	<a href="#">Link</a>
<a href="#">US 20110225330</a>	<a href="#">Portable Universal Communication Device</a>	<a href="#">Link</a>
<a href="#">US 20100220616</a>	<a href="#">Optimizing Network Connections</a>	<a href="#">Link</a>
<a href="#">US 20100217854</a>	<a href="#">Method and Apparatus for Intelligent Management of a Network Element</a>	<a href="#">Link</a>
<a href="#">US 20100146492</a>	<a href="#">Translation of Programming Code</a>	<a href="#">Link</a>
<a href="#">US 20100146112</a>	<a href="#">Efficient Communication Techniques</a>	<a href="#">Link</a>
<a href="#">US 20100146111</a>	<a href="#">Efficient Communication in a Network</a>	<a href="#">Link</a>
<a href="#">US 20090313613</a>	<a href="#">Methods and Apparatus for Automatic Translation of a Computer Program Language Code</a>	<a href="#">Link</a>
<a href="#">US 20090313004</a>	<a href="#">Platform-Independent Application Development Framework</a>	<a href="#">Link</a>
<a href="#">US 20090279562</a>	<a href="#">Content-aware dynamic network resource allocation</a>	<a href="#">Link</a>
<a href="#">US 20080040630</a>	<a href="#">Time-Value Curves to Provide Dynamic QoS for Time Sensitive File</a>	<a href="#">Link</a>

## Transfers

<a href="#"><u>US 20070169171</u></a>	<a href="#"><u>A technique for authenticating network users</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20060123481</u></a>	<a href="#"><u>Method and apparatus for network immunization</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20060075042</u></a>	<a href="#"><u>Extensible Resource Messaging Between User Applications and Network Elements in a Communication Network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20050083960</u></a>	<a href="#"><u>Method and Apparatus for Transporting Parcels of Data Using Network Elements with Network Element Storage</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20050076339</u></a>	<a href="#"><u>Method and Apparatus for Automated Negotiation for Resources on a Switched Underlay Network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20050076336</u></a>	<a href="#"><u>Method and Apparatus for Scheduling Resources on a Switched Underlay Network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20050076173</u></a>	<a href="#"><u>Method And Apparatus for Preconditioning Data to Be Transferred on a Switched Underlay Network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20050076099</u></a>	<a href="#"><u>Method and Apparatus for Live Streaming Media Replication in a Communication Network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20050074529</u></a>	<a href="#"><u>Method and apparatus for transporting visualization information on a switched underlay network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20040076161</u></a>	<a href="#"><u>Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20020021701</u></a>	<a href="#"><u>Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>WO 2006/063052</u></a>	<a href="#"><u>Method and apparatus for network immunization</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>WO 2007/008976</u></a>	<a href="#"><u>A technique for authenticating network users</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>WO2000/0054460</u></a>	<a href="#"><u>Method and apparatus for accessing network information on a network device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>WO/2016/203460</u></a>	<a href="#"><u>Ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>WO/2005/033899</u></a>	<a href="#"><u>Method and apparatus for scheduling resources on a switched underlay network</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>WO/2000/041368</u></a>	<a href="#"><u>Dynamic assignment of traffic classes to a priority queue in a packet forwarding device</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20140156556</u></a>	<a href="#"><u>A Time-variant rating system and method thereof</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20140156758</u></a>	<a href="#"><u>A Reliable rating system and method thereof</u></a>	<a href="#"><u>Link</u></a>

<a href="#"><u>US 20170085708</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20160373117</u></a>	<a href="#"><u>Ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20170322687</u></a>	<a href="#"><u>Systems and methods for electronic communications</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20170302282</u></a>	<a href="#"><u>Radar target detection system for autonomous vehicles with ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20180019755</u></a>	<a href="#"><u>Radar target detection system for autonomous vehicles with ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20170289332</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of IVR menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20170269797</u></a>	<a href="#"><u>Systems and methods for electronic communication</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20170099058</u></a>	<a href="#"><u>Ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20170099057</u></a>	<a href="#"><u>Ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20190128998</u></a>	<a href="#"><u>Radar target detection and imaging system for autonomous vehicles with ultra-low phase noise frequency synthesizer</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20190082043</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of ivr menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20180146090</u></a>	<a href="#"><u>Systems and methods for visual presentation and selection of ivr menu</u></a>	<a href="#"><u>Link</u></a>
<a href="#"><u>US 20180130102</u></a>	<a href="#"><u>Reliable rating system and method thereof</u></a>	<a href="#"><u>Link</u></a>

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- “R&D Models for Advanced Development & Corporate Research” Understanding Six Models of Advanced R&D - Ikhtlaq Sidhu, Tal Lavian, Victoria Howell - University of California, Berkeley. Accepted paper for 2015 ASEE Annual Conference and Exposition- June 2015
- “Communications Architecture in Support of Grid Computing”, Tal Lavian, Scholar’s Press 2013 ISBN 978-3-639-51098-0.
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## Presentations and Talks

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- [Lambda Data Grid](#)
- [A Platform for Large-Scale Grid Data Service on Dynamic High-Performance Networks](#)
- [Lambda Data Grid: An Agile Optical Platform for Grid Computing and Data-intensive Applications.](#)
- [Workflow Integrated Network Resource Orchestration](#)
- [DWDM-RAM: DARPA-Sponsored Research for Data-Intensive Service-on-Demand Advanced Optical Networks](#)
- [Impact of Grid Computing on Network Operators and HW Vendors](#)
- [Web Services and OGSA](#)
- [WINER Workflow Integrated Network Resource Orchestration.](#)
- [A Grid Proxy Architecture for Network Resources](#)
- [Technology & Society](#)
- [Abundant Bandwidth and how it affects us?](#)
- [Active Content Networking \(ACN\)](#)
- [DWDM-RAM: Enabling Grid Services with Dynamic Optical Networks](#)
- [Application-engaged Dynamic Orchestration of Optical Network Resources](#)
- [DWDM-RAM: DARPA-Sponsored Research for Data-Intensive Service-on-Demand Advanced Optical Networks](#)
- [An Architecture for Data-Intensive Service Enabled by Next Generation Optical Networks](#)
- [A Platform for Data-Intensive Services Enabled by Next Generation Dynamic Optical Networks](#)
- [A Platform for Data-Intensive Services Enabled by Next Generation Dynamic Optical Networks](#)
- [Optical Networks](#)
- [Grid Optical Network Service Architecture for Data-Intensive Applications](#)
- [Optical Networking & DWDM](#)
- [OptiCal Inc.](#)
- [OptiCal & LUMOS Networks](#)
- [Optical Networking Services](#)
- [Optical Networks](#)
- [Business Models for Dynamically Provisioned Optical Networks](#)
- [Business Model Concepts for Dynamically Provisioned Optical Networks](#)
- [Optical Networks Infrastructure](#)
- [Research Challenges in agile optical networks](#)
- [Services and Applications' infrastructure for agile optical networks](#)
- [Impact on Society](#)
- [Technology & Society](#)
- [TeraGrid Communication and Computation](#)
- [Unified Device Management via Java-enabled Network Devices](#)
- [Active Network Node in Silicon-Based L3 Gigabit Routing Switch](#)
- [Enabling Active Flow Manipulation \(AFM\) in Silicon-based Network Forwarding Engines](#)
- [Enabling Active Flow Manipulation \(AFM\) in Silicon-based Network Forwarding Engines](#)
- [Active Nets Technology Transfer through High-Performance Network Devices](#)
- [Enabling Active Networks Services on A Gigabit Routing Switch](#)
- [Programmable Network Node: Applications](#)
- [Open Innovation via Java-enabled Network Devices](#)

- [Practical Considerations for Deploying a Java Active Networking Platform](#)
- [Open Programmable Architecture for Java-enabled Network Devices](#)
- [Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines](#)
- [Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines](#)
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- [Open Programmable Architecture for Java-enabled Network Devices](#)
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- [Edge Device Multi-unicasting for Video Streaming](#)
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- [Java SNMP Oplet](#)
- [Unified Device Management via Java-enabled Network Devices](#)
- [Dynamic Classification in a Silicon-Based Forwarding Engine](#)
- [Integrating Active Networking and Commercial-Grade Routing Platforms](#)
- [Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines](#)
- [Open Distributed Networking Intelligence: A New Java Paradigm](#)
- [Open Networking Better Networking Through Programmability](#)
- [Open Networking](#)
- [Open Programmability](#)
- [Active Networking On A Programmable Networking Platform](#)
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- [Open Programmable Architecture for Java-enabled Network Devices](#)
- [Popeye – Fine-grained Network Access Control for Mobile Users](#)
- [Integrating Active Networking and Commercial-Grade Routing Platforms](#)
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- [Programmable Network Devices](#)
- [Open Programmable Architecture for Java-enabled Network Devices](#)
- [To be smart or not to be?](#)