

David Hilliard Williams

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Expertise

- Location-Based Services (LBS)
- GPS Systems; Network-Based Location Determination Systems
- Wireless 911 (E911); NG911
- Internet of Things (IoT); Real-Time Location Systems (RTLS)
- Non-Cellular/Indoor/Sensor-based Location Systems, including: RFID, Wi-Fi/WPS, BLE, LIDAR, Beacon-based RTLS; NFC/ DSRC; Wearable systems; Hybrids/Combinations
- Expert Witness Litigation Support, Patent/Intellectual Property Development and Protection Services
- GPS/Cellphone Criminal and Civil Case Forensics, using CDR, NELOS, PCMD, RTT, EVDO, and Cellebrite
- Internet of Things (IoT) Ecosystem (Sensors, Identity, Interfaces, Edge, Network, Cloud, Data Management, Analytics, Privacy and Security)
- Location & IoT Data Privacy and Security
- Safety and Security Application and Architecture Design and Implementation
- Sensor Design, Architecture and Interfaces
- Mobile Resource Management (MRM) Tracking and Management; Vehicle, Fleet, Worker, and Freight & Asset Tracking/Mgmt.
- Telematics; Vehicle Monitoring Ecosystem
- Connected Car/Auto. Vehicle (AV) Ecosystem
- Navigation Systems; PNDs; Local Search
- Map Data, Digital Mapping, GIS, & IoT IT
- Mobile Social/Business Networking
- LBS and IoT Enterprise/Consumer Product & Technical Strategy, Design and Build
- Location/Context-Centric Enterprise Process Reengineering, Integration, & Interoperability
- SMART location, SMART Home, SMART Wearables, SMART Buildings, SMART Cities
- Context/Presence-Based LBS and IoT
- M2M, Smart Grid/Energy Systems
- LBS Big Data and Cloud Computing

Professional Summary

David Hilliard Williams is an internationally-known expert in the wireless/mobile location field and President and Founder of E911-LBS Consulting. He specializes in wireless location product and technology strategy development and implementation, as well as Intellectual Property (IP)/patent and location forensics litigation services involving location technologies such as Global Positioning Satellite (GPS) systems; Network-based location determination technologies such as TDOA, ECID, and AFLT; Wireless 911 (E911) and Next Generation 911; Real-Time Location Systems (RTLS) including Radio Frequency Identification (RFID) systems, Wi-Fi-based positioning systems (WPS), BLE/Beacon-based location systems, and alternative RTLS (Ultrasound, Infrared); Near Field Communications (NFC); Wearable Tags/Sensor tracking systems; Zigbee/Mesh networks; and various hybrids and combinations.

Mr. Williams is expert in the full range of business and consumer location-based services (LBS) and IoT applications enabled by these location technologies, including safety, security, and intruder detection/monitoring, vehicle/fleet tracking/mgmt, telematics, local search, navigation systems, presence/context-aware apps, mobile resource management, asset and freight management, wearable tags/sensors, financial/mobile wallet, mobile hospitality/POS systems, supply chain management, family tracking, mobile social and business networking, proximity-based entertainment and leisure, gaming, and intelligent transportation systems.

Mr. Williams has extensive expertise in all aspects of LBS and IoT delivery across the mobile location ecosystem including enabling network communications, location technologies/sensors, geofencing design, map data, location data/database management, geospatial platform/Geographical Information Systems, GPS and other location chipsets, location data management, and device, infrastructure and integration providers. His client list includes Apple (2), AT&T, FedEx, GE, GM, Geotab, Google (4), the Houston Police Department, the L.A. County District Attorney's Office, Macropoint, Nextel, NAVTEQ, Qualcomm, Peschke, Samsung, Sprint, Toyota, Twilio, Verizon Wireless, VIVINT, and Volkswagen. He has successfully represented both prosecutors and defendants in criminal litigation (including assisting State Public Defender entities), as well as both sides of civil litigation. He has been deposed 10 times and has testified 5 times, including [successfully](#) in The Eastern District Court of Texas, winning both infringement and invalidity cases.

Mr. Williams is expert in smart location technology issues in the Internet of Things (IoT) and connected/driverless car fields, particularly in their utilization of location and context information through the practical envisioning and design of: consumer/enterprise use cases and associated application design, sensor design and deployment strategies; process (re)engineering; IT integration; data aggregation, segmentation, analysis, and management; scalability; and security and privacy issues, requirements, collaboration structures, and ongoing management. He is expert on Big Data issues associated with location data.

Mr. Williams has developed and implemented industry-leading product and technology solutions for numerous LBS applications and markets and provides consulting and research services to some of the leading carriers and enterprises in the U.S., Asia, and Europe. He has provided testimony, consulting research, technical expertise and advisory services in over 100 IP/Patent, Criminal/Civil Forensics, Product Liability, ITC, and Anti-Trust litigations/cases.

With over thirty years in location, communications and information technology solutions design, selection, implementation and ongoing management, Mr. Williams has extensive experience in the activities and issues needed to get applications to market, including planning and design at the application, system, interface/integration, network, IT, operational and customer facing levels. He has been published and quoted by leading magazines and newspapers about location-related services, including The New York Times, CBS News.com, The Columbus (Ohio) Dispatch, The Boston Globe, Computerworld, Directions Magazine, Mission Critical Communications, Popular Mechanics, and RFID Journal.

Mr. Williams has authored five books on wireless location, including *The Definitive Guide To RFID, Wi-Fi, Bluetooth Low Energy (BLE), UWB, Ultrasound, Infrared, and Other RTLS and IoT Technologies (available August 2019)*, *The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (two versions)*, *The Definitive Guide to Wireless E911*, and (co-authored) *The Definitive Guide to Mobile Positioning and Location Management*. Mr. Williams has authored dozens of research reports, and tracks and analyzes leading companies in the LBS, IoT, and public safety industries particularly with respect to their product and technology strategies, competitive capabilities and implementation issues. He is expert on all public policy and technology issues related to emergency services/public safety, location data privacy and security, and LBS and IoT privacy protection policies, systems, and support infrastructure. He opines on location privacy issues in various forums.

Employment History

From: 2002 **E911-LBS Consulting**

To: Present

Position: *President and Founder*

Provides services across the entire wireless value chain, particularly with respect to technology and business strategic planning and product design and development, plus specialized services such IP/Patent litigation associated with Location Based Services and applications, GPS, E911, IoT, RTLS, RFID, Wi-Fi, NFC, BLE, beacons, & other location technologies and associated ecosystems. Projects include:

- Provided expert witness, technical consulting, and research analysis services with respect to location-based services-related intellectual property/patent protection, licensing, and litigation (details in separate litigation support section).
- Provide forensics expertise in examination of mobile location-related events and associated data for civil and criminal cases (both prosecutor/plaintiff and defense entities).
- Developed, implemented, managed, and marketed a portfolio of LBS applications and broader offers for leading North American wireless carrier. Responsible for all dimensions of product lifecycle and associated budgets. Work included the development and launch of several LBS applications including mobile social networking, family tracking, local search, 411 w/ location, and mobile worker, fleet, and asset management. Worked extensively with network engineering to troubleshoot/refine new location-determination infrastructure to address/improve location accuracy, privacy and security issues.
- Conducted comprehensive technical and intellectual property analysis of Real-Time Location Systems (RTLS) market for European client looking to assert location-related patents.
- Conducted technical and intellectual property analysis for Fleet Management/Telematics operator and service provider assessing potential infringement candidates.
- Conducted analysis of location aggregation market for client interested in acquisition in that industry space. Client acquired recommended aggregator.
- Provided E911 consulting expertise in support of new spectrum regulatory approval and technical implementation issues for nationwide carrier.

- Managed the design, collection, and analysis of E911 infrastructure deployment of western region of major wireless carrier. Data collected focused on technical issues associated with TDOA (Time Difference of Arrival) technology implementation, and collection and reporting of location accuracy data for FCC reporting purposes.
- Developed the site map and primary content for the NAVTEQ (now HERE) Network for Developers (N4D) LBS web ecosystem - <http://developer.navteq.com>. Responsible for designing and managing the site map and overall content, identifying key contributors and materials, and utilizing a variety of fragmented information to develop broad and deep technical and business content to assist various expertise levels of application developers and business management to become intimately familiar with map data, GIS platforms, and LBS applications and to provide the information and guidance to successfully develop and launch their LBS applications.
- Provided strategic and technical guidance for mobile payments/wallet startup using location as a differentiator. Identified key issues and redeveloped successful patent application after initial USPTO rejection.
- Managed the development of the Nextel (now Sprint) Location-Based Services strategy. Efforts included market and technical analysis of likely LBS offerings and integrating those findings with Nextel's broader wireless voice and data strategies. Work included prioritizing applications based on focus group findings, business case attractiveness, ease of implementation, impact on network infrastructure, and synchronization and integration with GPS terminal and E911 mandate rollout plans. Managed network engineering and consulting team to design network modifications to best support the additional demands of LBS applications. Product strategy including researching and incorporating context-aware/presence concepts into product/device and network engineering plans.
- Developed navigation platform strategy for major international auto manufacturer. Assessed direction and technology requirements of in-car and portable navigation device (PND) technologies and developed technology strategy for future in-car navigation platforms.
- Developed numerous LBS company research reports using proprietary multi-point "report card" addressing numerous business and technology strategy dimensions and issues.

- Authored multiple books on wireless location, including *The Definitive Guide To RFID, Wi-Fi, Bluetooth Low Energy (BLE), UWB, Ultrasound, Infrared, and Other RTLS and IoT Technologies (available August 2019)*, *The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (2005 and 2009 versions)*, *The Definitive Guide to Wireless E911*, and (co-authored) *The Definitive Guide to Mobile Positioning and Location Management*.
- Advised numerous small companies and startups such as i360Hygiene, LOCAID, Finder Technologies, Orion GPS, and XYVerify on LBS-related issues to enhance value propositions on business, product and technology dimensions to enhance attractiveness to potential investors/acquisition candidates.

From: 2009 **AT&T Mobility**

To: 2010

Position: *Senior Product Manager – Enterprise LBS*

Led the development, implementation, and marketing of numerous enterprise location-based services across all sales, marketing and operational channels. Work included responsibility for all dimensions of product lifecycle and associated budgets. Products managed included telematics, fleet/vehicle management, asset/freight management, and mobile resource management GPS/LBS apps on a variety of platforms such as Telenav. Played key role in design of company-wide location services product and implementation roadmap.

From: 2007 **AT&T Mobility**

To: 2009

Position: *Consumer LBS Product Realization Manager (Consultant)*

Responsible for the design, development, implementation, and ongoing lifecycle management of several high-profile Consumer LBS applications and associated operational support. Overall application design and implementation responsibilities included AT&T FamilyMap, Loopt Mobile Social Networking, 411 with location, Slifter Local Search, and CaddyHawk Game systems. Work included design, troubleshooting, and implementation of AT&T location-related network, application, and privacy infrastructure and associated issues such as accuracy and privacy (efforts resulted in patent co-invention).

From: 1993 **Accenture**

To: 2002

Position: *Associate Partner - Communications & High-Technology Strategy*

Responsible for development of wireless location practice. Led development of business, technology, and product strategies for numerous communications and technology-centric companies looking to enter new markets. Specialized in new product design, development,

and implementation, as well as network infrastructure design. Efforts included assisting AT&T (re)enter local service, (then) Bell Atlantic launch long distance services, (then) GTE implement Intelligent Network services, as well as leading the design and implementation of communications networks in a variety of industries including hospitality/retail, energy, agriculture, and banking/financial services.

From: 1991 **Booz Allen & Hamilton**
To: 1993
Position: *Senior Associate – Information Technology Practice*
Provided and led consulting services for communications industry and other Information Technology-intensive companies in developing technology strategies for addressing new marketing opportunities and internal operational issues.

From: 1987 **Deloitte Consulting (Originally Touche Ross)**
To: 1991
Position: *Senior Manager*
Provided consulting services for technology-intensive companies in developing business and product strategies for addressing new marketing opportunities and internal operational issues.

From: 1983 **Hughes Aircraft Company**
To: 1985
Position: *Electrical Engineer – Radar Development*
Microcomputer and digital system design engineer on the F-15 fighter radar system as part of analog to digital platform conversion.

Litigation Support Experience

Date: 2016-2019 **Sterne Kessler Goldstein Fox**
Case: Google (2 cases); Google (Nest)
Projects: Providing expert support, reports, and deposition for Inter Partes Reviews (IPR) of several location/context-related patents on behalf of leading Internet services company.

Date: 2017-2018 **Finnegan & Henderson**
Case: Fed Ex
Project: Provided expert support, consulting, reports, deposition, and trial testifying for infringement and district court invalidity proceedings on behalf of leading transportation/shipping company. Case successfully won on both infringement and invalidity counts.

Date: 2013-2019 **Civil and Criminal Forensics**
Case: Various
Project: Provided cellphone and computer-based location forensics expertise
2017-2018 in over 20 criminal and civil cases. Expert/knowledgeable in

numerous forensic technologies and tools including CDR, NELOS, PCMD, RTT, EVDO, Cellebrite, Paraben, and Hawk Analytics.

- Date: Case: **Polsinelli**
Project: Uber
Providing expert support and reports for Trade Secrets case involving major shared transportation provider.
- Date: 2017-2018 **Renner Otto**
Case: Macropoint; Timekeeping Systems Inc.
Projects: Providing consulting and expert services in district court patent invalidity cases for transportation and employee tracking providers.
- Date: 2016-2018 **Paul Hastings**
Case: Samsung (3 cases)
Project: Provided expert services for Inter Partes Review (IPR) of multiple location, safety, and security patents on behalf of major telecommunications equipment and services provider.
- Date: 2016-2017 **Baker Botts**
Case: Twilio
Project: Provided location/E911-related expert services, report, and deposition for Inter Partes Review (IPR) of mobile registration patent on behalf of Voice & Video, Messaging, and Authentication APIs provider.
- Date: 2016 **Los Angeles District Attorney's Office**
Case: People v. Dawud Abdulwali
Projects: Provided expert services on location technologies used to identify and trace accused arsonist. Defendant pled guilty.
- Date: 2016-2017 **Fitzpatrick, Cella, Harper & Scinto**
Case: Geotab
Projects: Providing expert support, reports, and deposition for infringement defense of multiple asserted patents on behalf of fleet management/telematics provider.
- Date: 2015-2016 **The Ogg Law Firm PLLC**
Case: City of Houston Police Department
Project: Provided expert services/testimony regarding veracity of Automatic Vehicle Locator (AVL) systems in officer suspension case.
- Date: 2015-2016 **Sterne Kessler Goldstein Fox**
Case: VIVINT
Project: Providing expert support, reports, and deposition for IPR involving several location-related patents on behalf of home security and energy management company.

- Date: 2015 **Hogan Lovells**
Case: Apple
Project: Provided expert support for multiple location-related patent Inter Partes Review (IPR) and infringement proceedings for leading mobile platform, application and services provider.
- Date: 2015 **Thompson Hine LLP**
Case: Macropoint
Project: Provided expert support for patent litigation effort involving fleet management devices, software, and services.
- Date: 2013-2014 **Williams & Connolly**
Case: State of Maryland
Project: Provided expert services in assessing validity of GPS tracking bracelet/system in parole violation case. Case won.
- Date: 2013-2014 **Cravath, Swaine & Moore**
Case: Qualcomm
Project: Provided expert litigation support, technical consulting, and advisory services in Anti-Trust case regarding location services technologies, platforms, and standards.
- Date: 2014 **Patterson Thuent Pedersen, P.A.**
Case: Kaspersky Internet Security
Project: Provided expert litigation support and technical consulting in patent countersuit involving internet security services.
- Date: 2014 **Sullivan & Cromwell LLP, others**
Case: Peschke
Project: Provided expert support and technical consulting in location services infringement patent dispute involving interactive mapping applications. Effort included providing deposition testimony.
- Date: 2013 **XYVerify**
Case: Patent Re-Submission and Approval
Project: Rewrote patent application for LBS/financial verification system using multiple location determination methods. Effort enabled patent to be approved after initial rejection by USPTO.
- Date: 2012-2013 **Covington & Burling**
Case: Samsung
Project: Provided expert litigation support and technical consulting and advisory services in International Trade Commission case.
- Date: 2011-2013 **Connolly Bove Lodge & Hutz**
Case: Enovsys

- Project: Provided expert litigation support and technical consulting and advisory services for pursuit of LBS patent royalties and infringement settlements.
- Date: 2011-2013 **Voxson**
Case: Various
Project: Provided expert litigation support and technical consulting and advisory services for pursuit of E911 and LBS patent infringement royalties and settlements.
- Date: 2010-2012 **Morrison & Foerster LLP**
Case: Cellco Partnership (dba Verizon Wireless)
Project: Provided expert advisory and report services in support of IPR re-examination process of E911 and LBS patents.
- Date: 2011-2012 **Dovel & Luner**
Case: TrackBeam
Project: Provided market/technical consulting, expertise and research analysis of LBS patents to identify potential licensing candidates.
- Date: 2011 **SNR Denton**
Case: Wavemarket
Project: Provided market and technical consulting and advisory services for defense of LBS patent lawsuits.
- Date: 2010 **State of New Jersey**
Project: Provided wireless location consulting expertise in development of economic growth strategy for State of New Jersey.
- Date: 2007-2008 **General Electric**
Project: Provided consulting research and guidance on LBS and E911 technology, GE-owned patents, prior artwork, and future technology direction.

Patents

- "Method and apparatus for providing mobile social networking privacy." (U.S. Patent Number 8,613,109, issued on December 17, 2013)
- Multiple other patents pending

Education

<u>Year</u>	<u>College/University</u>	<u>Degree</u>
1987	The University of Texas at Austin (1 st in graduating class)	MBA, Information Systems Management
1983	Purdue University, West Lafayette, Indiana (Top honors; Tau Beta Pi, Eta Kappa Nu)	BSEE, Digital System Design emphasis

Publications

Books:

1. The Definitive Guide To RFID, Wi-Fi, BLE, UWB, Ultrasound, Infrared, and Other RTLS and IoT Technologies (available August 2019)
2. The Practical Guide to The Internet of Things (IoT): Use Cases and Enabling Technologies (available September 2019)
3. The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (2 versions, plus version in development)
4. The Definitive Guide to Wireless E911
5. The Definitive Guide to Mobile Positioning and Location Management (Co-authored)

Articles/Quotations:

1. Location Data Privacy posts/blog. Ongoing at www.E911-LBS.com.
2. The Columbus Dispatch. February 17, 2017. "Experts: GPS monitors couldn't save OSU student's life"
3. E911-LBS.com. May 2012. "The Pacifier Generation – How Wireless is Impacting Our Society"
4. Nbizmag.com. Summer 2008. "How Will the Convergence of LBS Technologies Affect Business?"
5. Directions Magazine. November 30, 2005. "The Deadline for the E911 Mandate Approaches... Where Do Things Stand?"
6. Computerworld. May 23, 2005. "Beyond The Supply Chain: The Impact of RFID on Business Operations and IT Infrastructure"
7. RFID Journal. June 12, 2005. "IT's Impact on RFID"
8. Directions Magazine. July 29, 2004. "The Strategic Implications of the Wal-Mart RFID Mandate"
9. Directions Magazine. February 25, 2004. "RFID-Hot Technology with Wide-Ranging Applications"
10. WirelessDevNet.com. 1/30/2003. "It's The (Location-Based) Applications – Stupid!"

Languages/Tools

- C/C++, Java, Basic, Cobol, Fortran, Pascal, APL, Assembly
- Cellebrite, Hawk Analytics, Paraben

Associations and Achievements

- NENA, APCO
- Certified in Emergency Management Response (CERT)