David Hilliard Williams

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Expertise

- Location-Based Services (LBS)
- 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
- GPS Systems; Network-Based Location Determination Systems
- 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)

- LBS and IoT Enterprise and Consumer Use Case and Product and Technical Strategy, Visioning, Design, Build, and Implementation
- Location/Context-Centric Enterprise Process Reengineering, Integration, & Interoperability
- IoT Enterprise Scalability and Management
- SMART location, SMART Home, SMART Wearables, SMART Buildings, SMART Cities
- Sensor Design, Architecture and Interfaces
- Location & IoT Data Privacy and Security
- Mobile Network Design and Implementation
- Context/Presence-Based LBS and IoT
- Map Data, Digital Mapping, GIS, & IoT IT
- Fleet Management; Telematics
- Navigation Systems; PNDs; Local Search
- Mobile Social/Business Networking
- Consumer, Worker Tracking/Monitoring
- Asset Tracking/Location Management
- Connected Car/Auto. Vehicle (AV) Ecosystem
- 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 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.

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 fleet management, telematics, navigation systems, mobile local search, mobile hospitality/POS systems, presence/context-aware applications, mobile resource management, asset management, wearable tags/sensors, financial/mobile wallet, supply chain management, family tracking, mobile social and business networking, proximity-based entertainment & leisure, gaming, intelligent transportation systems, and safety and security 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, AT&T, GE, General Motors, Geotab, Google, the Houston Police Department, Kaspersky Security, the L.A. County District Attorney's Office, LOCAID, Nextel, NAVTEQ, Qualcomm, Peschke, Royal Canadian Mounted Police, Samsung, Sprint, Toyota, Twilio, Verizon Wireless, and VIVINT. He has successfully represented both plaintiffs/prosecutors and defendants in criminal and civil litigation.

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 50 Intellectual Property/Patent, Location Forensic, 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 Beacon Technologies (available May 2018)*, *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.

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 five books on wireless location, including *The Definitive Guide To RFID, Wi-Fi, BLE, UWB, Ultrasound, Infrared, and Other RTLS and Beacon Technologies (available May 2018), The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (2005 and 2009 versions; 2018-2019 version in development), 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 management, asset management, and mobile resource management LBS on a variety of platforms including Telenav. Played key role in development 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,

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