4G Unwired
RF Engineering Services

Mark Seagren
Chief Technology Officer

SUMMARY OF QUALIFICATIONS

Principal Engineer with over 25 years of operational and consulting RF engineering design and optimization experience for LTE, VoLTE, UMTS, CDMA, EVDO, GSM, and WISP and Microwave networks. Propagation expert with extensive experience with Atoll (Forsk) Products, Wizard Engineering Software, Actix ACP/AFP and Gladiator post processing tools. Perform Microwave RF engineering for both US and international clients.

PROFESSIONAL EXPERIENCE

Jan 2006 – 4G Unwired, Inc. – Melbourne, FL – Chief Technology Officer

- LTE and UMTS System Design and Optimization for several 4G clients and Competitive Carrier Association members in the US and Caribbean.
- Developer of 4G Unwired's algorithms and processes for successful FCC/USAC Mobility Fund filings on behalf of several 901 winners.
- LTE Small Cell Design for Tier 1 clients in the US.
- GSM, CDMA, and UMTS network designs for several new license applications in both US and South America.
- Sprint-Nextel support in White Plains, NY -Responsible for Actix Automatic Cell Planning Tool Setup for Cluster Optimization in the NY market. Worked with ACP development on integration with markets Planet EV projects and Wavesight models. Developed processes and tools to improve and streamline the optimization process.
- Sprint-Nextel – Lee Microcell Model and clutter optimization in Wizard for the Boston and Baltimore-Washington markets.
- On-site Sprint-Nextel support in Tampa, FL -Responsible for 2007 Design Review and Optimization projects for Sprint-Nextel Florida and DeepSouth markets using Actix ACP tool during 2006.
- CellularSouth – Developed an EVDO Training Class

Wireless Systems Engineering, - Satellite Beach, FL Sr. RF Engineer.

- Nextel – Responsible for all frequency planning activities in central Florida, training of Nextel engineers on Wizard and CellOpt engineering software.
- Optimi - Extensive GSM and TDMA frequency planning and QoS improvement projects for Cingular and ATTWS nationwide including ACP in Los Angeles, Atlanta and Syracuse. Provided complete analysis of merging Cingular and ATT&T cells (ACNC project) for Cingular utilizing Wizard and Optimi custom software. Trained customer engineers in the use of Optimi AFP tools and Wizard software.
- United States Cellular, Manchester, NH – Led a team of 10 engineers for a 250 site CDMA 1xRTT (Nortel) system wide optimization in three states.
- United States Cellular, Knoxville, TN - Prepared preliminary CDMA2000 Overlay Design for northern Florida and southern Georgia. Provided preliminary antenna selections, centerlines, and azimuths for tower loading analyses. Also provided day to day RF engineering support for AMPS/TDMA system covering several Florida RSA's and MSA's.

- Complete system wide CDMA2000 Overlay Design for a wireless operator in the Midwest. Worked with Nortel to prepare link budgets and determine loading calculations; instructed client engineers in the use of the WIZARD CDMA 2000 module.
- CDMA 2000 WIZARD instruction for a rural cellular operator and a Washington DC based RF engineering and legal consulting firm.
- 850 MHz spectrum clearing, frequency planning and frequency coordination in preparation for an 850 MHz GSM overlay for a rural cellular carrier.
- On Going frequency coordination, frequency planning, and FCC application preparation for an offshore domestic cellular carrier.
- On-site GSM optimization support for ATTWS in Seattle, WA to troubleshoot Nokia 800 MHz system. Addressed link-budget, path balance and in-building coverage issues.
- TDMA and AMPS system drive test and system optimization for a rural wireless carrier.
- Training – Qualified to teach the following WSE courses: Frequency Planning, Wireless
- System Design Principles, FCC/FAA Rules and Regulations, Introduction to CDMA, Intermediate CDMA, Advanced CDMA, Introduction to GSM Networks.

Agilent Technologies, Inc., **Melbourne, FL. Senior RF Engineer**

- Performed site candidate evaluations for a CDMA PCS carrier covering 26 BTAs with nearly 900 sites in the eastern United States. Developed processes, databases, and macros to track the progress of candidates through the selection process. Interacted with project management and site acquisition in redesign work, providing guidance on FCC build-out requirements, and providing site specification sheets.
- Lead engineer in providing a preliminary CDMA PCS design for 16 BTAs covering the New York, Pennsylvania, and Virginia area resulting in nearly 400 sites. Tasks included verifying the link budget, setting up the project, laying down the sites, ensuring specified coverage objectives are met, generating a design report, and presenting the results to the client.

SAFCO Technologies, Inc., **Melbourne, FL. RF Engineering Manager** *(Agilent Technologies acquired SAFCO Technologies, Inc. in 2000)*

- GSM nominal system design and frequency planning in New Delhi, India. Utilizing *WIZARD*, prepared link budgets, calculated cell radii and designed system for 2% GOS. Performed site selection and site candidate analysis. Deliverables included D size MapInfo plots denoting all greenfield and co-located sites.
- On site cellular engineering support for major cellular/PCS carriers in Maine, New Hampshire, Pennsylvania, West Virginia, Alabama, and Florida. Responsibilities included - Search area analysis, Propagation model optimization, AMPS/NAMPS channel planning, CDMA spectrum clearing and design for several markets in Florida and Alabama; performed Monte Carlo CDMA system loading simulations on maturing CDMA markets to determine the CDMA design limitations. Additionally, developed macros to assist in the weekly tracking of performance statistics from Motorola switches and provided Metawave CDMA Spotlight deployment support. This project also involved developing a process to use historical CDMA traffic data and distributing traffic according to roadways and business areas instead of a uniform distribution. This project required expertise in: AMPS, NAMPS, TDMA, CDPD and CDMA using Northern Telecom, Lucent, Motorola, and Metawave systems.
- On site channel planning and site optimization in a very mature NAMPs cellular system in Israel. The cellular system covered the entire country and ranged over wide

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morphological and topographical conditions.

- Collected and performed evaluation of measured data in the 2.4 GHz band for integration into a propagation modeling tool in a point to multi-point type of application.

- Lead engineer for a turnkey PCS CDMA project encompassing 11 BTAs in the eastern United States. Prepared a nominal system design, evaluated morphological classifications during market visits, selected optimum test locations, organized and supervised drive teams to conduct real world RF data, analyzed the collected propagation model validation data, developed link budgets, completed a preliminary design according to customer specified requirements, and generated search area maps. Completed several design documents at various stages of the project and presented to the client for approval.

TEC Cellular, Inc., **Melbourne, FL - RF Engineering Manager**
(SAFCO Technologies, Inc. acquired TEC Cellular, Inc. in 1997; first employee hired when TECC was established in 1992)

Managed the Cellular Engineering Group responsible for providing consulting engineering services to a variety markets throughout the United States. The group was comprised of eight engineers and provided long term support to clients representing 6 MSAs and 18 RSAs throughout the country. The group provided the following services:

- Complete RF System design, System wide growth planning, Cell site evaluation, site selection and Search Area Map preparation; System wide frequency planning analysis/support; Frequency and FCC contour coordination with adjacent markets; Extensive FCC/FAA application preparation and documentation; Alternate propagation studies for SAB optimization; Microwave path planning

- Project engineer for a digital technology comparison (IS-54/TDMA vs. IS-95/CDMA) in Israel. Resulting analysis used to prepare a license bid for the 2nd operators license.

- Course instructor for several RF engineering classes including CDMA, Traffic Planning, FCC and FAA Regulations, Microwave Engineering, and Design Considerations for CDMA, GSM, IS-136, AMPS and NAMPS.

Cellular One, Worthington, Ohio – RF Engineer

- RF Engineer for the Cleveland, Akron, Canton, and Lorain MSAs (approximately 53 cell sites).
- Involved in performing FAA studies, filing FCC applications, frequency planning and coordination, solving system performance issues, and updating the overall system design.
- Involved in the testing and initial implementation of IS-54/TDMA radios in the Ohio System in order to increase the system capacity.
- Obtained experience with GE and Northern Telecom cell site equipment.
- Performed extensive drive-testing, site validation and data analysis.

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EDUCATION

1991   Engineer In Training Examination in Columbus, Ohio
1990   BS, Electrical Engineering, Grove City College in Grove City, Pennsylvania

PROFESSIONAL SKILLS

Software/Programming Languages: Optimi X Products ,WIZARD, MapInfo Professional, NETPLAN, PACE, ANET, OPAS, CMA, Spectrum Tracker, PathSearch, BASIC, DOS, Windows95/98/NT, Word, Word Perfect, Excel, Access, Vertical Mapper, Delorme TopoQuads, Visual Basic for Applications.

Test Equipment: Nemo, ZK, Agilent, Berkley Varitronic

Engineering Software; Atoll (Forsk), Wizard Instructor, Optimi X Products, Actix/CellOpt AFP, Planet EV.