Market Research Proposal

LAND MOBILE RADIO (LMR) SYSTEMS, SOFTWARE-DEFINED RADIO (SDR) & THE FUTURE OF MISSION-CRITICAL WIRELESS

2010-2014 GLOBAL MARKET DEMAND ANALYSIS

Mobile & Wireless Practice

April 2010

Land mobile radio (LMR) systems (or professional mobile radio systems) are an integral mission-critical communication system for a variety of public safety, first responder and national defense agencies. Across the spectrum of operators, these systems are under increasing pressure to meet expanding interoperability goals, account for the rise in alternative/complementary mobile and wireless platforms and reduce operating costs—all the while maintaining the extraordinary level of security and reliability that grew up the LMR market. These challenges raise functionality concerns for LMR systems which need to be addressed to prevent communication errors. Attention to expectations in these critical areas can solve significant financial concerns and business model challenges facing the industry.

The most important features of LMR systems are flexibility, security and efficiency—while coverage, reliability and increasingly interoperability are the differentiators. Vendor and user communities are taking various approaches to addressing interoperability requirements. One approach has been through leveraging software-defined radio (SDR) architectures. SDR is not new to LMR and is widely used, for example, to support multi-protocol radios—through flash upgrades. Beyond multi-protocol solutions, vendors are also looking to leverage SDR to support the development of multi-band radios to address interoperability requirements—for example, in situations where the first responders travel into other jurisdictions and/or provide mutual aid to other agencies, their radios could be reconfigured to communicate on the other systems, allowing the responder to be interoperable with the responders from other agencies. However, many technology and cost of ownership hurdles need to be addressed before these solutions become mainstream.

An alternative and less complex/costly interoperability solution has been system-to-system mediation whereby dissimilar radio systems are linked together using interface gateways (based on IP routing using VoIP). These solutions are referred to as Radio over IP (RoIP), and of all solutions addressing interoperability, they represent the least costly and leverage most/much of today's existing infrastructure. The downside here is the performance limitations of legacy solutions.

VDC’s 2010 Land Mobile Radio (LMR) Systems market intelligence program will once again cover major LMR radios and other edge/node devices, and will extend its coverage on interoperability software, consoles and a number of infrastructure elements.

In addition, VDC plans to research the impact of various interoperability solutions including SDR on LMR development and deployment. SDR functional elements and features are slowly influencing functional specifications for next-generation LMR solutions on a wider range of wireless markets. VDC will investigate where those intersecting points between SDR solutions and LMR markets are developing and becoming most prevalent.
RESEARCH SUMMARY AND OBJECTIVES

VDC’s Land Mobile Radio (LMR) Systems, Software-Defined Radio (SDR), and the Future of Mission-Critical Wireless: 2010-2014 Global Market Demand Analysis will focus on the end-user community demand for, and the supplier/partner community readiness to provide, LMR solutions that meet the rapidly changing technical and commercial requirements of an ever-expanding user community.

VDC will begin its work by providing clear definitions for the key embedded and enterprise segments that make up the current LMR market opportunity. Developing clear definitions and segmentations will enable this research to answer a number of critical questions:

- What is the market opportunity from 2010-2014 for LMR solutions? How will various economic stimulus spending bills – US, UK, China, and others – impact the global LMR and SDR market opportunities?
- How will changes in national defense strategies and budgets impact the LMR and SDR military market and program opportunities?
- How are LMR vendors, integrators/consultants and operators addressing interoperability from technical, commercial and operational perspectives? What impact will tri-band terminals have on the market? Will interoperability enable smaller agencies to obtain their own radio systems?
- How will the market be affected when the narrow banding mandate goes into effect? How competitive will public cellular networks be for data applications in core LMR markets?
- What impact will P-25 Phase 2 have on the market? How about other national, regional and technology developments?
- What impact will low cost digital technologies have on core LMR solutions?
- What impact will data application demand have on handheld and mobile radio design, deployment and management?
- What impact will the expanding application opportunities – including and perhaps, especially, video – have on LMR infrastructure?
- In which applications are functional elements of SDR appearing within, or alongside, digital LMR solutions?
- Where are industry opportunities beyond traditional public safety and military applications – specifically in the commercial sector such as transportation, utilities, and manufacturing?
- What will be the requirement for LMR radio integration into new mobile computing and communications platforms?
- What are key requirements for partnering, channels, and integration?

Product suppliers need reliable information, not unsubstantiated claims, in order to make sound business decisions. VDC’s Land Mobile Radio (LMR) Systems, Software-Defined Radio (SDR), & The Future of Mission-Critical Wireless: 2010-2014 Global Market Demand Analysis will answer these questions and more with a comprehensive and granular analysis of the LMR solution, industry, and competitive landscape.
To provide answers to these questions, the new market program will include:

- In-depth analysis of global market opportunity for LMR systems, with detailed market definitions and segmentations and major regional analysis;
- Market penetration scenarios, estimates and forecasts for LMR products;
- Customer technical and commercial requirements and preferences, including end-user investment drivers, system integrator/OEM selection criteria and more;
- Distribution channel demographics, business models, commercial and packaging requirements, satisfaction levels and more;
- Analysis of the structure of LMR product supplier community, including leading and emerging supplier market share, position, direction and profiles; and
- Discussion of key issues, forces and trends driving and restraining market growth and development, including opportunities and requirements for supplier to grow share and profit.

**RESEARCH SCOPE**

VDC’s Land Mobile Radio (LMR) Systems, Software-Defined Radio (SDR), and the Future of Mission-Critical Wireless: 2010-2014 Global Market Demand Analysis program will provide the following coverage:

<table>
<thead>
<tr>
<th>Edge Device Coverage</th>
<th>Infrastructure Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Portable/handheld and mobile/vehicle-mount radios</td>
<td>• LMR</td>
</tr>
<tr>
<td>- Commercial and industrial radios</td>
<td>- Base station controllers</td>
</tr>
<tr>
<td>- Public safety radios</td>
<td>- Dispatch consoles</td>
</tr>
<tr>
<td>- Military radios</td>
<td>- Gateways</td>
</tr>
<tr>
<td>• Mobile computers with integrated LMR functionality</td>
<td>- Interconnects</td>
</tr>
<tr>
<td>- Notebooks</td>
<td>- Interoperability subsystems</td>
</tr>
<tr>
<td>- Tablets/UMPCs</td>
<td>- Repeaters (including simulcast systems)</td>
</tr>
</tbody>
</table>

- SDR
  - Software
    o Middleware, including CORBA
    o Real time operating systems (RTOS)
    o Software communications architecture (SCA)
    o Proprietary stacks and frameworks
  - Hardware
    o FPGA / processors
    o Low noise amplifiers
    o Radio frequency front ends (RFFE)
    o Transceivers
    o Waveforms

Radio Technologies Coverage
- Trunking standards
  - TETRA
  - TETRAPOL
  - Project 25
  - DMR
  - dPMR
- Frequency bands
  - VHF (< 300 MHz)
  - UHF (300 MHz to 3 GHz)
  - 700 MHz
  - 800 MHz
  - 900 MHz
  - Multi-band
- Mode
  - Simulcast
  - Multicast
- Software-defined radio architecture

Services/Application Coverage
- Communication
  - Voice
  - Data
  - Video
  - GPS

- Data
  - Computer-Aided Dispatch (CAD)
  - Database queries
  - E-mail
  - GPS/AVL
  - Incident reporting
  - In-vehicle other applications (e.g. license plate recognition)
  - In-vehicle video (fixed and streaming)
  - In-vehicle/ general purpose computing
  - Messaging
  - Public records database access/lookup
  - Telemetry/machine to machine
  - Video surveillance
  - Voice logging/911

User Market Coverage
- Public Sector
  - Public Safety (at Federal, State and Local levels)
    o Police
    o Fire
    o EMS
  - Military
  - Federal Non-Military
    o Homeland Security
    o Department of Defense
- Commercial Sector
  - Construction
  - Education
  - Hospitality/entertainment
  - Industrial/ manufacturing
  - Mining
  - Transportation (bus, rail, port facilities)
  - Utilities

Geographical Coverage
- Americas (North, Central and South America)
- EMEA (Europe, Middle East and Africa)
- Asia-Pacific
RESEARCH CONTENTS

The following table represents the volume packaging for the 2010-2014 LMR Program. The outline below the table describes the analyses within each volume (with exceptions noted):

<table>
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<td>Volume 3: LMR Edge Devices: Asia-Pacific</td>
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<tr>
<td>Volume 4: Global LMR Infrastructure</td>
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Executive Summary
- Market overview and industry structure
- Strategic issues, trends, and market drivers
- Market estimates and forecasts
- Competitive landscape
- Sales and support channels
- User requirements
- Summary and observations

Scope and Methodology
- Segments and definitions
- Data collection tools
- Analysis models
- Sources

Market Overview and Industry Structure
- Technical value chain
- Sales and support channels
- Users
- Industry standards
- Industry associations
- Key regulatory issues

Strategic Issues, Trends, and Market Drivers
Including, but not limited to:
- Interoperability issues, particularly the status of RoIP, SDR, and other solutions
- LMR funding sources
- Frequency mandates and regulation impact on solution availability/requirements
- Legacy analog system extensions
- Digital migration, including analog vs. digital trunk system migration
- Commercial sector adoption drivers and barriers

Market Segmentation, Estimates and Forecasts
Base year 2009 unit and revenue shipment actuals (where applicable), average selling prices and forecasts through 2014, for the following segments:

- LMR edge devices (Volumes 1-3 only)
  - Product type
    - Portable vs. mobile
    - Analog vs. digital
    - Conventional vs. trunked
  - Trunking standard
  - Application segments
  - User market
  - Geographic region

- LMR infrastructure (Volume 4 only)
  - Technologies
  - Application segments
  - User market
  - Geographic region

Competitive Analysis and Position
- Supplier position and share by product type
- Changes in competition
- Strategic direction

Channel Analysis
- Company size
- Margin trends
- Current and future
  - Products offered
  - Services offered
  - User communities supported
- Supplier selection and evaluation criteria
- Supplier representation
- Supplier support requirements
• Sales and service firms’ perspectives on the LMR market
  - Industry trends
  - Growth offerings
  - Growth user communities
  - Custom solution requirements
  - Perception of suppliers

End User Analysis
• Current and future use of LMR products
• Types of services used/applications deployed
• Product selection criteria segmented by user community
• Product performance strengths/weaknesses
• User satisfaction ratings
• Preferred suppliers
• Supplier selection criteria
  (i.e. pricing, availability, maintenance/service support, etc.)
• OEM/integrator selection criteria (Volume 4 only)
• Radio design preferences (Volume 4 only)
• Organizational expenditures on LMR products

• Typical replacement cycle of LMR products
• LMR purchase source trends
  (i.e. direct to end user, dealer/distributor)
• Information sources on products, suppliers, sales and services firms
  (i.e. trade shows, Internet, etc.)

VDC Research Summary
• Summary observations
• Product development and marketing
• Channel position and direction
• Key success requirements and winning strategy elements across select markets

Vendor Profiles
• Corporate overview
• Primary offerings
• Industries and applications
• Geographic regions served
• Channels and customers
• Key partnerships
• Strategies and direction

RESEARCH SCHEDULE

Planning discussions between VDC and early subscribers ........................................... Through June 18, 2010
Monthly status reports ........................................................................................................ Begin July 2010
Interim findings .................................................................................................................. One month prior to publication

Final Deliverables:
Volume 1: LMR Edge Devices: Americas ................................................................. November 2010
Volume 2: LMR Edge Devices: Europe, Middle East and Africa (EMEA) ................. December 2010
Volume 3: LMR Edge Devices: Asia-Pacific ............................................................ January 2011
Volume 4: Global LMR Infrastructure ...................................................................... October 2010

For More Information Contact:

<table>
<thead>
<tr>
<th>Research Team</th>
<th>Account Representative</th>
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<tbody>
<tr>
<td>David Krebs</td>
<td><a href="mailto:davidk@vdcresearch.com">davidk@vdcresearch.com</a></td>
</tr>
</tbody>
</table>

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PROCESS AND METHODOLOGY

VDC Research strives to create valid and accurate primary market research using a structured approach, analytic tools, and proven analytic methods reinforced by information from secondary sources when appropriate.

METHODOLOGY

The rigor of VDC’s research methodology yields data we translate into information and knowledge to create insights that lead to innovation and business results for our clients. This market research service includes a number of data collection and analytic methods that are designed specifically to enable those results:

- **Market Segmentation and Definition**: Definition of market segments, target customers, and competing solutions critical to building accurate estimates, forecasts, supplier position and customer requirements.
- **Market Sizing and Forecasts**: Models based on supplier shipments, user budget analysis, recent installations, and future purchasing plans. Other key inputs include supplier forecasts of future growth rates, historical data, and economic outlook data.
- **Data Verification**: Primary and secondary research on target communities and companies is used to validate our results and includes conducting supplemental interviews at target firms, crosschecking with channel partners, estimates from competing firms and checking historical performance.
- **Supplier Share and Position**: Derived directly from structured, in-depth interviews of leading and emerging suppliers of LMR products, with specific emphasis placed on current and projected shipments on combination with VDC’s data repository.
- **Customer and Channel Requirements and Preferences**: Focused on customer and channel partner priorities driving consideration. Topics include a range of product and supplier selection criteria. We will explore current and future preferences for various technologies, feature sets, suppliers, and sources of supply.

STRUCTURED APPROACH AND TOOLS

- **Segmentation and Models**: Detailed analysis of LMR products and related market segments, customer class communities, products and technologies and channels that comprise market opportunities.
- **Technical Solution Value Chain**: Definition of the software and services that constitute the LMR technical value-chain.
- **Commercial Value Chain**: Analysis of the relationships between suppliers, channel partners, and enterprise customers that participate in the LMR product markets.
- **Data Collection Tools**: Include, but are not limited to in-depth telephone interviews, on-site interviews, and web-based interviews of manufacturers, channel participants, and customers.
- **Research Databases**: Includes VDC proprietary sources, research program sponsors, and industry specific third parties (e.g. trade publications, websites, and conferences).

PRIMARY RESEARCH

<table>
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<th>Target Communities</th>
<th>Approximate Sample Size</th>
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<tr>
<td>Suppliers of Radios</td>
<td>Approx. 15</td>
</tr>
<tr>
<td>Suppliers of System Infrastructure/Dispatch Consoles</td>
<td>Approx. 15</td>
</tr>
<tr>
<td>Independent Software Vendors (Application/Communication Software, SDR, etc.)</td>
<td>Approx. 10</td>
</tr>
<tr>
<td>End Users (Public Safety Agencies, First Responders, Military, Utilities, Transportation, Industrial, etc.)</td>
<td>Approx. 30</td>
</tr>
<tr>
<td>Standards Bodies/Industry Associations</td>
<td>Approx. 10</td>
</tr>
<tr>
<td>End Users (Public Safety Agencies, First Responders, Military, Utilities, Transportation, Industrial, etc.)</td>
<td>&gt;500 respondents</td>
</tr>
<tr>
<td>Channel Groups (OEMs, System Integrators and VARs)</td>
<td>&gt;100 respondents</td>
</tr>
</tbody>
</table>
RESEARCH TEAM

• **David Krebs**, Research Director

  David has more than ten years experience in mobile computing systems, wireless data communication and automated data-capture research and consulting. David’s experience in consulting includes: end-user segmentation and adoption analyses for next-generation mobile platforms and communication networks, automatic data-capture technology migration mobile software middleware and interfaces; development of proprietary forecast methodologies; comparative product performance evaluation; missionary sales and market expansion requirements analysis; and merger and acquisition due diligence advisory support.

  David is a graduate of Boston University.

• **Eric Klein**, Senior Analyst

  Eric is a market research and consulting professional specializing in the design, analysis, and delivery of project-based research. Over the past 15 years, Eric has worked with a wide array of firms across a number of industries, leading quantitative and qualitative research in areas such as innovation in enterprise software, supply chain risk management, manufacturing operations/automation, and IT spending research. Eric has worked in a variety of market research and management roles, providing market data and competitive intelligence to Fortune 500 firms. His previous employers include: AMR Research, The Yankee Group, and Affiliated Computer Services (ACS).

  Eric holds a Bachelor of Science in Finance from Boston University.

• **Balca Korkut**, Research Associate

  Balca supports all of the Mobile & Wireless practice’s major research programs and is a contributor on many custom research and consulting engagements. Her work includes coverage of enterprise mobility hardware, software and services, delivery models including managed services for enterprise mobility solutions, and more. Balca’s prior experience includes market research studies on entrepreneurship and development, online higher education, Information Technology industry in Pacific-Rim, hospitality and tourism and logistics industries.

  Balca holds a B.S. in Manufacturing Systems Engineering from Sabanci University in Istanbul, Turkey and an M.B.A. from University of Massachusetts Boston.

• **Christopher J. Rezendes**, Executive Vice President

  Chris has 18 years experience in industrial technology market research and consulting. He has more than 13 years experience in senior management and leadership positions at a number of IT systems and professional services organizations.

  Chris also has experience in VDC client environments managing business development, new product introduction, product management, channels, marketing communications, strategic sales, and corporate development functions for suppliers of a number of embedded hardware and software solutions. This work has included shared P&L responsibility for businesses with revenues in excess of $100 million.

  Chris has advised many of the largest and most respected companies in industrial and information technology industries worldwide. He has also worked with many of the most successful private equity and venture capital firms in the Americas and Europe.

  Chris is a graduate of Harvard University.
I want to order Land Mobile Radio (LMR) Systems, Software-Defined Radio (SDR), & The Future of Mission-Critical Wireless: 2010-2014 Global Market Demand Analysis. I have read the Contractual Provisions of this proposal, which can be found [here](#) and agree to its terms.

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Package pricing available

**Enterprise License** - Provides the right to post purchased research on portal/corporate network for sharing within organization.

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| Name: | ☐ Check Enclosed Amount: |
| Title: | ☐ Purchase Order Enclosed PO Number: |
| Company: | ☐ VISA ☐ Master Card ☐ American Express |
| Street: | Account Number: |
| City: State: | Expiration Date: |
| Zip: Country: | Name on Card: |
| E-mail: | ☐ Bill my company without a purchase order, but with my consent. |
| Telephone: Fax: | Signature: |

Authorized Signature: ____________________________________________________________

**New Accounts:** Orders must be pre-paid.

**Foreign Orders:** Payable in U.S. Dollars drawn on a U.S. bank, wire transfer, or by credit card.