



4G and WiMAX for Smart Grid

Enabling Access, Applications and Affordability

February 2010

Overview

Any smart grid is a telecommunications network for the utility and the communities it serves. 4G technologies provide any power utility with the most cost effective technology in monitoring the grid from power production to power consumption. Not only will a 4G smart grid read meters, they will also provide a range of cost saving services to the utility and the community as a whole. Mind Commerce's new research 4G and WiMAX for the Smart Grid: Enabling Access, Applications and Affordability proposes WiMAX as a Last Mile or 'Access' solution to provide a range of smart grid solutions or 'Applications' which, when compared with other smart grid technologies such as Broadband over Power Line (BPL) come in at less than half the cost per household reached offering industry leading 'Affordability' figures.

The research indicates that given the dilemma of US Department of energy awarding billions of dollars in smart grid grants while standards making bodies dither in providing the industry with standards, the power industry should look to the latest and greatest standards in telecommunications (Internet Protocol and 4G technologies such as WiMAX) to take advantage of federal dollars available for smart grid deployments while saving money on operating expenses. In addition, the deployment of a 4G network would enable the utility to offer wholesale and retail telecommunications services contributing new revenue streams for the utility while shortening the Return on Investment (ROI).

Any utility manager studying their smart grid options is no doubt concerned about the security of any smart grid network (foreign agents have been known to attempt to hack some parts of the US power grid), Quality of Service (QoS) issues, reliability of the technology and the potential for harmful interference to take down their smart grid network. This publication tackles those objections head-on in easy-to-understand language addressing both Last Mile and Middle Mile portions of a 4G smart grid network.

Most importantly, the paper analyses a BPL deployment in Boulder, Colorado where the power utility deployed a BPL-based smart grid at a cost of \$1,000 per household reached. The research finds that a more powerful, mobile, 4G, standards-based network could have been deployed at a cost of \$440 per household reached. The financial analysis offers a worksheet for power utilities to determine return on investment.

With its exhaustive analysis of 4G and smart grid, there is no other research currently available as comprehensive as 4G and WiMAX for the Smart Grid: Enabling Access, Applications and Affordability.

Key Findings

- 4G Smart Grid can be deployed at half the cost of broadband over Power Line (BPL) via an off-the-shelf solution
- Incremental revenue streams can be enjoyed via wholesaling telecommunications services supported by 4G smart grid applications
- 4G smart grid solutions provide utilities with cost savings on internal operations (mobile work force applications, etc)
- Ubiquitous broadband services can be realized through the deployment of 4G in the power utilities' market providing greater efficiencies for smart grid subsidies

Target Market

- Power utilities companies
- Renewable energy companies
- Telecommunications service providers
- Telecommunications vendors seeking entry to the smart grid market
- Government regulatory authorities
- Power sector vendors
- Telecommunications and utility investors

Table of Contents

Executive summary -The 3 A's	Gigabit Ethernet Wireless Backhaul Solutions
Access: 4G as Smart Grid Access Technology	Quality of Service (QoS)
What is a 4G Network?	Interference mitigation
Standards Based Equipment	Frequency Reuse
4G and Smart Grid	Rain fades
4G Last Mile Access: What is WiMAX?	Reliability/availability
Fixed vs. Mobile WiMAX	Ease of Licensing: E-Band in the US
Utility Manager Objections to WiMAX	High Availability
Interference	Backhaul Conclusion
Good Quality of Service	Wireless Backhaul Considerations
WiMAX Reliability	Comparisons with Fiber
WiMAX is not Wi-Fi	APPLICATIONS FOR A 4G SMART GRID
WiMAX Components	What does a utility need?
WiMAX Base Stations	Grid monitoring
Outdoor CPE	Meter reading, remote turn-on/turn-off
Indoor CPE	Grid physical security
USB, netbooks, femtocells	Monitoring and metering distributed generation
Link budget and building penetration	AFFORDABILITY: COST PER HOUSEHOLD REACHED
Spectrum Considerations	Capital Expenditures: Cost per Subscriber or Household Reached
Internet Protocol	Operational Expenditures
Access Conclusion	Unconventional Revenue Streams
4G Backhaul Overview	Conclusion
Wireless Middle Mile Solutions	
Considerations for Wireless Middle Mile	
Backhaul Requirements	
Licensed Microwave Wireless Backhaul Solutions	
Licenses protect the links	

About Author



Frank Ohrtman has almost 20 years experience in VoIP and wireless applications. He is the president of WMX Systems, LLC, a Denver, Colorado-based consulting and systems integration firm. Mr. Ohrtman learned to perform in-depth research and write succinct analyses during his years as a Navy Intelligence Officer (1981-1991) during which he specialized in electronic intelligence and electronic warfare. He is a veteran of U.S. Navy actions in Lebanon (awarded Navy Expeditionary Medal), Grenada, Libya (awarded Joint Service Commendation Medal), and the Gulf War (awarded National Defense Service Medal).

His telecommunications career began with selling VoIP gateway switches for Netrix Corporation to long distance bypass carriers. He went on to promote softswitch solutions for Lucent Technologies (Qwest Account Manager) and Vsys (Western Region Sales Manager). His consulting clients include national governments and tier one telephone companies.

Mr. Ohrtman is a Gerson Lehrman Group Scholar (<http://www.glgcouncils.com>) and serves as Dean of WiMAX for Applied Learning Solutions (<http://www.e-als.com>). He is a regular blogger and contributor to WiMAX.com (<http://www.wimax.com>) and annual presenter at WiMAX World (<http://www.wimaxworld.com>) as well as local Cisco Users Groups. Mr. Ohrtman serves as an advisor to Bush Telecommunications Pty Ltd and the Rural Broadband Consortium of Australia.

Mr. Ohrtman holds a Master of Science degree in Telecommunications from Colorado University College of Engineering (master's thesis: "Softswitch As Class 4 Replacement-A Disruptive Technology"), a Master of Arts degree in International Relations from Boston University and a Bachelor of Arts, Political Science, from University of Iowa

Frank may be reached at Frank@MindCommerce.com

Order Form

Report Title

4G and WiMAX for the Smart Grid: Enabling Access, Applications and Affordability

License Type

- Single User License\$ 995 USD Company-wide License.....\$ 1,995 USD
 Team License (2-5 people) \$ 1,365 USD Other Licensing options available: Contact Mind Commerce

Family/Surname

First Name

Position

Company

Address

Country

Post Code

FAX

Telephone

Email

Order Type



- Order by FAX at 1 877 646 3266

Card Number

Expiration Date (MM/YY)

CV Code

Cardholder's name

Signature

Billing Address

Postcode

Country

Signature

Date

Online Ordering

Customers can order online by visiting report web page:
<http://www.mindcommerce.com/Publications/4GWiMAXSmartGrid.php>