How to Build a Reliable Business Case for a 3.65 GHz WiMAX Initiative in the US Using the TEA|WiMAX Business Case Analysis Tool

WiTech

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Executive Summary

In the second half of 2007, the Federal Communications Commission (FCC) introduced a light-licensing scheme for the 3.65 GHz Band with the objective of unlocking the market potential for wireless services and widening the availability of broadband to underserved areas in the US.

This new scheme brings a number of benefits to US wireless operators, giving them access to WiMAX-based technology, which before the FCC order was available only for the licensed spectrum, and represents a unique opportunity for growth, minimizing investments and operational costs.

Nevertheless, despite the lower access barrier, also in the 3.65 GHz Band, building a WiMAX network is and will remain a complex undertaking and the initial planning stage, where the business case is defined and the budget is allocated, is very critical for setting a solid foundation for the success of the initiative. Misjudgments and mistakes made at this stage will influence heavily the next phases; in particular, the subsequent network planning and design phases.

This key set of activities can be better done when equipped with a specialized decision support tool such as TEA|WiMAX from WiTech, a unique application capable of performing thorough WiMAX technical-economic analyses in an integrated manner.

TEA|WiMAX allows performing four main types of Analyses: a Market Analysis to evaluate the potential market for WiMAX services; a Technical Analysis to dimension the WiMAX Access & Backhauling network infrastructures; an Economic & Financial Analysis to calculate all key figures of the Business Plan for the WiMAX initiative; a Scenario & Sensitivity Analysis to iteratively fine-tune the WiMAX plan, in real-time and total privacy, and to view the results instantly, in an animated graphical format, for all analyses.

A sample Business Case in the 3.65 GHz Band, made with TEA|WiMAX business case analysis tool and referred to the deployment of a WiMAX network in an urban area in the US, can be downloaded. The document was obtained from the report automatically generated by the tool at the end of the analysis exercise.

1 Introduction

In the second half of 2007, the Federal Communications Commission (FCC) introduced a light-licensing scheme for the 3.65 GHz Band with the objective of unlocking the market potential for wireless services and widening the availability of broadband to underserved areas in the US.

Licenses in the 3.65 GHz Band are not exclusive but are easy and inexpensive to obtain. Operators willing to exploit this band have only to fill out an on-line form to register and pay a minimal cost ($ 210) per each application.

The FCC light-licensing scheme for the 3.65 GHz Band brings a number of benefits to US wireless operators, including: low levels of interference thanks to base stations registration and contention protocol adoption, better propagation characteristics (in comparison with the License-Exempt 5 GHz Band) that improve coverage performance, flexibility in the choice of the channel bandwidth to be adopted, possibility to deploy the network choosing when and where. Last but not least, the 3.65 GHz Band has given wireless operators access to WiMAX-based technology, which before the FCC order was available only for the licensed spectrum.

The attractiveness of the 3.65 GHz Band is proven by a couple of facts: at the end of 2008, a number of FCC-certified devices from 10+ vendors were commercially available, all of them WiMAX-based, and about 420 operators nationwide had applied for or received a license.

Nevertheless, despite the lower access barrier, also in the 3.65 GHz Band, building a WiMAX network is and will remain a complex undertaking and the initial planning stage, where the business case is defined and the budget is allocated, is very critical for setting a solid foundation for the success of the initiative. Misjudgments and mistakes made at this stage will influence heavily the next phases; in particular, the subsequent network planning and design phases.

In these uncertain economic times, there is no room for risky and poorly analyzed decisions and fundamental ingredients of every business case exercise are revenues and costs which, quite naturally, have to be maximized and minimized respectively.

On one hand, costs are thereby a consequence of the underlying market, rollout plan, and technology strategies, which can be directly mapped on a certain infrastructure required to serve the service demand associated with the revenue predicted.

On the other hand, costs also impact on the chosen technology, the rollout plan, and market strategy. For instance, the introduction of flat fees has to be based on a sound knowledge of the service production costs and the network capabilities.

A holistic, iterative approach, that takes into account all business and technology aspects since the outset is thus key. This will ensure that an iterative alignment of the business and technology strategies will be achieved, allowing to clearly identify the main cost drivers.

In other words, it is important not to focus on the single facets of the revenue forecast, technical decisions, and cost calculation, but consider all these different aspects in a comprehensive, integrated view, building the business case through successive approximations.

Thus, on the Market side, it will be required to evaluate the potential market for WiMAX services, identifying target segments, defining service profiles, choosing types of user terminals, and, finally, forecasting Revenues.

Subsequently, on the Technical side, this will mean to properly dimension the WiMAX Access & Backhauling network infrastructures, defining the required bill of quantities.

On the Economic & Financial side, it will mean calculating CAPEX & OPEX and evaluating all WiMAX Business Plan's Key Performance Indicators.

Finally, a Scenario & Sensitivity Analysis should allow to iteratively fine-tune the WiMAX Business Plan, analyzing the influence of parameter & boundary condition changes.

This business planning activity can be better done when equipped with an appropriate decision support tool, which has to have some key characteristics:

First, the tool has be based on real best practices; that is, it should incorporate the real experience coming from having done real projects.

Second, the tool should be equipped with well calibrated, WiMAX technology-related, market, technical, and economic models. Well calibrated means that these models should allow to reliably close the link between revenues and costs, and this should happen through a modeling cycle that allows to iteratively calculate investment costs until an optimized result, typically minimized costs, is achieved that is able to sustain the service demand associated with the revenue predicted.

Third point, the tool should be able of presenting manageable Input and Output with meaningful correlations; that is, each model should understand and manage the correlations between model input and output and its validity range.

Last but not least, the tool should support an iterative way of working by design; in particular, the scenario & sensitivity analysis activity should be supported natively.

TEA|WiMAX by WiTech supports and provides exactly all of the above

With TEA|WiMAX, WiTech provides all WiMAX players with a powerful tool to help define their business cases and allocate their budgets more reliably, entering into the network planning and design phase more confidently.

TEA|WiMAX is a sophisticated business case analysis tool that allows performing thorough techno-economic analyses and deliver accurate and reliable business cases for a WiMAX initiative in a fast and dependable manner.

TEA|WiMAX was developed by WiTech over five years of extensive industry experience supporting major operators and equipment suppliers in several strategic initiatives and projects.

TEA|WiMAX allows analyzing the business case for a WiMAX network initiative with a holistic approach, in an integrated, iterative way. The tool features comprehensive market and revenue forecast models, well calibrated technical modeling tailored to the WiMAX technology, calculation of Total Cost of Ownership (TCO) and detailed Profit & Loss with close evaluation of key performance indicators.

A fast and simplified configuration of more than 500 different input variables and assumptions (with suggested/best-practice-recommended values) allows a fine-tuned setting of the TEA|WiMAX tool. An interactive, dashboard-styled and very easy-to-use Graphic User Interface (GUI) provides users with optimum interactivity and the ability to perform fine-grained scenario & sensitivity analyses to align the business case with a company's strategies, analyzing the influence of parameter changes and the consequence of fundamentally changed boundary conditions in real time.

At the end of the analyses, a very detailed report is automatically compiled and published in editable and PDF formats. The report contains a complete summary (with tables, diagrams and charts) of input parameters, the results of the market analysis, the outcome of the technical modeling, and the economic and financial statements for up to ten years.

TEA|WiMAX conforms to the IEEE 802.16e/d standards and the WiMAX Forum's Fixed and Mobile Profiles. Further custom profiles can be added independently by the user. In addition to the Candidate Bands for WiMAX, the TEA|WiMAX tool supports all Custom Bands in the 450 MHz to 28 GHz range.

2 TEA|WiMAX Key Characteristics

TEA|WiMAX is made up of four main modules, according to the different analyses that the tool can perform; in turn, each module is constituted by different sub-modules.

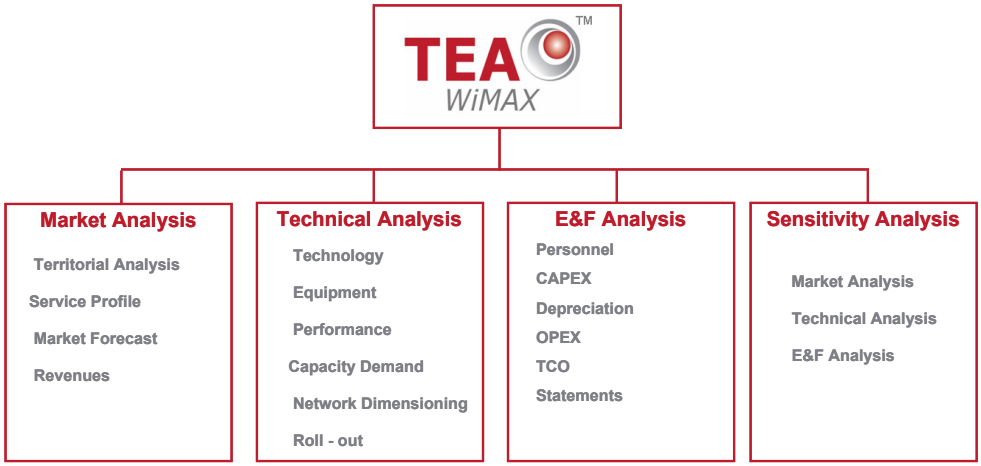

Figure 1 – TEA|WiMAX Analyses

Market Analysis

The Market Analysis module allows evaluating the potential market for WiMAX services, characterizing target markets, defining service profiles, and forecasting market penetration and revenues.

Up to five geographical areas can be analyzed at the same time and independently. Each geographic area of interest is characterized by considering key territorial and socio-demographic parameters such as its extension in square kilometers/miles and the distribution of Dense Urban, Urban, Suburban, and Rural type of scenarios; main demographic data that are considered are the number of inhabitants, households and micro/small/medium/large local units located in the considered area.

The portfolio of service profiles (packages of services) to be offered is defined considering both technical features and pricing policies. As for technical features, the Internet access service is characterized in terms of Peak Information Rate (PIR) and Committed Information Rate (CIR) in Down Link and Up Link; whereas VoIP service is taken into account in terms of number of VoIP lines per user and voice coding algorithm. Concerning

pricing policies, Activation Fee, Monthly Fee, and User Terminal Lease Fee are taken into consideration as revenue sources. Up to six different service profiles can be defined.

Market penetration and revenues are forecasted considering the churn impact for each year of the analysis period and for each considered area. The analysis period can be extended up to ten years.

Figure 2 – Market Analysis

Technical Analysis

The Technical Analysis module allows dimensioning the WiMAX Access and Backhauling network infrastructures to define the required bill of quantities (number of Base Stations, logical sectors, radio links and ASN Gateways) needed to meet the capacity and coverage requirements. To do this, different aspects are analyzed.

The capacity required in Down Link and Up Link by the users located in each area to be served is estimated with reference to the relevant parameters defined in the Market Analysis.

The WiMAX technology profile to be used can be either selected among the standard Fixed and Mobile profiles defined by the WiMAX Forum or custom defined. Moreover, Multiple Antenna System features can be managed.

A complete link budget analysis is conducted taking into consideration an extended set of parameters, such as Base Station and User Terminal characterization (antenna gain, transmit power, diversity gain, losses, sector number, terminal type, MIMO, etc.) and margins (penetration margin, fading margin, interference margin). Up to six types of User Terminals can be considered, from Outdoor Subscriber Unit to Handset devices. The proper Path Loss Model, which better reproduces the radio propagation scenario, can be chosen among six supported models (Cost-231, SUI, ECC-33, Log-normal with/without Shadowing, Free Space).

As for network dimensioning, this takes into account a number of relevant parameters, including Base Station overlapping factor, existing backbone infrastructures and type of wireless backhauling technology to be adopted (SDH, PDH, IP Ethernet and License exempt). The network roll-out is defined in terms of the percentage of year-on-year deployed infrastructure.

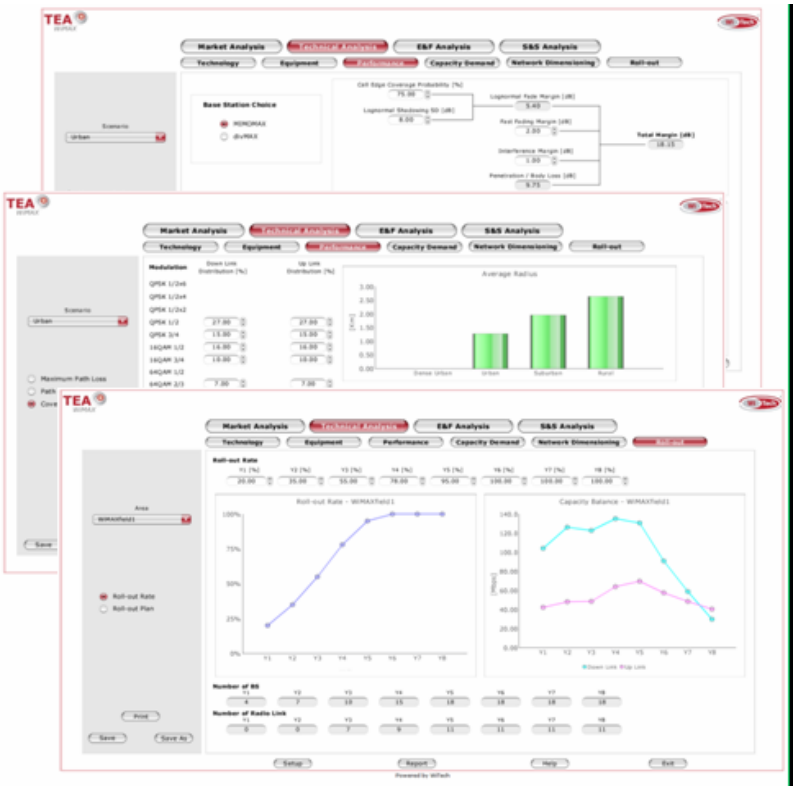

Figure 3 – Technical Analysis

Economical & Financial Analysis

The economic and financial feasibility of the WiMAX initiative can be assessed after having calculated CAPEX and OPEX expenses and having estimated some key indicators, such as EBITDA, Net Income, NPV, PBP and IRR.

The personnel costs are analyzed considering all typical roles in a WiMAX company (executive staff, technical ops, sales, marketing, general & administrative people) and defining their salary and benefits.

To forecast expenditures, all main CAPEX and OPEX figures for the WiMAX initiatives are defined and calculated, such as spectrum license cost, broadband connectivity cost, network and system equipments costs (Base Station, ASN Gateway, CSN, User Terminal), costs of labor for network management, charging/billing and customer care costs, marketing and sales costs, etc..

A Total Cost of Ownership (TCO) is calculated in order to fully evaluate all direct and indirect costs related to the WiMAX initiative.

A Profit & Loss calculation will show whether the WiMAX initiative makes or not a positive Net Income during the analysis period.

A Cash Flow Analysis is carried out in order to evaluate key financial indicators, such as NPV, PBP and IRR.

A Balance Sheet Statement is defined according to the guidelines given by the International Accounting Standards Committee (IASC).

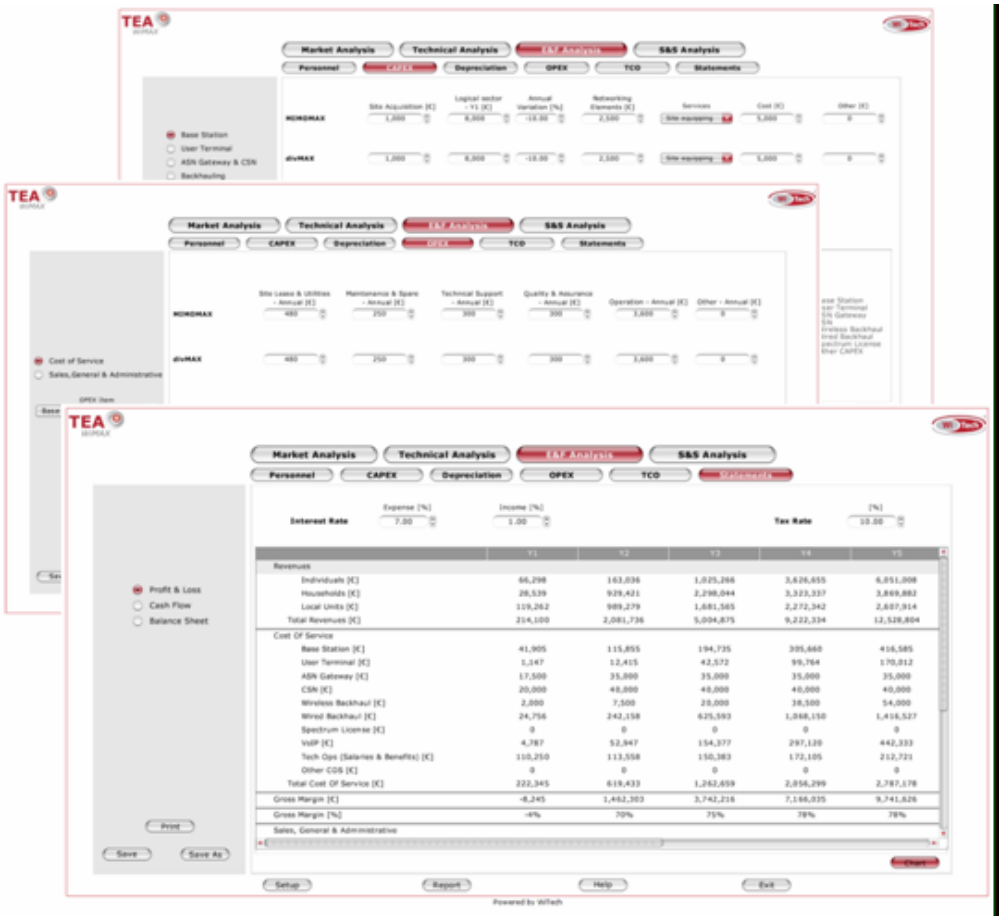

Figure 4 – Economical & Financial Analysis

Scenario & Sensitivity Analysis

The Scenario & Sensitivity Analysis allows an iterative fine-tuning of the WiMAX business case, analyzing the influence of parameter and boundary condition changes. The user can perform the Scenario & Sensitivity Analysis for the Market, Technical, and Economic & Financial analyses in real-time and total privacy and view the results instantly in an animated graphical format.

Figure 5 – Sensitivity Analysis

3 Sample Business Case in the 3.65 Ghz Band in US

A sample Business Case made with TEA|WiMAX business case analysis tool can be downloaded from http://www.witech.it/documenti/TEAWiMAX_Report_3650_MHz.pdf. The document was obtained from the report automatically generated by the tool at the end of the analysis exercise.

The sample Business Case is referred to a deployment of a WiMAX network in an urban area in the US serving both residential and business users.

The offered portfolio of services is constituted by five user profiles, defined in terms of both technical features and pricing policies according to the prevailing economic condition and the competitive scenario in the considered market. The “Internet Access and VoIP” bundle is addressed to residential users, whereas “Internet Access” only is addressed to business users.

The network is based on WiMAX and, in particular, on the Mobile WiMAX System Profile operating in the 3.65 GHz Band with a channel bandwidth of 10 MHz and supporting TDD as duplexing format.

3-sector Base Stations are taken into account and they are configured according to the spectrum regulations (EIRP equal to 40 dBm). The Subscriber Units (SU) can be both outdoor and indoor: outdoor SU are equipped with planar 17 dBi antenna and are well-suited for business users; whereas indoor SU are equipped with 12 dBi window antenna and are well-suited for residential users.

The roll-out of the network is organic and driven by the growth of the capacity required by the users located in the considered area.

About WiTech

WiTech, founded in 2003 as a spin-off of the University of Pisa , Italy, has become shortly one of the most interesting reality in the Next Generation Networks/Next Generation Services (NGN/NGS) scenario, with a focus on BWA (Broadband Wireless Access) and standard technologies like 3G/HSXPA, WiMAX and 4G/LTE. In the consulting & engineering area, thanks to its in-depth expertise, WiTech provides the market with high-value services ranging from strategic consulting on investment plans to engineering services for network design and network planning. On the solution side, the company is engaged in the development of specialized business case analysis tools, capable of performing thorough technical-economic analyses of wireless initiatives in an integrated manner, and in the development and integration of innovative BPM-enabled NGOSS/BSS (Business Process Management-enabled Next-Generation Operation Support System/Business Support System) frameworks and components, aimed at allowing more automation and better control of key telecommunications processes. WiTech is a Regular Member of the WiMAX Forum and a Member of the TM Forum

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