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The Public WLAN Market And Its Business Models - An Empirical Study

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Abstract

Wireless local area network (WLAN) is a radical technology, enabling new ways to provide mobile access. A number of established and new companies have entered the mobile market with new business models. Yet, it is not clear how these new business models affect the mobile industry and which of them will really succeed. We introduced the IDEA framework to guide the design and evaluation systems of new business models driven by new and radical technologies and applied it to the WLAN technology and business models that it enables (Shubar and Lechner 2003). This article focuses on the empiric validation of our hypotheses regarding the public WLAN (PWLAN) industry. We develop the hypotheses according to the IDEA framework for business model design and evaluation. In the empirical study we analyze business models of 118 PWLAN companies and compare them with the business model types, which we have identified according to the IDEA framework. The second subject of our empirical research are recent alliances and cooperations in the PWLAN industry. We analyse 78 alliances and co-operations. This article targets academics, who are interested in business model innovation, as well business people, who are interested in the recent development of the PWLAN industry.

Keywords: *Public WLAN, Business Models, Mobile Business, Mobile Internet, Innovation Wireless Fidelity (WiFi) , Industry Analysis, Hot Spots.*

1   Introduction

Short-range wireless technologies such as IEEE 802.11, HyperLAN, HomeRF, Bluetooth, etc. are designed to cover areas ranging from 10 to a few hundred meters.[1] Wireless Local Area Network (WLAN) technologies cover - compared to cellular standards like GSM or UMTS - a small area at significantly lower initial costs. Laptops are typically equipped

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[1] In the following article, WLAN technologies will be used to refer to all short range wireless technologies, such as IEEE 802.11, Bluetooth, HyperLAN, etc

with Wirless LAN cards and access points are available almost for free. Due to their decentralized architecture, open Internet standards, and low cost base, these technologies have the potential to enable mobile telecommunication services using innovative business models. Thus, they can change the established mobile network operator (MNO) and internet service provider (ISP) value chain on a mid- or long-term basis.

Together with the low level of complexity and the low-cost base, this technology has enabled new industry outsiders with - in some cases - new business models to enter the mobile market. These new business models range from the commercial provision of mobile Internet access for travelling business customers to the coverage of entire city sectors by non-commercial associations.

In addition to the assumed technological competition for future data traffic, these new business models also compete with the existing business models of today's MNOs and ISPs.

Our research focuses on the impact of the new technology on the business models and, in particular, on the business model of the MNOs and ISPs. We have developed a new framework to support the development of new business models driven by new and radical technologies.[2] We introduced the IDEA framework and applied it to analyse the Public WLAN (PWLAN) market, which is driven by the WLAN technology (Shubar and Lechner, 2003). We have identified 14 viable Business Model types for the PWLAN industry and sketched the potential dynamics of this industry.

Focus of this article is the empiric validation of our hypotheses, which have been developed according to the IDEA framework. We analyze the business models of 118 PWLAN companies and compare them with the business model types, which we identified according to the IDEA Framework for business model design and evaluation. The second subject of our empirical research are recent alliances and co-operations in the PWLAN area. We analyze 78 alliances and co-operations. Focus here is to validate and to better understand the dynamics of the PWLAN industry. In our research, we identify a shift from the independent "Fully integrated operator" model to a system of specialised business models. Also, the rapidly increasing number of alliances and cooperations is a symptom of a strong dynamics and interaction in the PWLAN industry.

The article is structured as follows. In section 2, we provide a short overview of the IDEA framework, in section 3 we summarize our results and develop our hypotheses regarding the PWLAN industry. The empirical research is presented in Sect. 4. The paper concludes with a brief discussion.

2   Idea Framework

The IDEA framework supports the development of new business models driven by new and radical technologies and helps to understand the new industry.

The framework consists of four modules, which support the steps of the analysis and design process. Note, that it is typically necessary to iterate the process with its four modules. Each iteration may provide a better understanding of the new industry and its value chain. In opposite to other idea generating frameworks like TRIZ/ARIZ (Zobel, 2001) the IDEA Framework does not seek for the "ideal machine" or try to solve a

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[2] See definition Henderson, R. et al. (1990) for radical innovation.

concrete problem. The focus of our framework is to discover the new innovation space for business models, enabled by the new technology and to identify not one but a system of interacting business models and thus the new industry. The IDEA framework is based on the works of Slowotzky (1999), Stähler (2001), Afuah and Tucci (2001) and Porter (1996). According to Stähler (2001, p. 47), a business model consists of 3 major components: the value proposition, the value architecture and the revenue model. The value architecture comprises internal and the external architecture.

Figure 1 depicts an overview of the IDEA framework with its four modules.

The task of **Module I** is to **identify** the new design possibilities for business models resulting from the new technology. The industry and its business models are built on specific assumptions about the mechanism of the industry. As long as these assumptions do not change, there is no need to change the established business models. A new technology, which changes these assumptions, requires a change of the business models. So, in the first step of the Module I, we identify the need for business innovation, when assumptions have changed. The next step is to identify the new possibilities of the re-designing of the business models – we call them **new design possibilities**.
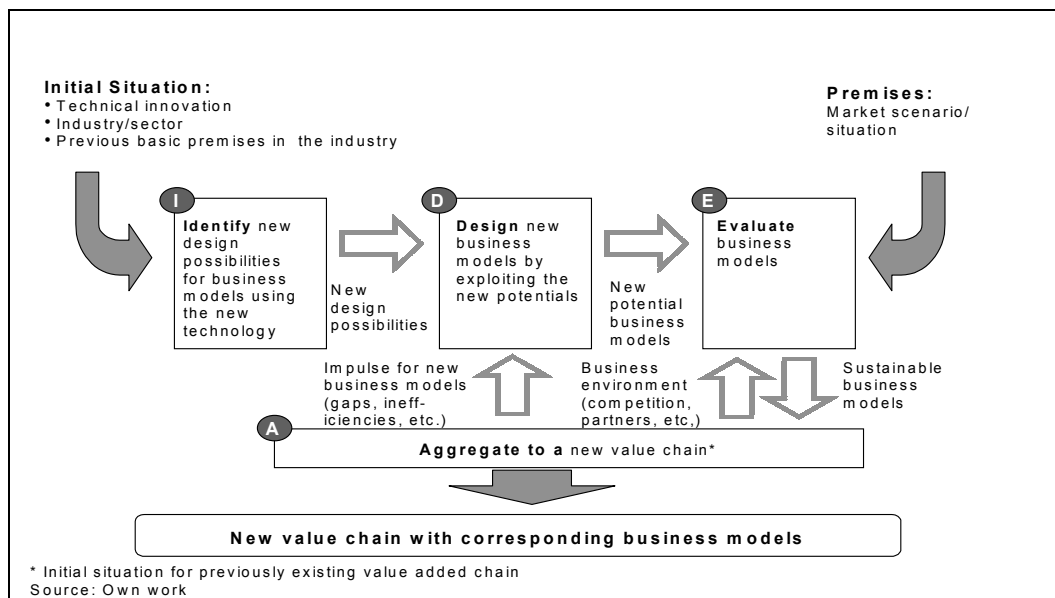

Figure 1: *IDEA Frame Concept*

The result of **Module D** is to **design** a set of new business models using the new design possibilities identified in Module I. The module refers to the morphological box of Zwicky (1966) in order to generate new ideas and respectively to design new business models. The core element is identifying the dimensions, which determine the solution and the corresponding concrete options of each dimension. To reduce the complexity of the problem, only the dimensions with the highest impact on the business model are further considered, as they determine most of the innovation potential and the performance of the business model. Possible business models are combinations of the options along these dimensions. The output of this module is a set of new potential business models.

In **Module E**, the potential business models, which were identified in the Module D, are **evaluated.** The task here is to identify those business models that have a potential to succeed in the market. All considered business models are ranked according to their performance in assumed market scenarios.

Note that the levels of sophistication of the business models description, of the scenarios and of the ranking mechanisms should coincide. Ranking mechanisms should consider all aspects of the business model. After having ranked the models, we draw a line between those models that will probably survive and those that will not. The analysis is continued only with those models that have the potential to survive.

In **Module A**, the business models are **aggregated** in a value chain. The aim is to understand the environment of every single business model that has been identified as well as the dynamics of and the interaction between the business models and thus the dynamics of the industry. For that purpose, we use the concept of the value chain, introduced by Porter (1988). All identified business models are placed in the value chain with regard to the value – adding activities they deliver in this industry. Afterwards, the interactions between the business models are analysed. There are three kinds of interaction: (1) Service Relationship, (2) Competition, (3) Alliances / Coalitions.

Module A provides new insights into the industry. Which could evolve into an impulse for a further iteration.

3   Public WLAN (PWLAN) Business Models And Industry Dynamics

The PWLAN market is the public offering of communication services (data and voice transmission) by using short range wireless technologies. Today, PWLAN services constitute mainly broadband Internet access.

As the current main value proposition of PWLAN operator is to provide broadband wireless Internet access, it affects the ISP and the MNO market. Most MNOs have announced to start or already started offering PWLAN.[3] ISP players have also a good position to enter the market, as they already cover a substantial part of the PWLAN value chain.

Besides some technical issues, the uncertainty with regard the right business models are the key challenges the PWLAN market has to overcome - Lonergan (2002, P. 9).

We will highlight our main results regarding the PWLAN industry and its business models, which are based on the IDEA framework. We will focus only on commercial business models.

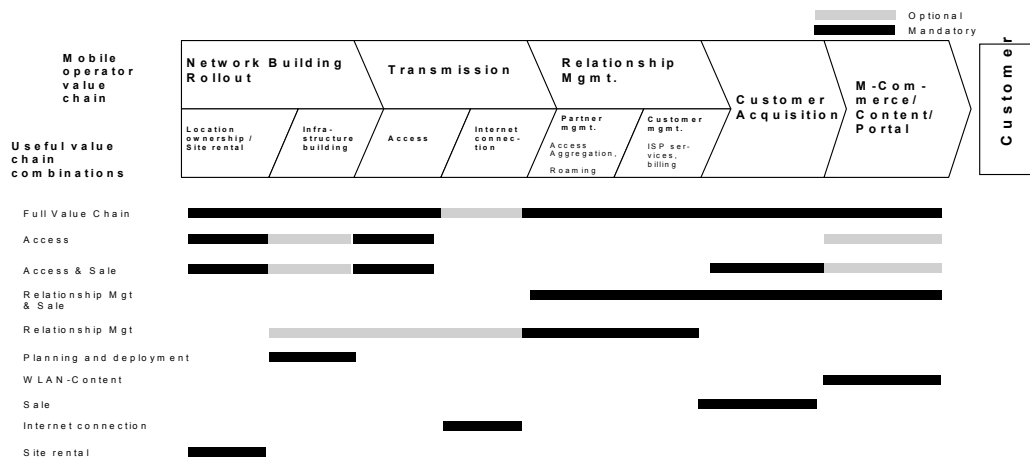[3] Examples are Telia, T-Mobile, vodaphone and mmO2.

Figure 2: *Value Chain Combinations*

Module I: Regarding new assumptions, which appeared with WLAN technologies in the mobile network operator and ISP industries, the emphasis should be put on "No Special Know-How", "Small Initial Investment" and "Free Frequency Spectrum". Mostly these new assumptions affect the internal structure of the business models of the MNOs' and ISPs' business models, as they remove the common market entry barriers of the MNO and ISP markets. Therefore, new assumptions enable almost everybody to provide a PWLAN service. Owners of a PWLAN service could be location owners or even private persons.

Module D: The new assumptions enable ownership models mainly in the access part of the value chain, but they also affect the other value chain parts, and thus lead to a new composition of the value chain. After evaluation of all possible design dimensions, **Ownership** and **Composition of the value chain** are identified as the dimensions with the highest impact on business models performance, as they determine the other business model parts and are very difficult to change afterwards.

In order to identify options of **Composition of the value chain** dimension we look at the value chain of the mobile network operator (Figure 2). The activities of the value chain are: network building & rollout, transmission, relationship mgmt., customer acquisition and content. We consider useful combinations of value chain activities and identify 10 of those useful Those options are depicted in Fig. 2 with their mandatory and optional activities. The 10 useful combinations of value chain activities are: full value chain, access, access & sale, relationship mgmt. & sale, relationship mgmt., planning & deployment, WLAN-content, sale, Internet connection and site rental. This is the first dimension in the design of the PWLAN business model.

The second dimension is ownership. With regard to **Ownership** dimension we identify three options:

- Specialized company, which exclusively runs the service. It is specialized in this service and thus can fulfil know-how and investment needs for running this service.

- Location owner, who runs this service as a side production. He can reuse his location, infrastructure of his main business and thus realizes a cost advantage.

- Private person, who uses his private location and infrastructure.

#	Business Model	Owner Ship	Value Chain	Description of business model
1	Fully Integrated Operator	Specialized Company	Full Value Chain	Offers PWLAN Internet Access in multi locations. Owning most Access Points as well as having Roaming agreements with some access point owners.
2	WLAN Service Provider	Specialized Company	Relationship Mgt & Sale	Offers PWLAN Internet Access in multi locations. Relying only on roaming agreements with access provider
3	Relationship Management ASP	Specialized Company	Relationship Mgt	Provides Access Provider + with customer authentification and billing functionality -no customer ownership. Coordinates Roaming agreements for access provider.
4	Access Provider	Specialized Company	Access	Owns Access Points in multi locations. Has roaming agreements with Service Provider, but does not have a sales force.
5	WLAN-Content Provider	Specialized Company	Content	Offering Location based Services and Content for PWLAN in multi locations. .
6	Network Planning	Specialized Company	Planning & Deployment	Specialized in planning and deployment of WLAN access points for access provider
7	Reseller	Specialized Company	Sale	Sells contract and prepaid cards for Fully Integrated Operator and WLAN Service Provider in physical stores or online.
8	ISP	Specialized Company	Internet connection	Connects the hotspots to the internet. Get fixed or traffic based fee from PWLAN provider.
9	Small Local Operator	Professional Location Owner	Full Value Chain	Offers existing customer base an additional service only in this location.
10	Venue Access Provider +	Professional Location Owner	Access & Sale	Own the Access Points in their location. Sells contracts and prepaid cards for their own brand (customer ownership) and for PWLAN Provider with which they have a roaming agreement.
11	Venue Access Provider	Professional Location Owner	Access	Owns only the Access Points in their location. Has roaming agreements with Service Provider, but does not have a sales force.
12	POS Reseller	Professional Location Owner	Sale	Location Owner sells contract and prepaid cards for Fully Integrated Operator and WLAN Service Provider in the hotspot (point of service).
13	Private Access Provider	Private Person	Access	Owns an private Access Point and offers Internet access for free or has a roaming agreement with a service provider.
14	Site Rental	Location Owner	Site Rental	Rents his site to a Fully Integrated Operator or to an Access Provider.

Source: Own Work

Figure 3: *Identified And Sustainable PWLAN Business Models*

Module E: There are 30 combinations (3*10) of the two dimensions. Several of the combinations can be excluded as they do not make sense (e.g. a private person, who runs the whole value chain). The residue models are then evaluated. The most relevant market assumption for the evaluation of these business models is the level of penetration of WLAN users in the business customers and consumer market segments. For this main assumption we build three market scenarios: the worst case, base case, and the best case (the level market of penetration increases from the worst case to the best case). All 14 business models listed in Figure 3 have been evaluated in these scenarios and have been considered as potentially sustainable. Figure 3 contains the list of business models with the two design dimensions and a brief description of the business model.

Module A: By grouping the 14 business models according to their activities in a value chain, we get the value chain of the PWLAN industry (Figure 4).

Six main service relationships can be identified between the business models. Those service relationships are depicted in Fig 4:

1. **Site Rental:** Location owner rent his sites for a fixed fee or land revenue share to fully independent operators and access providers.

2. **Access Point Planning and Deployment:** Network Planning Bureaus help to set-up hot spots, as most of location owners lack technical capability.

3. **Roaming:** Roaming is the main service relationship between the business models, as mostly all business models need roaming to aggregate enough customers for their service. Three kinds of roaming agreements could be differentiated: the exclusive roaming of an access provider to an access aggregator[4], the non-exclusive roaming of an access provider to an access aggregator, and the roaming agreements between access aggregators.

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[4] Access aggregators are business models who want to provide their customers with an increased coverage through roaming.

4. **Multilateral roaming:** The pure bilateral roaming contracts with a high number of small access providers (e.g., for a nationwide roaming) has high transaction cost due to its complexity. Multilateral roaming agreements and a roaming platform provided by a relationship management application service provider (RM ASP) could reduce these costs. Additionally, it could provide small access providers with an aggregation mechanism to increase their negotiation power.

5. **Authentication and Billing:** Authentication and Billing especially in combination with roaming are rather complex. A specialized RM ASP can provide the necessary infrastructure.

6. **Contract Reselling:** Fully integrated operators and WLAN service providers rely on nationwide distribution of their service. For an efficient physical distribution channel, they have to cooperate with contract resellers. Point of sale (POS) Resellers could be location owner, who already have a selling point from their main business (hotels, cafes, etc.).

Looking on the main activities of the value chain, we can identify three potential fields of **competition**: access providing and the two sub-activities of relationship mgmt.: partner and customer mgmt.

With regard to access providers, the competition is very limited as they mostly do not offer substituting products (covering the same area). The access providers also benefit[5] one from another, as there is a network effect through any additional coverage, which increases the overall value to end users. But access provider business models are competing in renting the locations. The site rental price will therefore be set according to expectations of their own business case. Fully integrated operators compete against each other and against the location owner's business model for this scarce resource.

With regard to partner mgmt. as part of the relationship mgmt., the competition is about providing the biggest coverage, to cover the area with the most traffic and to use it or to sell it to a third party (with the help of roaming). The substituting product is their network coverage, as it might be overlapping. As far as customer management is concerned, it is about selling this network coverage to PWLAN users (own or users of partners) and bundling as many customer relationships as possible.

Most power in the value chain will be located in the activities of relationship management and, in some cases, in access providing. Both activities have market barriers enabling high margins. Access providers owning the location have a resource advantage, which is not imitable. In high traffic areas, like airports, access providers can claim a supreme price. Relationship management (partner and customer management) is a scale business and, thus, companies can build market barriers through economies of scale.

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[5] See also Porter [Port96, P. 267]. He describes the strategic benefit of competition which accrues when the competition covers less attractive segments (areas). Otherwise the original company would have to cover those segments on their own.
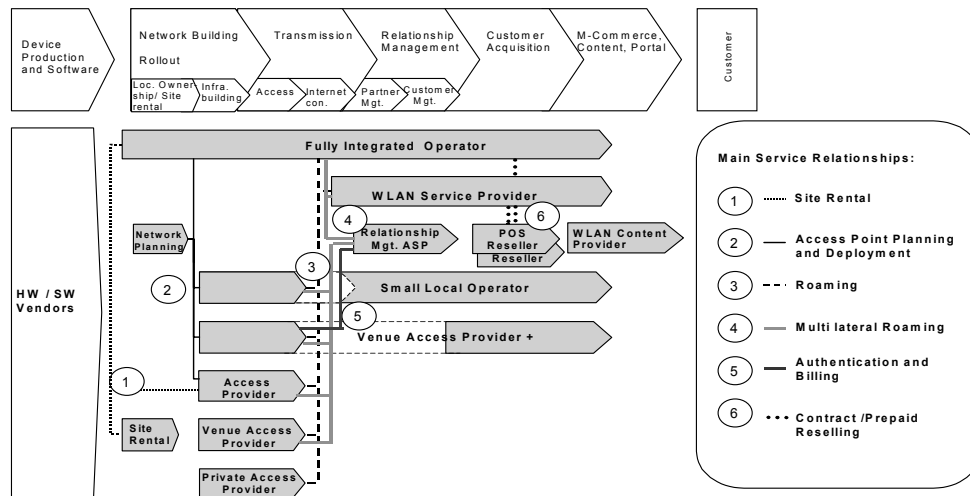
Source: Own work

Figure 4: *Value Chain*

There are three potential situations for alliances and coalitions:

- **Roaming alliances:** Roaming is not only one of the main service relation but also one of the most important alliances in the PWLAN industry, as it allows to share the risk of investment in hot spots, to gain economies of scale, to get an access to scarce hot spot resources and to shape the competition. Roaming alliance is necessary to provide a unified user-experience and the demanded ubiquitous service. Roaming can be agreed between nearly all kinds of business models. RM ASP takes a leading position in these kind of cooperation, as their value proposition mainly depends on the number and the size of the roaming agreements.

- **Co-Development / Co-Marketing:** With regards to co-development, there are two areas of potential cooperation: development of a new HW- or SW-platform and deploying Access infrastructure. Cooperation for deploying Access infrastructure is possible between HW-Vendors, network planning bureaus, and RM ASPs. Vehicle manufacturers or construction companies can also join such a cooperation.

- With regard to co-marketing, the potential areas of cooperation are: 1) promotion of the PWLAN-service in general, and thus the PWLAN industry and 2) bi-lateral agreements to sell a service/product of one partner through an existing branded sale channel of another partner.

- **Merger / Acquisition / Joint Venture (M/A/J):** Although acquisition is not a coalition in the narrow sense, it is driven by the same motivations. Two types of M/A/J can be distinguished in the PWLAN industry: knowledge-driven and scale driven M/A/J. Scale-driven M/A/J is typical for value chain parts with strategic assets. In PWLAN industry these would be access, customer and partner relations.

Research Hypotheses

This analysis of the PWLAN market using the IDEA framework results in a system of business models and some hypotheses on the business models and the relations between those business models. We focus our empirical research on the validation of the following two main hypotheses blocks:

1) All identified commercial PWLAN companies can be categorised into one of the 14 identified commercial business models. Market players will focus on this business model, which complies best with their core competence. Therefore we assume that MNOs and ISPs will focus on business model concentrating on customer relation; new entrants will focus on business models concentrating on network building and/or partner mgmt.. Venues will decide according their location setting (kind of customer, point of sale/ cash system, etc.) and their technical capability.

2) All alliances in the PWLAN field can be categorized in the following 3 alliance types: (1) Roaming agreements, (2) Co-development/ Co-marketing, (3) Merger/ Acquisition/ Joint Ventures. We assume that in the early stage of the PWLAN market most alliances will concentrate on Co-development/ Co-marketing. After reached a critical mass of PWLAN companies and hotspot locations, we assume that the number of roaming agreements will boost up. We expect the number of M/A/J to increase significantly at this time, as number and quality of hotspots will have a significant influence on the barging power regarding the roaming agreements.

4   Empirical Analysis

According to the numbers of hotspots Asia is the biggest market with more than 13 000 hotspots, followed form North America with 6600 hotspots and Europe with nearly 3000 hotspots (Gebert 2003).Forecast for yearly PWLAN revenue in 2006 range between 0.8 billion EUR - Lonergan (2002, P. 2) - and 3.1 billion EUR - Pow (2001) - for Western Europe.

Today PWLAN services are mainly broadband Internet access. Voice services (Voice over IP) are technical possible, but mass-market solutions are still under development.[6]

Specialized players in the market are either new entrants or are subsidiaries of existing ISPs and MNOs. The biggest player according number of hotspots is Korea Telecom followed by T-mobile with more than 2000 hotspots in the US. Biggest Western European Player according to the number of hotspots is the Scandinavian mobile network operators Telia Homerun (merged with Sonera Wgate) with more than 550 hotspots.

As today the main target customer for PWLAN Services are frequent business travellers or so called nomadic workers, venues like airports, hotels and conference centres are also involved in the PWLAN field. But also locations like restaurants (Mc Donalds) and coffee shops (Starbucks) have been identified as interesting hotspots.

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[6] Avaya, Motorola and Proximm are working on a WLAN mobile phone with integrated Voice over IP - Heise-Online 2003

Design of the empirical study

The empirical study focus to validate the two blocks of hypotheses that have been validated with two different data sets.

In the first part of the empirical study we focus on the business models in the PWLAN market. We have analyzed business models of 118 commercial companies that are involved in the PWLAN industry. For the analysis of companies specializing on WLAN, we did a full analysis of all companies mentioned in BrainHeart Capital 2002 and 2003 and Thorngen. We considered BrainHeart Capital (2002) for 19 companies, BrainHeart Capital (2003) for 50 companies, Thorngen (2002) for 4 companies. Concerning companies that do WLAN as a side business, we considered 45 major venues (airports, hotels and conference centres). Information source for them was BrainHeart Capital (2002). In our analysis, we considered also as sources of information home pages and publicly available business information.

The second part of the empirical study focuses on relationships between business models. We did a complete analysis of all cooperations, mergers & acquisitions and joint ventures in the PWLAN field reported from mid 2000 to November 2003 in the news archives WiFi Planet (2003) and Broadband Wireless Online (2003).

All data gathering and analysis have been done from mid October until mid of November 2003.

Business model

On the basis of information found on their web-sites and from the specified secondary information sources, we have categorized these companies' primary PWLAN business models into the 14 business model types, which we have identified in the previous section (c.f. Figure 3). The primary business model is categorised according to the actual value chain activities these companies perform and according to the ownership. The categorization is depicted in *Figure 5*.
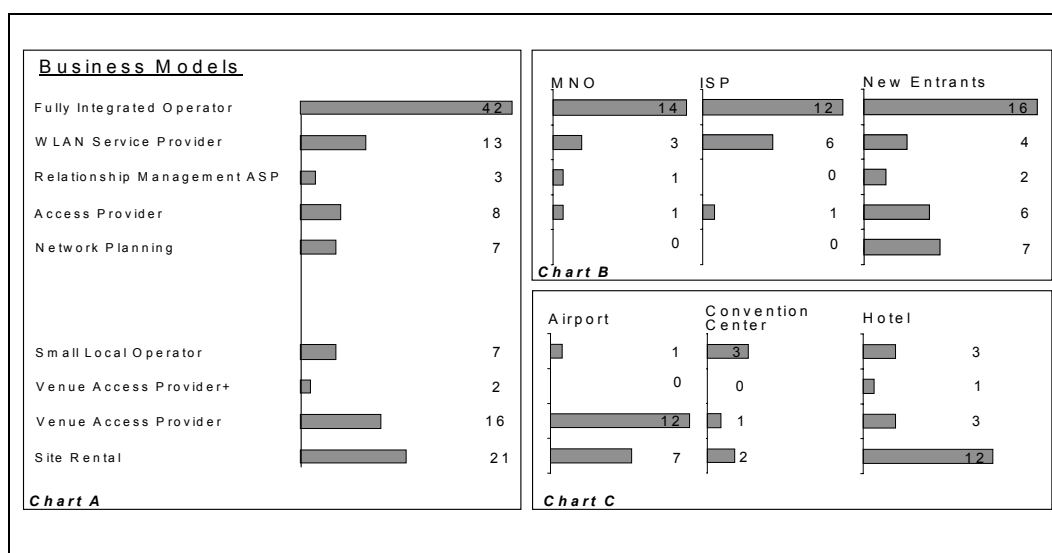

Figure 5: *Primary Business Models By Types of Specialized Players*

Most of the specialized companies follow the "Fully Integrated Operator" business model. The second most frequent business model is the "WLAN Service Provider" model. There is a remarkable amount of non-specialized companies in the WLAN market

(business models Small Local Operaotr, Vanue Access Provider+, Venue Access Provider and Site Rental).

While looking on the different types of players (MNOs, ISPs and New Entrants[7]) in Figure 5, Chart B, one can notice that the distribution of the different business models differs for different type of players, but the full integrated business model is still the most frequently followed one by each type of player.

There are mainly two reasons for this: First, the PWLAN industry is still young and it is dynamically changing. Thus, it is risky to follow a business model, which relies on other emerging business models / companies. The fully integrated operator model is the most independent model, as it relies only on site rental agreements to provide services. Second, the pure offering of the PWLAN service to the end users does not need a significant investment. It can be done by selling prepaid cards through the regular cash system of the venue or through online purchasing by using credit cards. Until now there have been no significant marketing investment maid to establish a brand name and to build a customer base.

When looking more thoroughly, one notices that companies follow multiple business model strategies. So they either practice a second business model, which they really consider as their core business model, or have at least an intention to do so. We call this "intended" business model the secondary business model[8].We have also identified the secondary business model of observed specialised companies by analysing their recent strategies, cooperation deals and proclaimed business goals. The results are presented in the Figure 6.
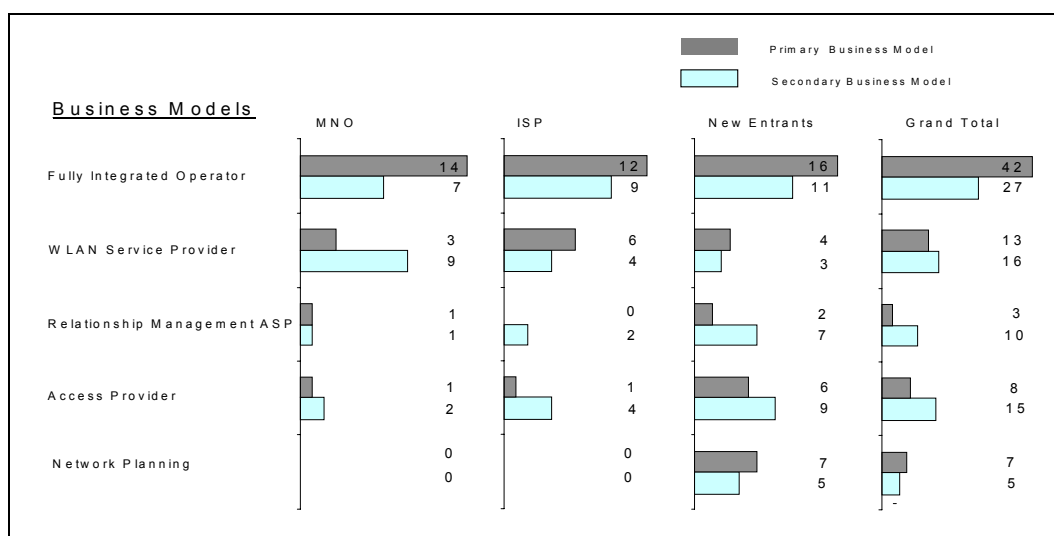

Figure 6: *Primary And Secondary Business Models By Types Of Specialised Players*

From the figure 5 we can see a clear shift of MNO companies from "fully integrated operator" business model to the "WLAN Service Provider" business model. The number

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[7] New Entrants are also established IT companies, that are new to the internet service providing industry (mobile or fixed).

[8] In the case companies do not have a second business model than the secondary business model equals the primary business model.

of MNO companies, which follow the "WLAN Service Provider" business model, increases.

With regard to ISP companies, we observe a shift from "fully integrated operator" business model to "Access provider" and "Relationship management ASP" business models, but there is not a clear focus on certain value chain parts.

Concerning the new entrants, we can see again the decrease in the number of companies following the "fully integrated operator" business model as in cases with MNO and ISP companies. In contrast, a number of companies, that follow "Relationship Management ASP" and "Access provider", is growing.

In total, one can observe a tendency of shifting from "fully integrated operator" business model to other specialised business models in PWLAN market, that match more to the core competencies and assets of the different players. In Figure 7 the shift of the business models is shown on a company level. The company names are placed in the circles according to their primary business models. Companies, which have a secondary business model are placed in the intersection of the according circles of their primary and their secondary business model. Arrows are highlighting the shifts from the primary to the secondary business models.
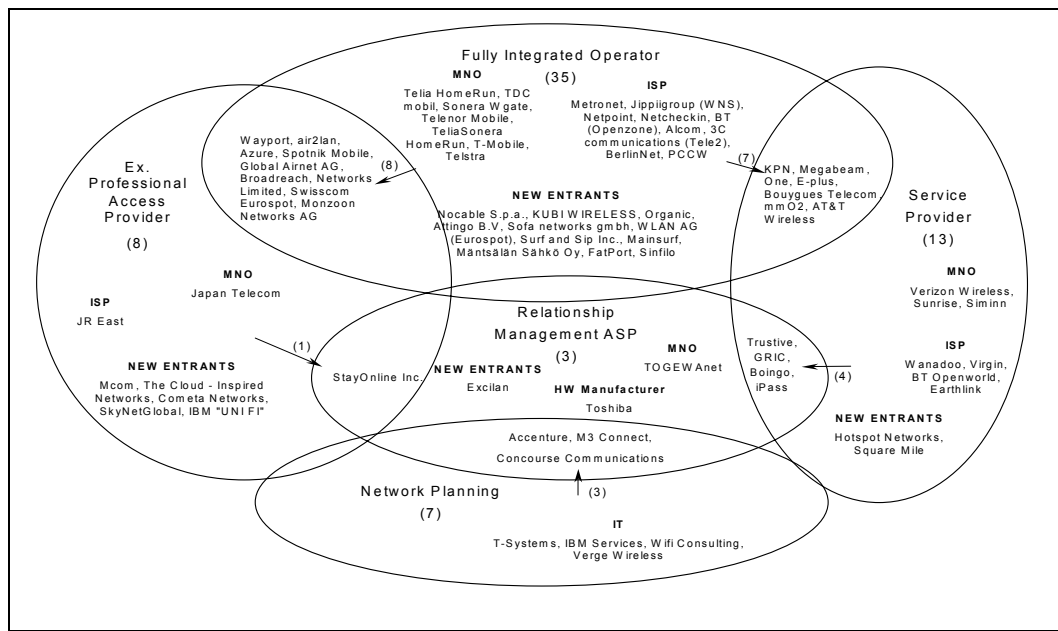

Figure 7: *Specialised Companies'Business Model Landscape*

Looking on the business model distribution of different venue types (Figure 5, chart C), we see that most airports prefer a "venue access provider" business model with regard to WLAN technologies. Reason for that is that airports have normally their own IT department, which is capable to install and run a WLAN infrastructure. But as they do not have an own selling point or customer relation, they need a WLAN service provider to sell their capacity. In addition, airports are seen as the most common place for business travels to use PWLAN. PWLAN service provider must offer their service in this locations to attract more customers. Therefore, they are likely willing to pay a higher roaming fee than their expected revenue from this location.

In contrast to airports, convention centres prefer a "small location operator" model, thus taking responsibility for the whole value chain. They also see a demand on WLAN

technologies in their accommodations, as business people are mainly the customers of convention centres. Due to the fact that they have a technically capable stuff and their own selling point, the "Small Local Operator" model enables them to maximise their revenue and to keep control over the location.

Many hotels do not consider WLAN services as a big revenue source and normally they do not have a technical stuff for an easy installation of WLAN technologies. That is why they do not risk to invest capital in installation of the WLAN technologies. However, some hotels decide to have WLAN service in their rooms or lobbies just in order to add value to customers or to be perceived as modern hotels, therefore hotels prefer less risky "site rental" business model, which does not require investment from hotels side.

Alignment of Empirical Findings with Hypotheses Block 1

Comparing our results with our formulated hypothesis we have found PWLAN companies from 9 out of the 14 identified business models. Two business models (Private Access Provider and ISPs) were not focused in our empirical research. POS Reseller has not been indicated separately, but most hotels and conference centres, who are acting as Venue Access Providers or have a Site rental agreement also act as a POS Reseller. We have not found in our first data set (regarding PWLAN business models) a company acting as a PWLAN Content Provider, but we could identify one company (VPI.net) during our data gathering for PWLAN alliances, which was following a WLAN Content Provider business model.

In both data sets there was no PWLAN company following the Reseller business model. Potential reason for this, is that the PWLAN market is still very small regards number of hotspots and number of user. As PWLAN service is not ubiquitous , PWLAN user are tend to buy their access legitimation at the point of service.

Regarding the hypotheses, that PWLAN players will choose a business model according to their core competence, we have seen a clear shift of MNOs who are changing their Fully integrated Operator business model towards a WLAN Service Provider model, which is focused on customer acquisition and relation. New Entrants are shifting as assumed towards Relationship Mgmt ASP and Access Provider business models. Regarding ISPs we were not able to identify a clear focus on the PWLAN Service Provider model and thus on customer relations. A possible reason is that small ISPs are afraid of a direct competition with MNOs only concentrated on customer relations and therefore choosing business models where they keep assets in other value chain parts.

The empirical data has also reinforced our hypothesis that venues are choosing their business model accordingly to their location settings and their technical competence. Thus most airports are following a venue access provider model, as they have the technical capability, but do not have a natural selling point. Most convention centres are following a Small Local Operator model as they have a natural selling point and the technical capability. Most hotels choose to sign site rental agreements, as they are lacking the technical capability.
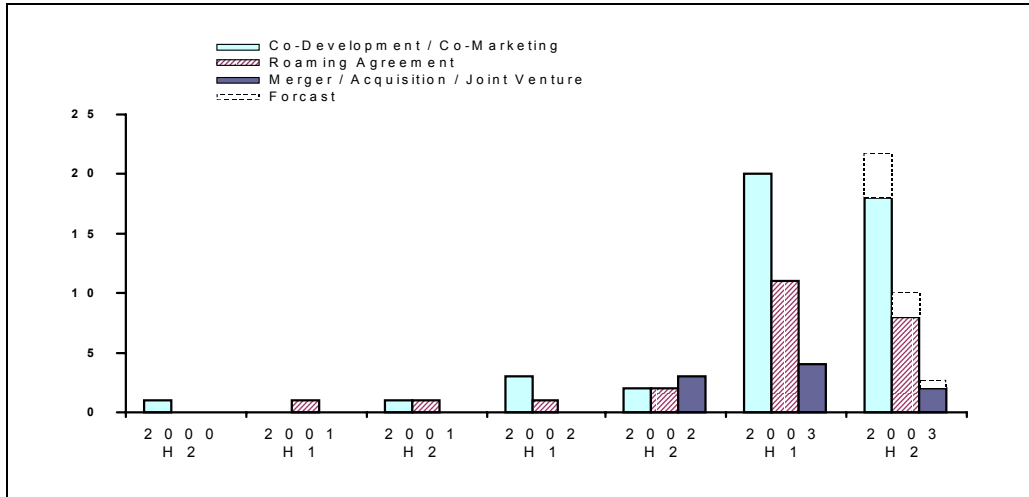
Figure 8: *Number Of PWLAN Alliances*

Alliances

We also analysed 78 alliances and collations between different PWLAN companies. Sources of our research were beside the web sides of PWLAN companies the PWLAN and mobile news archives WiFi Planet (2003) and Broadband Wireless Online (2003). From the diagram (Figure 8) one observes the dynamic growth of interaction between the different business models. While we have analysed only 1 alliance in 2000, the number of observed alliances in 2003 was 62. The prediction until year end of 2003 is 71. Most of these alliances were product development / marketing co-operations and roaming agreements.

We categorized the cooperation partners according to their secondary business model. In Figure 9 the distribution of the business models of the cooperation partners are shown for each type of cooperation (Co-Development/ Co Marketing, Roaming, and Mergers/ Acquisition/ Joint Ventures). As we categorized for each identified alliance two cooperation partners the total number of business models of the observed cooperation partners are 156.
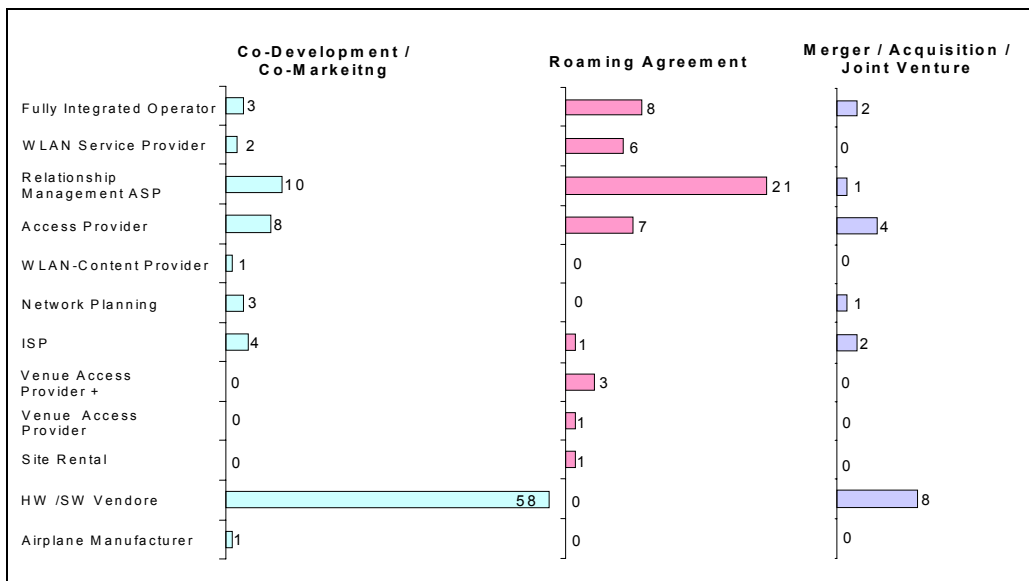

Figure 9: *Distribution Of Alliances By Types Of Business Models*

Regarding co-development/ co-marketing most co-operation partners are HW/SW Vendors and concentrating on co-development of new products (examples are Motorola, etc. in order to develop a mobile solution to enable Enterprises to roam voice connections between their own WLAN and the cellular network). Other interesting Cooperations are between airline manufactures like Boing or Airbus with HW Vendors and PWLAN Service Companies to provide in-flight internet connections. This could be in the future also an interesting field for other vehicle manufacture like bus and train producer. Regards to co-marketing coalitions main partnerships were focusing on increasing the general awareness of PWLAN services and the WLAN technology. Prominent example for this is Intels Centrino promotion in cooperation with other PWLAN service companies. Other co-marketing cooperations were between established mobile network vendors and WLAN specialized HW vendors in order to sell MNOs an integrated PWLAN and cellular mobile solution. An example is the cooperation between Juniper Networks and Siemens.

Mergers/Acquisition/Joint ventures are evenly distributed between WLAN service companies and HW / SW Vendors. The reason for WLAN Service companies to merge (or to participate in joint ventures) is to gain scale regards to customers or/and number of hotspots. The main driver for HW / SW Vendors to merge or to participate in a joint venture is complimentary knowledge.

Relationship Management ASPs have a leading position with regard to the number of roaming co-operations. This is explained by the fact that the value proposition of Relationship Management ASPs relies on the number of partners and hotspots they have relations to. In Figure 10, the roaming agreements between the different business models are shown by connecting lines. The number of identified roaming agreements between these business models are attached to the connecting line: The higher the number of alliances between the particular business models the thicker is the line connecting theses two business models. Nearly 80% of the roaming agreements are coordinated by Relationship Mgt. ASPs. Through this hub and spoke structure they are able to reduce the transaction cost significantly, which is involved in setting up roaming agreements. Biggest player according to number of hotspots with roaming agreements are Ipass (2800), Boingo (1200) and GRIC (1200).
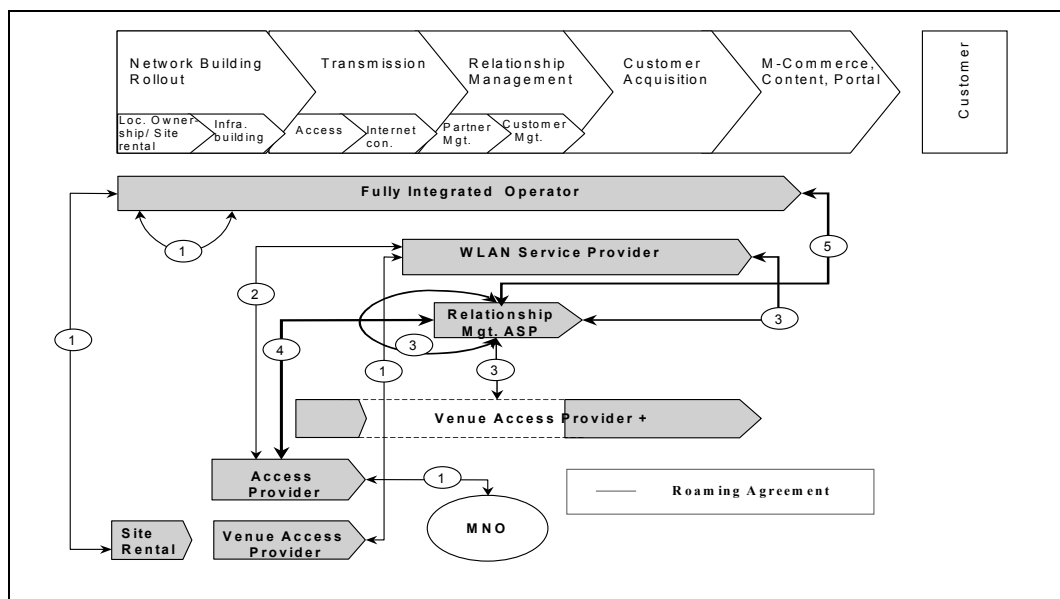

Figure 10: *Roaming Alliances*

Alignment of Empirical Findings with Hypotheses Block 2

All identified alliances in the PWLAN field could be categorized in the 3 alliance types: Roaming agreements, Co-development/ Co-marketing, M/A/J.

As assumed most alliances in this early stage of market development and until the last half year were Co-development/ Co-marketing alliances.

The number of new roaming agreements has increased significantly in the first half year 2003. We would have assumed a further increase of new roaming alliances during the second half year of 2003, but the number of roaming alliances kept nearly steady. A possible explanation for this is the high number of roaming alliances signed with Relationship Mgmt. ASPs. They act as a roaming hubs and thus reducing the needed number of roaming agreements (and the cost) to roam between the different PWLAN companies.

We had expected a significant increase in the number of new M/A/J, but this number was low compared to the number of roaming agreements. The most M/A/J was between HW and SW Vendors, where we would have expected more scale driven M/A/Js between Full Integrated Operators, PWLAN Service Providers, Relationship Mgmt. ASPs and Access providers. We expect that this consolidation will occur more obvious in 2004.

5   Conclusion

This paper makes two contributions. First, we were able to validate the IDEA framework as a framework to design and evaluate business models with an empirical analysis of one novel industry. The framework is itself presented in detail in (Shubar and Lechner, 2003). The method to analyze the potential of a technological innovation for business models or business model innovation contributed to the state of the art. Business models have established themselves as a viable analysis unit in the past couple years. For an overview of business models see e.g. (Pateli and Giagis, 2003). Various papers discuss the components of business models and the need for a comprehensive view in the analysis of business models (Osterwalder, 2003) or (Gordijn and Akkermans, 2001). Our approach distinguishes itself through the technology innovation focus and the impact of technology on the business model is one of the main issues in the IDEA framework. We believe that this method can applied to other industries that are established by some technological innovation.

The second contribution of the paper is a structured analysis of the WLAN industry with its business models, its players and the strategic movements in this markets. This analysis is certainly a snapshot made 2003. One can however see and observe the strategic movements of the players. Currently this market seems to be in a consolidation phase with players trying to reach a critical mass and driving smaller or less effective players out of the market. The observations here are to some extent typically for an industry driven by technology and based on strong standards and this allows some foresight on how this industry might develop in the next few years.

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