



Fixed-Mobile-Convergence White Paper

*A look behind the development and
introduction of one of
the world's most widely-used
enterprise FMC solutions*

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EXECUTIVE SUMMARY

ABOUT THIS WHITE PAPER

The purpose of this document is to provide market participants and experts with insight into SPEECH DESIGN's product strategy and market approach to satisfying emerging Fixed-Mobile-Convergence (FMC) demand, with an emphasis on serving the business customer.

ABOUT BUSINESS FMC

FMC is one of the most discussed and misinterpreted (or perhaps just variously interpreted) concepts in telecommunications today. Most people, when referring to FMC, envision "dual-mode" handsets, automatically switching between cellular and WLAN/IP networks. There are two main drivers of this approach: the poor in-building coverage of the U.S. cellular networks (a problem virtually non-existent in Europe) and the promise of cost savings ("cheap" WLAN/IP vs. "expensive" cellular). The latter argument is losing weight as cellular prices continue their steep decline and flat rates become increasingly common. Two of the most prominent products based on the dual-mode concept and targeting consumers, Deutsche Telekom's T-One and BT's Fusion ⁽¹⁾, failed to attract enough customers to be cost-justified and were both recently discontinued.

SPEECH DESIGN is taking a different approach to FMC that is totally focused on the business customer.

Rather than pursuing a disruptive path requiring new PBX and / or new handsets, we have developed an innovative concept which allows the enterprise to keep its pre-existing PBX infrastructure, service plan and terminal devices while gaining significant business benefits from "One Number / One Voice Mail / Any Device" functionality. SPEECH DESIGN launched its pioneer business FMC product, Mobile Pro, five years ago. It was structured as a typical PBX peripheral, compatible with most popular PBXs and sold through the traditional PBX sales channels. With approximately 1,000 installations, Mobile Pro has become, to our knowledge, the most-sold enterprise FMC server in the world. In 2006, Speech Design embarked on a project to dramatically expand its FMC market reach by re-designing its flagship mobility system for the "convergent carrier" market and for PBX-independent distribution. Simplicity, right price-points for the SMB market and easy adoption by various sales channels were the major criteria for success. In late 2007, the resulting product was launched by T-Systems, in what is probably the largest-scale business FMC initiative globally. We are currently in cooperation discussions with other tier-1 convergent carriers.

(1) <http://gigaom.com/2008/02/06/is-bt-fusion-dead-in-the-water/> . BT continues to market the service to business customers.

ABOUT SPEECH DESIGN

Founded in 1982 and based in Germany, SPEECH DESIGN is a leading European provider of messaging and mobility solutions for the corporate and carrier markets. Although more than 140,000 companies and millions of consumers daily use SPEECH DESIGN's products and services, they are largely unaware of our company or brand: all sales are indirect, either through leading communications providers such as Avaya, Deutsche Telekom, Orange, Siemens, Swisscom, and Vodafone, or through IT partners such as HP. Such widely-known products and services as Vodafone's Visual Mailbox, Deutsche Telekom's residential T-Net-Box voice mail and Siemens' PBX-integrated Xpressions Compact voice mail, are just a few examples of the prominence of SPEECH DESIGN's position in the industry.

SPEECH DESIGN has a broad and deep expertise in developing, manufacturing and marketing leading-edge communications products, covering hardware and software, wireline and wireless, TDMA and IP, and corporate and carrier solutions. Our corporate parent, Bogen Communications International, Inc., is an audio communications company headquartered in Ramsey, New Jersey, USA.

EVOLUTION AND CURRENT STATE OF THE MARKET

Wireless, wireline, IT and internet technologies and markets developed independently from each other. For the last 10 years, four worlds have co-existed, and four industries have developed separate skill sets, vocabularies, distribution channels, mentalities and dynamics.

End users had to learn 3 different terminals:

- § Personal Computer
The office PC to replace the typewriter and the calculator and to surf the new world of the Internet.
- § Office Phone
The office fixed-line phone to call their customers, suppliers, colleagues, friends and family.
- § Mobile Phone
The mobile to call and text-message their customers, suppliers, colleagues, friends and family and to be reachable “always and everywhere”

None of these worlds were really united. Since the late 90's, market researchers have been predicting billions of US \$ in revenue for so-called Unified Communications / Unified Messaging solutions linking phones to PCs and e-mail accounts. Investors, start-up companies, and consumers are still waiting for the promise to come true. While the “big picture” of Unified Communications was still being painted, pragmatic companies like RIM took the market by surprise and delivered a solution that millions of business people had been waiting for: the BlackBerry.

Some new buzz words like FMS (Fixed Mobile Substitution) then started to appear in industry journals and forums. Mobile operators launched frontal attacks against the fixed line carriers. Trendsetters Vodafone and O2, which did not have major commitments to a fixed-line business (at the time, Vodafone was looking to sell their German wireline subsidiary, Arcor) began to push hard for a pure FMS concept: “disconnect your wireline phone, the mobile is all you will ever need!”. Combined with UMTS for speedy data connections, the new mobile phone generation promised to provide users with a single universal device and service for all their voice and data needs.

After all the “hype”, what is today's reality? Do users have only one phone? Have they disconnected their fixed line (or IP-based) phones? Some have, especially in the residential / SoHo / “road warrior” segments of the market. But most of those who work in a “real office” environment, with mixed office / mobile lifestyles and colleagues to collaborate with, still have their nice old PBX phones.

Pragmatism seems to be coming back on the front page. The word “substitution” has begun to disappear from the scene and “convergence” is taking over. Rather than selling Arcor, Vodafone has announced the plan to fully integrate it under the Vodafone brand; it is also partnering with alternative carriers in its main markets to “resell” some fixed-line services, mainly in the broadband area ⁽²⁾. Convergent carriers (basically the large incumbents in most countries) realized that their fixed line subsidiary has something of tangible value: large installed customer bases and commanding market shares in broadband (DSL). Most incumbent carriers are now reorganizing themselves and instead of focusing on the technology, they are starting to focus on customers and their segment-dependent needs.

With the emergence of these trends, it became possible to develop and “sell” a business FMC solution suited for the different market players.

(2) Extract of Vodafone Strategy report from 2008:Complementary to our high speed mobile broadband (HSDPA) offerings, Vodafone is now offering fixed broadband services (DSL) in five markets. With the exception of Arcor, our fixed line business in Germany, the provision of these services to date has been on a resale basis

THE CHALLENGES

We had many different challenges to overcome in order to develop a successful product:

- § Price Pressure
Downward pressure on prices is one of the major trends in the mobile market. Any new solution “must” help reduce costs.
- § New Hype
Any new high-tech product must integrate “new things” (new design, new technology, new hype). Developing a new product based on “traditional” technology attracts no real attention (not enough hype), impeding “saleability” to customers.
- § Technology Convergence
Any convergent product must cope with three types of technology: IT, PBX and Mobile.
 - Distribution
The IT, PBX and Mobile distribution channels have very little in common. Sales mechanisms, strategies and philosophies vary and sometimes even contradict each other.
 - Product
Product life and sale cycles differ widely:
for PBXs, the life cycle is around 7-10 years
for IT systems around 2-4 years and
for mobile handsets around 1- 2 years (often driven by subsidized contracts).
 - Service
Service organizations must heavily invest in technical training if they want to handle another industry’s products.

THE OBJECTIVES

The objective was to develop a product which can be sold and installed by any of the three channels (IT, PBX and Mobile) despite their differences, and:

- § adapts to any pre-existing PBX infrastructure
- § fits the cost/price structure of SMB customers, our core target group
- § works with any mobile and any fixed-line phone
- § brings a clear business advantage to the end user but also helps “control” costs
- § offers a clear economic and strategic benefit to the sales channel.

OUR APPROACH

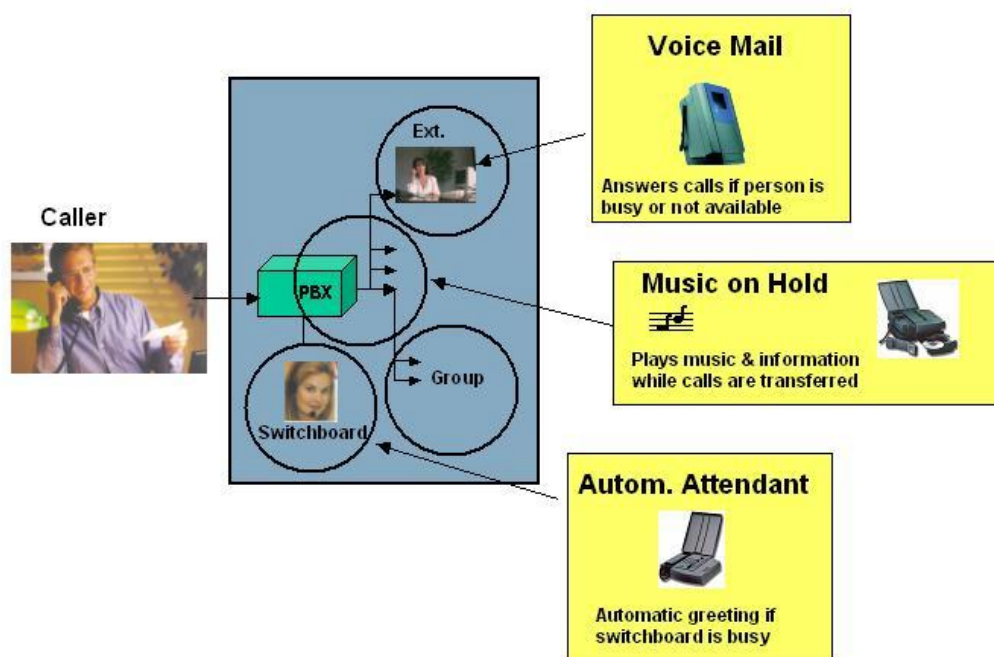
Many of the different FMC concepts in the market would have not enabled SPEECH DESIGN to achieve its goals. We therefore developed our own approach, always driven by the objectives described above.

ADAPT TO ANY PRE-EXISTING PBX INFRASTRUCTURE

In European countries, the majority of both SMEs (> 10 employees) and Large Enterprises (> 250 employees) have an ISDN-based telephone infrastructure.

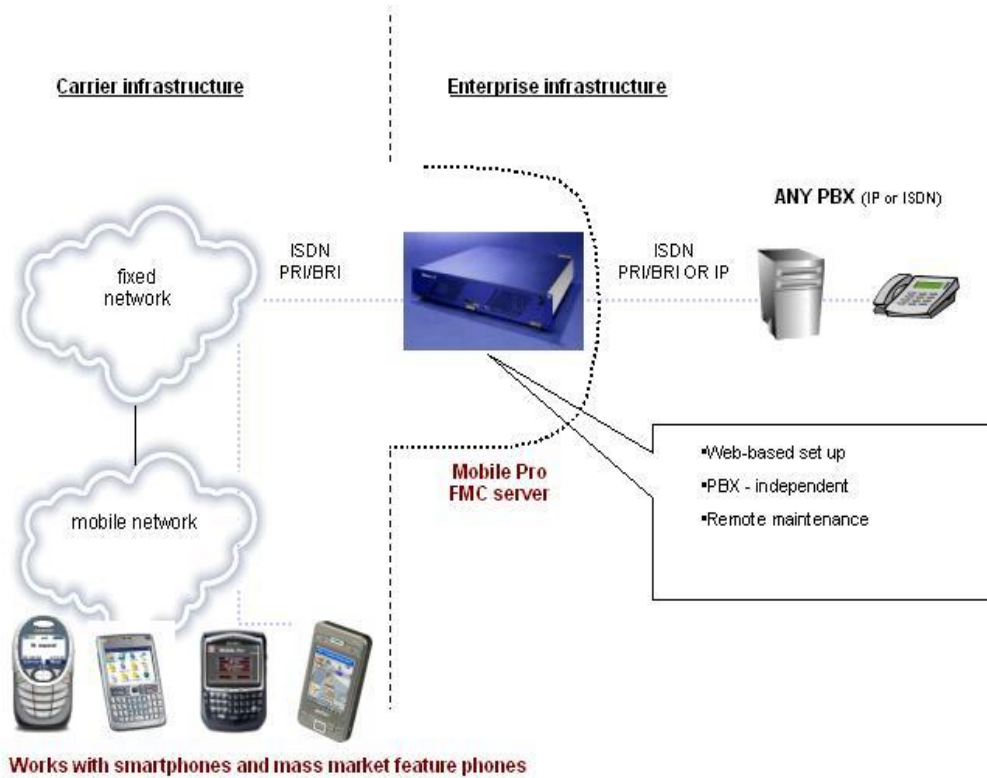
Historically, most third-party application servers have been installed “in the back” of the PBX using analogue or ISDN lines. Several PBX-specific protocols have been used for communications between the PBX and the applications servers (DTMF-based protocols for voice mail, specific IT-based protocols or modified CSTA protocols for CTI, charge printer protocols for billing systems).

In the last 10 years, Speech Design manufactured and sold more than 140,000 such systems through its PBX distribution channels.



Our experience has shown that the installation of a third party application requires detailed technical knowledge of the particular PBX model the application is to serve. In many cases, additional PBX modules and programming are needed for the application to work.

We therefore knew that great advantages would accrue to a product that didn't have the limitations associated with adaptation for a particular PBX. In order to make a PBX-independent product, we had to stop connecting the application "in the back" of the PBX. Instead, we decided to connect our FMC application "in front" of the PBX, directly at its connection point to the ISDN trunk(s) of the PSTN. This interface is standardized and independent of the PBX. Being a "transparent" gateway, the system acts as a PBX towards the PSTN and as the PSTN towards the PBX. Suddenly, there is no need to be an expert in PBX programming, greatly facilitating installation.



FIT THE COST / PRICE STRUCTURE OF SMB CUSTOMERS

Any external PBX application requires a server to run the software and DSP – based communications boards (ISDN or analogue) to interface to the PBX and support telephony functions. Applications designed for large enterprises often run on standard industry servers with communications boards from specialized manufacturers. The hardware cost is high but the large number of users (typically several hundred) supported by such a system often leads to an acceptable price per user.

In the SMB segment (small and mid-sized businesses with typically 5 – 50 users for an application), using the same standard industry hardware and spreading it over a smaller user base would lead to the price per user being unacceptably high.

One of Speech Design's unique capabilities is its more than two decades of experience in development and volume manufacturing of both communications software and hardware. We've learned how to optimize products for enterprise applications and offer the necessary quality at an acceptable cost. Speech Design solutions are thus marketable not only to large but also to small and medium enterprises. As a result, all partners in the distribution channel can achieve motivating margins, and customers feel they pay a fair price for the added-value of the solution.

One important step in ensuring the "affordability" of our FMC solution was the decision to develop our own ISDN boards, dramatically reducing the total solution cost.

WORKS WITH ANY MOBILE AND ANY FIXED-LINE PHONE

A key element in the recipe for a successful solution concept is simplicity: making the customer's life easier without "turning it upside down". Each one of us can be reached at many phone numbers (office, private mobile, business mobile, home, etc.). All of these numbers are served by different service providers under different contracts and are linked to different handsets (analogue, digital or even PC-based IP phones, basic mobiles, smartphones, etc.).

Our concept was based on the approach that users should be able to keep all their phone numbers, service plans and handsets, but could none-the-less be reached under one number (the office PBX extension number) on any of these devices, if they so wished. Also of great importance, for outgoing business calls this number would be displayed to the called party no matter which phone (fix or mobile) is used for the call. The concept of "one number any device" was therefore created.

In order to be able to use virtually any phone to control the system, we opted for the universal touch-tone (DTMF) protocol. Memorizing the command set is supported by simple mnemonic abbreviations (*C for Conference, *H for Hold, etc.) and voice prompts.



In recognition of the unique needs of smartphone users, we developed Smartphone Mobility Client Software. Compared with voice prompt driven dialogues on basic mobiles, the Mobility Client Software offers smartphone users the convenience of a visual interface, with all FMC features presented on the handset display for direct "click of a button" selection. The Mobility Client Software is available for all popular BlackBerry, Nokia and Windows Mobile smartphones.



CLEAR BUSINESS ADVANTAGE AND COST CONTROL

In our experience, business users of communications services generally know what they want. Over the last few years they have come to realize that with a powerful, simple, and affordable FMC solution, they improve work efficiency, accomplish more each day, and still have more time for other things they feel are important.

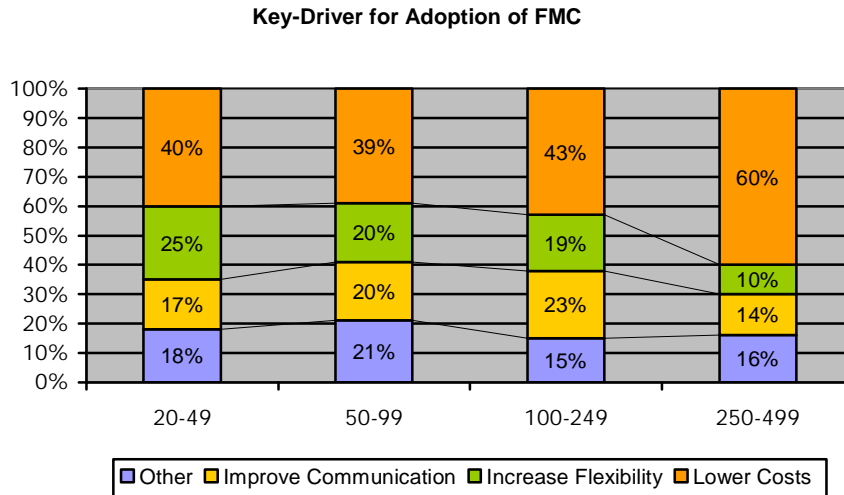


Figure 5: Key-Drivers for Adoption of FMC. IDC European Vertical Market Survey, 2008

Approximately 1,000 companies of all sizes have already chosen one of Speech Design’s FMC solutions (as of February 2008). Several of our customers have agreed to provide case studies showing what advantages our FMC solution brings to their business. You will find some of these references on the Speech Design website.

<http://www.speech-design.com/en/corporate/references/>

Looking across Speech Design’s large base of enterprise installations, here are some of the key benefits cited by our customers:

- § *One number reachability*
Users are available everywhere at one extension number, providing customers and partners with perfect service. Convenient and easy to use, Mobile Pro creates more efficiency in daily mobile life.
- § *Mobile availability for excellent customer service*
Turn a cell phone into a mobile PBX extension and a “phone assistant”. Even away from the office, users are able to process calls immediately, transfer calls to colleagues, and quickly set up conference calls. Settings can be easily changed, e.g., users can switch call forwarding on and off, quickly and free of charge while travelling.
- § *One mailbox for all voice messages*
One common mailbox informs the user of all voice messages; this mailbox can also be conveniently accessed with a simple mouse click on any PC (voice messages are sent to each user’s e-mail account as a .wav file). Mobile Pro supports many voice mail systems already in place as well as the mobile phone mailbox.

§ *Information everywhere*

No customer inquiry is overlooked. With the Call Recording function, live telephone conversations can be recorded. These recordings are simply sent to the user's voice mailbox or mobile phone mailbox. Additionally, the information can also be sent to an e-mail account as a standard .wav attachment.

§ *Easy to reach on company premises*

Users are available on the premises anytime anywhere at their fixed-line numbers. An economical and easy-to-implement alternative to an on-campus wireless (DECT) system.

§ *Mobile communications: cost-effective and transparent*

Route mobile calls via the corporate fixed-line connection, saving significant amounts of money, especially on international calls. Use the Call Back function while abroad, turning outgoing mobile calls into incoming calls from the corporate PBX. The Call Back function also enables staff members to use their privately-owned mobile phones for company communications. Private and business calls are easily separated.

ECONOMIC AND STRATEGIC BENEFIT TO THE SALES CHANNEL

One of our objectives was to create an FMC solution that could be easily installed at any location by any company with basic technical competence. We achieved this, and a very interesting consequence has been the distinct advantages that each distribution channel receives from reselling our product.

Advantages for fixed-line carriers

Let's take T-Systems as an example. T-Systems is the part of the Deutsche Telekom Group responsible for all its business customers, with the exception of the lowest-end SoHo segment. With more than 160,000 corporate customers, T-Systems is Europe's largest Business Carrier. T-Systems introduced Speech Design's Mobile Pro product in September 2007. Our product is installed at the customer site; it is "plug & play" between T-Systems ISDN access point and whatever PBX the customer happens to have. The customer buys a service contract for a 24 month-period, sometimes including some special Business Mobile-Fixed tariffs. The service is sold under the name "Octopus Mobility Services" (OMS) and is one of the top 4 products T-Systems will strategically push in 2008.

In addition to its fixed-line service, T-Systems markets all 3 types of technology described previously: Mobile Service (T-Mobile), IT and PBX. The motivation of T-Systems to sell Speech Design's FMC solution is very high for several reasons:

- § The market potential for T-Systems is very large and the sales timing doesn't depend on any specific PBX, IT or mobile contract sales cycle. Almost every business in Germany is a T-Systems customer for one or more of the following services or products: ISDN fixed-line service, T-Mobile's mobile service, on-site or hosted PBX and / or IT integration services. Since Speech Design's system can be installed independently of whether T-Systems sold the customer the original PBX or not, T-Systems can offer the FMC solution to all its ISDN customers as a service. This approach can be compared to the BlackBerry concept.
- § Customers control their costs and in some cases save dramatically on communications. At the same time T-Systems can increase its ARPU per user, even for customers using competitive mobile services (please contact us if you are interested in more details on the tariffs and cost structure aspect).
- § T-Systems can use FMC as a platform to launch a winback campaign, improve its image, and be pro-active against the next disruption wave coming into the market.

Advantages for the PBX distribution channels

Product development and sales cycle of PBXs and their applications are long (on average 6-7 years). When a company needs a new PBX, 4-6 suppliers compete aggressively to get the deal. Prices have been falling sharply over the past 10 years. Lots of features have been added. Popular applications have been integrated directly into the main PBX units, helping reduce the cost of manufacturing and, in consequence, the customer price levels.

Speech Design is a proactive player in this market. We develop and manufacture Xpressions Compact, the application server integrated into the Siemens HiPath 3000 PBX, one of the most successful SMB-PBXs in the world. The applications we have developed for this

platform are: Auto-Attendant, Music-On-Hold, Voice Mail, Management Software for the IP phones and, most recently, Mobility (based on the Speech Design's FMC product family). Xpressions Compact volume runs in tens of thousands, sold by Siemens around the world along with the HiPath 3000 switches.

Let's focus on the PBX dealer. What happens after the supplier has installed the PBX on a company site? Not much. PBX systems are very reliable (they hardly ever break) and self-sufficient. In general, updates are not necessary, and further applications are not pro-actively offered. In many countries, systems are financed or leased and maintenance contracts are secured for the resellers for the next 6/7 years. The motivation of the dealer to make any changes or push new application on the installed PBX is nonexistent, since it often produces more costs than it brings revenue, distracts the sales force from selling new PBXs, and opens the door to price discussions in a market with constantly falling prices.

What changes with the availability of Speech Design's FMC solution? Dealers now have a significant new business opportunity. Not only can FMC be sold to customers actively seeking a new PBX; it can also be sold to customers with an existing PBX, regardless of where they bought it. And FMC sales to businesses with a competitor's PBX will provide a relationship to leverage when the customer needs a new switch. In short, dealers can offer Speech Design's FMC solution to any potential customer, regardless of what PBX has been installed, when and by whom. In the process they can reach new customers who will one day need a new PBX.

FMC – savvy dealers can also consider reselling fixed or mobile business tariffs. Contract commissions are high and can significantly boost the dealer's profitability, as well as smooth out revenue.

Who says opportunity, says change. Such a new sales approach requires a change in the way dealer business is done. But whether dealers choose to change their sales process or not, they will still be faced with new competitors: IT system integrators reselling UC systems like Microsoft, or IBM, and many others.

Advantages for the IT system integrator

For IT system integrators, Speech Design's FMC product offers an excellent vehicle to enter the voice communication market.

The sales dynamics within the IT market are fundamentally different from those of the PBX market. IT infrastructure is frequently, sometimes even daily, being updated. Not being up-to-date can represent a serious danger, especially if the customer's business strongly relies on the Internet.

Since Speech Design's FMC product does not require any PBX knowledge, it lets IT-system integrators enter the market today, and be in a better position when their customers will want to replace their PBX with an IT / IP –based next generation system. It is unquestionable today that Microsoft, IBM and Cisco will become major players in the voice and video business communication market within the next few years and IT system integrators must be prepared to follow this development.

NEXT STEPS IN PRODUCT EVOLUTION

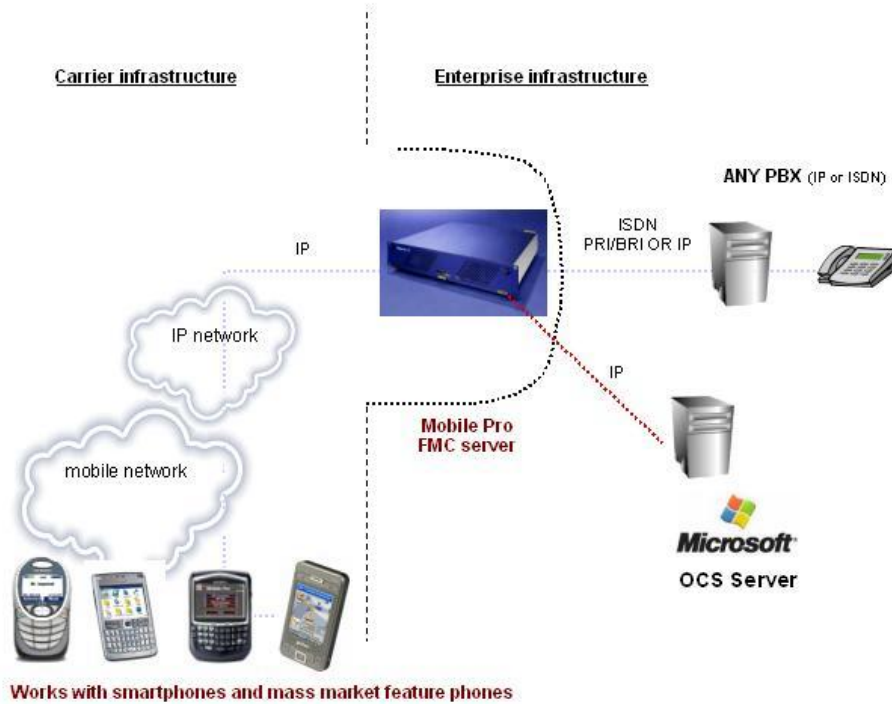
Speech Design strategy will evolve with circumstances, but our primary objective will remain the same: create applications which help users to “get a job done” (to borrow an expression from Prof. Christensen in his famous book *Seeing What's Next*). And in continuing to develop leading edge FMC product, we will continue to cope with “merging” 3 different technologies while maintaining simplicity of installation and use.

Most experts expect that, voice and voice services will eventually migrate entirely to a data infrastructure. Speech Design will integrate technological innovations in lock-step in order to help our customers increase market share by helping end users adopt new applications at a competitive price.

Today, in Europe, regardless as to whether a PBX uses TDM or IP technology or is a “hybrid” (mixing TDM and IP), it is still almost always connected to an ISDN network of a service provider (most of the time the incumbent fixed-line carrier). Most incumbent carriers have decided not to abandon the field to alternative VoIP service providers and are launching their own IP-based offerings. In support of this Speech Design is working on a new version of its FMC product, which will integrate all new VoIP developments and will enable:

- § *Fixed line carriers:*
to extend the new SIP-based voice services they are launching by FMC and Microsoft OCS connectivity. In other words, Speech Design will help service providers take advantage of high margin services in case the pressure to dissociate services from the transports (as is currently the case) increases.
- § *PBX distribution channels:*
to take advantage of any technology migration helping them increase their business and technical expertise within the Mobile and IT area, which they lack today. Furthermore, they can adaptively benefit from the success of VoIP technologies.
- § *IT system integrators:*
to use their core IT competence and propose to their customers a migration path to IP and wireless telephony, without compromising their current voice and mobile infrastructure.

The graphic below shows clearly our short term product evolution.



Long-term product development is still kept confidential. Should you wish to be updated as soon as we announce new developments, contact the author of this report at the email address listed on the title page.