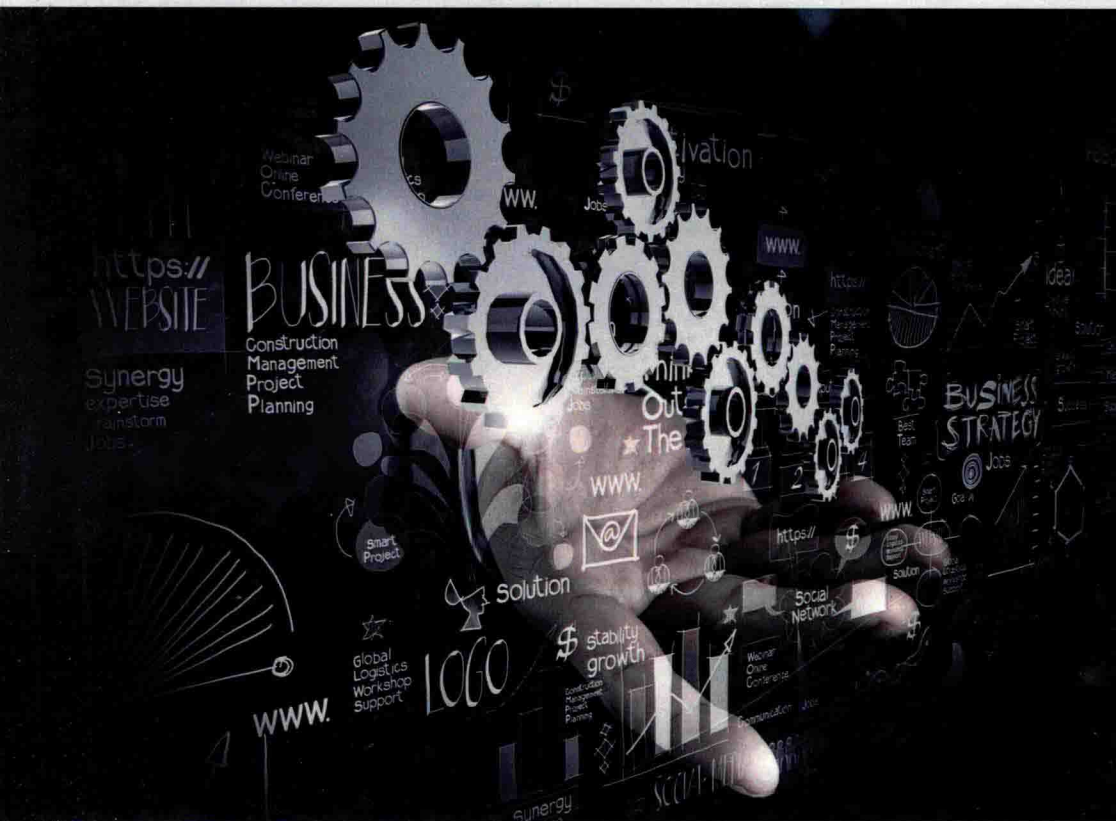


# Managing the PSTN Transformation

A Blueprint for a Successful  
Migration to IP-Based Networks

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CRC Press  
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*Deutsche Telekom AG*



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## Preamble



Claudia Nemat, Board Member, Europe and Technology, Deutsche Telekom; and Kerstin Günther, Senior Vice President, Technology Europe, Deutsche Telekom.

The IP transformation blueprint described in this book is the product of countless hours of hard work by hundreds of individuals over almost 2 years. It is not just a theoretical cookbook that tells you how this could work. This actually happened—we at Deutsche Telekom migrated the entire public switched telephone network in Macedonia to an Internet protocol-based platform. Our colleagues in Macedonia and everyone else who supported them are real pioneers, within the Deutsche Telekom Group, and within the entire industry. We are publishing our IP transformation blueprint because the lessons we learned and the experience we gained in Macedonia can easily be scaled up and applied in other markets around the world to benefit everyone.

To the untrained ear, it sounds simple: you switch the phone lines from one technology to the other. Nothing could be further from the

truth. Our experience has shown that a successful migration relies on key aspects beyond the technological side. Therefore, this work also includes a product portfolio roadmap, a commercial roadmap, an NT/IT roadmap, and several business cases. It is our firm belief that everything we learned during the network migration in Macedonia can be applied to other countries around the globe. It is simply a question of scale, of taking what we did there and scaling it up to larger network environments. In Macedonia, we encountered every type of challenge imaginable, especially in integrating complex systems such as flight control at their airports, alarms for fire and police response, large enterprise customers; the list goes on.

At its core, this is a question of cooperation and collaboration across corporate functions. Projects like this one show what we can do when our people work closely together across borders and functions. It enables us to properly apply our skill and knowledge—regardless of where they are. This close collaboration is inherent in an IP network.

An IP network is a unified, future-oriented system with an unprecedented capacity for the ever-growing demand for bandwidth. It also further strengthens our position in Europe as a technology leader. It brings us closer to our customers, who can now activate new services within hours; to our partners, who can connect their value-added services to our network within weeks; and it brings our local operations closer to each other.

Our ultimate goal is a fully integrated pan-European network where the technology speaks the same language no matter where it is. That language is IP. This network will one day integrate mobile and fixed-line technology and enable a new cloud-based production model. It will eliminate redundancies, increase efficiency, and pave the way for the value-added services and solutions of the future. This blueprint is therefore, the first vital step toward creating a truly pan-European network.

It is just a matter of time. Until then, please read on and learn all about what our IP transformation meant and means to us.

**Claudia Nemat**

*Board Member*

*Europe and Technology*

*Deutsche Telekom*

**Kerstin Günther**

*Senior Vice President*

*Technology Europe*

*Deutsche Telekom*

## The Authors

**Sandra Dornheim** is project manager at Deutsche Telekom, Europe and Technology, with a focus on go-to-market and launch management. Over the past 2 years she was responsible for the go-to-market work stream within the IP transformation and PSTN migration initiative at Deutsche Telekom. Seven countries were supported and involved in the project and colleagues from these countries provided us with their valuable feedback and insights, which have also contributed to the book. After graduating with a master's degree at the University of Mainz (Germany) in business and economics, Dornheim started working for Deutsche Telekom. She has 11 years of telecommunication experience within different organizations and projects; however, her focus has always been on marketing and sales. She completed her second master's of science degree in strategic marketing leadership at the Henley Business School in the United Kingdom.

**Kerstin Groß** works at T-Systems as a program director in Corporate Steering, and is responsible for the Transformation Office of T-Systems. After obtaining a master's degree in business administration from the European Business School (EBS), Oestrich-Winkel (Germany), she wrote a doctorate thesis at the Endowed Chair for Corporate Finance and Capital Markets at the EBS. Following her postgraduate work, Groß began her career in consulting at A.T. Kearney; specializing in

three areas: aviation, utilities, and telecommunications. As a result, she decided to continue her focus on telecommunications, and worked as a senior project manager at the Center for Strategic Projects at Deutsche Telekom's headquarters (Bonn, Germany) for 3 years. Within that time she was part of the team developing the first IP transformation blueprint responsible for the network and IT blueprint, migration strategy, and framework as well as product migration. After her time at CSP Groß changed to her current position.

**Malte Debus** works as a senior project manager for the Center for Strategic Projects within the Deutsche Telekom Group. As part of the team developing the first IP transformation blueprint he was responsible for the business case framework. Following his master's degree in business administration from the University of Marburg (Germany), Debus wrote a doctoral thesis on the efficiency of supervisory boards in German stock corporations. He joined Deutsche Telekom in 2009, and has more than 5 years of telecommunication and consulting experience with a strong focus on restructuring and performance improvement projects.

**Frank Achmann** is vice president at Deutsche Telekom Technical Service, where he is responsible for E2E failure cost reduction. Prior to this position, he worked at the Center for Strategic Programs within the Deutsche Telekom Group, as the project lead developing the first IP transformation blueprint. Upon receiving a master's degree in business and engineering in Cologne (Germany), he joined the automotive industries. As a program manager he was technically and commercially responsible for several multinational programs developing fuel tank systems. After 7 years, Achmann decided to change his focus to telecommunications and worked as a senior project manager at the Center for Strategic Projects at Deutsche Telekom group headquarters.

**Julia Hirschle** is a project manager at Deutsche Telekom, Europe and Technology, with a focus on strategic commercial projects and processes. For the past 2 years she has been responsible for European-wide business steering processes and commercial projects within the commercial area of Deutsche Telekom's headquarters. Prior to this, she



worked as a project manager in the IP transformation and PSTN migration initiative at Deutsche Telekom with a focus on a European-wide best practices approach. Hirschle graduated from the University of Mannheim (Germany) with a degree in business and economics. She has 4 years of telecommunication and project management experience, specifically in restructuring, technology, and innovation projects.

# Introduction

Next-generation networking (NGN) describes key architectural evolutions in telecommunication core and access networks that will be developed over the next years. The general idea behind NGN is one single network for all information and services (voice, data, and all types of media, such as video).

The required shift toward standards-based architectures allowing service providers to create multipurpose platforms that share a common infrastructure is called *IP transformation*. It ensures technological leadership forming a new paradigm for telecommunication businesses with higher service quality standards (see Figure I.1).

While there are several enablers supporting the IP transformation as a broadband rollout (xDSL, FTTx) and IP network optimization (e.g., BNG and TeraStream), a basic but challenging requirement is an all-IP infrastructure and thus the decommissioning of PSTN. To reach this goal, customers and products of the PSTN network need to be transferred to the IP network. This process is called *PSTN migration*.

As an enabler for IP transformation, PSTN migration is primarily focused on cost avoidance, network stability, and minimized churn during the migration process. Potential revenue increases from new IP services or value creation for customers and further efficiencies from

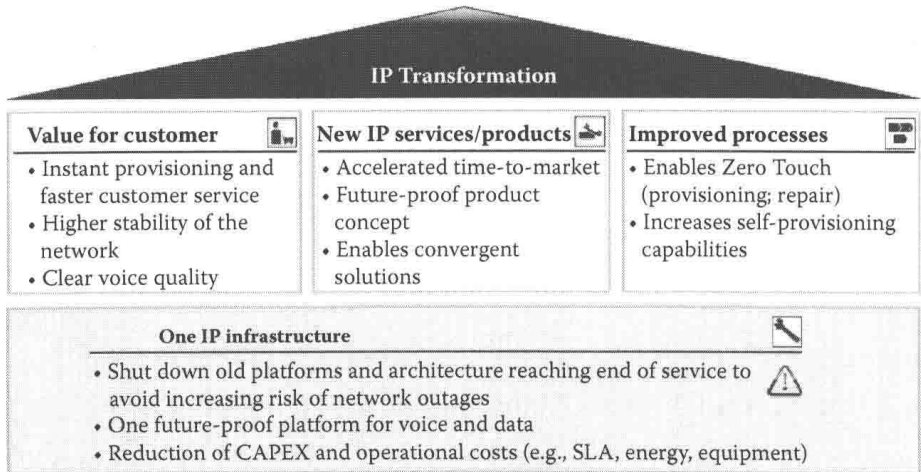


Figure I.1 Benefits of IP transformation.

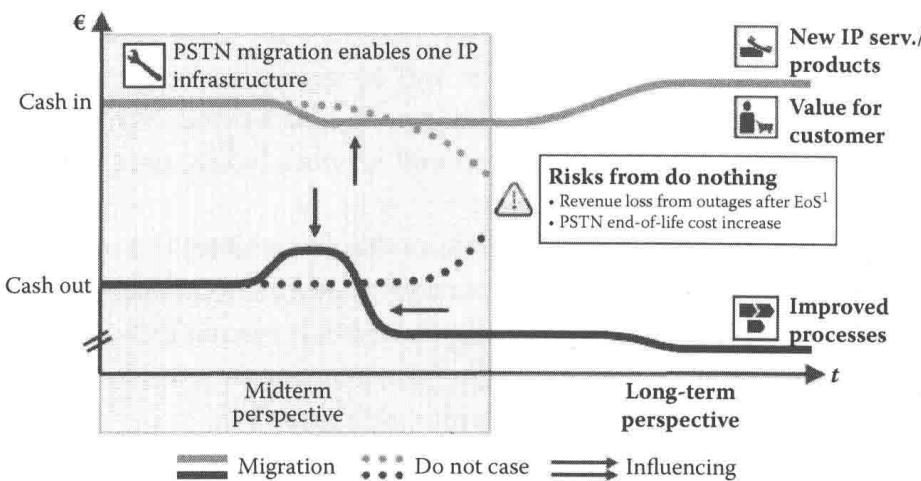


Figure I.2 PSTN migration as an enabler for IP transformation.

process improvements are not within the scope of PSTN migration projects. They need to be addressed separately in a long-term perspective of IP transformation (see Figure I.2).

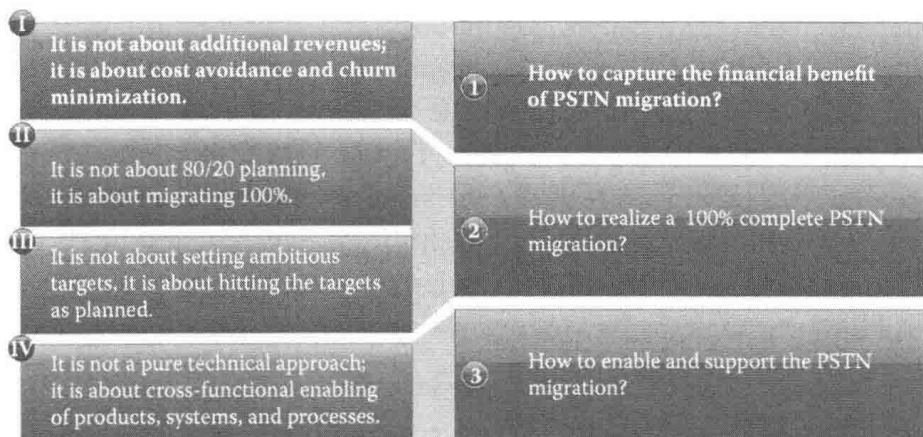
PSTN migration impacts the whole company for all business functions and with a complete fixed customer base. The largest part of this challenge is posed by the legacy TDM voice platform, the PSTN. All incumbent operators are struggling with their PSTN migration, mostly because they had initially underestimated the complexity and criticality of the issue and as a result:

1. They were not clearly focused on the core purpose of the PSTN migration—which is to avoid costs while minimizing churn—and therefore allowed themselves to be distracted by possible revenue upsides.
2. They tried to approach the problem in a “80/20” fashion, saw some initial success on simple products in simple customer segments, and finally got stuck on the more complex products.
3. They set ambitious top-down targets without prior thorough analysis of the constraints and options at hand, targets which subsequently had to be revised over and over and therefore lost credibility.
4. They framed the issue as decommissioning of a technology, to be led by the chief technology officer (CTO), rather than migration of customers, with heavy involvement and commitment of all functions, particularly the chief marketing officer/ chief operating officer (CMO/COO).

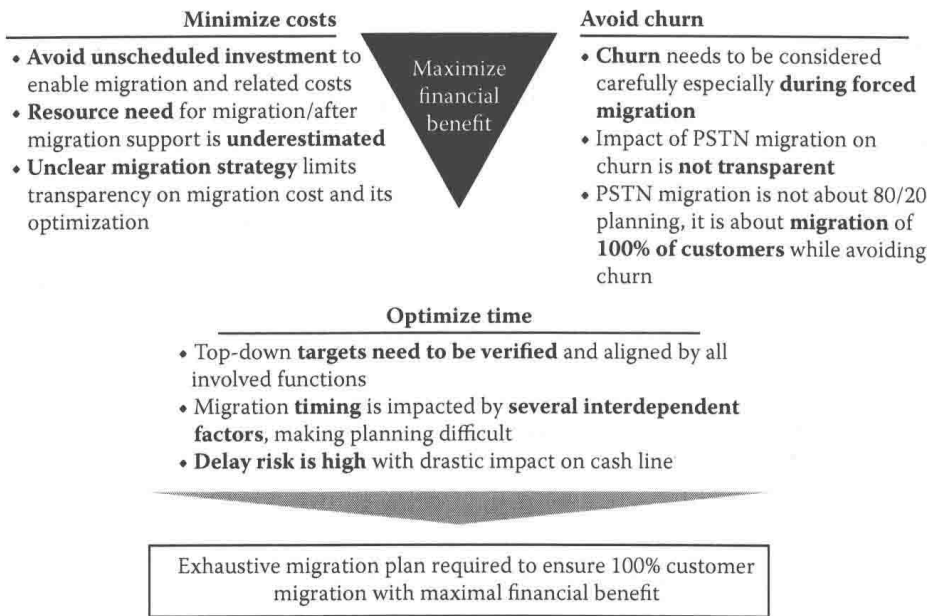
During the PSTN migration project within Deutsche Telekom and seven countries, we developed a reference blueprint, summing up the state of the art knowledge on PSTN migrations and key learning.

Here, we provide an overview of this blueprint, sorted by the three key problem areas (Figure I.3):

1. How to capture the financial benefit of the PSTN migration
2. How to realize a 100% complete PSTN migration
3. How to enable and support the PSTN migration



**Figure I.3** The PSTN migration challenges, grouped into three key problem areas.



**Figure I.4** Triple constraints of PSTN migration.

### How to Capture the Financial Benefit of PSTN Migration

As a key requirement for IP transformation, PSTN migration is a necessity which has to be realized in a financially optimal way considering both costs and potential revenue loss. Thus, it is not about additional revenues, it is about cost avoidance and churn minimization.

The financial benefit of PSTN migration is impacted by three dimensions—costs, churn, and time. The management of each dimension and their interaction is highly complex and provides challenges in every migration project (see Figure I.4). All three dimensions need to be reflected in the business case model.

The business case can be simply constructed by comparing migration costs to cost savings due to the shutdown of PSTN platforms. Experience shows migration from PSTN to IP technology costs around 30€ (\$38) to 60€ (\$75) per subscriber, distributed over 3 to 5 years, while the expected cost benefits from switching off the PSTN platform are around 10€ (\$13) per subscriber per year.

However, these figures only provide a rough orientation and it has to be kept in mind that

- It is often unclear which costs are migration related and thus within scope.

- Migration costs are heavily influenced by required resources for each customer segment, especially toward the end of cleansing an area.
- Savings of PSTN migration may be underestimated, because they do not account for an avoidance in cost explosion or churn if some of the switches actually do reach the end of their useful lifetime.
- Business case results are highly sensitive to migration-related churn; already 2% of total customer base churn can alienate the financial benefit of the business case.

Hence, the business case has to be extended, taking various additional factors into account.

Additionally, for decision-relevant business cases, the question—what to compare PSTN migration with—is not an easy one. Comparing it to an imaginary “flat line” do-nothing scenario is not realistic, as do nothing yields a strong rise in costs, as well as a high risk of network failures and a total failure of the PSTN in the long run. Thus, it is not a real option and the comparison of the PSTN migration scenario should be conducted against a realistic scenario or minimal change—usually a midterm interim solution such as prolonged PSTN usage or soft switches.

Hence, the benefit of PSTN migration needs to be calculated by comparing incremental financial implications of the specific interim and full migration options of the countries with regard to revenue, operational cost development, and CAPEX (capital expenditure) investment. Having transparency in these options as well as parallel enabler projects (e.g., investments into higher broadband coverage) are key challenges and prerequisites for solid and non-overlapping business case calculations.

The financial benefit of a full migration scenario versus interim solution can be influenced by four major drivers:

- *Minimize churn:* A customer facing problems, while being migrated or later using IP services, will always churn with his full contract revenue from voice, broadband, TV, and other services.
- *Migration costs:* The level of many expenditures, such as IMS or access network investment, is determined by the technical starting point of the country; but resource needs for customer

migration and levers for optimization (e.g., remote migration) should be carefully considered.

- *Migration timeline:* Migration of the full customer base should always be accomplished in an ambitious timeframe to minimize the periods with negative cash flow.
- *Long-term savings:* The main expected benefits of switching off the PSTN platform are savings in energy costs, service level agreements, and personnel costs in planning, assembling, and maintenance.

To support each country with this challenge, we have developed a standardized business case framework. Besides overarching benefit calculations this helps to

- Provide a solid and comparable basis to orchestrate CAPEX, OPEX (operational expenditure), and revenue discussion within and across all functions (e.g., marketing, sales, customer care, NT, IT, regulatory).
- Ensure cross-functional alignment for target setting during the conception phase of the project and rollout preparation as well as final execution of the migration plan.
- Faster align the country business case results with shareholder Deutsche Telekom AG through a common understanding of the impact from PSTN migration.

### How to Realize a 100% Complete PSTN Migration?

One key challenge of PSTN migration is that it is not about 80/20 planning, it is about migrating 100%. This holds true not only for the total project and the PSTN shutdown but also for the individual area shutdown. However, these area shutdowns are the main driver of savings. Thus, the question is not, how fast can you migrate a large number of customers, but how long does it take to migrate the last customer. It also shows the migration status in 2012, which had already migrated a large number of customers, but still has left the more complex business and wholesale customers, who might block the shutdown of the focus areas.

To mitigate the resulting risk, careful planning has to be done, which is not about setting ambitious targets; it is about hitting the targets as planned.

Consequently, migration planning needs to realistically detail how to contact and migrate customers, and also when to migrate each customer. To realize this and optimize the trade-off between costs, time, and churn, some key learning is applied in the migration planning framework presented in the blueprint:

- Migrate by area to maximize savings, migrate by product to leverage spare resources (costs and time).
- Start early with customized solutions and wholesale solutions, as they often block the clearance of areas (time).
- Maximize leverage of natural migration (NM), as it is the most optimal resource and most customer-friendly way for migration (costs).
- Manage all types of resources choosing a trade-off on churn, cost, and/or time, and check readiness to make those sacrifices (costs, time, and churn).

To ensure the implementation of learning and a smooth migration process, the framework focuses on the two major resource constraints of product development and migration resources. The resulting migration plan comprises not only the sequencing of product development but also the planning of the migration itself, defining how each customer is migrated (migration strategy), and when (migration sequence).

The planning process starts with the optimization of product development, defining not only the development start date but also the date of substitute readiness. The prioritization of products follows two imperatives:

- High-volume mass products first as their early readiness increases natural migration and resource leverage.
- Complex products first as they take a long time to develop, migrate, and form the major roadblocks.

The migration sequencing approach strives to maximize savings while managing available migration resources and reducing the delay risks of the project. As savings are mainly driven by the shutdown of an area, migration should be done in an area-by-area approach. However, to leverage spare resources before and during an area migration, a migration by product is used as well.



Identifying the product sequence within the product-by-product approach, a framework is provided by mainly applying two recommendations:

- *Complex products*: Start with multiarea products to reduce roadblocks for area cleansing, start with complex products to mitigate long migration duration.
- *Standard products*: Focus on mass products with expected limited success of natural migration.

Area sequencing forms the most complicated task, as many resource and timing constraints are implied on the area-by-area migration combined with strong interdependencies of sequencing and resource requirements. To break this circularity issue, the sequencing is done in a scenario approach taking timing constraints, savings on migration costs, and early migration savings into account. The scenarios are combined and optimized by different levers to ensure sufficient resource availability on different dimensions (CAPEX/OPEX, customer care FTEs, regional technical services FTEs).

### How to Enable and Support the PSTN Migration?

In preparation of PSTN migration three major adjustments are required, not only in NT and IT, but also in the product portfolio and processes, which can impact various functions. Hence, PSTN migration is not a pure technical approach; it is about a cross-functional enabling of products, systems, and processes:

- The PSTN product portfolio needs to be transferred into the IP world and thus the new value-cost-optimized IP product portfolio needs to be created.
- NT/IT need to be enabled for IP and the migration demands vast adjustments in systems.
- IT processes for migration need to be defined and the majority of existing processes adapted.

The development of the new IP product portfolio is complex and crucial due to the large scale covering all PSTN product substitutes and due to the strong regulatory involvement throughout the whole