

Chapter 2

Understanding Today's Telecommunications Industry

Abstract Understanding today's telecommunications industry is a prerequisite for a successful architectural transformation. The tremendous changes of the industry during the last decades have completely altered their rules and structures. In the past, traditional—mainly government-owned—telecommunications operators were responsible for the technical realization of fixed-line and mobile radio communications. Their business model was based on long-term infrastructure investments that were financed through usage-based connection fees. Today, competitors of traditional operators do not necessarily require their own network infrastructure—such as, for example, Over-The-Top (OTT) providers. Increasingly, the technical connection is becoming a commodity. Innovative applications, convergent services, and dedicated customer orientation are today's success factors. However, increasing data volumes and mobile usage still requires ongoing modernization of network technologies. A major challenge for telecommunications operators is the combination of continuous innovation requirements with a stagnating market and changing value chains. Section 2.1 explains the market conditions and ecosystem with respect to price decrease and cost pressure, competition through Over-the-Top providers, new opportunities in vertical markets, and challenges for regulators. The interrelation between commercial and technical products as well as changed customer demands and usage behavior are discussed in Sect. 2.2. The value chain reacts to the changed market conditions through increased fragmentation of the value creation and new partnering, which are topics of Sect. 2.3.

The telecommunications industry is currently going through a major transformation which creates both opportunities and challenges for fixed operators, mobile operators as well as Internet service providers (e.g. Grover and Saeed 2003; Picot 2006; Plunkett 2014). New and innovative players are entering the telecommunications market, and this has led to a restructuring of the whole telecommunications industry (Pousttchi and Hufenbach 2011; Wulf and Zarnekow 2011a). Through the fast technological development, increasing market dynamics and deregulation in many countries, the complexity in the telecommunications industry is constantly increasing (Plunkett 2014, pp. 7–9).

Those changes and challenges of the telecommunications industry are the topic of various publications and studies with different focus, including overall market research (Plunkett 2014), value creation and market players (Grover and Saeed 2003; Peppard and Rylander 2006; Picot 2006; Pousttchi and Hufenbach 2011; Tardiff 2007; Wulf and Zarnekow 2011a), (de)regulation and competition (Cave et al. 2002; Gentzoglanis and Henten 2010), standardization (Lyll 2011), structures and processes (Bruce et al. 2008; Czarnecki et al. 2013; Pospischil 1993) as well as various functional or technical specifics (e.g. Copeland 2009; Czarnecki and Spiliopoulou 2012; Grishunin and Suloeva 2015; Lewis 2001; Mikkonen et al. 2008; Misra 2004; Yahia et al. 2006).

The first challenge of today's telecommunications industry is to understand the various players. In the past, the technical realization of communication via mobile or fixed-line networks was the major objective of telecommunications operators.¹ The convergence of voice, video, and data has led to mergers, acquisitions, and partnerships (Tardiff 2007, p. 132; Wulf and Zarnekow 2011b, pp. 10–11). Increasingly, application and content offers are intermixed with telecommunication services (Peppard and Rylander 2006, pp. 133–134). Entertainment services such as TV offers are linked to traditional communication services, resulting in new competition between TV cable operators and communication network operators (Plunkett 2014, p. 7). The convergence of telecommunications, media, and hardware industries is an already observed implication (Arlandis and Ciriani 2010, p. 121).

Plunkett (2014, pp. 7–8) points out that the exact composition of the telecommunications industry varies when it comes to including or excluding certain business sectors—e.g., communication equipment or related consulting services. Arlandis and Ciriani (2010, pp. 121–124) relate the telecommunications industry to the information and communication technology (ICT) sector, which they define as an ecosystem consisting of technologies providers, network operators, platform operators, and content providers. Grover and Saed (2003, p. 120) propose a categorization of the telecommunications industry into network providers, tool providers, transaction/service providers, and internet/content providers.

When it comes to concrete enterprises offering telecommunication products and services, there is a huge range of different business models, including branded resellers, mobile virtual network operators, or mobile virtual network enablers (Pousttchi and Hufenbach 2009, p. 87). There is a variety of characteristics to differentiate those business models—e.g., functional coverage of the value chain or level of control of the communication network (Kimiloglu et al. 2011, pp. 40–41). A clear understanding of the market positioning and business scope of a

¹In this book the term *telecommunications operator* is used for all firms offering, providing, and operating telecommunication products and services. It can be seen as synonym for *telecommunication company* or *telecommunication firm*. It is understood as a generic term including, e.g., *telephone company* or *communication service provider*. A telecommunications operator might offer different telecommunications services (e.g., voice or data) to different customer segments (e.g., residential or wholesale).

Customer	consumer		business (retail)	business (wholesale)	
Value Chain	component	subsystem	network system	device	
	network		service	content/application	
Business Activities	production	operation & maintenance	sales	after-sales	
Network	fixed line		mobile	satellite	

Fig. 2.1 Framework for categorizing telecommunications operators (according to Czarnecki 2013, p. 52)²

telecommunications operator is an essential prerequisite to support its transformational needs. Therefore, in this book, a categorization along the dimensions *customer*, *value chain*, *business activities*, and *network* is proposed (cf. Fig. 2.1). The different dimensions and characteristics are based on a review of existing categorization criteria related to the telecommunications industry (Cave et al. 2002; Doebelin and Dowling 2007; Ehrmann 1999; Fransman 2002, p. 475; Gerpott 2003, p. 1090; ITU 1998, p. 13; Maitland et al. 2002; Picot 2006; Pousttchi and Hufenbach 2011).

The dimension *customer* specifies the intended end customer(s) of the telecommunications operator. It is differentiated into consumer, business (retail), and business (wholesale). The *value chain* starts with the technical hardware and software prerequisites of communication networks (component, subsystem, network system, and device). The network covers all technical aspects required to realize services which might be related to content or applications. The *business activities* are divided into production, operations and maintenance, sales, and after-sales. The *network* can be specified by fixed line, mobile, and satellite. The scope of a concrete telecommunications operator might be a complex mixture of the above characteristics.

Telecommunications operators are confronted with various challenges that influence their transformational needs. Those challenges are summarized along the dimensions *market*, *products/services*, and *value chain* (cf. Fig. 2.2).

The *market* conditions have changed due to convergence that leads to increased competition (Cave et al. 2002; Plunkett 2014, pp. 7–22; Wulf and Zarnekow 2011a, pp. 290–292). Those changes of the market structures and ecosystem (Arlandis and Ciriani 2010, pp. 124–129) result in new market potentials (Basole and Karla 2011, pp. 313–314; Kimiloglu et al. 2011, pp. 47–48; Pousttchi and Hufenbach 2009, p. 87) combined with increased cost and price pressure. Furthermore, these changes

²Translated and revised version of the illustration published in Czarnecki (2013, p. 52).

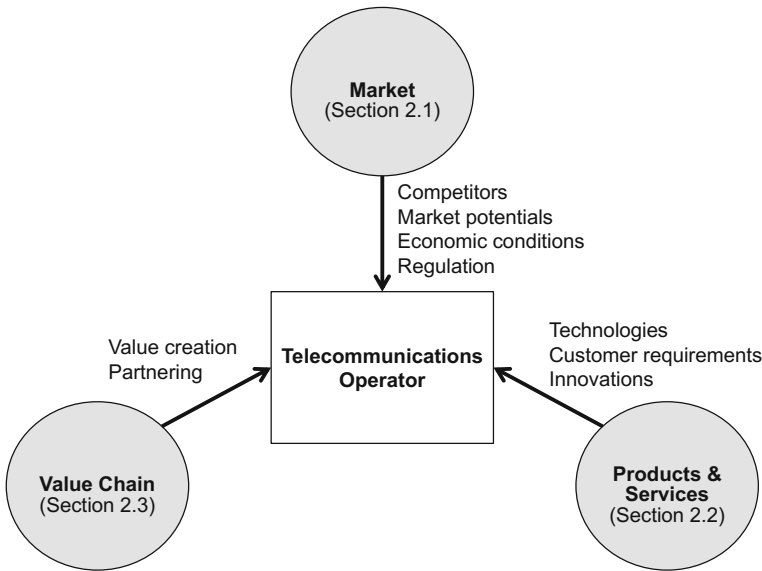


Fig. 2.2 Challenges of telecommunications operators

lead to new requirements and challenges for regulators (Tardiff 2007). The *value chain* reacts to the changed market conditions through increased fragmentation of the value creation (Peppard and Rylander 2006, pp. 128–129; Pousttchi and Hufenbach 2011, p. 307) and new partnering (Grover and Saeed 2003, pp. 121–125). In the dimension *products and services*, telecommunications operators are confronted with the complexity of production systems (Bruce et al. 2008; Misra 2004) as well as changed customer demands and usage behavior (Gans et al. 2005, pp. 256–259; Taylor 2002, pp. 126–135). Both are related to the requirement of continuous innovations (Picot 2006) and shorter product development cycles (Bruce et al. 2008). Those challenges are an important factor for the transformation of telecommunications operators. Therefore, they are further discussed in the following sections: telecommunications market in Sect. 2.1, telecommunications products and services in Sect. 2.1.3, and telecommunications value chains in Sect. 2.2.2.

2.1 Telecommunications Market

The telecommunications market has changed tremendously. The resulting cost and price pressure and their impact on telecommunications operators are discussed in Sect. 2.1.1. Convergence leads to increased competition through Over-the-Top (OTT) providers that offer content and application services on top of existing

communication services. The challenges of OTT providers for traditional telecommunications operators are summarized in Sect. 2.1.2. In summary, the changed market conditions lead to the disappearance of former revenue sources. New revenue potentials could be realized in vertical markets, which are discussed in Sect. 2.1.3. Furthermore, these changes result in new requirements and challenges for regulators (Tardiff 2007) as illustrated in Sect. 2.1.4.

2.1.1 Price Decrease and Cost Pressure

From an economic perspective, the telecommunications industry is an important part of the ICT sector. Global revenue figures are provided by various analysts and research companies. They depend on the exact definition of the industry being applied for their calculation. Plunkett (2014, p. 8) uses a broad definition and estimated a global revenue of 5.4 trillion USD for 2014. The Telecommunications Industry Association (2015) publishes a global revenue of 5.6 trillion USD. Bloomberg³ defines *Telecom Carriers* as an own industry with a total revenue of 2.1 trillion USD. When it comes to the future trend, these analysts and research companies forecast a slight revenue growth for the next years. However, this revenue growth is decreasing. From a global perspective, the telecommunications industry is a stagnating market.⁴

For a differentiated understanding of the telecommunications industry, the following figures should be considered:

- The worldwide number of fixed-telephone subscriptions has been declining since 2006, from 1.26 to 1.10 billion in 2014 (ITU 2015a).
- The worldwide number of mobile-cellular telephone subscriptions has more than doubled since 2006, from 2.75 to 6.95 billion in 2014. However, the growth rate is decreasing (ITU 2015a).
- The worldwide number of broadband subscriptions (fixed and mobile) is increasing. Mobile-broadband subscriptions have especially demonstrated a tremendous growth, from 0.27 billion in 2007⁵ to 2.69 billion in 2014 (ITU 2015a).

³Bloomberg offers an online tool called *Bloomberg Industry Market Leaders (Visual Data)* that provides key metrics of 49 industries and 580 leading companies (please see www.bloomberg.com/visual-data/industries/). The figure cited here was accessed in Dec. 2015.

⁴From the macroeconomic perspective the access to modern telecommunication infrastructure is a critical success factor for economic growth and wealth. Please see, e.g., Hanna (2010), Laudon and Traver (2015), and OECD (2014) for further information. This book focuses on the microeconomic perspective—i.e., the impact of the changed conditions for telecommunications operators.

⁵The mobile-broadband technology started with 4G in 2006 (Plunkett 2014, p. 495). Therefore, ITU provides figures for mobile-broadband subscriptions from 2007 onwards. (Plunkett 2014, p. 495).

- The market penetration for communication services is constantly increasing: the global estimates for 2015 by ITU (2015b, pp. 2–3) are 69 % of 3G population coverage, 46 % of households with internet access, and 46 % of individuals with mobile-broadband subscriptions. For the member countries of the *Organisation for Economic Co-operation and Development* (OECD), the penetration is much higher, with an estimated 81 % for mobile-broadband subscriptions (OECD 2015).
- For most communication services, a price decrease can be observed (ITU 2015b, p. 5; Plunkett 2014, p. 8) which is a result of the increased competition and ongoing deregulation of the market. For example, ITU (2015b, p. 5) shows decreasing prices for fixed-broadband between 2008 and 2011 with a stagnation since then.

Telecommunications operators are confronted with tremendous changes in the usage behavior in a stagnating market—e.g., compared to a basic mobile phone, using a smartphone generates more than 14 times the data volume (Verma and Verma 2014). This growth of the data volume has to be handled under the condition of stagnating or even decreasing prices. In the past, traditional communication services—for example, voice telephony—were the major revenue sources of telecommunications operators. Now, the pure transmission is becoming more and more of a commodity for the customer. The increasing demand for high transmission bandwidths still requires extensive investments in network infrastructure. However, those same networks are then beneficial for content and application providers such as Google, Facebook, and Netflix, that can profit from the resulting revenues without any participation in the infrastructure investment. For further information please see the discussion about *net neutrality* (e.g. Belli and De Filippi 2015; Plunkett 2014, p. 10). Furthermore, those content and application providers even compete with traditional telecommunications operators. As a result, telecommunications operators require innovative services to secure their revenues. Hence, the two contrary conditions of a stagnating and innovative market are mixed. For telecommunications operators, this means the combination of cost reduction and efficiency increase in order to realize the financial flexibility for investments in innovative services.

This financial situation is further complicated through new competition caused by the convergence of the market. The technical capability for a broadband transmission requires major investments in fixed or mobile network infrastructure. The value proposition recognized by the customer is related to the communication service. And today those communication services can be offered without owning any network infrastructure. For example, the launch of smartphones—which was seen by the telecommunications operators as an opportunity to introduce new services leading to higher *Average Revenue Per User* (ARPU)—has actually been a facilitator for the introduction of new services by Over-the-Top (OTT) providers (cf. Sect. 2.1.2). The new services offered by OTT providers have replaced equivalent telecommunication services—e.g., *WhatsApp* in the messaging market has replaced the traditional Short Messaging Service (SMS).

In the voice market, IP-based products such as *Skype* and other highly complex enterprise applications have resulted in falling revenues for telecommunications operators. In fact, the usage of Voice over Internet Protocol (VoIP) is massively changing the telecommunications industry (Plunkett 2014, pp. 14–16). As a consequence, the traditional voice and messaging markets for telecommunications operators are constantly in decline. A significant part of both historic and predicted telephony and messaging market shifts can be attributed to regulation—either directly related to pricing (e.g., changes in maximum termination or roaming fees), or through the introduction of more competition (e.g., new licensees and wholesale rules). Section 2.3.2 provides a more detailed look at the new role of regulators in today’s telecommunications industry.

For telecommunications operators, the changed market conditions require higher efficiency and flexibility. In most cases, this leads to transformations of operational structures. These transformations are supported by the reference architecture described in this book. From a strategic perspective, telecommunications operators have to combine their technical capabilities with revenue to create new value propositions. For integrated telecommunications operators—i.e., those operating fixed and mobile network infrastructures—a strategic option is the bundling of communication services and enrichment with content. A typical example is a quadruple-play service combining mobile and fixed telephony, broadband internet, and IPTV. In most cases, this requires partnering with content providers (Grover and Saeed 2003, pp. 121–125). With those product bundles, telecommunications operators enter the television, video, and media markets. The results are new competitors, such as television cable companies,⁶ (Plunkett 2014, p. 17) and increased complexity of the value creation (Peppard and Rylander 2006, pp. 128–129; Pousttchi and Hufenbach 2011, p. 307). Moreover, those services require a high bandwidth. Therefore, increasing the bandwidth of the offered data connection is an additional strategic option. As example, launching Fiber-to-the-Home (FTTH) services is currently an important topic for telecommunications operators (Plunkett 2014, pp. 17–18).

In summary, from a financial perspective telecommunications operators are confronted with price decrease and cost pressure. Both are related to changed usage behaviors and strong competition in convergent markets. In response, telecommunications operators have to realize new revenue sources through innovative services. Under the condition of globally stagnating telecommunications markets, the challenge is to combine the two contrary objectives of investments in innovations with consistent cost management.

⁶The competition with cable providers works both-ways. Telecommunications operators are addressing customers of cable providers by offering IPTV services. Cable providers are addressing the customers of telecommunications operators by offering broadband internet services.

2.1.2 Emergence of Over-the-Top (OTT) Providers

The widespread adoption of mobile Internet access has lowered the barriers for many companies to enter the communication services market (Fritz et al. 2011, p. 269). Meanwhile, major Internet players have identified opportunities and have also entered these markets. In most cases these services are not necessarily expected to be major drivers of revenue growth; however, they are usually expected to complement the core business, similar to device sales or advertising. The most powerful Internet players are increasingly able to leverage their strengths in the value chain by presenting their communication services as the defaults in devices.

From a market perspective, OTT providers are the logical consequence of the changed market conditions. The rising emphasis of application services (Peppard and Rylander 2006, pp. 133–134) combined with the convergence in the ICT sector (Arlandis and Ciriani 2010, p. 121) have strengthened new competitors (Wulf and Zarnekow 2011a, pp. 290–292). From a technical perspective, the separation of application and communication services from their technical transportation (Knightson et al. 2005) has supported this trend. In practice, the impact of OTT providers on both telecommunications market and traditional telecommunications operators is discussed in various reports (cf. Table 2.1).

Telecommunications operators have several strategic options to overcome the challenges arising from OTT providers. Most of the strategies developed and implemented by telecommunications operators to deal with the pressure coming from OTT providers are defensive. The telecommunications operators are aware that OTT communication services are eroding their revenues and, therefore, they need to have a strategy in place to counteract this trend. Blocking VoIP services is a strategy that many telecommunications operators use.

Table 2.1 Selected reports about OTT market and strategies

Publisher	Title	Content	References
Analysys Mason	OTT communication services worldwide: stakeholder strategies	OTT trends and major players	Sale (2013)
Analysys Mason	Case study: Google's OTT communications strategy	Analysis of OTT services offered by Google	Bachelet and Sale (2014)
Informa Telecoms & Media	VoIP and IP messaging: Operator strategies to combat the threat from OTT providers	Evaluation of OTT markets for mobile service operators	Clark-Dickson and Talmesio (2013)
Strategy Analytics	Is VoLTE the answer to the OTT voice threat?	Impact of OTT VoIP services on mobile operator strategies	Kendall (2013)
IDATE Research	OTT video: Opportunities for Telcos around VoD, SVOD and Telco CDN	Analysis of market for OTT video services and impact on strategies of telecommunications operators	IDATE Research (2013)

Instead of blocking VoIP services, there are some mobile operators that are partnering with OTT providers, and also some mobile operators that are developing their own OTT-like services in their digital business divisions. So far, these two approaches represent the minority of cases. In particular, the attempt to develop own OTT-like services is a strategy which is still in its early stages and which will require a higher maturity level in the digital business areas. On the other hand, the current developments in the OTT market are increasing the pressure on telecommunications operators, giving them only a small window of opportunity to conceive an effective response strategy.

The strategic response alternatives for traditional telecommunications operators to OTT providers can be summarized as follows⁷:

- *Accept OTT services*: Several telecommunications operators have chosen a hands-off approach to any service that can increase the usage of data, including OTT services. These telecommunications operators believe that the non-occasional nature of communication services such as IP voice and messaging can lead to a strong incentive for customers to purchase a data plan upgrade.
- *Attack or absorb OTT services*: Many telecommunications operators have decided to attack OTT-based services directly by preventing subscribers from using IP services. This is realized by combining economic and technical aspects that prevent the use of IP services. Another approach is to absorb OTT services by making them ineffective from a customer's perspective. Customers use IP voice and messaging services with the objective to save money. In response, operators are, for example, introducing large voice and messaging bundles with the result that customers do not need to use OTT services in order to save money. In addition, offering services that are similar to the ones offered by OTT providers is a possible strategy. Launching proprietary OTT services is, so far, the least developed option. In the past decade, there have been some attempts by telecommunications operators to deploy instant messaging clients.
- *Partner with OTT providers*: In some cases, telecommunications operators decide to partner with OTT providers with the objective of benefiting from them. On the one hand, telecommunications operators are afraid that their core services could be marginalized by OTT providers; on the other hand, they are aware that these services can be popular amongst customers. Telecommunications operators that decide to partner with OTT providers might benefit from both the OTT services as well as the OTT brand.

The strategic options listed above are not necessarily mutually exclusive, and many telecommunications operators are active in several of these areas. Price will continue to be the major driver in the voice market. Therefore, telecommunications operators use pricing levers to ensure their voice services are relevant to most smartphone users.

⁷Based on results of Detecon's OTT knowledge development team. Please see also the reports listed in Table 2.1 for further details.

Google is an example of a successful OTT provider (Bachelet and Sale 2014). In some areas it is a strong competitor of established telecommunications operators. Google has established comprehensive product and service categories for devices, operating systems, applications and services, content and advertisement so as to service their customers from one source. This provides Google with a competitive advantage in comparison to telecommunications operators specialized in selected categories only. Offering the existing application service via own mobile network capacities (e.g., realized as a *Mobile Virtual Network Operator*) could be a strategic option that would fit to the ongoing convergence of the whole ICT sector. For traditional telecommunications operators, however, the demand for communication services is directly linked to the existence of attractive content and applications: for example, the growing demand for mobile data services is based on the ever-increasing range of mobile content and applications by, e.g., Google.

This one example highlights the complex interrelation between OTT services and telecommunications operators. The extensive communication services portfolio of OTT providers, their level of control and also the ability to monetize their services present a growing challenge for most telecommunications operators. There are still some operators that have not yet recognized the severe risk of their services being eroded by OTT-based communication services. However, the majority of telecommunications operators have clearly seen the urgent need for developing a strategy for OTT communications.

OTT's business models develop rapidly and change the traditional revenue models as follows⁸:

- Advertisement is one of the main revenue sources of OTTs;
- Paid subscriptions start to work for OTTs with a larger customer base;
- "Freemium" apps have proved to be an innovative monetization strategy;
- Cloud storage as an add-on service has increased profitability; and
- Business intelligence is a powerful tool for content distributors.

In Fig. 2.3 a phased approach is outlined to assess the impact of OTTs on the business and thus develop an effective, feasible response strategy tailored to the specific needs.

Several telecommunications operators are investing in the development of products and services for vertical markets like energy, automotive, healthcare, and education in order to generate additional revenue streams besides the traditional telecommunications business. In Sect. 2.1.3, the growth potential in vertical markets is further analyzed and concrete examples for selected vertical market service offerings are provided.

⁸Based on results of Detecon's OTT knowledge development team.

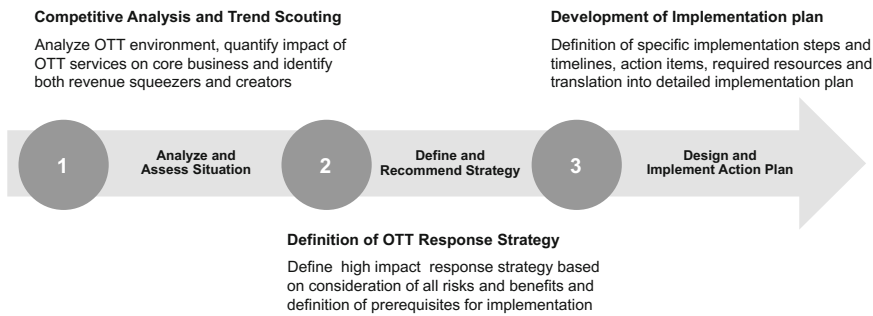


Fig. 2.3 OTT response strategy development approach

2.1.3 Growth Potential in Vertical Markets

In Sects. 2.1.1 and 2.1.2, the challenges facing telecommunications operators due to price decrease, cost pressure, and the threat posed by the emergence of OTT providers are explained. Telecommunications operators could address these challenges by generating new revenue streams in non-telecommunications business areas. Telecommunications operators have started to look into various vertical markets for which vertical-specific products and services can be developed and offered.

The common vertical markets named by most telecommunications operators are automotive, banking, consumer packaged goods, education, energy and utilities, government, healthcare, insurance, manufacturing, mining, public sector, retail, transportation and logistics as well as smart home. Cloud-based solutions and Machine-to-Machine (M2M) solutions are, for instance, services that can be offered to various verticals.

Several elements are required for telecommunications operators who decide to enter vertical markets including (Sapient 2011, p. 4):

- transformation capabilities beyond telecommunications;
- overview of product demands for vertical markets;
- innovative products and services to be offered;
- product development team with vertical knowledge;
- strong partner network for different verticals; and
- direct or indirect sales channels.

An analysis (Foong and Delcroix 2011) shows that services in vertical markets are expected to generate revenue amounting to 8.1 % of worldwide traditional telecom services revenue in 2015. Ambitious telecommunications operators are able to raise this figure up to 15 % or even 20 %. Media/entertainment (including advertising), Machine-to-Machine (M2M) services, cloud computing and IT services are promising areas for generating revenue (Foong and Delcroix 2011, p. 1). So far, most telecommunications operators are still facing several difficulties in running a profitable business in their vertical markets. On the cost side, major

upfront investments are required. In most cases, on the revenue side telecommunications operators have to rely on indirect sales channels because their own sales channels need time to build up vertical sales capabilities.

Telecommunications operators are confronted by challenges that have to be addressed when entering new vertical markets including (Foong and Delcroix 2011, p. 7):

- *Lack of vertical knowledge.* Many telecommunications operators lack the necessary knowledge, know-how and capabilities and, therefore, partnerships as well as acquisitions should be considered.
- *Difficulty in developing vertical products.* A prerequisite to realize substantial revenues is the development of the right vertical products that actually meet the customer demands.
- *Presence of global competitors.* There are large, established global players with the required vertical expertise and customer base in various markets that are competing with the telecommunications operator.
- *Lack of global scale.* Regional telecommunications operators are less attractive to content and application developers. Content and application providers are more attracted by partners with global reach.

Partnerships, acquisitions, and strategic investments will play a significant role in this context and will also be a major driver for entering new vertical markets. In Sect. 2.3.2, the motivation for operator partnering, potential operator partnering areas and related benefits are described.

In general, a large number of initiatives in a vertical market do not necessarily correlate with a high maturity level of these initiatives. This effect is particularly the case in vertical markets that are exposed to strong influencing factors beyond control of the telecommunications operator (e.g., mobile health and mobile financial services). These verticals are indicating a greater need to tailor each product to specific market conditions. There is no single vertical market that has until today achieved the desired maturity. Figure 2.4 illustratively shows the correlation between the number of initiatives by vertical, and the average initiative readiness score (Velasco-Castillo and Renesse 2014, p. 12). Based on project experience with leading international telecommunications operators that is related to the establishment of M2M competence centers and cloud business units, there is an indication that these two initiatives will have the potential to reach the strategic target of achieving both a high number of initiatives and a high average readiness score.

Telecommunications operators are transitioning from a product-centric approach, in which all customers are offered the same service, to a customer-centric one. Customer-centric approach means designing customized solutions, tailored to the needs of each customer or customer-segment, which could be a specific vertical industry. Customized services will allow telecommunications operators to distinguish themselves and market unique solutions. This approach also changes the way telecommunications operators are organized, and they will

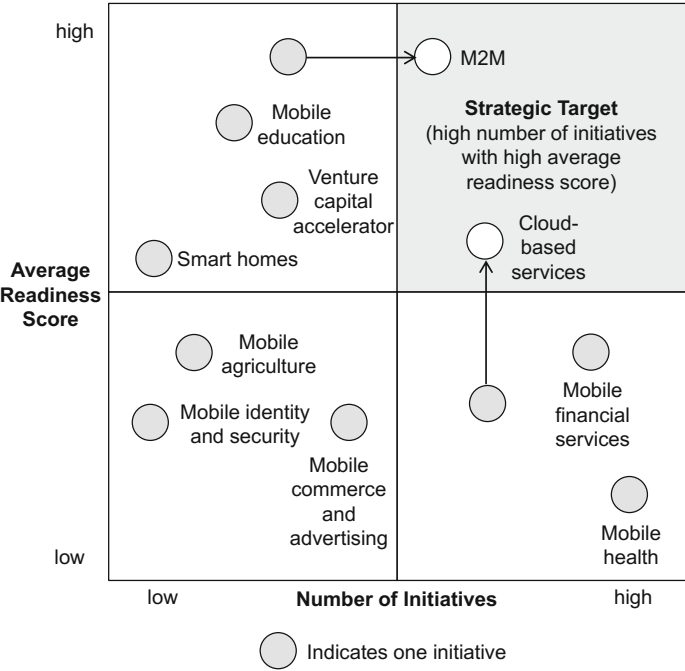


Fig. 2.4 Correlation of number of vertical initiatives and readiness score (according to Velasco-Castillo and Renesse 2014, p. 12)⁹

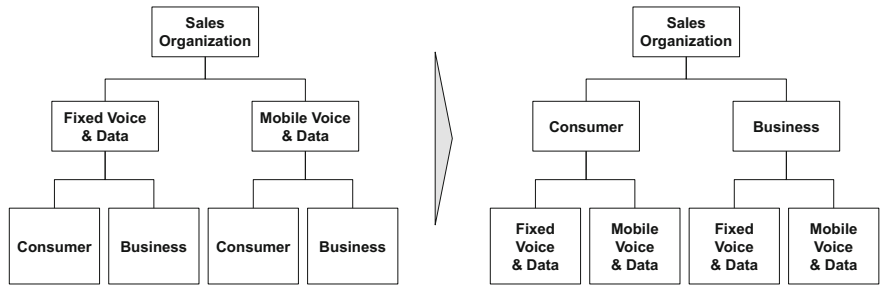


Fig. 2.5 Transition from product-centric to customer-centric organization (according to Pouillot 2013, p. 22)

typically be moving from a product-oriented sales structure to a customer-centric one (Pouillot 2013, p. 22) (cf. Fig. 2.5).

⁹In this figure the interrelation between the number of initiatives and the average readiness score is based on Velasco-Castillo and Rendesse (2014, p. 12). A strategic target window is added in the top right corner of the figure to highlight the strategic goal for all initiatives. Based on own project experience, M2M and cloud-based initiatives are highlighted to achieve the strategic goals in the first place.

In the following, a discussion of four selected initiatives of telecommunications operators in the vertical areas is presented.¹⁰ Machine-to-Machine (M2M) and cloud computing are two exemplary topics that are highly relevant for entering vertical markets. Healthcare and automotive are two examples of vertical industries.

Vertical 1—Machine-to-Machine (M2M)

The general idea of M2M is a ubiquitous communication of devices (machines) in order to enable automated operations between them (Chen et al. 2014, p. 98). In recent years, this idea has been intensively discussed in research and practice (e.g. Ahn et al. 2010; Antunes et al. 2014; Boswarthick et al. 2012; Liu et al. 2015). M2M is related to the vision of *internet of things* as it allows the connection of everyday objects (Wu et al. 2011, pp. 36–37). From a technical perspective, a widely available communication network is an essential prerequisite (Boswarthick et al. 2012, p. 3; Wu et al. 2011, p. 37) that is enabled by 3G and 4G mobile networks (Chen et al. 2014, p. 100; Kan Zheng et al. 2012, pp. 184–185). Providing M2M platforms is a technical requirement for telecommunications operators (Antunes et al. 2014, p. 436) that facilitates additional revenue streams in various industries, such as manufacturing (Matsuda and Kosaka 2016), healthcare (Park et al. 2015), and transportation (Boswarthick et al. 2012, p. 25). A broad range of use cases is possible, including tracking and tracing, payment, and remote maintenance (Wu et al. 2011, p. 38).

M2M services and solutions can be offered in a Business-to-Business (B2B) and in a Business-to-Business-to-Consumer (B2B2C) environment. Figure 2.6 shows examples for B2B2C and B2B verticals that are relevant for M2M.

The main drivers for the M2M business are derived from political, economic, social, technological, environmental, and legal dimensions for which some exemplary drivers are summarized in Fig. 2.7.

M2M is a topic that is mainly related to mobile operators because the required data connectivity for devices is ensured through SIM cards and, therefore, mobile networks. The M2M business for telecommunications operators differs significantly

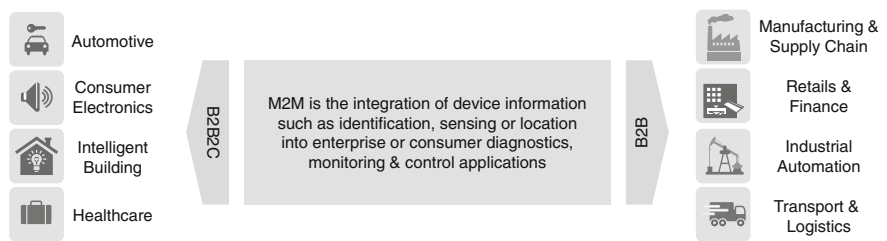


Fig. 2.6 M2M verticals for B2B2C and B2B

¹⁰Most of the information provided in this section is based on results from Detecon through project work in the international telecommunications industry.

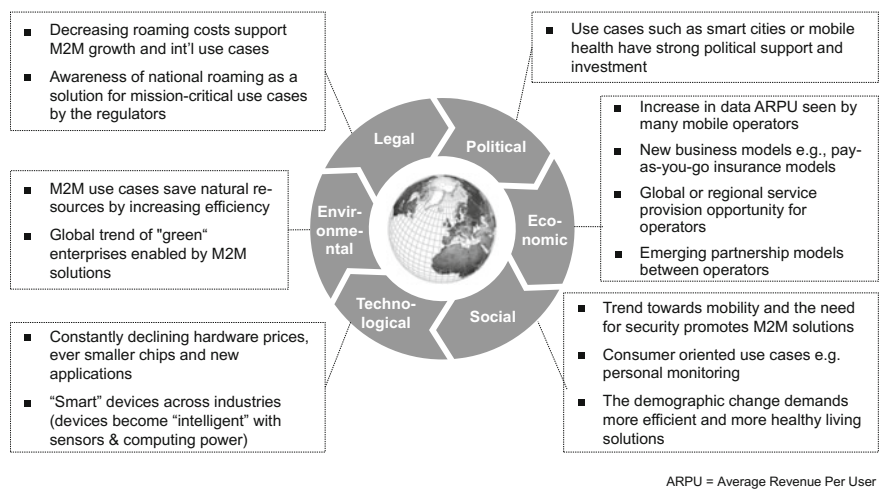


Fig. 2.7 Main drivers for M2M

	Traditional Mobile Operator	M2M Provider
Number of SIMs	Typically few SIM per customer	Many SIM per customer
Customer Interface	Manual, individual customer contact	Automated, with no customer contact on a per SIM basis
Bearer & Availability	Voice and data communications; medium requirements for availability	Data communication (IP/SMS) - barely voice; Significant use cases require high availability
Bandwidth /Volume	High bandwidth requirements and volume of data through mobile Internet	M2M use cases typically have low volume and bandwidth requirements per unit basis
Roaming	High domestic share, rather low international roaming requirements	Use cases with high international roaming volume; permanent roaming for availability
Value Chain Complexity	Typically E2E service offering by Operator	Operator is part of a fragmented M2M value chain; E2E orchestration skills required
Churn	Prepaid deals and short contract duration cause high turnover and high acquisition cost	Long contract duration (typ. 3-5 years) and high service provider switching costs

Fig. 2.8 Traditional Mobile Operator vs. M2M Provider

from the traditional business of a mobile operator. Figure 2.8 provides an overview of some differences for selected elements like the number of SIMs, customer interface, and roaming.

In the M2M business, telecommunications operators have the possibility to either become a *Wholesale Provider*, a *Managed Connectivity Provider* or a *Managed Connectivity and Solution Provider*. Those telecommunications operators providing M2M connectivity as a wholesale provider might only be able to realize small margins. Based on project experience in the M2M field, it is estimated that the highest margins can be realized through the provisioning of M2M solutions. Hence,

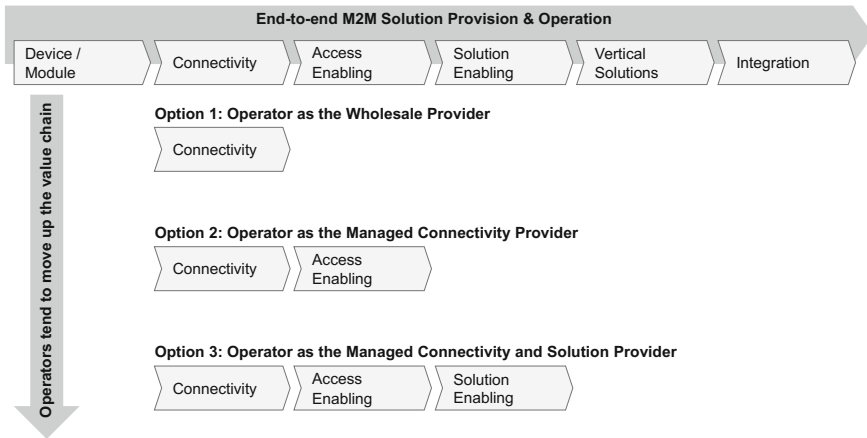


Fig. 2.9 M2M value chain

a strategic option for telecommunications operators is to move up the value chain from connectivity providers to access and solution enablers in order to capture higher margins. The classical M2M value chain for telecommunications operators from wholesale providers to managed connectivity and solution providers is presented in Fig. 2.9.

Vertical 2—Cloud Computing

Cloud computing is an intensively discussed research topic with a high practical impact (e.g. Leung et al. 2015; Trovati et al. 2015; Vijayakumar and Neelanarayanan 2016). It can be seen as an enabler that has tremendous impact on the whole ICT industry (Armbrust et al. 2010, p. 50). Computing services are decoupled from the technical capabilities (software and hardware) that are required to run these services (Buyya et al. 2009, p. 599). Today a huge amount of cloud services is available, delivered by providers through data centers hosting cloud applications that are accessed by customers via a network like, e.g., the Internet (Buyya et al. 2009, p. 600; Qian et al. 2009, p. 627).

This trend has tremendous implications for telecommunications operators from the technical and business perspective (Claus et al. 2010). First, cloud computing is enabled by the ubiquity of broadband telecommunications networks (Buyya et al. 2009, p. 600; Develder et al. 2012, p. 1151; Mikkilineni and Sarathy 2009, p. 57). Second, cloud computing offers virtualization capabilities that might influence the managing and provisioning of network services (Jain and Paul 2013, pp. 24–25). Third, the offering of cloud computing services is an opportunity for telecommunications operators (Claus et al. 2010, pp. 7–8). Hence, in recent years telecommunications operators have significantly invested in the area of cloud computing in order to be able to provide cloud services to consumers and business customers across various verticals (Claus et al. 2010). Furthermore, cloud computing can also

be considered as an enabler for growth in vertical markets and is related to other vertical topics such as M2M (Chen et al. 2014, p. 104; Wu et al. 2011, p. 37).

Various guidelines and models for the development and deployment of cloud-related services already exist. In the telecommunications industry the definitions, service models, and deployment models provided by the *National Institute of Standards and Technology (NIST)* are widely used. According to the NIST, the typical cloud service models are (Mell and Grance 2011, pp. 2–3):

- *Infrastructure as a Service (IaaS)* provides fundamental computing resources (e.g., storage) that can be used to run any software.
- *Platform as a Service (PaaS)* offers the deployment of user-created applications over the cloud infrastructure, for example, by using programming libraries or tools.
- *Software as a Service (SaaS)* covers the whole deployment of applications that can be accessed by users.

According to the NIST, those services should include on-demand self-service, possibilities for access through heterogeneous clients, and scalability mechanisms. Based on the target group, the deployment could be realized as a private, community, or public cloud. Also a combination of those approaches is possible (Mell and Grance 2011, pp. 2–3).

Vertical 2—Healthcare

The healthcare market is complex and is characterized through a high number of stakeholders that are part of the value chain. The key stakeholders in the healthcare ecosystem include hospitals, general practitioners, health insurances, pharmaceutical companies, health ministries, providers of ICT solutions (i.e., hardware and software), and the patients themselves. The healthcare market distinguishes between the primary market, the secondary market, the tertiary market and new markets as shown in Fig. 2.10.

The current transformation of the healthcare market leads to significant investments along the value chain. In this context, ICT is an enabler for automation, data security and privacy, integration of different standards, telemedicine, patient self-monitoring platforms, digital health insurance cards and health commerce. As an example, according to the Gulf Cooperation Council (GCC), the healthcare spending in the Middle East is expected to increase fivefold, from US\$12 billion in 2007 to more than US\$60 billion by 2025, and ICT is expected to be fastest growing in the healthcare area (Mourshed et al. 2014).

Telecommunications operators are well known for their capabilities to develop, implement, and integrate different ICT solutions as well as to handle huge amounts of customer data. Hence, some telecommunications operators have started to invest in the development, implementation, and market launch of ICT solutions for the healthcare market. The vertical market for healthcare is an opportunity for the telecommunications operators to partly escape from the revenue decline and cost pressure described in Sect. 2.1.1.

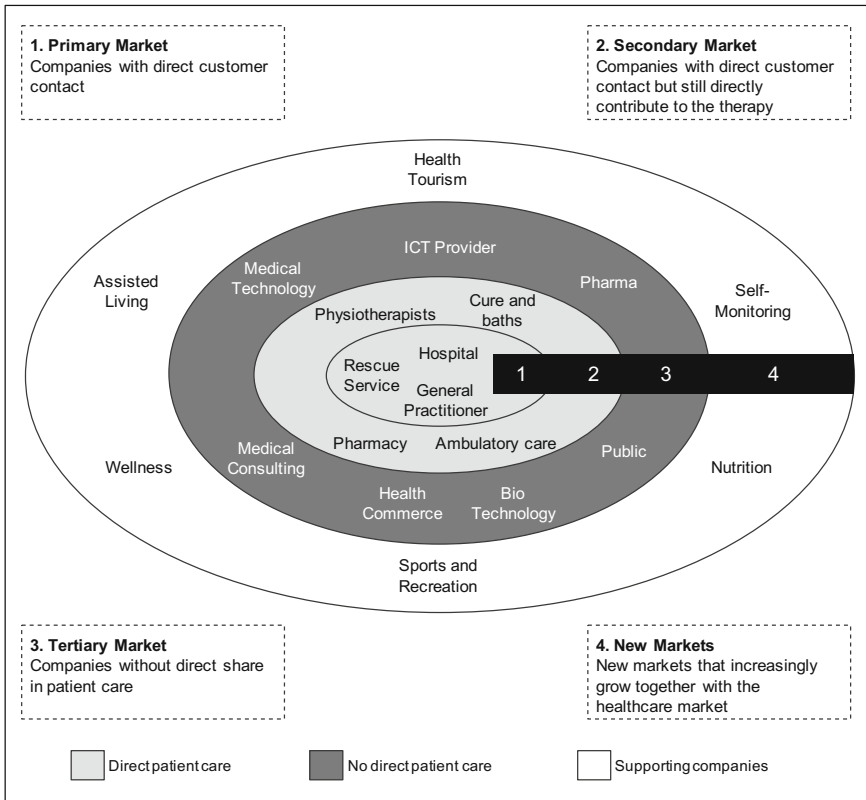


Fig. 2.10 Market map for healthcare

As an example, Deutsche Telekom, Germany’s largest fixed and mobile operator, has done significant investments to successfully enter the healthcare market. Since 2010 the healthcare division has grown rapidly at Deutsche Telekom. It has developed many individual eHealth products on its own, recruited new partners, invested in start-up companies, and made successful acquisitions. They have done the investments on such a large scale that Deutsche Telekom Healthcare & Security Solutions GmbH is now one of Europe’s healthcare ICT market leaders. Healthcare product areas covered include, e.g., connected healthcare, telemedicine, diabetes prevention portals, hospital information systems (HIS), adherence solutions, patient entertainment and digital insurance cards.¹¹

Vertical 4—Automotive

Today the car is an essential part of people’s connected life and work. With state-of-the-art ICT, driving becomes more efficient, safer, and more convenient.

¹¹Please see www.telekom-healthcare.com for further details.

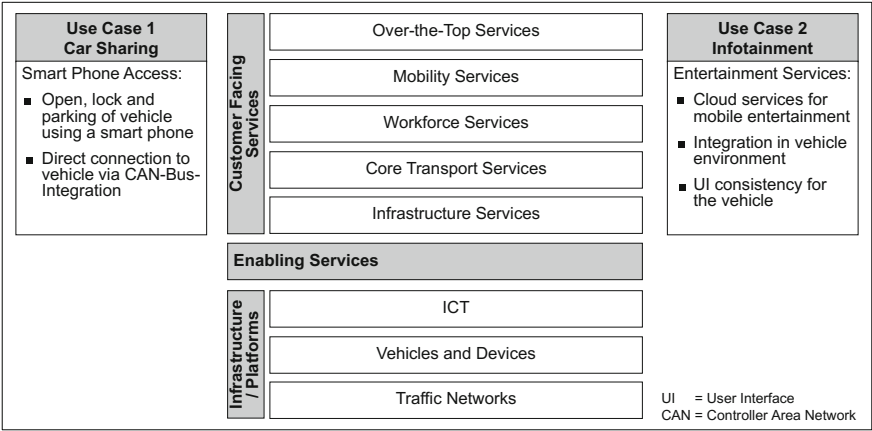


Fig. 2.11 Overview of connected mobility services in automotive

Consequently, the automotive industry offers significant business potential for telecommunications operators. As leading ICT service providers with their entire mobility ecosystem, high-performance mobile communications network, high standards of security, and quality, telecommunications operators could be the perfect partner for the automotive industry.

The advantage for automotive manufacturers is that they gain permanent, direct access to their customers and can manage services online by accessing their vehicles remotely. Once the car is part of a mobile network, automotive manufacturers can save distribution and service costs, continuously improve their product quality, tie customers into their car workshop, and control and improve their capacity utilization. Also, fleet operators benefit by integrating vehicle-based business processes that support more efficient, more sustainable use of their vehicles, and logistics service providers can optimize the operating costs of their trucks, route planning and real-time truckload management if their vehicles are online. Connected mobility services provided by telecommunications operators are based on the interworking of ICT and infrastructure components. As depicted in Fig. 2.11, use cases for connected mobility services include car sharing, infotainment and connected mobility experience.

2.1.4 A New Role for Regulators

The uneven playing field in the digital services ecosystem hinders network owners from capturing fair returns, or even the returns they had expected. The increasing demand for high transmission bandwidths requires extensive investments in

network infrastructure. However, those same networks are also increasingly beneficial for content and application providers (like, e.g., Google, Facebook, Netflix) that gain high revenues without any participation in the infrastructure investment. Currently, there is a significant value migration from telecommunications operators to OTT providers (cf. Sect. 2.1.2) and device manufacturers. Several asymmetric regulation issues were identified (Amendola et al. 2014, p. 22) that are summarized at the beginning of this section in order to highlight the challenges for telecommunications operators:

- When it comes to privacy and data protection, providers of equivalent services are not treated equally in terms of the regulatory obligations.
- Switching and data portability is currently regulated for telecommunications operators and not for OTT providers.
- As new market entrants, OTT providers often have more flexibility to maximize tax savings than telecommunications operators.
- Some services provided by OTTs are not subject to the strict e-communications services rules.

The amount of data traffic generated over mobile networks by applications is constantly increasing. The impact of the growth of mobile smart devices and connections on global traffic has been analyzed by Cisco (2015). Traffic of smart devices is expected to grow from 88 % of the total global mobile traffic to 97 % by 2019. This percentage is significantly higher than the ratio of smart devices and connections, which is estimated to reach 54 % by 2019 (Cisco 2015, p. 10). The main reason for this is that, on average, a smart device generates much more traffic than a non-smart device. As a consequence, backbone networks are required to handle the explosion in data (e.g., through fiber optic technologies).

Another central trend has been explored regarding social media and social networking (ITU 2012, p. 5). The number of active social media users surpassed the first billion already in 2011, and most of them connect to social media using their mobile devices. An interesting finding is that the countries with the ten highest penetrations of social media users are located in developing countries. The profile of users is also changing, with a growing number of organizations, public entities, telecom/ICT regulators, and government agencies joining the individual and business users (ITU 2012, p. 5). It is a fact that social media has emerged in recent years as a tool for hundreds of millions of Internet users worldwide. Regulators should consider social media from several perspectives. The social media usage must be better understood by regulators so that the importance of social media can be properly assessed for policy development purposes (ITU 2012, p. 14). For regulators, it is also important to assess whether social media raises new regulatory or policy challenges that have to be addressed. It is relatively certain that regulators will be required to establish a policy framework for the use of social media in the near future.

Regulation	Licensed network operator	OTT player
Licensing	Subject to license and license fee	No license required
Quality of Service	SLAs included in the license	No quality requirements
Interconnection	Interconnection mandated	No interconnect requirements
Universal Service	Subject to universal service obligation	Not subject to universal service regime
Consumer Protection	Subject to consumer protection policy	Little or no enforcement power
Legal Interception	Usually license condition	Country dependent
Taxation	Subject to national tax regime	Service dependent

Fig. 2.12 Regulatory imbalance for operators and OTTs

On the one hand, there is an apparent imbalance regarding market and market entry conditions between licensed telecommunications operators and OTT providers. On the other hand, a new regulatory balance is not yet in sight. A comparison¹² of the regulatory obligations for licensed network operators and OTT providers has been performed, and the results of the comparison are summarized in Fig. 2.12.

In this context, the concept of *net neutrality* is further examined. Net neutrality is a somewhat vague concept. A common and at the same time high-level understanding of net neutrality is that all IP traffic should be treated equally, regardless of the type of content, service, application or device. There is an intense discussion about the concept of net neutrality (e.g. Belli and De Filippi 2015; Plunkett 2014, p. 10). ITU has defined network neutrality as follows: “Network neutrality is best defined as a network design principle. The idea is that a maximally useful public information network aspires to treat all content, sites, and platforms equally. This allows the network to carry every form of information and support every kind of application.” (ITU 2013, p. 16).

¹²The comparison is based on project work conducted by Detecon.

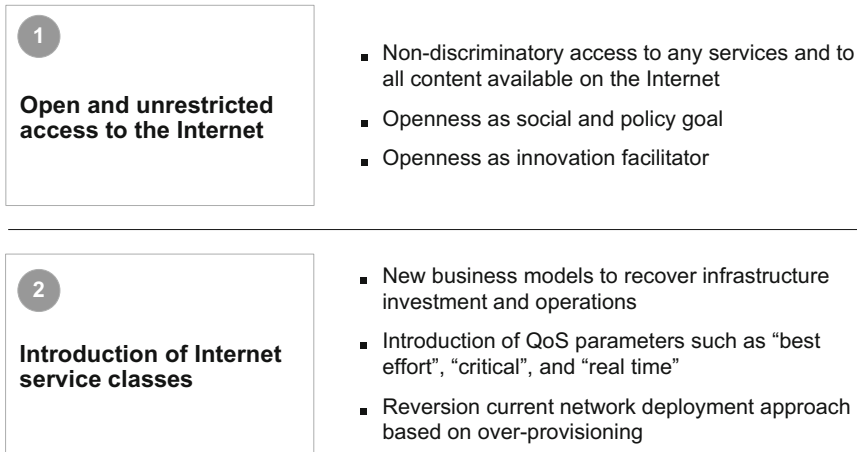


Fig. 2.13 Network neutrality and two opposing positions¹³

There are a number of issues related to network neutrality which regulatory authorities should consider. The focus to date has been at the national level. However, the Internet is in fact a global network. It seems inevitable that, at some point, there will be a push to extend the regulation of net neutrality from the national to the international level (ITU 2013, p. 22). The following three different categories of actions can be differentiated:

- *Cautious observation*: These countries have considered whether network neutrality rules are needed at this point in time and decided not to take any action for now.
- *Tentative refinement*: These countries have implemented a "light" approach that introduces some new rules to the existing regulatory framework governing communications services. For example, some rules require greater transparency and disclosure of network management practices. Still, these new rules do not go so far as to prohibit certain behaviors.
- *Active reform*: These countries have gone further with the changes to their regulatory framework and prohibit specific behaviors by Internet Service Providers (ISPs). The changes to the regulatory framework include, for example, the prohibition of blocking and throttling that are often subject to reasonable network management practices.

The network neutrality debate can be characterized by two opposing positions. One position is open and unrestricted access to the Internet, whereas the other position is about the introduction of Internet service classes. It is recommended that regulators should go beyond the current either-or-approach, but combine the two positions as outlined in Fig. 2.13.

¹³Network neutrality and two opposing positions based on project work from Detecon.

2.2 Telecommunications Products and Services

In order to react to the changed market conditions, telecommunications operators are confronted with continuous innovations (Picot 2006) and shorter product development cycles (Bruce et al. 2008). Realizing a flexible interrelation between commercial products and technical services is important for a fast reaction to market demands. Furthermore, due to deregulated markets and increased competition, committed focus on the customer is essential. In Sect. 2.2.1, a general product and service structure is introduced. The consistent management of the customer experience is discussed in Sect. 2.2.2.

2.2.1 *Interrelation Between Commercial Products and Technical Services*¹⁴

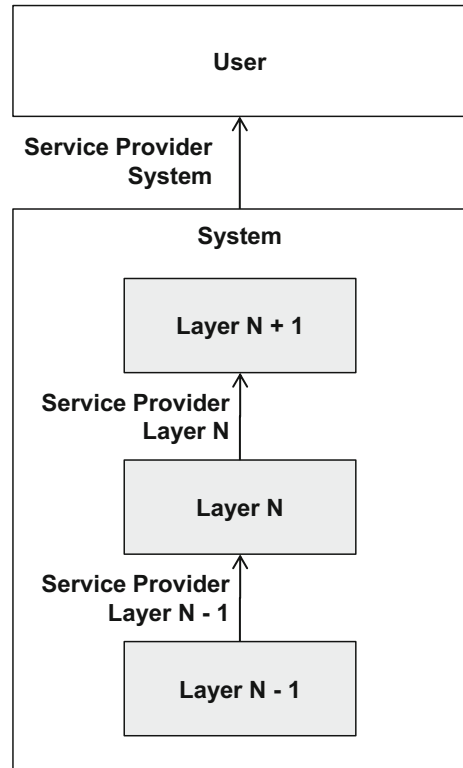
Telecommunication services are services that are usually provided fully or predominantly in telecommunication networks. In a broader sense services are, in the context of distributed systems, described as a component that provides certain functionality to a user (Coulouris et al. 2005, pp. 7–8). A hierarchical decomposition of services is possible because communication systems are represented in different layers (e.g., Open Systems Interconnection, OSI). This means that the service of a communication system is composed of services from individual layers as shown in Fig. 2.14 (Tanenbaum and Wetherall 2014, p. 30).

Services should therefore be described with reference to a consistent level of detail. A service of the transmission layer has to be distinguished from a service of the application layer, although both services might contribute to the same communication service. In this context protocols are understood as a framework of rules to execute a particular service (Tanenbaum and Wetherall 2014, pp. 40–41). At the same time, protocols within a layer can be arbitrarily changed as long as the service is executed towards the user according to the agreed quality parameters. Exemplary protocols are the well-known *Transmission Control Protocol/Internet Protocol* (TCP/IP) used in the Internet (Tanenbaum and Wetherall 2014, p. 41) and the *Radio Link Control/Medium Access Control* (RLC/MAC) used in mobile telephony (Werner 2010, p. 193). From a technical perspective, a telecommunication service is a communication facility that is described through distinct features (e.g., information type, communication type, bandwidth requirement) and service performance.

Previously, dedicated service networks were operated, meaning that networks were assigned to one dedicated service—e.g., the telephone network was assigned to the telephony service. This arrangement was no longer necessary with the usage of digital networks, which is also referred to as technology convergence

¹⁴This section is a translated and slightly revised version of the content published in Czarniecki (2013, pp. 39–41).

Fig. 2.14 Relation between services and layers (according to Georg 1996, p. 43)¹⁵



(Wieland 2007, p. 46). However, this has also made the classification of telecommunication services difficult, as they are strongly dependent on the technical development and the usage behavior. For instance, the differentiation between mobile telephony and data services was quite useful at the end of the 20th century (Gerpott 1999, p. 61). Nowadays, with the increasing usage of mobile data services, this differentiation is no longer sustainable.

With respect to communication types, a differentiation can be made between individual services (e.g., voice telephony) and a distribution service (e.g., radio). The individual service facilitates an information exchange between two or more participants in both directions. The distribution service allows asymmetric information exchange from one sender to several recipients (Gerpott 1999, pp. 59–60). In addition, it can be distinguished by the form of exchanged information (e.g., voice, picture, text).

The selling of telecommunication services to customers remains an original objective of a telecommunications operator. In this respect, the consideration of telecommunication services from a marketing perspective also has to be made.

¹⁵Translated version of the illustration published in Czarnecki (2013, p. 39).

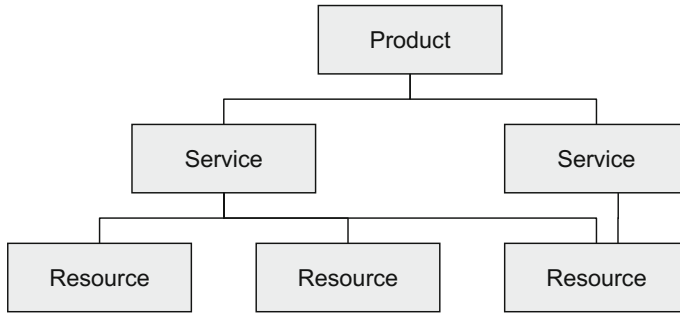


Fig. 2.15 Interrelation between product, service, and resource (according to Bruce et al. 2008, p. 19; Czarnecki and Spiliopoulou 2012, p. 393; TM Forum 2015, p. 46)¹⁶

At the same time, a differentiation between a general service (e.g., the installation service of a service technician), a technical service (e.g., the transmission service of a mobile network) and a service as a product (e.g., consisting of general and technical services) is important. In fact, the term *service* is used for all three different types. The differentiation is, in most cases, only possible by considering the overall context. In the technical context of IT systems or communication networks, services are often understood as the technical provision of functionality as described above. From an economic perspective, the telecommunications industry belongs to the service industry and, accordingly, a service will be provided to the customer (Zeithaml and Bitner 2003, p. 3). As shown in Fig. 2.14, only a subset of the services is perceived by the customer. All other services are executed within the telecommunications network as well as the telecommunications system, and are not visible to the customer.

In order to avoid terminological confusion, the term *product* should be used to describe a telecommunication service that is provided to a customer (Bruce et al. 2008, p. 19; Snoeck and Michiels 2002, p. 335). According to Bruce et al. (2008, p. 19) and TM Forum (2015, p. 46), the following tripartition is used for structuring (cf. Fig. 2.15):

- *Product* represents the commercial view and can consist of one or several services (in a broader sense) and technical devices (e.g., telephone)
- *Service* (in a broader sense) is a detailing of a product and can comprise a technical telecommunication service (e.g., voice telephony) as well as an additional provision of service (e.g., connection of telephone)
- *Resource* represents the lowest level of detail and, therefore, the building blocks of services. A resource can be a physical device that is owned by the customer (e.g., telephone) or it can be used by the customer either completely or partially (e.g., telephone line). Resources can also be immaterial goods (e.g., installation work).

¹⁶Translated version of the illustration published in Czarnecki (2013, p. 41).

2.2.2 Customer Experience Management

Customers of telecommunications operators do have increasing expectations in terms of product functionality, ease of product usage, efficiency of processes, and the skills and knowledge of staff working in the different sales channels. A solid *Customer Experience Management (CEM)* can be a major differentiator for telecommunications operators and leads to higher customer satisfaction and loyalty.

In the past, monopolistic telecommunications operators had a more administrative view on customer demands. Nowadays telecommunications operators have to accept the typical rules of highly competitive markets: customers are willing to pay more if a good service quality is ensured, whereas weak service experience leads to complaints and customer churn. Some reasons for customer churn can be the interaction with unmotivated employees, unexpected charges, or products and services with a poor quality. It is important that telecommunications operators understand that negative customer experience pushes customers away. At the same time, it is human nature to pass on negative experience more intensively to others than positive experience. Hence, a primary objective of telecommunications operators should be to introduce enhanced processes and solutions which will minimize the probability of negative customer service.

High customer satisfaction and loyalty at all customer touch points is the key objective of any CEM endeavor. A comprehensive approach is needed to achieve sustainable optimization of customer interactions and avoid customer disappointments in critical interactions—the so-called *moments of truth*. This new, overall approach should aim for a fundamental change in the customers' perspective and the avoidance of customer disasters in future by concentrating on critical interaction points. The change in the customers' perspective will result in the sustainable optimization of critical customer interactions. Concentrating on high priority customer grievances, rather than overambitious and complex CEM concepts that often fail during the implementation, usually leads to tangible and measurable benefits in a relatively short timeframe. Practical project experience has shown that the trial and validation of pilots can be more successful than doing endless analysis. A general rule of this approach is that there should always be careful consideration of the customer perspective before undertaking any optimization measures.

The approach developed and successfully applied to improve customer experience and hence customer satisfaction consists of two steps:

In the first step, key pain points with high priority from a customer perspective are identified at different customer interaction points. The customer interaction points can be identified by analyzing customer-centric processes, such as order, change, termination, or problem solving (cf. Sect. 4.3.1). Figure 2.16 illustratively shows some customer-centric processes, typical customer interaction points, and examples for the prioritization of interaction points from a customer perspective. Customer interaction points with a high priority and a negative customer perception are selected to be addressed first.

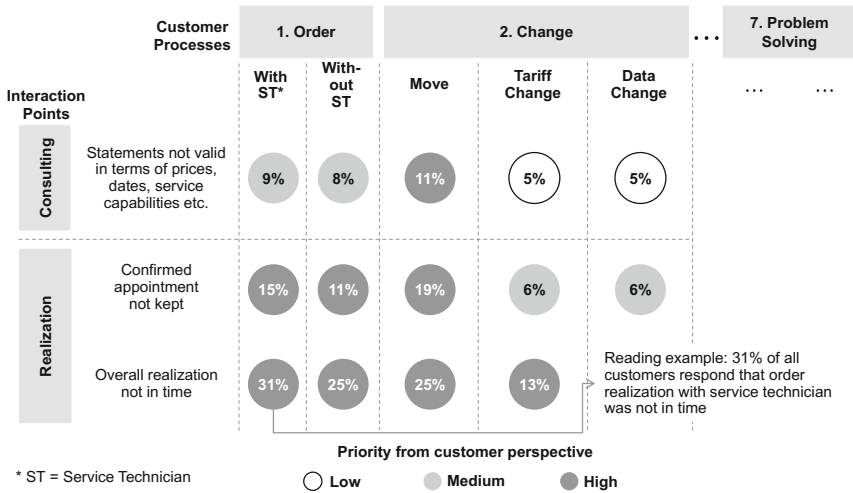


Fig. 2.16 Pain point identification from a customer perspective¹⁷

In the second step, action areas and concrete initiatives for eliminating negative moments of truth are defined to implement optimization measures with tangible benefits. For each initiative, a problem statement has to be formulated in order to ensure that all stakeholders who are involved in the initiative have the same understanding of the existing challenges. The specific objectives and the expected outcome of each initiative also have to be defined amongst the stakeholders. All initiatives should strictly focus on customer anger elimination.

Next, there is an illustrative example related to the problem-solving process of a telecommunications operator. This example consists of a problem statement, the formulation of the initiative objective, and the expected benefits:

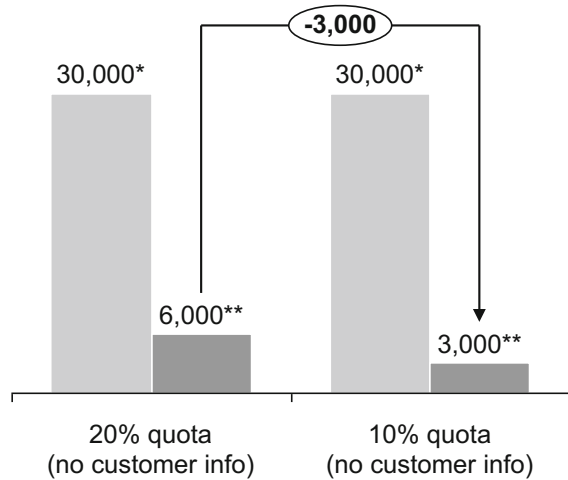
Problem Statement: 20 % of all customers are not proactively informed when a service technician is unable to keep an appointment.

Objective: To reduce the non-information quota by 50 % in cases involving delay. Customer grievances can be significantly reduced if adequate information is sent to customers in advance in situations where a service technician cannot keep an appointment.

Benefits (illustrative figures): Fig. 2.17 shows that a 50 % reduction in the non-information quota in those situations involving any delay would lead to 3000 additional customers getting a message when a technician is unable to keep an appointment.

¹⁷Approach developed by Detecon in cooperation with a leading European telecommunications operator.

Fig. 2.17 Example for improved customer experience



- * Number of customer appointments per year
 ** Number of customers not informed when an appointment will not be kept

Greater benefits can be achieved if similar measures are defined and implemented for many, different high priority customer grievances. Measures could include the proactive disposition of customer appointments in the technical service area, or the usage of existing IT-systems and relevant customer data to contact the customer. In practice, this is unfortunately often not the case in today's telecommunications industry. A positive effect of such measures is that any delay and rescheduling of customer appointment become transparent to the customer as soon as possible. This subsequently leads to the improvement of perceived appointment compliance and a reduction in the general dissatisfaction with rescheduling.

2.3 Telecommunications Value Chain

The value creation in the telecommunications industry is heavily influenced by new players, such as content and applications providers (Peppard and Rylander 2006, pp. 128–129; Pousttchi and Hufenbach 2011, p. 307). The resulting erosion of the traditional value chain is discussed in Sect. 2.3.1. A reaction of telecommunications operators is the establishment of new partnerships (Grover and Saeed 2003, pp. 121–125). The impact and a step-wise partnering approach are introduced in Sect. 2.3.2.

2.3.1 Erosion of the Traditional Telecommunications Value Chain

For a long time, the focus of the telecommunications industry has been on the transmission of information over long-distance networks. The transmission was mainly focused on the technically correct transmission of signals. A major part of the value creation of a telecommunications operator was the roll-out and operations of the required network infrastructure. Those communications networks were related to extensive long-term investments, which served as an enormous market entry barrier for new competitors. The requisite skillset was mainly related to communications engineering.

However, in the last two decades the telecommunications industry has gone through a major transformation (Cave et al. 2002, p. 3). The driver of this transformation is the technological development in terms of higher bandwidth and improved computing power. This technological development has resulted in innovations and a different user behavior—for example, through social networks (Picot 2007, p. 19). The convergence of telecommunication services (Bertin and Crespi 2009, pp. 188–189), the usage of mobile value-added services (Bina and Giaglis 2007, pp. 241–246), and the impact of mobile devices (i.e., smartphones) with high performance operating systems (Basole and Karla 2011) are all impacting the telecommunications industry. The value creation in telecommunications has moved away from the pure transmission of information towards the offering of application services (Peppard and Rylander 2006, pp. 133–134; Pousttchi and Hufenbach 2011, p. 299). The consolidation of telecommunication, computer and media industry is a result (Arlandis and Ciriani 2010, p. 121).

The telecommunications value chain creates exciting new opportunities and new challenges for infrastructure and service providers at the same time. The value chain that has long been successfully established in the telecommunications industry for a long time is increasingly being deconstructed. New, powerful players are entering the market, and a radical restructuring of the industry is ongoing. In fact, the rapid technological developments and increasing market turbulences have added new dimensions to an already complex scenario. Several implemented business models that were generating revenues for telecommunications operators have become less important (Li and Whalley 2002, p. 460). The increased focus on applications has resulted in a convergence of voice, video, and data. The technical transmission becomes a minor part of the overall telecommunications value chain, which is now confronted with new players, mergers, and acquisitions (Tardiff 2007, p. 132; Wulf and Zarnekow 2011b, pp. 10–11). Entertainment services like TV offers are linked to traditional communication services, leading to new competition between TV cable operators and communication network operators (Plunkett 2014, p. 7). Virtual

Table 2.2 Selected reports about changes of the telecommunications value chain

Publisher	Title	Content	References
STL Partners	Five principles for disruptive strategy	Strategic options for business models in the telecommunications industry	STL Partners (2014)
Ovum	Innovative broadband pricing strategies	Importance of content and applications for differentiated pricing strategies	Ovum (2014a)
Ovum	Digital operator strategies	Evaluation of business models based monetization of new services	Ovum (2014b)
Informa Telecoms & Media	Industry outlook 2014—digital futures: Creating new roles and value chains	Broad analysis of changed market conditions, e.g., spend per different players of the value chain	Informa Telecoms & Media (2014)
IDATE	Future telecom: Trends and scenarios for 2025	Evaluation of future scenarios of the value chain and their impact on telecommunications operators	IDATE (2014)

business models (e.g. Virtual Mobile Operator) exist that allow a successful value creation without owning and operating a communication network (Pousttchi and Hufenbach 2009, p. 87). Li and Whalley (2002, pp. 462–468) argue that the result is a value network consisting of software intermediaries, financial intermediaries, content providers, portals, and resellers.

Also, in practice, the changes of the telecommunications value chain and the impact of those changes on business models are discussed in various reports (cf. Table 2.2). All of those reports describe the erosion of the value chain and the requirements of new, changed business models for traditional telecommunications operators. The pure provisioning of voice and data transmission via fixed or mobile networks seems to be an outdated business model. The change from usage-dependent to flat-rate tariffs was the starting point for traditional telecommunications operators to think about new revenue streams. Various studies illustrate those changed market conditions based on revenue and usage figures (e.g. Plunkett 2014). As a result, applications become an important part of the value creation (cf. Fig. 2.18). The combination of transmission services with application services allows differentiated pricing strategies and new revenue models (e.g., advertisement). For traditional telecommunications operators, such innovations require investments into own developments, acquisitions, or partnerships with new market players (cf. Sect. 2.3.2).

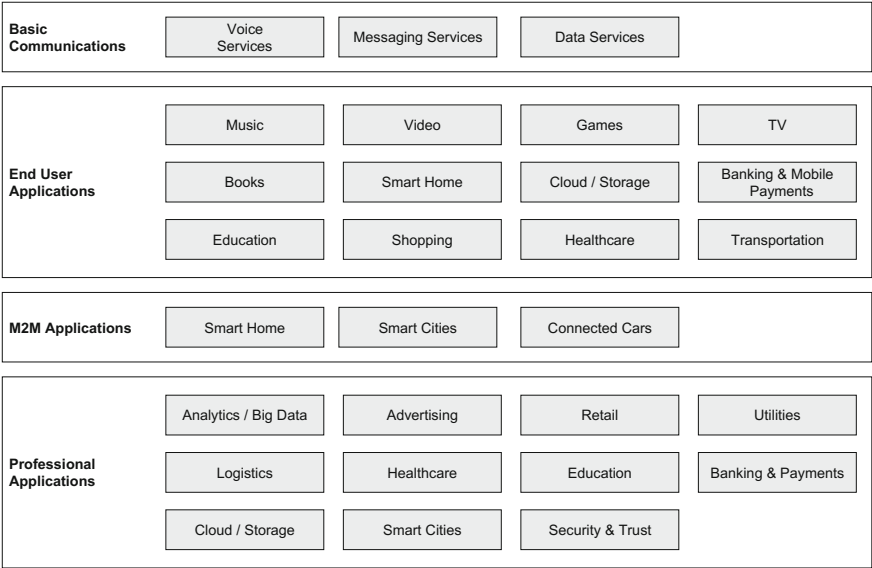


Fig. 2.18 Selected innovative services of the telecommunications value creation¹⁸

2.3.2 The Operator Partnering Imperative

The way towards sustainable growth for telecommunications operators in existing and new business areas still remains a major challenge. Nowadays telecommunications operators are facing a twofold competition, from well-established telecommunications operators and from large and small players in the market, who successfully attract consumers with mobile Internet and innovative online services, for example.

Through increasing competition in the telecommunications industry as well as the emergence of OTT providers as described in Sect. 2.1.2, the need for establishing partnerships between telecommunications operators is becoming more important. In the past, telecommunications operators have mainly concentrated on moving their own business forward without taking partnerships with other operators seriously into consideration. The situation has changed and leading telecommunications operators are becoming more open to establish strategic partnerships for high priority business areas.¹⁹

In Sect. 2.1.3, the general growth potential in vertical markets and the activities of telecommunications operators in selected business areas like M2M, healthcare, cloud, and automotive are discussed. The endeavor to generate new revenue

¹⁸Own illustration based on the reports shown in Table 2.2.

¹⁹The information provided in the section is mainly based on project work conducted by Detecon.

streams and to successfully enter these business areas requires large financial investments by the telecommunications operators. Entering new markets is a challenge for telecommunications operators, and there are examples where additional investments are required as part of the learning curve. Experts with the relevant vertical expertise should be an active part of the project teams developing solutions and service offerings. Telecommunications operators often face long recruitment cycles for experts and therefore consider alternative scenarios in the form of support from partners.

Operator partnering is an especially viable option if both telecommunications operators have a non-overlapping footprint and a similar group structure with regard to headquarters and national companies. It is also helpful if both companies have a comparable governance structure and equal operating model between group headquarters and operational companies, as these types of operators are usually facing similar corporate governance challenges.

The core elements of a strategic partnership framework between telecommunications operators with increasing mutual responsibility include:

- general knowledge sharing and transfer;
- regular site visits;
- joint business models;
- joint market and sales approach for products/services; and
- revenue and investment sharing.

Selected advantages for the telecommunications operators are:

- benefit from existing solutions of the other operator;
- joint product development and innovation activities;
- reduction of product development cost;
- new and innovative business models;
- potential to enter new regional markets; and
- footprint extension for own products and services.

For the purpose of identifying potential business areas for partnership, knowledge sharing, and transfer as well as the development of joint business models, it is recommended that telecommunications operators establish a strategic partnership framework for the mutual benefit of both organizations. While establishing the strategic partnership framework, investments, benefits, and the level of interest have to be in balance for both parties. A strategic partnership framework can be established by following a stepwise approach as shown in Fig. 2.19.

Step 1—Framework Agreement

In the first step, the telecommunications operators explore opportunities for commercial partnerships with regard to several business areas in the telecommunications market or other vertical markets, which should enable them to exploit untapped synergy effects. For this initial step, both telecommunications operators enter a general framework agreement. In the framework agreement, the operators agree to cooperate with each other and use reasonable commercial efforts to identify and evaluate possibilities for commercial partnerships in the areas of cooperation.

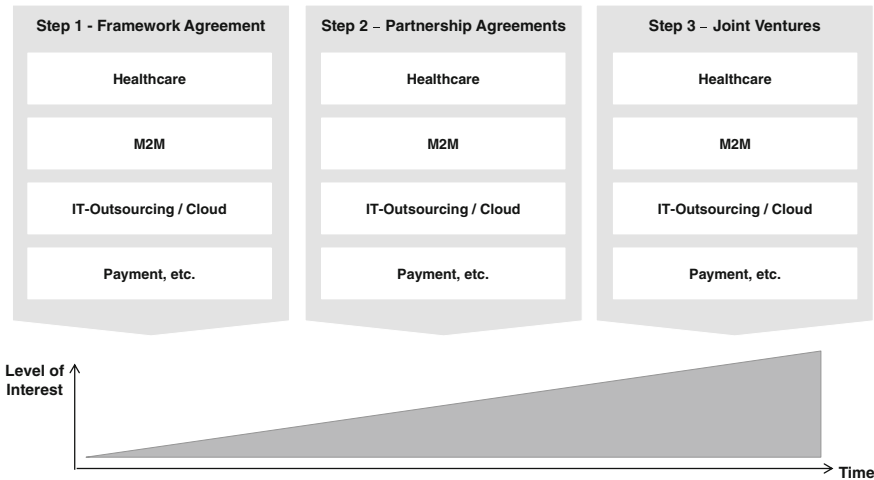


Fig. 2.19 Strategic partnership framework establishment

Step 2—Partnership Agreements

In the second step, concrete partnership agreements for joint business models are established between both telecommunications operators with the objective of revenue and investment sharing. The partnership agreements are ideal for cooperation in selected business areas that promise a positive return on investment. Besides the elaboration of joint business models and solutions, both telecommunications operators can also develop joint go-to-market and sales approaches. Through joint go-to-market and sales approaches, knowledge can be exchanged between both telecommunications operators. Lessons learned from the actual implementation of the market approaches for products and services can also be shared, and these are an important input for improvement initiatives in both telecommunications operators.

Step 3—Joint Ventures

In the third step, both telecommunications operators decide to establish a joint venture as a separate entity that will fully focus on the common business interest.

A real-life example for operator partnering and the establishment of a joint venture is BuyIn²⁰ which is the 50:50 procurement joint venture between Deutsche Telekom and Orange. The joint venture combines approximately EUR 20 billion of annual spend of the two companies in three main domains: network, customer equipment and service platforms. By pooling their procurement activities in this equal joint venture, Deutsche Telekom and Orange expect to achieve significant economies of scale and deliver annual savings through best price alignment, the aggregation of volumes, the harmonization of specifications and improved collaboration.

²⁰Please see <http://www.buyin.pro> for further details.

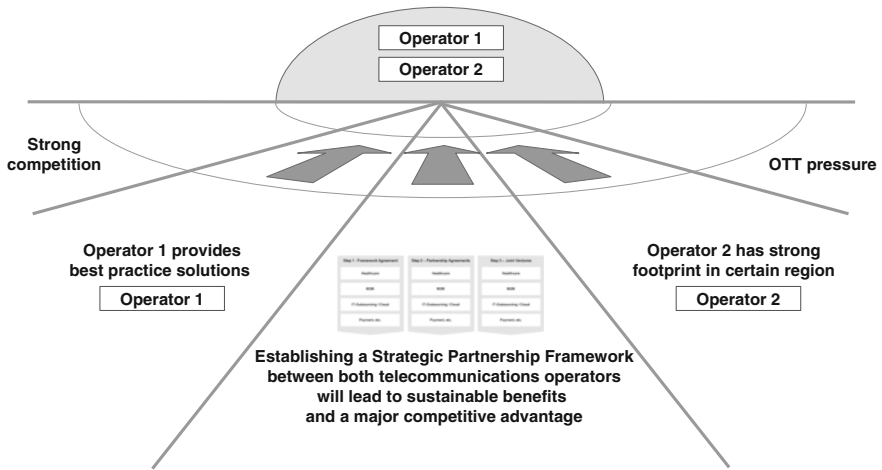


Fig. 2.20 Target picture of strategic partnership framework

As illustrated in Fig. 2.20, the strategic partnership framework consisting of the three steps will bring both telecommunications operators together in selected business areas. The target picture—i.e., to deal with competition from other operators and OTT pressure, as well as to jointly bring best practice solutions to the market—can all be achieved through implementing the strategic partnership framework by both telecommunications operators.

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