

Exploring the Potential of Fixed and Mobile Convergence in Indonesia's Telecommunication Industry

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Abstract. Indonesia's telecommunications industry faces challenges as connectivity becomes commodity and revenue stagnates or declines in some countries. To address these challenges and attract users amidst increasing competition, operators are innovating their services, with a focus on Fixed Mobile Convergence products that combine fixed and mobile broadband technologies. This research aims to explore the significance and value or benefits of implementing fixed and mobile broadband innovation for telecom service provider in Indonesia, with qualitative approach involving interviews with both international telecom operators and local telecom operators. The interview results highlight the importance of fixed and mobile broadband for infrastructure efficiency, customer satisfaction, revenue generation, and churn reduction. As operators strive to sustain their companies and meet the evolving demands of users, the findings offer valuable insights into the advantages and implications of Fixed Mobile Convergence implementation in the telecommunications industry in Indonesia.

Keywords: Fixed Mobile Convergence (FMC), Indonesia, Telecommunication

1. Introduction

The Internet is an electronic tool that can be utilized for various activities such as a window of knowledge, entertainment media, communication, research, and business transactions. Indonesia boasts a total of 14.91 million users of fixed broadband (Hidayat, 2023) and 346.8 million users of mobile broadband (Kusnandar, 2022).

Rapid technological advancements and increasing consumer demands are driving telecommunication companies worldwide to explore innovative solutions. One such innovation is Fixed Mobile Convergence (FMC), which aims to integrate fixed and mobile broadband services to create a good Quality of Service (QoS) for users. This convergence represents a paradigm shift in telecommunication services, blurring the boundaries between fixed and mobile broadband networks.

FMC enables telecommunication service providers to offer various integrated services, including voice, data, and multimedia, through a single platform. This allows users to access these services seamlessly, regardless of location or device used, thereby enabling consumers to access services without regard to their location or device used.

The integration of FMC services has the potential to transform the telecommunications landscape in Indonesia, a country with a rapidly growing digital economy and a large and diverse population. As the demand for connectivity continues to increase, telecommunication companies in Indonesia are exploring innovative solutions to meet the evolving needs of consumers and businesses.

In this preliminary research, the researchers focused on FMC in the context of the telecommunications landscape in Indonesia. This study aims to: a) understand current FMC adoption levels among operators in Indonesia, b) identify integrated services offered, c) explore perceived benefits and challenges, d) provide implications for stakeholders. This study focused on understanding the level of convergence adoption by telecommunication providers in the country, the types of integrated services offered, and their impact on consumer behavior.

2. Literature Review

VoIP technology allows voice communication over the internet, converting analog voice signals into digital data packets. It offers cost-effective and feature-rich telephony services, eliminating the need for traditional circuit-switched networks. As VoIP evolved, it became more robust, reliable, and capable of delivering high-quality voice calls over various internet connections, including fixed broadband and mobile networks. LTE, or Long-Term Evolution, is a standard for wireless broadband communication. It provides high-speed data transmission, low latency, and improved spectral efficiency compared to previous generations of mobile communication technologies. LTE enables faster internet connectivity and supports a wide range of multimedia applications, including voice, video, and data services.

The combination of VoIP and LTE technologies forms the backbone of Fixed-Mobile Convergence. FMC aims to unify fixed-line and mobile networks, allowing seamless handover of communication sessions between different access technologies. With VoIP running over LTE networks, users can access voice services over both fixed and mobile connections using a single device and a unified phone number.

The concept of fixed and mobile convergence is rooted in the evolution of telecommunications technology. Conventionally, fixed and mobile networks operate independently, serving different communication needs. However, with the emergence of digitization and the proliferation of mobile devices, the boundaries between fixed and mobile have started to blur. This has given rise to the idea of converged communication services that integrate fixed and mobile into one platform.

Hybrid access is an initial approach that can be used to implement FMC; however, this approach is highly limited because fixed and mobile broadband networks are still two separate networks connected through an aggregation point (Condoluci et al., 2019).

The convergence of fixed and mobile networks has gained global momentum as telecommunication service providers strive to offer more versatile services to users. In advanced countries, FMC technology

has become a standard for providing integrated services such as voice, data, and multimedia delivery. The success of FMC services in these markets has encouraged telecommunication companies in developing economies like Indonesia to explore similar solutions to meet the increasing demand for connectivity.

A review of the global telecommunications industry reveals several trends related to FMC. Firstly, FMC services have become a primary strategy for telecommunication providers to remain competitive in rapidly evolving markets. By offering integrated services, providers can attract and retain customers seeking convenience and flexibility in their communication choices.

Most global telecommunication operators are already prepared for market integration through FMC structures. A summary of relevant Merger and Acquisition (M&A) activities is presented in **Figure 1** below.

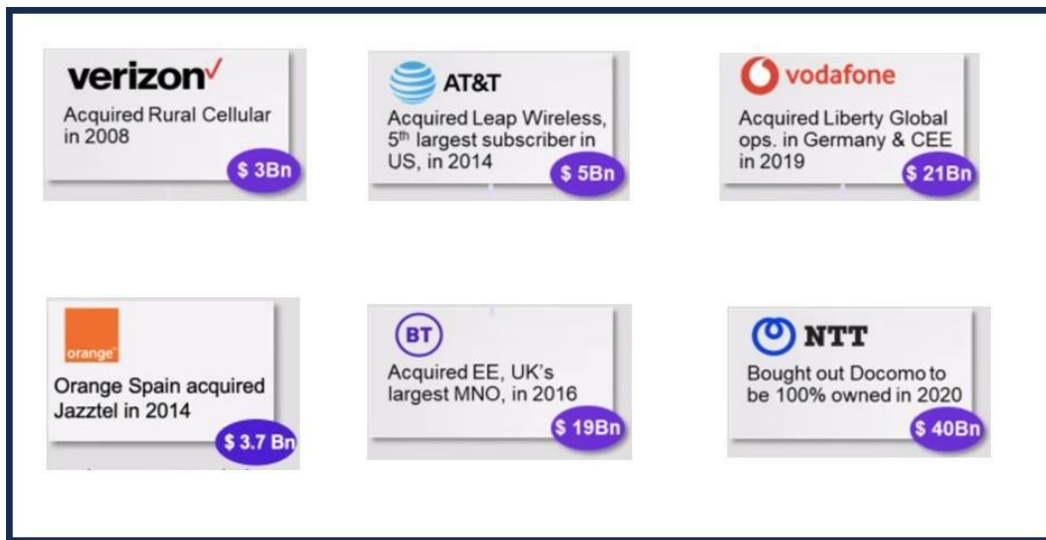


Fig. 1: FMC related Merger & Acquisition

Globally, FMC has been proven to impact user adoption, churn rate, and user value in both prepaid and postpaid markets. However, the implementation of FMC does not always guarantee success; it depends on the strategies employed. The technological implementation can result in value creation or reduction in different countries, as shown in the infographic in **Figure 2**.

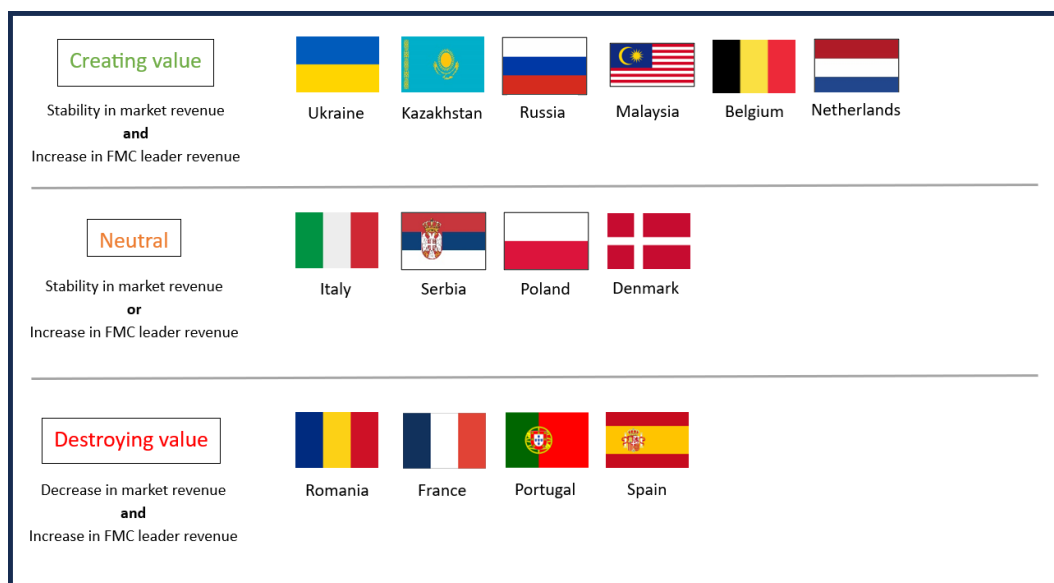


Fig 2: Value creation of FMC implementation

In addition to convenience and flexibility for users, FMC offers significant cost savings for telecommunication service providers and results in increased energy consumption due to shared infrastructure. FMC will impact control and data architecture, offering features beyond traditional network control by enabling the implementation of new end-to-end services (Pachnicke et al., 2016).

Secondly, advancements in Voice over Internet Protocol (VoIP) and Long-Term Evolution (LTE) technologies have significantly contributed to the development of converged services. VoIP allows voice call transmission over the internet, eliminating the need for separate fixed-line infrastructure for voice communication. Meanwhile, LTE provides high-speed mobile data connectivity, enabling seamless delivery of multimedia content across fixed and mobile networks.

Lastly, the proliferation of smartphones and mobile applications has transformed consumer behavior, creating a demand for equal access to communication and entertainment services. Fixed and mobile convergence addresses this demand by enabling users to access various services through their preferred devices, regardless of their location.

In Indonesia, the relevance of FMC is heightened by the unique characteristics of the country. As a rapidly growing digital economy with a population of over 270 million, including a significant portion of tech-savvy youth, the demand for seamless communication services is increasing.

One key aspect that makes FMC highly relevant in Indonesia is its ability to optimize the use of existing telecommunication infrastructure. While Indonesia's geographical diversity poses challenges in providing comprehensive network coverage, FMC offers a strategic approach to leverage shared infrastructure, maximize network resources, and reduce excessive investments. By integrating fixed and mobile services within a unified architecture, telecommunication providers can expand coverage to remote and underserved areas more effectively, driving digital inclusion across the country. Several telecommunication service providers in Indonesia have already started implementing FMC services, including Telkomsel FMC by combining Indihome and mobile services, XL with XL Satu service, Indosat HiFi, and Oxygen + Fren.

Furthermore, the seamless transition between fixed and mobile networks enabled by FMC architecture can enhance the overall user experience. In countries with high mobile device penetration rates, users expect continuity and consistent service quality when switching between fixed and mobile communications. The architecture of FMC, as depicted in Figure 3 below (Nam & Park, 2016).

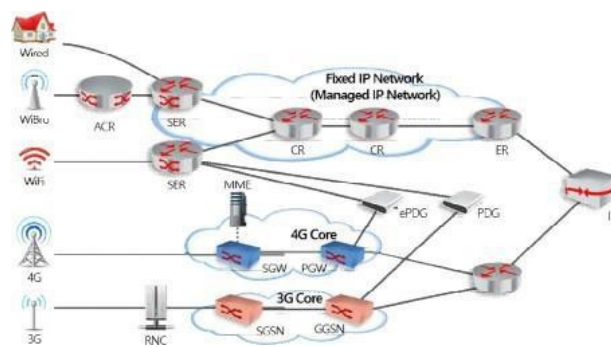


Fig. 3: FMC Architecture (Nam & Park, 2016)

The Indonesian government has also recognized the importance of digital connectivity in driving economic growth and social development. Policies and initiatives that promote digital transformation and further technology adoption emphasize the potential of fixed and mobile convergence in contributing to the nation's progress.

In Indonesia, giant corporations have implemented various strategies to adopt FMC. PT Telkom Indonesia entered into an agreement with Telkomsel to integrate IndiHome into Telkomsel. Upon the

completion of the IndiHome integration, Telkom's effective ownership in Telkomsel increased to 69.9 percent, while Singtel's ownership in Telkomsel became 30.1 percent.

XL Axiata, as a promoter introducing FMC to the Indonesian society since 2021, reached a non-binding agreement with Link Net regarding the transfer of internet business. Additionally, PT Indosat Tbk. (ISAT) acquired assets from MNC Play, a subsidiary of PT MNC Vision Network Tbk. (IPTV) (News Source, 2023).

Several studies have investigated the implementation and impact of FMC in various contexts. Studies such as by Samdanis et al. (2017) analyze the implementation approach of FMC technology through hybrid access between fixed and mobile networks as a preliminary step in FMC technology deployment. Meanwhile, studies by Nam & Park (2016) and guidelines by 3GPP (2018) delve deeper into the architecture that can be used in implementing FMC technology development.

Research in advanced countries has highlighted the benefits of convergence, as seen in papers by Pachnicke et al. (2016) and Pardo & Sassatelli (2016) which analyze increased operational efficiency for telecommunication providers and improved user experiences. However, studies focusing on emerging markets like Indonesia are still limited.

To address this gap, this preliminary research aims to contribute to existing knowledge by exploring the current situation of fixed and mobile convergence in the Indonesian telecommunications industry. By conducting an in-depth analysis of the local market and examining unique challenges and opportunities, this study seeks to provide valuable insights that can inform stakeholders in the industry and policymakers in shaping the future of telecommunications in Indonesia.

3. Methodology and Analysis

The methodology employed in this interview session utilizes qualitative analysis method. It is conducted by defining questions to be presented to the respondents. The interview format adopted is that of a Forum Group Discussion.

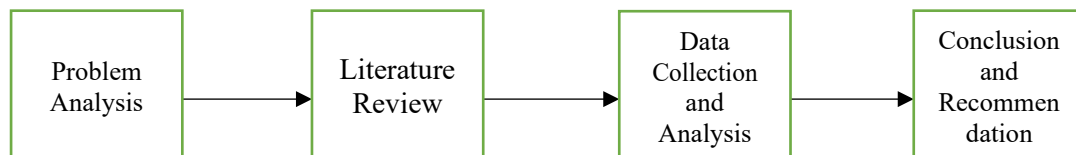


Fig. 4: Research Stage

The problem analysis is conducted by examining reports from each operator. For example, information can be gathered from news source. By reviewing news articles, we can collect the necessary information for study.

This methodology is limited to the four major telecommunications companies in Indonesia. Following data collection and analysis, FMC is deemed necessary to enhance efficiency and establish an unbreakable network, addressing issues prevalent in both fixed and mobile broadband. The following is a list of questions:

No.	Interviewer Question	Respondent Answer
1.	According to your perspective, what is meant by FMC?	FMC is the integration of two distinct technologies: fixed and mobile broadband. Both will serve as backups to achieve seamless integration between fixed and mobile broadband technologies.
2.	How important is FMC for the company (Telkom/Telkomsel)?	One of the current phenomena is the dissatisfaction among mobile and fixed broadband customers. As a result, there is a migration of customers from operator A to operator B. Customers will always seek a better and more reliable operator. The FMC model can assist operators in becoming the solution to this demand for an unbreakable network.
3.	What are the considerations behind Telkom's decision to adopt FMC?	Telkom adopts FMC for several purposes: • Efficiency: With the FMC infrastructure model, the use of fiber optic infrastructure can be more efficient as it can be utilized simultaneously for both mobile and fixed services.
		• Unbreakable: FMC can be employed as a solution for achieving unbreakable. In the event of disruptions in fixed broadband, traffic can be redirected to mobile broadband infrastructure, and vice versa.

4.	What are the potential risks associated with FMC?	With the emergence of FMC technology and innovation, potential risks may arise: • Customer dissatisfaction: Customers may experience a decline in satisfaction due to discrepancies between their expectations and the services received. Additionally, suboptimal FMC services may lead to churn, where customers switch to other operators. • Revenue decline: Dissatisfaction resulting from poor customer experiences can lead to a decrease in revenue due to increased customer defections and subscription cancellations. • Company image: There is a possibility of a decline in the company's image as the number of customer complaints outweighs the number of satisfied customers.
5.	What strategy will Telkom adopt to enter the FMC business?	The FMC solution adopted is implemented gradually. In the initial stage, the solution is implemented at the access network level, specifically at the customer premises equipment (CPE). Subsequently, it progresses to the network level above it, such as within the network infrastructure.
6.	What are the factors influencing the success of an FMC business?	The success of the implementation consists of several factors, namely: • Tool factor (Infrastructure) • Process factor • People factor
7.	What is the most crucial aspect of implementing FMC technology?	The FMC technology considers several aspects that serve as the primary reasons for its adoption, with customer experience being paramount. Furthermore, internal organizational factors within Telco, such as revenue, customer base, and infrastructure efficiency, serve as driving forces for its implementation.

8.	How beneficial is FMC for customers?	Based on the current broadband infrastructure conditions, customers and infrastructure are classified into two categories: Fixed and Mobile Broadband. Consequently, networks and customers remain separate and cannot yet be realized within a single integrated infrastructure. Therefore, influential factors do not provide an integrated solution. Hence, with the introduction of FMC, the time and duration of broadband network repair processes can be minimized in accordance with the presence of FMC infrastructure.
9.	What are the benefits of FMC for existing and prospective customers?	Several benefits that can be derived from the presence of FMC for customers include: • Enhanced customer experience • Efficiency in the utilization of Fixed and Mobile Broadband networks from the customer's perspective • Improved continuity of both Fixed and Mobile Broadband network connections
10.	Once FMC has been implemented within the organization, what are the future developments?	The advent of FMC represents an initial step for operators to maintain service levels and customer satisfaction. From the operator's perspective, continuous development of FMC technology will be pursued through several strategies, including the advancement of technologies to be applied in both Fixed and Mobile Broadband. Additionally, there will be a focus on digitalization of business processes to enhance simplicity and efficiency.
11.	How does the concept of FMC enhance competitive advantages?	The concept of FMC enhances competitive advantages by expediting the process of customer service repair. Operators benefit from efficiency gains in infrastructure.

4. Result and Discussion

In recent years, Indonesia has made gradual but significant progress in adopting FMC technology in the telecommunications industry. FMC is undertaken with several objectives. Firstly, the FMC infrastructure model aims to enhance the efficiency of its utilization. Secondly, FMC serves as an unbreakable solution to address the challenges inherent in both fixed and mobile broadband, thereby constituting an innovative step forward for the telecommunications industry.

While the FMC trend is not as widespread as in some advanced countries, the momentum for developing this technology is increasing as telecommunication service providers recognize its potential to enhance services and meet consumer demands. Indonesia, as a country with rapid technological

development, offers various types of services provided by operators.

One remarkable development related to the network convergence situation in Indonesia is the integration of services offered by telecommunication providers. Both major and smaller operators have started combining fixed and mobile services to provide integrated communication packages to customers. These packages include voice calls, internet access, and various multimedia services, all accessible through a single account and billing system.

Although integrated services are gaining attention, the level of convergence varies among different providers. Some companies have taken a comprehensive approach, offering seamless transitions between fixed and mobile networks, allowing users to switch devices during ongoing calls without interruption. However, others are still in the early stages of convergence, mainly offering integrated billing for fixed and mobile services.

Users who can quickly adopt technology and are tech-savvy will experience the convenience of integrated services, especially those who frequently switch between fixed and mobile networks. These users appreciate the ability to access the same services and content on multiple devices, enhancing their overall communication experience.

On the other hand, some users remain hesitant to adopt FMC, citing concerns about service quality and network reliability. Perceptions of the complexity of FMC services and fears of potential disruptions during transitions from one network to another have led to resistance or rejection among some segments of the population.

However, there are several risks associated with the implementation of FMC. Among these is customer satisfaction, which may decline if the services provided fail to meet expectations, ultimately leading to decreased revenue and impacting the company's image.

One strategy to mitigate these risks is to proceed gradually, starting at the customer premises equipment (CPE) level within the access network. Subsequently, expansion to higher network levels, such as the network infrastructure, can be pursued.

The factors that can contribute to the success of implementing FMC consist of several elements; tool factor, process factor, and people factor. In addition to the aforementioned factors, it can be observed that the primary rationale for adopting FMC lies in enhancing customer experience, supported by operator revenue, customer base, and infrastructure efficiency.

The progress of FMC in Indonesia is closely related to the condition of the country's telecommunications infrastructure. While major urban centers have sophisticated fixed and 4G/5G mobile networks, rural and remote areas face challenges in network coverage and quality. Disparities or gaps in infrastructure development can affect the national development of FMC services.

To address this issue, telecommunication providers are investing in expanding and improving their networks, especially in underserved areas. The ongoing development of 5G technology also promises high-speed and reliable connectivity delivery, which will be crucial in enabling more comprehensive fixed and mobile convergence solutions.

Telecommunication providers must be able to overcome regulatory barriers related to pricing, licensing, and service quality standards when implementing FMC strategies. The level of support and cooperation from the government in creating a supportive environment will greatly influence the speed of FMC technology adoption in the country.

The telecommunications market in Indonesia is highly competitive, with several major players vying for market share. With the growing appeal of FMC technology to users, service providers strategically position themselves to capture the increasing demand.

Existing operators leverage their customer base and existing network infrastructure to offer converged services. Meanwhile, new FMC technology players are exploring innovative business models to enter the market with their convergence packages.

The competitive landscape, coupled with diverse consumer needs, shapes the path of FMC implementation competition in Indonesia. Understanding and adapting to market dynamics will be crucial for telecommunication companies to succeed in this ever-evolving landscape.

According to the paper by Harno et al. (2009) the driving factors in FMC adoption are as follows:

- **Industry:** From an industry perspective, several key factors include cost and investment savings by eliminating duplication and harmonizing network and service management; faster time to market by having the flexibility to provision and deploy new and advanced services across multiple end-user devices simultaneously; and the ability to retain customer loyalty by facilitating and simplifying access to services.
- **Technology:** Some key factors include advancements in research, development, standardization, and implementation of enabling technology platforms such as IP Multimedia Subsystem (IMS) (TSGS, 2018); the increasing availability of multi-radio mobile devices.
- **Market:** Several key factors include customer demand for equal access to advanced content and services; single Authentication, Authorization, and Accounting (AAA) capability; user-friendliness; affordability of new services.

For telecommunication service providers in Indonesia, there are challenges and obstacles in implementing FMC technology. The challenges for operators providing telecommunication services in implementing FMC are as follows (Hsiung & Difede, 2016):

- Providing convergent services from the combination of fixed and mobile networks.
- Effective operations that can deliver and manage user experiences across various fixed and mobile networks.
- Seamlessly connecting voice, data, video, and smart home services on the go, at home, and in the office, across fixed and mobile networks.

According to the white paper Hsiung et. Al (2016), if the FMC implementation is successfully carried out, service providers can also benefit from:

- Stabilization and revenue growth.
- Reduction in customer churn.
- Increase in Average Revenue Per User (ARPU).
- Growth in the number of subscribers.
- Generation of new revenue streams, as demonstrated by Telefonica, KPN, China Mobile, & KDDI. Customers will also experience higher "value for money" for converged services if supported by a good user experience.

The concept of FMC presents a paradigm shift for the telecommunications industry, offering potential benefits for both service providers and users. Through service and network integration, service providers can offer a comprehensive range of voice, data, and multimedia services.

One potential benefit of FMC is the improvement in service quality, with the ability to seamlessly switch communication sessions between fixed and mobile networks without interruption. This capability not only enhances the QoS for users but also has the potential to foster customer loyalty.

Furthermore, FMC also has the potential to drive digital inclusion in Indonesia. By leveraging shared infrastructure, service providers can expand their reach to underserved areas. This inclusive approach not only promotes social equality but also opens up new opportunities for economic development in remote regions.

The introduction of FMC represents the initial step for operators to uphold service levels and customer satisfaction by innovating in fixed and mobile broadband. From the operator's perspective, there will be continued development of FMC technology through several strategies, including the enhancement of technologies to be applied in both fixed and mobile Broadband. Additionally, there

will be a focus on digitalization of business processes to streamline operations and improve efficiency.

5. Conclusion

From the results of this preliminary research, the value or benefits of implementing FMC innovation for telecommunication operators in Indonesia are as follows:

- The scope of work for this research is limited to the aspect of connectivity, enabling future research to explore broader aspects.
- FMC represents an innovation in the field of telecommunications that serves as a solution to the challenges of fixed and mobile broadband in Indonesia.
- Customer satisfaction poses a significant challenge in the implementation of FMC.
- Increase in operator revenue as Quality of Service (QoS) improves.
- Strengthening the brand image of telecommunication operator companies.
- Reducing CAPEX/OPEX in the deployment and maintenance of infrastructure due to the shared use of infrastructure for both fixed and mobile broadband.
- Enhancing competitive advantage as technology evolves.

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