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New Business Models and Monetization Flows for Next Generation Marketplaces in the Mobile Telecommunication Ecosystem

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Title

New Business Models and Monetization Flows for Next Generation Marketplaces in the Mobile Telecommunication Ecosystem

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Abstract

With 6G networks on the horizon bringing ultra-low latency, built-in AI, and truly immersive connections—we have a unique chance to transform the telecom industry. As Communication Service Providers (CSPs) move towards more flexible and virtualized systems, marketplaces are becoming key platforms for unlocking new business models and revenue opportunities. This paper investigates the transformative role of next-generation marketplaces within the 6G mobile ecosystem. Through an extensive literature review and an analytical framework, we map the evolution of marketplace implementations, analyze the critical role of marketplace implementations in driving operational efficiency and revenue diversification, and propose a novel business model. A Marketplace-Driven Business Model for a CSP is proposed. In the proposed business model, various stakeholders and users are involved, creating an interconnected digital ecosystem where services are provided, consumed, and monetized. Understanding these interactions is vital for fostering sustainable growth and maximizing value creation in next-generation digital services. The results provide insights into monetization flows highlighting the strategic pathways for CSPs in the 6G era.

Index Terms

6G networks, Communication Service Provider, Marketplace, Business model, Monetization, Mobile Network Operator

1. Introduction

The arrival of 6G isn't just about faster connections it's about bringing intelligent, adaptive, and self-managing networks that can power truly transformative services. While 5G set the stage with things like network slicing and edge computing, 6G takes these innovations even further by weaving in AI, enabling real-time processing, and offering security at the quantum level. As CSPs aim to monetize beyond traditional service offerings, digital marketplaces become central platforms for bundling, distributing, and monetizing next-generation services. This paper explores the evolution of telecom business models and proposes a marketplace-driven approach tailored to the unique capabilities of 6G. This chapter is an introduction to the central role of digital marketplaces and the underlying business models in 6G era. In Chapter 2 we provide a review on existing

research on business models in telecommunication field, identifying also some gaps for future work. Chapter 3 presents real world examples on how MNOs are monetizing 5G capabilities. In Chapter 4 we trace the evolution of telecom business models from basic connectivity to complex ecosystems. Chapter 5 analyzes the critical role of marketplace implementations in driving operational efficiency and revenue diversification for telecom providers providing also a basic taxonomy of marketplaces. A proposal on a Marketplace-Driven model is presented in Chapter 6 describing the roles and monetization strategies for the different stakeholders involved. Chapter 7 concludes the paper by summarizing the opportunities and challenges suggesting some future work.

2. Background and Related Work

Existing research from T. Taleb et al. (2017) and M. Chen et al. (2019) has explored platform-based business models in telecom, focusing on API economies and cloud services. However, the integration of immersive technologies, decentralized governance, and predictive AI for monetization remains underdeveloped. Studies on 5G monetization models from I. Chochliouros et al. (2018) and S. Yrjölä (2020), provide valuable frameworks but lack adaptation to 6G requirements.

Chesbrough, H. (2007) open concept described the benefits of leveraging external ideas commercializing internal assets but lacked the implementation guidelines in traditionally closed telecom sectors. Osterwalder, A. (2004) through his Canvas proposal provides ways to iterate strategic plans, but on the other hand oversimplifies complexities relevant with legacy network constraints, and rapid technological evolution.

Key scientific publications exploring platform-based business models in 5G and 6G contexts are available. Yrjölä et al. (2021) introduces the 4C framework (connectivity, content, context, commerce) and analyzes how mobile operators can transition to platform-based ecosystems in 5G/6G. Moqaddamerad (2020), focuses on business model innovation in the context of emerging technologies and more specifically of 5G. Both offer robust frameworks for operator-led ecosystems but underemphasize power imbalances between telecom incumbents and new entrants (e.g., hyperscalers, startups). L. Jiao et al (2024) innovatively integrates generative AI with 6G platforms but lacks concrete analysis of scalability challenges for API-driven marketplaces. Kokkinis et al. (2023) focuses on techno-economic feasibility but relies on static models that may not account for rapidly evolving user demands (e.g., metaverse applications) or sustainability costs of edge computing.

This paper builds upon these foundations and extends to a new approach by integrating marketplace evolution and business model innovation into a common concept. To address the feasibility of such a proposal we explore the readiness of the CSPs towards 6G era through three main aspects.

We review the most common use cases of monetization in 5G networks and services, taking as an example the MNOs, to identify the maturity of the CSPs to deploy next level 6G services.

We describe and analyze the evolution of the Business Models in 5G/6G era as proposed by research and implemented by the industry, to identify the evolved business proposals adopted.

We provide a Marketplaces taxonomy focused on Target customer segments, Type of services provided and Revenue generation mechanisms, to draw a baseline of Marketplace evolution of the CSP segment.

3. Market use cases on 5G monetization

Mobile network operators (MNOs) worldwide are actively monetizing 5G network capabilities through diverse strategies that leverage their high speed, reliability, low latency, and network slicing capabilities.

There are three notable real-world examples for different solutions and services provided by 5G network operators and they address various customer needs.

- Private 5G Networks for Industrial Automation
- Fixed Wireless Access (FWA) services for home broadband
- Network Slicing deployments for specialized services across various industries

One of the typical 5G services that have been already deployed is the provision of Private 5G networks (Table 1), to support Industrial automation providing services like uncongested network capabilities for simple use cases like logistic devices support to complex use cases for autonomous devices and robots' management.

Table 1: Private 5G Networks for Industrial Automation

Use Case	Deployment Description	Use Case Description	Outcome
Bosch Salzgitter Factory (Germany) ¹	Bosch, with Qualcomm and Bosch Rexroth, deployed a private 5G network in its manufacturing plant.	Supports autonomous mobile robots, automated guided vehicles (AGVs), and real-time image transmission for quality control.	Achieved ultra-reliable 99.9999% network uptime, enhancing precision and reducing downtime.
CJ Logistics (South Korea) ²	Private 5G network installed in Icheon City logistics hub to replace congested Wi-Fi infrastructure.	Enables AGVs, mobile robots, and real-time data from handheld scanners and tablets.	Reduced infrastructure cost and improved scanning productivity by 20%.
BASF Antwerp (Belgium) ³	BASF, Nokia, and Citymesh deployed a 10 km ² private LTE/5G network for site-wide operations.	Supports communications, fire hazard surveillance, water treatment monitoring, and logistics automation.	Enhanced safety and operational efficiency via reliable, high-capacity wireless infrastructure.

¹ [GSMA: Bosch 5G Case Study](#) – Use of 5G for advanced automation in manufacturing.

² [Ericsson Mobility Report](#)

³ [STL Partners Report](#)

Tesla Gigafactory (Germany) ⁴	A private 5G network was deployed in Berlin-Brandenburg for factory shop floor operations.	Real-time operations in production lines, intralogistics, and quality control.	Up to 90% reduction in overcycle issues in General Assembly.
John Deere Factories (Global) ⁵	Deploying private 5G across U.S., South America, and Europe to minimize wired connections.	Connected robots, vehicles, and hand tools to support digital factory infrastructure.	Aims to reduce wired connections from 70% to 10%, increasing flexibility and lowering maintenance.
Lufthansa Technik (Germany) ⁶	Deployed a 5G campus network at its Hamburg site.	Enables remote part inspections and video streaming of borescope examinations.	Improved customer service and reduced physical presence requirements.
Airbus Global Facilities ⁷	Deploying multi-campus private 5G across Europe, China, and the U.S.	Supports assembly lines, quality checks, and smart manufacturing operations.	Streamlined operations and improved cross-site data sharing.
BASF Tarragona (Spain) ⁸	First private 5G network in the Spanish chemical industry with Nokia, Cellnex, and Boldyn Networks.	Enables AR applications, IoT deployment, and seamless industrial device connectivity.	Boosted operational visibility, safety, and productivity through digitalization.

The second example of 5G deployment use cases is the provision of high-speed last mile connectivity for end users. A list of deployments from different service providers around the world is presented in Table 2.

Table 2: Fixed Wireless Access (FWA) services for home broadband

Use Case	Deployment Description	Use Case Description	Outcome
Jio AirFiber (India) ⁹	Reliance Jio launched Jio AirFiber to provide 5G FWA services, targeting areas where fiber deployment is challenging.	Offers high-speed internet in Tier II towns, addressing last-mile connectivity issues.	Achieved 87.7% market share in UP East with over 426,000 subscribers.

⁴ [SNS Telecom Case Study](#) – 5G private networks in automotive manufacturing.

⁵ [Avnet Industry Overview](#)

⁶ [SNS Telecom](#) – Aviation MRO sector using 5G for remote inspections

⁷ [RCR Wireless](#) – Airbus's global private 5G strategy

⁸ [STL Partners 2023 Survey](#)

⁹ [Times of India](#) – Details Jio's dominance in the 5G FWA market in UP East.

C Spire (USA) ¹⁰	C Spire launched 5G FWA services across Mississippi, utilizing 28GHz equipment.	Provides high-speed internet with no data caps, installation fees, or long-term contracts.	Users report download speeds up to 750Mbps and upload speeds up to 600Mbps.
Turkcell Superbox (Turkey) ¹¹	Turkcell deployed the Superbox FWA service using Cat-11, 4x4 MIMO-capable CPE.	Targets customers without access to fiber or dissatisfied with ADSL performance.	Provides premium broadband service with high throughput and capacity.
Horizon Powered (USA) ¹²	Horizon Powered deployed FWA solutions across Ohio, Illinois, Indiana, and Kentucky.	Aims to provide gigabit connectivity to underserved regions, addressing the digital divide.	Targeted to reach 1.4 million households and businesses by end of 2024.
Bell Canada & Nokia (Canada) ¹³	Bell Canada partnered with Nokia to bring high-speed internet to rural communities using FWA technology.	Utilizes Nokia's FastMile solution to provide broadband access to underserved areas.	Aims to connect approximately 1.2 million homes and businesses in rural areas.

Network slicing deployments are gaining focus from various end users providing services to support optimized multimedia and streaming applications, security and other critical applications that require high reliability and coverage. (Table 3)

Table 3: Network Slicing deployments for specialized services across various industries

Use Case	Deployment Description	Use Case Description	Outcome
Verizon Enhanced Video Calling (USA) ¹⁴	Verizon launched a consumer service using 5G network slicing to improve video call quality.	Provides optimized video and sound quality on calling apps, even during network congestion.	Enhanced video calling experience in over 150 metro areas for users on specific plans and devices.
T-Mobile Network Slicing for Events and First Responders (USA) ¹⁵	T-Mobile utilized network slicing to support business-critical functions at high-profile events and for emergency services.	Provides dedicated network slices for point-of-sale terminals, ticket scanning, and prioritized connectivity for first responders.	Improved reliability and performance for critical services during events and emergencies.

¹⁰ [Lifewire](#) – Overview of 5G availability and C Spire's offerings.

¹¹ [Ericsson Mobility Report](#) – Insights into Turkcell's FWA deployment.

¹² [Horizon Powered](#) – Case study on FWA deployment across four states.

¹³ [Tech Networks](#) – Discussion on FWA deployment in rural Canada

¹⁴ [The Verge](#) – Details Verizon's use of network slicing for consumer video calling services.

¹⁵ [Ericsson Mobility Report](#) – Explores T-Mobile's real-world applications of network slicing.

Telefónica Movistar Intranet 5G (Spain)¹⁶	Telefónica deployed 5G network slicing to offer private, secure, high-performance connectivity for enterprises and public services.	Supports applications requiring high bandwidth and low latency, such as remote diagnostics and emergency services.	Enhanced digitalization and improved communication quality for various sectors.
Singtel 5G Network Slicing at Singapore Grand Prix (Singapore)¹⁷	Singtel deployed 5G network slicing during the 2022 Singapore Grand Prix to enhance the spectator experience.	Provided high-quality video streams and differentiated connectivity services for event attendees.	Demonstrated commercial opportunities of differentiated connectivity services using network slicing.
China Mobile and Ericsson for Disaster Management (China)¹⁸	China Mobile and Ericsson developed a solution using 5G network slicing for natural disaster monitoring and emergency response.	Utilized dedicated slices for high reliability and coverage to control drones and unmanned lifeboats for search and rescue operations.	Enhanced emergency response capabilities in areas prone to natural disasters.
Telstra Connected Construction Sites (Australia)¹⁹	Telstra implemented 5G standalone network slicing to provide reliable connectivity for construction sites in rural areas.	Reserved network slices to meet specific bandwidth requirements for CCTV and data connections on construction sites.	Enabled faster deployment and reliable connectivity without the need for fiber infrastructure.
Vodafone UK's Broadcast of King Charles III's Coronation (UK)²⁰	Vodafone UK utilized 5G network slicing to support the live broadcast of the coronation event.	Provided a dedicated slice of its public 5G standalone network for a major broadcast event.	First use of network slicing by a UK operator for a significant broadcast, ensuring reliable coverage.

Leading CSPs are already making progress providing network infrastructure. Many have started integrating cloud-native and edge but advanced features like full network slicing, are still in early stages. Most of the use cases are driven by the need to monetize on 5G CAPEX investments fast through vertical feature deployments.

¹⁶ [El País](#) – Discusses Telefónica's implementation of network slicing in Spain.

¹⁷ [Ericsson Mobility Report](#) – Details Singtel's deployment of network slicing at a major sporting event

¹⁸ [EU-Vietnam Business Network](#) – Covers various 5G network slicing trials and collaborations.

¹⁹ [Sasken Blog](#) – Discusses real-world deployment of network slicing by mobile network operators.

²⁰ [Sasken Blog](#) – Details Vodafone UK's application of network slicing for broadcasting.

4. Evolution of Business Models in the Telecommunications Ecosystem

In this chapter we classify business models across Business to Customer (B2C), Business to Business (B2B), and Business to Business to anyone (B2B2X) dimensions to clearly distinguish how value is created, delivered, and monetized in relation to who the customers are and how services are structured. This classification helps businesses and especially CSPs, understand their role in increasingly complex digital ecosystems. CSPs have come a long way over the past two decades changing their business models significantly, shifting from straightforward connectivity offerings to complex ecosystem-driven strategies. This evolution can be segmented into four key phases, each reflecting a shift in strategic priorities and monetization methods. They've evolved from providing basic connectivity to creating ecosystems that enhance their business strategies. This process includes four main stages, each reflecting shifts in focus and profit generation.

4.1 Era of Voice and Data Commoditization (2000–2015)

During the early 2000s, CSPs operated predominantly under a Business-to-Consumer (B2C) model, competing primarily on price and volume for voice and SMS services. The advent of smartphones brought a gradual transition to mobile data-centric offerings. In parallel, Business-to-Business (B2B) models existed primarily in the form of leased lines and corporate VPNs, with limited value-added services. The business strategy during this period was largely utility-based, focused on connectivity provisioning without deep vertical integration. As a result, the marketplaces provided basic functionality in the form of e-shops.

4.2 Service Diversification and 4G-Driven Partnerships (2015–2020)

With the deployment of 4G LTE, CSPs began to diversify their offerings. The B2C segment witnessed bundling strategies combining mobile connectivity with digital content services such as video streaming and music platforms. Concurrently, the emergence of early B2B2X (Business-to-Business-to-Everything) models introduced collaborative opportunities, particularly between telecom operators and Cloud Platform Service (CPS) providers. For example, AT&T's strategic alignment with AWS marked the beginning of edge-cloud integration for enterprise clients, foreshadowing the platform-based ecosystems of the future.

4.3 5G-Enabled Ecosystems and Vertical Integration (2020–Present)

The current phase is characterized by widespread deployment of standalone 5G networks, enabling advanced use cases such as network slicing, private networks, and ultra-low latency industrial automation. B2B models have expanded to include smart factories, smart cities, and edge computing frameworks. Moreover, B2B2X has matured significantly, now accounting for a growing share of digital revenue. Examples include Orange's fintech initiative "Orange Money" Hassan, Syed Tabrez (2021) and healthcare service integration by European operators²¹. Quad-play bundles, like those offered by Thai operator AIS²², combine Fixed Wireless Access (FWA), immersive AR applications, and entertainment services into a single offering, showcasing the fusion of physical and digital infrastructure.

²¹ <https://www.orange.com/en/group/our-activities/health>

²² <https://www.metaswitch.com/knowledge-center/case-studies/ais-case-study>

In **B2B2X** Business Model Network Operator acts as a Retailer towards the Buyer bundling services from 3rd parties with Telecommunication services.

Following a different approach in **B2B2X** Business Model Network Operator acts as a Supplier towards 3rd party Service Retailers, which are bundling services with Telecommunication services.

Moreover, in a **B2B2X** Business Model Network Operator acts as a Supplier towards a Virtual Network Operator who is bundling 3rd party Retailer services with Telecommunication services and acts as a Retailer.

To give a better understanding of these models, different flavors of the B2B2X approach are presented in the following graphs. The service flow and the bundling of the services appears with arrows as the monetization flows appear with a currency sign. The color coding depicts the origin of the service and the revenue respectively.

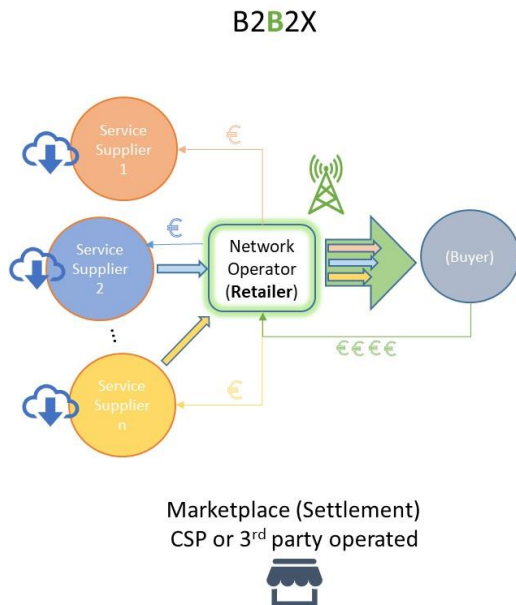


Figure 1: B2B2X Business Model

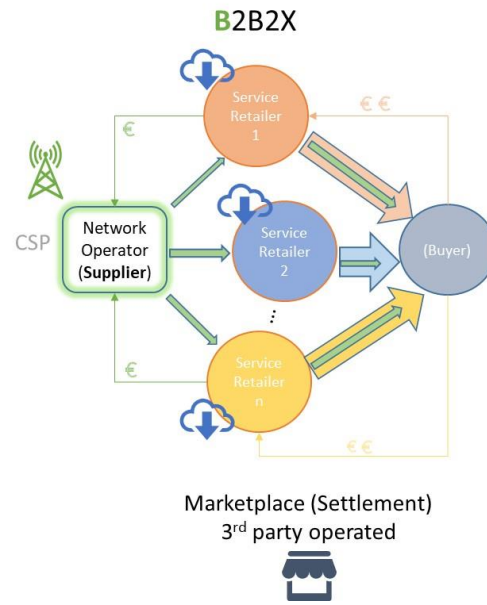


Figure 2: B2B2X Business Model

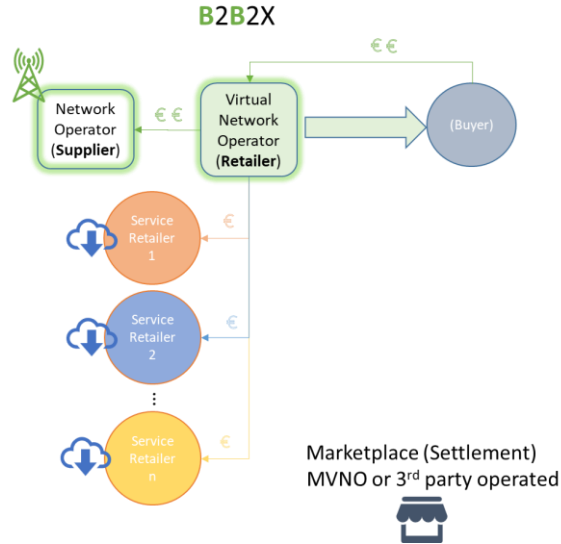


Figure 3: B2B2X Business Model

The common characteristic of the models described above is that the operation of the Marketplace to provide these services is always handled by a third party.

4.4 Platform-Based and API-Driven Models in the 6G Era (2025 and beyond)

Looking ahead, the emergence of 6G technologies will accelerate the shift toward API-driven, platform-based business models. Telecom operators are expected to function as integrators within expansive digital ecosystems, enabling partners—including app developers, cloud providers, and vertical industry players—to co-create services. These ecosystems will support dynamic service instantiation, real-time AI/ML processing, and integration of quantum communication elements.

A visual representation of such a business model is presented in Figure 4. Network Operator acts as a Supplier to a Platform Operator who is bundling 3rd party Retailer services with Telecommunication services and acts as a Retailer towards the target buyer. The marketplace settlement is operated by the Platform Operator itself or another 3rd party operator.

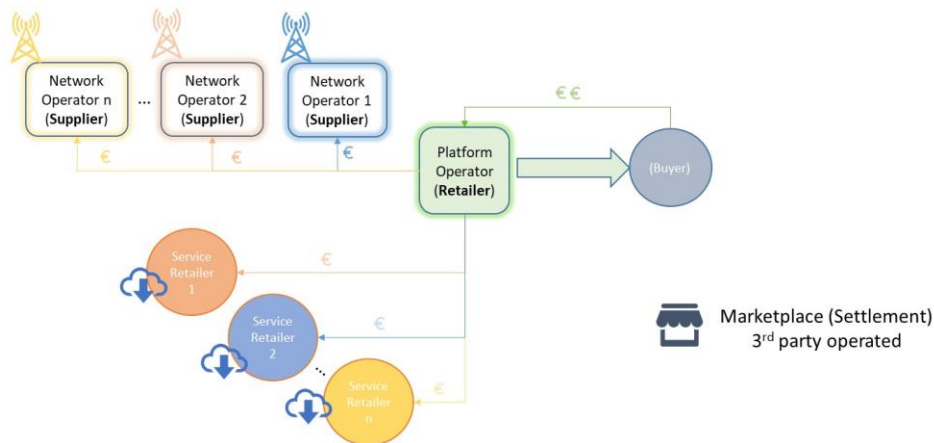


Figure 4: Platform based Business Model

According to GSMA Intelligence, over 60% of telecom operators are developing strategies to expose network capabilities via programmable interfaces, unlocking monetization through Network-as-a-Service (NaaS) and other models. This trajectory illustrates the transformation of telecoms from mere "pipe providers" to orchestrators of digital platforms, powered by over €175 billion in 5G/6G infrastructure investment for the period 2024-2030 and an expanding network of cross-industry partnerships.²³

Although some providers are hesitant to give up full control of customer relationships, adopting open or federated marketplace models has been shown to improve flexibility, accelerate innovation, and create new revenue streams (S. Yrjölä, 2016). To make this shift work, CSPs must do more than rethink their business strategy. They also need to embrace modern technologies such as cloud-native platforms, Open Digital Architecture (ODA), and standardized APIs. Industry efforts like TM Forum's Digital Business Marketplace Catalyst offer practical guidance on how to build and manage these ecosystems (TM Forum, 2022). Advanced tools like artificial intelligence and zero-touch automation will also play a central role in managing services efficiently and delivering them in real time (A. R. Prasad, 2017). Ultimately, this shift toward marketplaces reflects a deeper change: CSPs must evolve both technically and culturally to lead in a world where value comes not just from connectivity, but from collaboration and digital experience.

Business models for 6G CSPs on the other hand reveal various forward-looking strategies designed to monetize and capitalize on the unique capabilities of 6G. (Seppo Yrjölä et al., 2020), (STL Partners, 2020). A shift from traditional telecom models to platform-based ecosystems is expected, where telecom operators will function more as integrators within a multi-stakeholder ecosystem. This includes fostering partnerships with cloud providers, tech companies, and app developers to create holistic digital services. The focus will be on enabling cross-industry applications such as IoT, AI, and AR, delivering services through a combination of network, cloud, (Samuel Olaoluwa et al., 2024) and edge computing (Wevolver, 2025), (George, A. Shaji et al., 2023). These innovative models are all designed to address the need for telecom operators to move beyond simple connectivity and become key players in the digital services ecosystem, leveraging 6G's advanced capabilities to offer differentiated services.

From the analysis above some conclusions were derived and gaps identified. CSPs continue to rely heavily on traditional revenue streams like data plans, voice, and wholesale services. A small number are experimenting with more dynamic models following the unique capabilities of 6G business models for platform-based ecosystems. That means that CSPs gradually are becoming mature enough to follow more flexible business models to monetize their products. A true multi-sided platform model to support the complete range of customers from business to individual is missing.

5. Analysis of Marketplace Implementations in CSPs

In recent years, CSPs have been moving away from their traditional role as basic connectivity providers and toward becoming orchestrators of digital platforms. One of the most promising tools

²³ <https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2025/01/0125-Mobile-Economy-Europe-2025-web.pdf>

supporting this transformation is the digital marketplace. These marketplaces allow CSPs to team up with partners across industries, expanding their service offerings while staying competitive in a fast-evolving digital landscape. Marketplace implementations within CSPs are becoming critical drivers for operational efficiency and revenue diversification. By deploying digital marketplaces, telecom providers can streamline the process of selling and provisioning network services and applications, facilitating rapid deployment and scalability (Sharma et al., 2022). Successful marketplace implementations typically involve leveraging cloud-native platforms and service orchestration techniques, enabling providers to offer tailored and dynamic service bundles that meet diverse customer demands (Johnson & Kaur, 2021). Moreover, marketplaces promote increased collaboration with third-party vendors, fostering innovation and enriching the service portfolio, ultimately enhancing customer experience and satisfaction (Rodriguez et al., 2020).

In the following table a Taxonomy of Marketplaces is illustrated focused on Target customer segments, Type of services provided and Revenue generation mechanisms.

Table 4: Taxonomy of Marketplaces

Marketplace Type	Type of Service Provided	Revenue Stream	Description of Revenue Stream
Consumer Marketplaces	Mobile Plans & Devices	Subscription Fees	Revenue from prepaid/postpaid mobile plans and data services.
		Device Sales	Profit from selling smartphones, tablets, and accessories.
	Value-Added Services (VAS)	Add-on Purchases	Charges for entertainment, cloud storage, ringtones, etc.
Digital API Marketplaces (Reuters, 2024)	Network & Billing APIs	API Access Fees	Charging developers and businesses to access telecom APIs.
		Revenue Sharing	Sharing revenue with partners using the APIs.
Wholesale & B2B Marketplaces (Giovanni Camponovo et al., 2003)	Network Leasing	Capacity Leasing Fees	Earnings from selling wholesale bandwidth or leasing infrastructure.
	Managed Infrastructure	Infrastructure Service Fees	Providing backend support and services for other telecom businesses.
Financial & Mobile Money Marketplaces	Mobile Money Transfers (McKinsey, 2018)	Transaction Fees	Charges applied on each P2P transfer, bill payment, or merchant transaction.

Marketplace Type	Type of Service Provided	Revenue Stream	Description of Revenue Stream
Enterprise & IoT Marketplaces (Syniverse, 2023)	Mobile Banking (Peter LYONS, 2018)	Interest Margins	Profit from difference between interest paid on savings and earned on loans.
	Data Analytics (McKinsey, 2018)	Data Monetization	Using transaction data for credit scoring, targeted marketing, or partnerships.
	IoT Connectivity	Connectivity Charges	Subscription or per-device fee for network access.
	IoT Management Services	Value-Added Services	Income from device management, analytics, and security services.
MVNO & White-Label Marketplaces (Giovanni Camponovo et al., 2003)	Platform Partnerships	Revenue Sharing	Joint monetization with IoT platform and hardware vendors.
	Network Access to MVNOs	Wholesale Access Fees	MNOs charge MVNOs for network usage.
	White-Label Telecom Services	Platform Licensing	Selling turnkey telecom platforms with branding and tech support.
	Backend & Customer Services	Service Fees	Earnings from customer service, billing, and compliance for MVNOs.

The taxonomy presented above provides a useful framework for recognizing the limitations inherent in the implementations of the more complex Marketplaces targeted to the CSPs market. A conclusion derived from the table above is the trend towards verticalization of the marketplaces which is mainly driven by the opportunities derived from the 6G features and functionality. CSP marketplaces are mainly B2B oriented with the most common implementations to support API exposure of the CSPs services, network slicing and edge services. These marketplaces usually offer integration with hyperscalers to support global cloud services. A horizontal approach of a CSP managed marketplace does not exist. This gap is the one we are trying to address with the proposal of marketplace-driven business model which will enable the on-boarding and interaction between different stakeholders that range from business to consumers usually interacting with complex business flows.

6. Marketplace-Driven Business Model for 6G

A Marketplace-Driven Business Model for a CSP is proposed. In the proposed business model, various stakeholders and users are involved, each playing a critical role. These participants are crucial in creating an interconnected digital ecosystem where services are provided, consumed, and monetized.

As a result, the roles of each stakeholder in such a complex environment have evolved and the monetization flows, has changed and extended accordingly. For each stakeholder identified in such a business model specific roles are described providing also ways to generate revenue from various interactions.

A Stakeholder Analysis will follow, describing in detail how each of these stakeholders position and function, what are the interactions with the other stakeholders, and which are the possible ways to monetize the services provided.

6.1 Communication Service Provider

In a marketplace-driven business model and more specifically in the context of evolving 6G ecosystems the CSP evolves from a traditional connectivity enabler to a strategic ecosystem orchestrator.

As the marketplace owner and infrastructure provider, CSP manages 6G network connectivity, edge computing, and AI services delivering the essential backbone for network slicing, AI automation, and cloud/edge services, enabling other stakeholders to operate seamlessly within the ecosystem. Its role also includes facilitating real-time network management, optimization, and security services.

Businesses and consumers can subscribe to customized service packages, while network slicing fees allow for monetizing industry-specific slices of the 6G network tailored to specific use cases like healthcare and autonomous vehicles. Additionally, usage-based billing charges enterprise customers based on data consumption, bandwidth, or the number of transactions for AI-powered services.

6.2 Enterprises (B2B Users)

Business end users' needs have changed following the enhancements provided by 6G networks. Large corporations require robust and reliable telecommunication connectivity solutions to support their complex operations. For example, an autonomous production facility using autonomous vehicles on a large scale can be operated by using ultra-low latency and high bandwidth services to support mission-critical operations. Decision-making and operational efficiency on the other hand can be enhanced using AI-driven applications that provide real-time data analytics and predictive maintenance.

SMEs can also take advantage of 6G networks to enhance their operations. Network-as-a-Service (NaaS) service is such an example that provides dedicated network slices for specific applications, ensuring optimal performance and reliability.

Finally, industrial users can enable real-time monitoring and control of industrial equipment, reducing downtime crucial factors in manufacturing, improving their productivity.

Business users and Virtual Network Operators requesting premium Network-as-a-Service (NaaS) services enabling ultra-low latency slices. Network slicing appears to be a critical enabler in 6G networks, providing virtualized, end-to-end network segments tailored to diverse application needs (Botez et al., 2025). In addition, Edge computing and Fog computing fees may be applied to users charging for localized, real-time data processing (A. G. Tasiopoulos et al., 2021). Autonomous Service-Level Agreement (SLAs) mechanisms based on guaranteed performance metrics can be used to provide custom flows of monetization (Faisal et al., 2023).

6.3 Developers and Application Providers

CSPs act as Technology providers/enablers towards 3rd parties facilitating them to onboard their services, APIs and Vertical applications. CSPs provide the means (CI/CD, SDKs, APIs) for the 3rd parties to implement, certify, verify and publish their products with the highest level of automation. Third-party developers and software companies create applications leveraging open CSP APIs to integrate with the 6G network. Applications examples may include but not limited to smart cities, AR/VR, IoT platforms, healthcare diagnostics, and smart home solutions.

CSPs act as Platform providers delivering an abstraction layer to federate and orchestrate the edge computing infrastructure and provide a web-based authentication, management, reservation, and payment model for developers (B2B2x) to monetize the advanced telecommunication services. Hosting fees would be an additional revenue flow for the CSP. A Revenue-sharing model from application sales and subscriptions can be applied on top of API usage fees for telecom infrastructure integration.

6.4 Consumers (B2C Users)

Consumers are still in focus of the CSPs as they can directly benefit from the advanced services provided. Consumers utilize personalized services through extensive reality, AI-driven services for healthcare and fitness and smart home automation using mobile devices, wearables, and connected home devices.

Subscription services which provide premium content and experiences tailored to the customer's needs will be a key item for end user monetization. Personalized mobile and internet plans will be designed and provided based on user's behavior, ensuring best value. Additionally, pay-per-use models will be available for high-bandwidth services, allowing the customers to only pay for what they use.

6.5 Governments and Public Sector

Government entities and local authorities are the key users for applications to provide public safety, smart infrastructure management, environmental monitoring, and transportation management, which require secure and reliable 6G services.

The real-time aspect, enabled by the low latency capability of the 6G network will enable smart city infrastructure services powered by AI and edge computing. Data analytics and predictive modeling will be provided as a value-added service.

6.6 Cloud Platform Service Providers

CSP Cloud providers are extending their role from suppliers of storage, computing power, and AI processing to deliver hybrid cloud-edge solutions partnering with CSPs. Infrastructure fees are applied for storage and processing via a share revenue model.

6.7 IoT Device Manufacturers

Manufacturers of IoT devices which are connected to the 6G network, enabling real-time communication and data-driven services. Device sales through the marketplace, bundled with data services. Integration fees will be applied to ensure network compatibility, while data monetization can be achieved through advanced analytics services.

6.8 AI and Machine Learning Providers

Specialized AI companies develop algorithms and models powering AI-driven services, including predictive maintenance and personalized experiences. Fees for deploying and using custom AI solutions are the drivers of the main revenue stream. Analytics-as-a-Service offerings on top of the solutions provided may extend the revenue.

Following the stakeholder analysis, we created a RACI table to identify who is Responsible, Accountable, Consulted, or Informed for key ecosystem activities.

Table 5: CSP Marketplace Stakeholder RACI Matrix

Activity Stakeholder	Manage 6G Infrastructure & Network Slicing	Enable & Operate Digital Marketplace	Onboard APIs & Applications	Consume Customized Connectivity Services	Provide Edge/Cloud Resource Integration	Monitor & Enforce SLAs	Offer AI/ML Analytics & Insights	Deliver Vertical Applications (e.g., Smart Cities)	Ensure End-User Personalization & Experience
CSP	A	A	A	C	R	A	C	C	R
Enterprises (B2B Users)	C	C	C	R	C	C	C	C	C
Developers & App Providers	C	C	R	C	C	C	C	R	C
Consumers (B2C Users)			C	R				C	A
Government & Public Sector	C	C	C	C	C	C		A	C
CPS Providers	C	C	C		A	C	C		
IoT Device Manufacturers		C	C		C		C		
AI & Machine Learning Providers		C	C		C	C	A	C	C

CSP is Accountable for almost all core activities and Responsible for running the marketplace platform additionally to the operation of the 6G infrastructure. As a central orchestrator of the ecosystem has been Consulted across the stakeholder interactions. The CSP is transforming into a central manager of value provision evolving from the traditional role of just providing connectivity

to the users. Developers and Application Providers are Responsible for delivering vertical use cases through application on boarding. They are being Consulted for the API usage and cloud integration and customization of the services participating in a revenue-sharing model. B2B and B2C Users are Responsible mainly for the service consumption and Accountable for the personalization of these services as they act as the main revenue generators. CPS providers acting as strategic partners to the CSP are Responsible for the cloud and edge infrastructure provisioning. In most of the cases they are Consulted about AI workflows and API hosting procedures. AI service providers are Accountable for the provision of analytics and models to be used by the Customers as a service and Consulted about the integration and the edge deployment of the systems.

As the ecosystem is highly collaborative the Responsibility and Consultation has been spread to all the stakeholders depending on the core functions in opposition to the Accountability which is concentrated with the CSP as he is performing the orchestration of the ecosystem. Consumers have limited active roles as their role is constrained to end-point users.

All the stakeholders analyzed in this chapter are depicted in Figure 5 together with the different monetization flows initiating from the CSP through the Marketplace to the different stakeholders. For every stakeholder the means of monetization are presented. A CSP can initiate flows through third party Integrators and providers using a revenue sharing model.

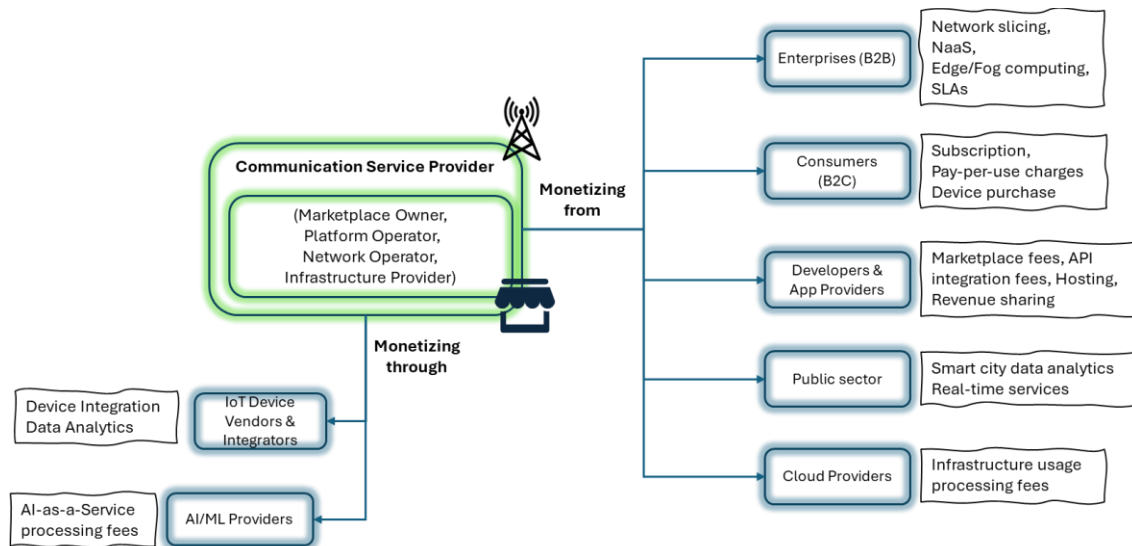


Figure 5: Monetization flows vs Stakeholders

The telecommunication marketplace revenue streams analyzed describe how CSPs generate income in today's digital economy leveraging the proposed Business Model and using the Marketplace as the impetus to achieve this. The traditional subscription-based revenue streams bundled with device sales remain foundational for the CSPs income, but they are only a small part of the picture. Extending the service-based architecture, application-driven architecture is served as the network services will be tailored to specific application requirements and use cases.

In the evolving 6G ecosystem, the CSP plays a pivotal role as the marketplace owner and infrastructure provider, managing and orchestrating 6G network connectivity, edge computing, and AI services. This role will enable synergies and interactions with all the stakeholders involved. These synergies foster collaboration, innovation, and diverse revenue streams, transforming the CSP into a strategic ecosystem enabler. A CSP can redefine his position and role from a monolithic provider of telecommunication services to a key player.

The proposed CSP marketplace can generate revenue through a variety of monetization strategies that are more complex than the traditional connectivity models. Marketplace fees to developers, enterprises, and IoT vendors for hosting their apps, APIs, or services on the platform or using the platform to provide their goods and services to the buyers, may be applied. Data monetization will be enabled by offering to 3rd parties or partners, anonymized information based on user behavior, network usage, or service performance. Revenue-sharing model ensures that the revenue generated by third-party apps or services sold through the marketplace is fairly divided between the stakeholders.

7. Conclusion and Future Work

The 6G digital marketplace is characterized by a multifaceted ecosystem where diverse stakeholders contribute distinct roles and monetization strategies. Understanding these interactions is vital for fostering sustainable growth and maximizing value creation in next-generation digital services. We conclude that marketplaces in 6G networks should serve as both technical and business enablers.

The proposed model presents strategic opportunities for CSPs to diversify revenue, attract ecosystem partners, and enhance customer experiences. Challenges include regulatory compliance, standardization, and cybersecurity. Future work may include empirical validation through case studies and modeling of monetization flows in simulated 6G environments. Finally, the lack of a common framework for standardization is obvious as the main bodies (GSMA and TM Forum) trying to standardize the CSP-run marketplace implementations are moving to different directions with TM Forum enabling an internal CSP system standardization and GSMA focusing on external API monetization.

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