



THE FUTURE OF CARRIER BILLING

Whitepaper Prepared for DOCOMO
Digital



Contents

1. Carrier Billing for Digital Content

1.1.1 The Rising Usage of Digital Content.....	3
<i>Figure 1.1: Total Number of Digital Content Users in 2021 (m), Split by 4 Key Regions</i>	3
1.1.2 The Digital Content Monetisation Opportunity.....	4
<i>Figure 1.2: Total Digital Content Revenue (\$m), Split by 4 Key Regions, 2021-2026</i>	4
<i>Figure 1.3: Total Digital Content Spend in 2021 (%), Split by 4 Key Regions: \$211 Billion</i>	4
<i>Figure 1.4: Varying Payment Methods for Digital Content</i>	4
1.1.3 Carrier Billing Opportunities in Asia Pacific.....	5
<i>Figure 1.5: Digital Content Spend in Asia Pacific</i>	5
<i>Figure 1.6: Total Digital Content Carrier Billing Spend in Asia Pacific in 2021, Split by 5 Key Categories: \$22 Billion</i>	5

2. The Impact of Carrier Billing

2.1 Serving the Underbanked with Direct Carrier Billing.....	7
<i>Figure 2.1: Total Number of Banked Individuals (m) and Total Number of Mobile Subscribers (m) in 2021, Split by 4 Key Regions</i>	7
<i>Figure 2.2: Total Carrier Billing Spend by Device in 2021</i>	7
2.1.1 The Impact of 5G on Digital Content.....	8
<i>Figure 2.3: Total 5G Data Consumption via Personal Devices in 2021, Split by 4 Key Regions: 234,546 PB</i>	8
2.1.2 Payment Method Analysis.....	9
2.1.3 Why Carrier Billing Is Ideally Suited to Digital Content.....	9
<i>Figure 2.4: Total End User Carrier Billing Spend on Digital Content in 2021 (\$m), Split by 5 Key Content Categories</i>	9

2.1.4 The Rise of the Subscription Economy & Carrier Billing's Suitability... 10
i. Drivers of Subscription-based Services..... 10
ii. Flexibility of Payment Options..... 10

3. The Role of DOCOMO Digital in Carrier Billing

3.1 DOCOMO Digital.....	12
3.1.1 Corporate Information.....	12
<i>Figure 3.1: Key Digital DOCOMO Statistics</i>	12
3.1.2 DOCOMO Digital's Carrier Billing Solutions.....	13



ADS payments

by docomo digital



PREPARED FOR DOCOMO DIGITAL

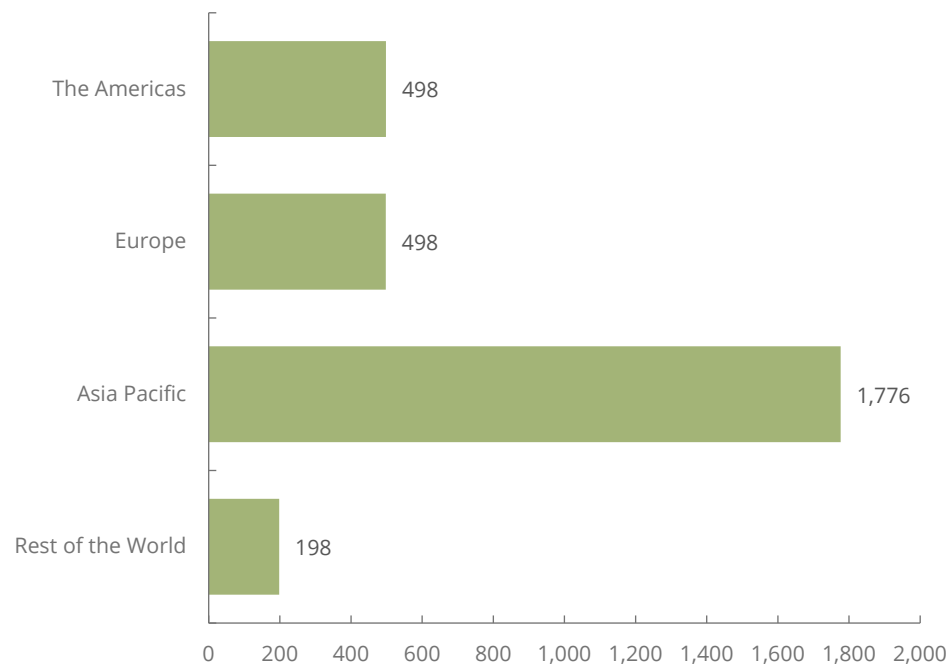
1. Carrier Billing for Digital Content



1.1.1 The Rising Usage of Digital Content

The consumption of digital content is changing rapidly: the increasing number of devices, such as smartphones and connected TVs, is enabling users to access digital content through an increasing multitude of devices. Established platforms continue to grow and explore new ways of monetisation beyond digital advertising. Future ecosystems will include widening how content is consumed and created, meaning that this new outlook also requires a cohesive and dependable infrastructure of stakeholders and systems to make it viable in the long term.

Figure 1.1: Total Number of Digital Content Users in 2021 (m), Split by 4 Key Regions



Source: Juniper Research

Shown in figure 1.1, Juniper Research has outlined the number of digital content consumers. The majority of users are located in the Asia Pacific region, mainly due to the faster adoption of cheaper android-based smartphones.

As a result, this does translate to more monetary opportunity for digital content providers and developers in this region. However, the question of payments acceptance must be addressed. It is clear that payment support will differ across regions and ensuring that a wide array of payments is available to the end user at the point of purchase.

Additionally, digital content monetisation will broaden beyond mainstream and established use cases, including video and music streaming. As the market evolves, we expect to see more ways in which digital content can be used to provide consumers with entertainment.

While video and music content will continue to blossom alongside gaming, other avenues of digital content will continue to flourish outside of the typical formats consumers associate with online content. In the realm of mobile gaming, immersive reality will become increasingly popular as smartphone-native apps leverage existing app stores to expand their reach amidst the roll-out of 5G networks.

Carrier billing is the process of adding payments to a mobile phone bill or pre-paid balance, rather than a direct payment via card or a digital wallet. Carrier billing will profit from supporting these different models, in which consumers can select which elements they wish to have from larger content libraries, normally for lower fees. Such small services are less profitable on a per-unit basis, but by reaching a large market, they can significantly increase overall profits for media companies and provide a customer funnel into higher-paying services.

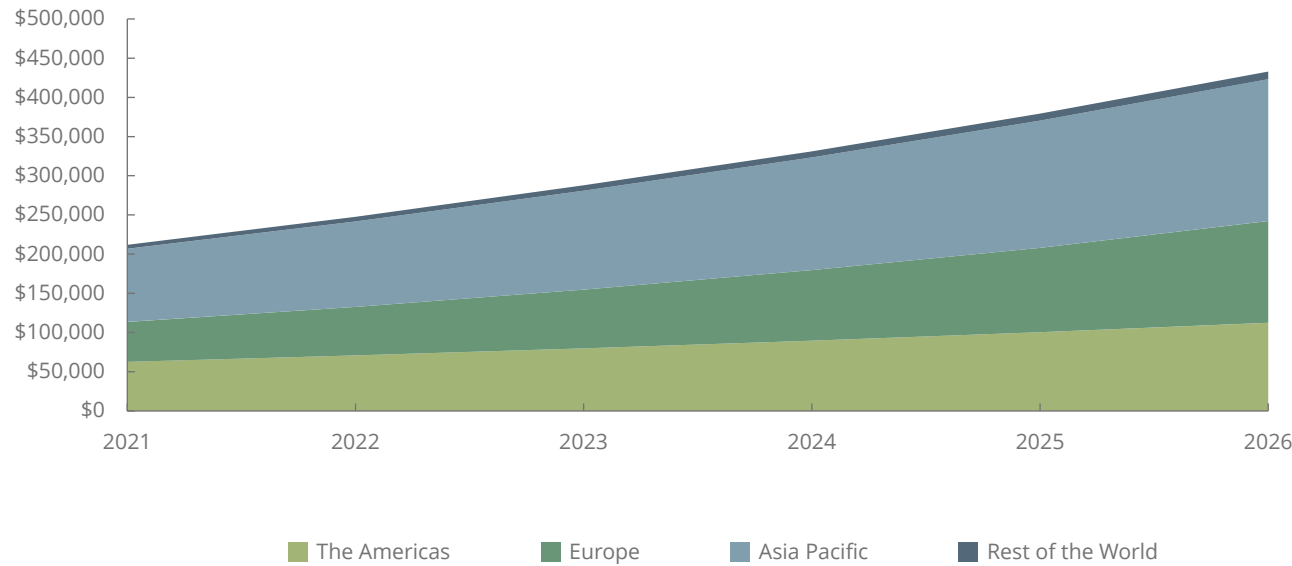
An inherent advantage of carrier billing services is the 'low-click' nature: once carrier billing has been set up on the account, payments are some of the simplest across all payment methods.



1.1.2 The Digital Content Monetisation Opportunity

The future monetary value of the digital content market is anticipated to grow to \$430 billion by 2026; rising from \$211 billion in 2021, as can be demonstrated in figure 1.2. This evidently represents a significant revenue opportunity for all market stakeholders, with this phenomenal growth driven by increasing access to content consumption devices and frictionless payment processes.

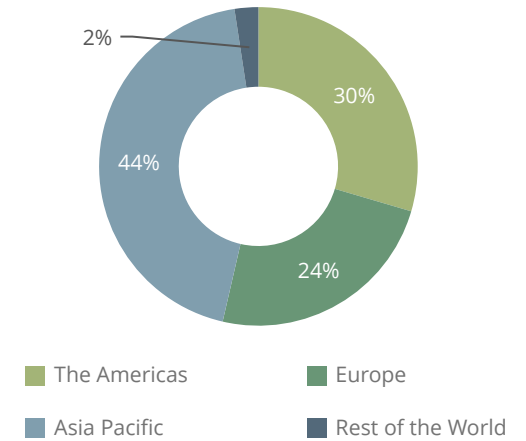
Figure 1.2: Total Digital Content Revenue (\$m), Split by 4 Key Regions, 2021-2026



Source: Juniper Research

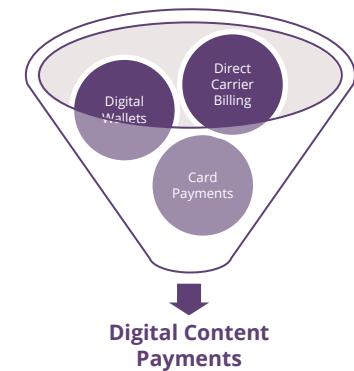
As can be seen from figure 1.3 to the right, Juniper Research anticipates that 44% of digital content spend is anticipated to be attributable to the Asia Pacific region this year, despite a large number of individuals who are unbanked. As a result, this presents significant opportunities for direct carrier billing as a payment solution.

Figure 1.3: Total Digital Content Spend in 2021 (%), Split by 4 Key Regions: \$211 Billion



Source: Juniper Research

Figure 1.4: Varying Payment Methods for Digital Content



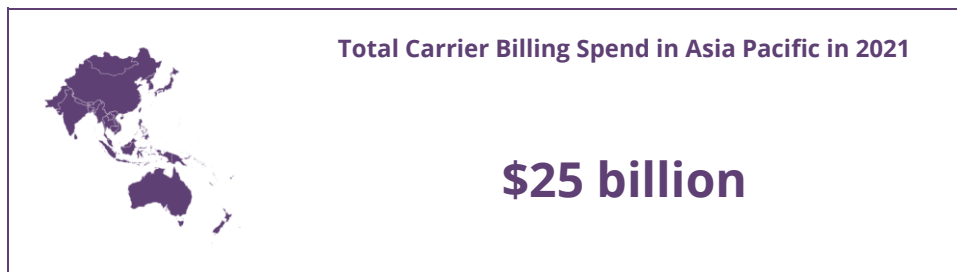
Source: Juniper Research



1.1.3 Carrier Billing Opportunities in Asia Pacific

In terms of carrier billing, Juniper Research estimates that spend over the channel will exceed \$25 billion this year; representing over half of global spend across the technology.

Figure 1.5: Digital Content Spend in Asia Pacific



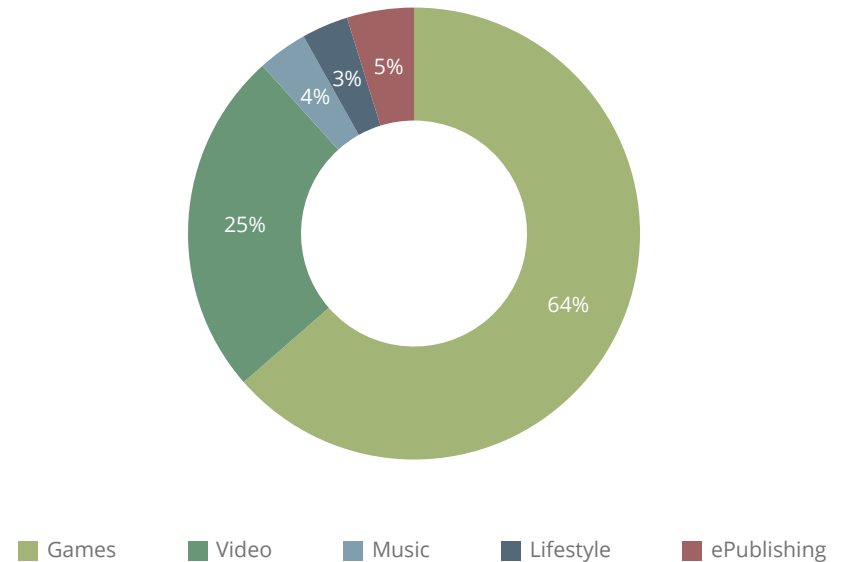
Source: Juniper Research

Countries including China, Japan and South Korea are expected to contribute significantly to this spend and are heavy users of digital content. Out of this \$25 billion of spend, \$22 billion is expected to be spent on digital content, including games, videos, music and other published content.

By 2025, carrier billing spend on digital content in Asia Pacific is expected to reach \$42 billion. This represents a growth of over 90% in just four years.

As can be seen from figure 1.6, games will comprise the majority of carrier billing spend in the region in 2021. Indeed, the market is well defined and benefits from established distribution channels and user readiness. Given the aforementioned advantages of carrier billing, this category is ready for greater adoption of carrier billing as a payment channel.

Figure 1.6: Total Digital Content Carrier Billing Spend in Asia Pacific in 2021, Split by 5 Key Categories: \$22 Billion



Source: Juniper Research

However, other categories cannot be discounted. Juniper Research expects growth in all categories over the next four years. Whilst games are anticipated to generate a large amount of spend, carrier billing spend on video and music services are counted as the two fastest-growing segments, with spend across both categories more than doubling over the next four years.

As a digital content platform, partnering with the correct payments platform is essential in order to maximise the uptake by users. DOCOMO Digital enables content developers to achieve this by offering direct carrier billing services.



PREPARED FOR DOCOMO DIGITAL

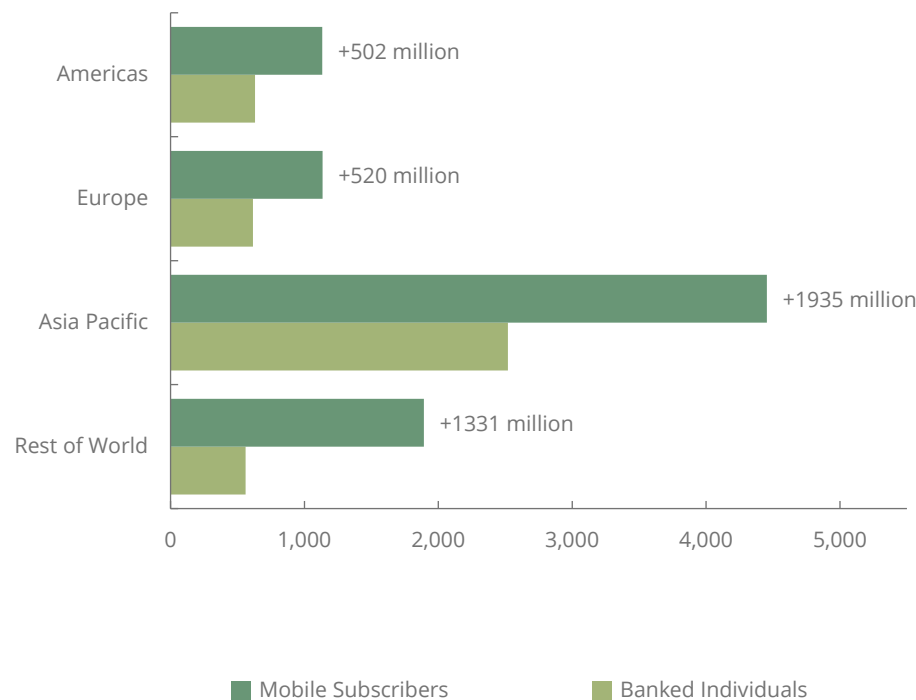
2. The Impact of Carrier Billing



2.1 Serving the Underbanked with Direct Carrier Billing

Figure 2.1 shows the total number of banked individuals and total number of mobile subscribers. As is evident, there are more mobile subscribers in each of the four regions than there are banked individuals. This leads to the conclusion that, in all regions, direct carrier billing must be offered as option to pay for digital content.

Figure 2.1: Total Number of Banked Individuals (m) and Total Number of Mobile Subscribers (m) in 2021, Split by 4 Key Regions



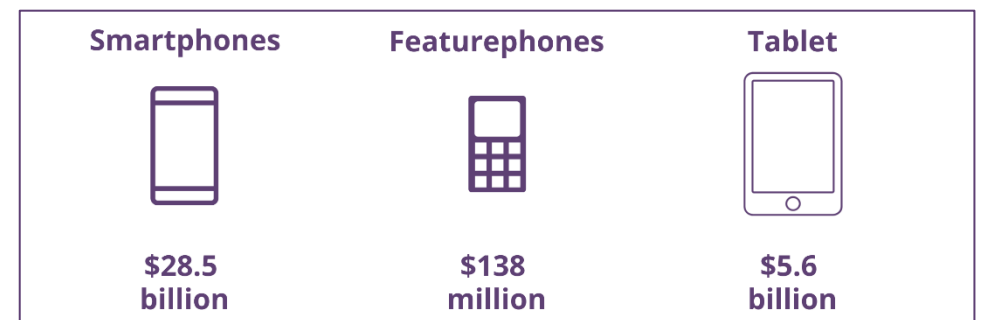
Source: Juniper Research

Carrier billing plays an important role in the payments space; in areas where there is a low number of banked individuals or where availability of banking services is low, mobile subscribers can leverage their mobile phone bill to subscribe to services or add one-off payments to their bill.

Improved telecommunications infrastructure and better mobile Internet connectivity have increased the applicability of direct carrier billing.

From the perspective of digital content developers, it is important to choose distribution channels that offer carrier billing as a potential payment option. A failure to do so will inevitably lead to missed monetisation opportunities, as potential digital content users who are only able to use carrier billing are unable to adopt the digital content service. However, Juniper Research estimates that 28% of the global adult population were unbanked in 2020, with this falling to 18% by 2025. It is evident that the Asia Pacific region presents the biggest gap in terms of banked individuals and mobile subscribers (1.9 billion). Countries including the Philippines and Vietnam contain more unbanked individuals than banked individuals as of 2021.

Figure 2.2: Total Carrier Billing Spend by Device in 2021



Source: Juniper Research



2.1.1 The Impact of 5G on Digital Content

5G, initially launched in 2019, will have a profound impact on the consumption of digital content. Indeed, these initial launches were found in North America, Europe and the Asia Pacific region, where demand for digital content is highest. Efficient network roll-outs and effective pricing strategies generated increased demand for 5G connectivity via personal devices.

As a result, there is a perfect platform for growth of digital demand content via personal devices over the next five years.

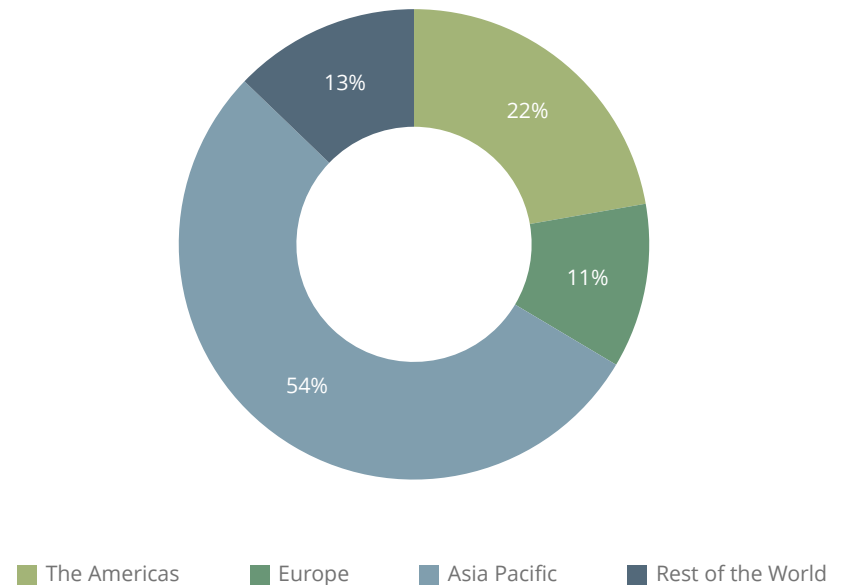
The majority of data consumption over 5G personal devices will be located in the Asia Pacific region; much of this data consumption can be attributable to digital content over smartphones and cellular tablets.

Indeed, increasing 5G connections will enable a growing number of users to access more content. The high bandwidth of 5G will also enable mobile subscribers to access more data-intensive connectivity. The technology itself brings significant improvements to digital content consumption over previous iterations, the most notable of which is network slicing. This will enable the delivery of digital content during peak times of demand by segmenting the network to enable more efficient data termination.

5G will not just benefit the end user, but also digital content providers. Live digital content will be a key beneficiary of increased mobile data throughput by enabling content to be delivered via 5G and fibre networks more efficiently, effectively increasing bandwidth for a higher number of users.

New digital content mediums will also be impacted by 5G networks. A key example of this is the rise of immersive reality, including augmented and virtual reality. These technologies require both high bandwidth and low latency if they meet consumer expectations.

Figure 2.3: Total 5G Data Consumption via Personal Devices in 2021, Split by 4 Key Regions: 234,546 PB



Source: Juniper Research

As digital content becomes more elaborate and the services on offer to users becomes more substantial, monetisation will remain the most crucial aspect for content developers. Whilst offering the widest variety of payment options will be the main priority for these players, they must not underestimate the potential for carrier billing and how it can reach users who are unbanked or unwilling to use other payment mechanisms.



2.1.2 Payment Method Analysis

Carrier billing will grow as it continues to be offered as a payment option alongside alternative payment methods. These technologies, such as card payments or digital wallets, continue to act as an alternative to users, whilst more experimental technologies, such as central bank digital currencies, are expected to experience more traction in the future.

Merchants, who work with the operators via payments providers, are continuing to integrate themselves further with the network operators and developing more comprehensive relationships within the ecosystem. In turn, this is helping to raise the profile of carrier billing in areas where the payment option has not often been considered, or experienced as greater uptake as other regions.

However, there are other payment channels that users of digital content may choose to use:

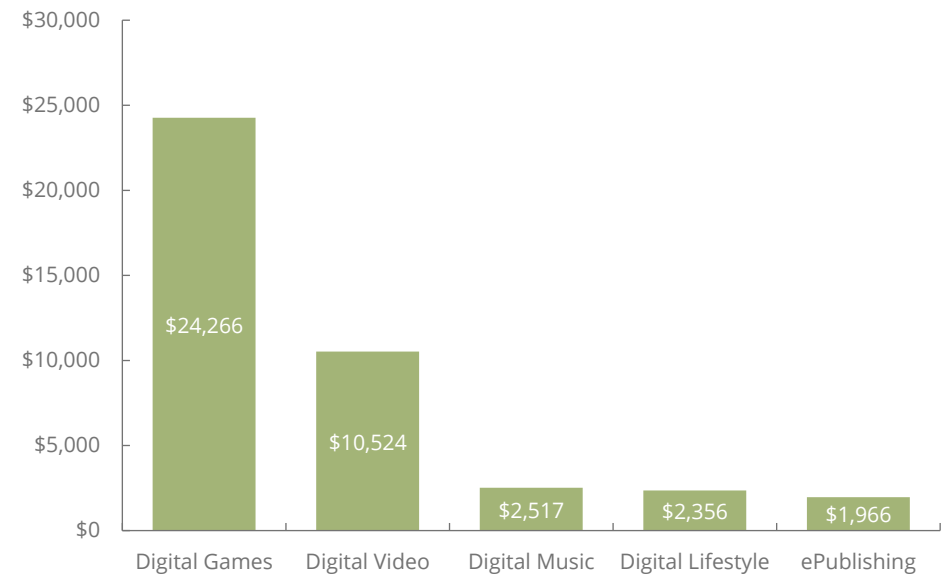
- Digital wallets, which includes software-based systems that securely stores users' payment information for many payment methods and websites in one location
- Card payments, which leverage bank information to process the transaction directly.

Both these payment options provide varying benefits and drawbacks against carrier billing. Whilst all three payment options have robust authentication processes, choice will be largely dependent on availability and which channel provides the least friction in terms of payments.

2.1.3 Why Carrier Billing Is Ideally Suited to Digital Content

Low-friction processes are a key advantage of carrier billing over other services, as the payment is authorised by the mobile network operator using the MSISDN as a key user identifier. In the realm of digital content, users expect a fast and simple delivery process that enables them to access the content as quickly as possible after the payment has been authorised. Given that much of this content is accessed on smartphones themselves, carrier billing is well positioned to capitalise on this growing number of digital content users.

Figure 2.4: Total End User Carrier Billing Spend on Digital Content in 2021 (\$m), Split by 5 Key Content Categories



Source: Juniper Research

In order to maximise the potential of carrier billing in this space, there needs to be collaboration between the payment merchants, such as DOCOMO Digital, and the network operators who are processing the payments. Given the complexity of the ecosystem, it is in the best interest of stakeholders to partner with companies such as DOCOMO Digital, who has built a substantial network of partnership with operators. In turn, this enables vendors and retailers to quickly and efficiently set up carrier billing as a payment option.

DOCOMO Digital is well positioned to capitalise on this increasing usage of digital content globally given its relationships with network operators.



2.1.4 The Rise of the Subscription Economy & Carrier Billing's Suitability

Digital goods and services have already completed a transition to a subscription economy, as digital content benefits from infinite scalability. This is most notable in the digital games, digital video and digital music segments, where providers such as Netflix and Spotify will be able to scale up service provision infrastructure, as users grow with relative ease.

Despite this rise in the subscription economy, there will always be instances of transaction digital content. These will include mobile apps that use PPD (pay per download) as a monetisation technique. Previously, apps often leveraged carrier billing for this, however with the rise of app stores for smartphones, account management and security allowed card payment to realise a greater share of this digital content spend.

i. Drivers of Subscription-based Services

The rise of a GaaS (Games-as-a-Service) has been accelerated by services such as Apple Arcade and Xbox Game Pass; these services have opened up the door to the possibility of having access to a content of digital games libraries for a monthly fee in a similar fashion to mobile video or audio streaming services.

Whilst these have become popular in regions such as North America and Europe, there are clear future opportunities for growth of these services in the Asia Pacific region where there is a high penetration of smartphones and increasing access to mobile data. However, as discussed previously, there are many mobile subscribers in this region that are unbanked. Carrier billing platforms, who already have the relationships with network operators in this region, will capitalise by enabling this band of subscribers to access digital games subscriptions via carrier billing services.

ii. Flexibility of Payment Options

Carrier billing will benefit from the ability to manage payments for subscription services, and users should find the ability to cancel service subscriptions beneficial to managing their mobile bill payments. This gives subscribers a greater peace of mind when it comes to bill management. Many subscribers will have multiple subscriptions being paid for via their mobile bill, and the ability to offer management tools will be

greatly desired by mobile subscribers. Mobile operators must ensure that they can offer these management services, or partner with carrier billing platforms that can provide them.



payments
ADS 
by docomo digital



PREPARED FOR DOMOCO DIGITAL

3. The Role of DOCOMO Digital in Carrier Billing



3.1 DOCOMO Digital



3.1.1 Corporate Information

DOCOMO Digital is the international payments business of the NTT DOCOMO group. The company partners with carriers, merchants, OTT services, app stores and payment providers in both developed and emerging markets around the world. With teams based in fifteen countries, the company enables partners to grow their digital services' revenues, while enhancing the customer experience for their users. Their robust managed services platform and coverage across carriers and the most locally relevant payment methods enable faster time-to-market, especially for streaming, gaming, eCommerce, and productivity application providers.

Figure 3.1: Key Digital DOCOMO Statistics



Source: DOCOMO Digital

Its Payments portfolio solves the challenges of scale, customer acquisition, regulation, and complexity for telecom operators, for merchants, and payment service providers. With its partner network of operators and payment providers, it provides payment services to nearly four billion people around the world.

DOCOMO Digital was established as the company's international mobile commerce platform in 2016; following a series of acquisitions in the area. It provides marketing and payments solutions to help telecom carriers, brands, and merchants unlock growth in the mobile commerce ecosystem while enhancing the experience for their users.

Its position as a subsidiary of a major telco is one of DOCOMO's advantages, not just because of the technical expertise available but because of the insights into the market it can gain from its parent company – a pioneer in carrier billing globally.

DOCOMO Digital employs over 300 staff. Its CEO is Jonathan Kriegel, Chief Commercial Officer is Jonathan Bennett and SVP Strategy is Hideki Oishi.

Key Clients & Strategic Partnerships

One of DOCOMO Digital's biggest partnerships is with Google. The company enables carrier billing for Google Play for over 50 carriers, and passed €1 billion (\$1.2 billion) in end-user spend across Google's markets in 2015. Early examples of this partnership included an integration with Bouygues Telecom in France in 2013, which enable easier purchases for subscribers across the Bouygues network. It has also allowed DOCOMO to crack new markets – in 2018, DOCOMO partnered with Vodacom to provide the first Google Play DCB in Tanzania.

The company's other most important partnership is with Amazon. Over the past three years, DOCOMO Digital has established 37 integrations for Amazon Prime services and it is working on further deployments.

Among operators, Telefónica has proved to be one of DOCOMO's key partners. A leading telecommunications provider in Europe and Latin America, Telefónica has recently started deploying the DOCOMO Digital platform into its Latin American markets. Given the popularity of electronic banking in this region, and the potential provided by both an Internet-savvy middle class and a large unbanked population, this could provide DOCOMO with a significant growth opportunity.



In Japan, DOCOMO Digital has a successful partnership with Shopify, using DOCOMO's existing integration with Japan's telcos seamlessly, to deploy DCB. The company's robust 'know your customer' API allowed secure transactions to be easily set up, and together with Shopify, it carried out seminars on DCB for merchants, to advocate for the value of the payment system and help them understand its benefits. This led to greater uptake of DCB among merchants using Shopify.

In the Middle East and North Africa, DOCOMO Digital has partnered with Zain Group, a leading telco with over 49.5 million subscribers. By introducing a group-wide API programme, the companies have removed significant barriers to developing partnerships with digital service providers. This has led to enhanced offerings across Zain's content services for its subscribers.

Exposure and refinement of APIs has been central to many of DOCOMO Digital's partnerships. In France, it was chosen by Bouygues Telecom to help that company expose its APIs to merchants in a standard way; easing the expansion of DCB among French digital merchants. Work with Bouygues also spotlighted the efficiency benefits for telcos of working with an experienced DCB provider, as DOCOMO provided Netflix and Spotify integrations within weeks, rather than the 9-12 months Bouygues estimated this would have taken to achieve in house.

DOCOMO Digital has previously focused on large-scale global merchants, but has recently altered its strategy to broaden its client base. It is updating its platforms to serve a wider range of merchants, still global operators, but working on different scales and in new verticals, such as dating and sports.

One recent partnership is with Silicon Valley start-up Juvo. In this work, the companies are looking at how to score the financial reliability of customers based on their history and use this to extend credit. If MNOs can judge which customers are good debt risks, then they can extend credit to these customers through DCB systems when they do not have quite enough money on their phone to pay for a good or service. This will allow trustworthy customers to spend more; making DCB more valuable for customers and channelling more payments through carriers.

DOCOMO Digital continues to add new telco partnerships to its roster. Recent additions include TrueMove H in Thailand and VTC Pay in Vietnam, as DOCOMO increases its presence in emerging markets.

3.1.2 DOCOMO Digital's Carrier Billing Solutions

DOCOMO Digital offers a range of mobile payments and carrier billing solutions, as well as mechanisms to process payment for physical and ticketing goods. It is currently working on expanding the core offerings it provides to its clients, including a subscription platform that would support subscription management for streaming.

The company uses one API for a single integration to access all local and global APMs; it offers a full range of carrier billing payment flows, from WAP and SMS to single-click and in-app methods. Its KYC, payment and financial services have been designed to remove friction throughout the sign up, shopping and checkout processes across all connected merchant channels.

DOCOMO tackles bad debt through a Billing Risk Manager, which allows telcos to identify bad debt risks among their customers and apply adaptive spending limits to keep their DCB spending within what they can afford. Machine learning algorithms use data and live simulations to control for risk on millions of transactions in real-time.

One of DOCOMO Digital's main aims at present is to get the message out about carrier billing. After recently appointing a new head of partnership from outside the payments industry, the company found that many merchants whom it expected to be familiar with DCB were not. The company is working with partners to raise awareness among merchants and encourage a shift towards DCB.

DOCOMO is currently launching Smart Hub, a new service that helps app developers target customers who have made purchases with carrier billing in the recent past. This has potential to make the initial marketing of a product more focused and effective.

This is just one example of the company's current exploration of how to monetise the data flow across its networks; acknowledging and profiting from the information that accumulates through carrying out large volumes of electronic transactions. Data which has, until now, been a side effect of the payment process but could now become a major product for DOCOMO to market. The company is leveraging this data to increase its value to clients in a number of ways; a process which will



enhance the value of those clients, and thus support DOCOMO's long-term profitability.

DOCOMO is materially expanding its payment platform. The company has seen operators increasingly keen to work with merchants to reach their customers and wanting a more managed service to do this. As this is not telcos' core business, many of them are looking for a partner to provide support with onboarding, reconciliation, and other issues around managing relationships with merchants. In this context, DOCOMO is positioning itself as a bridge between the needs of merchants and those of MNOs.

To support its growing operations and increase the flexibility of its services, DOCOMO Digital has recently agreed a three-year investment plan to move its digital services out of two European data centres and onto cloud computing. This is expected to bring lower latency, enhanced disaster recovery, and faster onboarding for clients. As part of the operation, DOCOMO is redesigning its core applications to increase their flexibility. Each telco the company works with has its own bespoke systems, and DOCOMO's engineers have to adjust to these. The cloud move and associated rebuilding will make it easier and quicker to integrate these varied systems.

In terms of its future operations, DOCOMO Digital is looking at how its existing offering can be combined with other services. For example, carriers can combine loyalty schemes and payment apps to create a virtuous cycle of engagement with both, and the company has seen interest in this from several carriers.