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SatoshiPay

An emerging leader in digital nanopayments

By Milan Radia, Hardman & Co Analyst

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SatoshiPay

An emerging leader in digital nanopayments

SatoshiPay is a developer of micropayment solutions for the digital economy. Its blockchain-based platform facilitates payments of small, even fractional, sums for online content and services. This delivers a much-needed monetisation platform for publishers against a backdrop of pressure on digital advertising revenue.

- Market leadership in prospect: Traditional payment systems, debit and credit cards in particular, are incompatible with micropayments, due to high minimum fees per transaction. Blockchain is inherently better-suited to micropayments, but even the leading blockchains and cryptocurrencies have seen transaction fee escalation and processing congestion. SatoshiPay has an opportunity ahead to take substantial share in a rapidly-expanding new market.

- Substantial end-markets: The company's addressable markets encompass digital online content, internet video, the Internet of Things (IOT), in-game purchases and other similar closed-loop systems. These are multi-billion-dollar markets and growing at double-digit CAGRs. Solid sales execution will, of course, be key, but the relatively benign competitive landscape and sheer scale of opportunity are key potential drivers of revenue growth.

- Digital content publishers are under pressure: The traditional digital advertising-based revenue model is decreasingly effective in the face of ad-blocking software. Similarly, paywalls for journalistic content are exerting an adverse impact on website traffic for these publications. Yet, on demand content consumption is a growing habit. Micropayment is emerging as a potentially important monetisation mechanism for content publishers.

- Platform: Over the past four years, SatoshiPay has developed an entirely cloud-based, high-performance, enterprise-grade payments platform. Its blockchain underpinnings facilitate exceptionally low transaction costs, fast processing and high levels of security. Scalability runs to hundreds of transactions per second. SatoshiPay has a partnership with the Stellar Development Foundation, which is giving away 50 million units (or some $10m) of its native currency, called Lumens, to drive adoption and liquidity. SatoshiPay has been given allocations of Lumens to use as part of its user-acquisition initiatives.

- Contract wins: SatoshiPay recently announced a contract win with City A.M., a free London daily newspaper. This followed a contract win with The Register, a high-traffic technology news website. SatoshiPay is presently in advanced discussions with a number of potential large and well-known clients, including a major European publisher, which, if concluded successfully, would result in a significant step change in revenue.

- Risks: The company has a strong core technology platform but, in terms of customer acquisition and revenue development, the business remains in its relative infancy, in turn inevitably creating execution risks and uncertainties with respect to the financial trajectory of the business over the next year or two.

- Investment summary: SatoshiPay may be an early-stage business, but it has the opportunity to deliver very strong revenue growth from this year onwards. The management team is accomplished and savvy, and is executing with a clear direction. The decision to move to the Stellar blockchain platform, away from

bitcoin, is an example in this regard. Early contract wins with publishers, especially the larger names, will create step changes in financials and valuation.

SatoshiPay

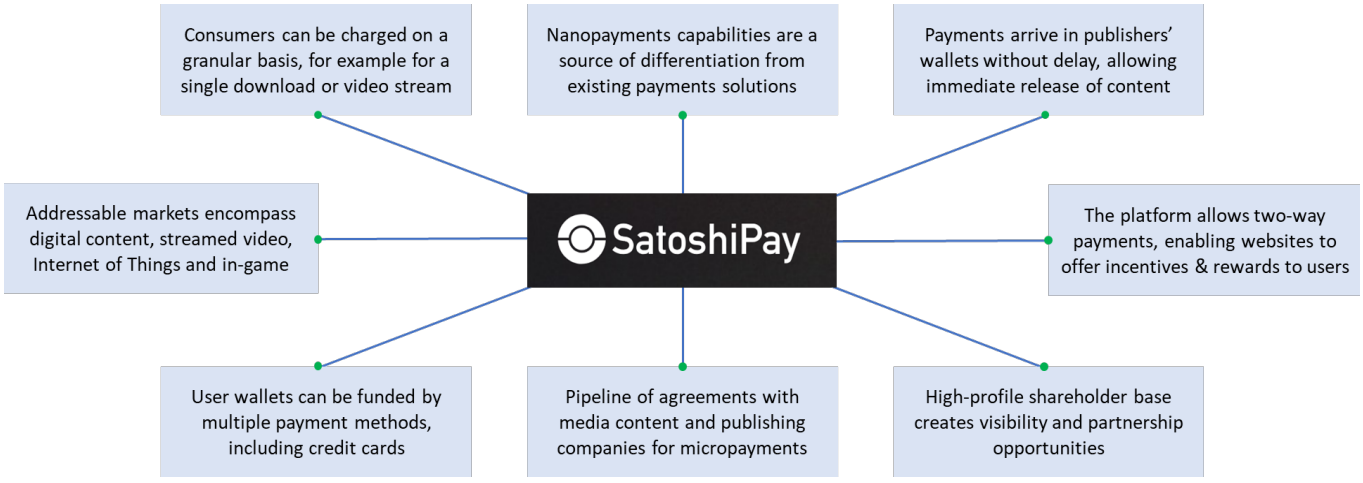
SatoshiPay is a developer of micropayment solutions for the digital economy. Its blockchain-based platform facilitates payments of small, even fractional, sums for online content, products and services. Providers of online content can now charge a few pennies or even less than a penny for access to individual pieces of content – which could be an online newspaper article or blog, a music track, a few minutes of streamed content (e.g. a live sports broadcast), an in-game purchase, or bytes of data from a connected device – the list is almost endless.

The simple fact is that the digitisation of the consumer and business worlds is a secular trend that remains in its early stages. Even earlier in development are mechanisms and platforms for large-scale content providers to monetise their digital assets at a granular level.

Founded in 2014, SatoshiPay successfully beta-tested its platform to high levels of performance and scalability, and it is now ready for mainstream deployment. The next step is to win deployments with major publishing houses and content owners to build on the smaller publishers that have been secured to date (indeed, approximately 3,000 smaller publishers have signed up to SatoshiPay to date).

The ongoing hiatus in advertising-based internet revenue models, combined with SatoshiPay's advanced discussions with certain major publishers, suggest that revenue momentum could build relatively quickly. This report sets out some of the background on SatoshiPay, the broader industry segment and key technologies, together with details of the company's technology platform and anticipated financials.

SatoshiPay – key features



Source: Hardman & Co Research

Introducing SatoshiPay

SatoshiPay is one of the leading emerging providers of a digital payments platform that facilitates micropayments rapidly and without the need for cumbersome user logins. The underlying platform is based on the latest blockchain technologies, delivering a highly scalable and low-cost means for content owners, publishers and other participants in the digital economy to monetise their assets and offerings.

The company does not itself hold any personal details about users; nor does it hold client funds. Therefore, it does not require an e-Money licence. The underlying blockchain platform acts as the banking ledger, with a permanent record of all payment transactions.

Nanopayments gap in the payments market

Today, there is no online payments mechanism in widespread use that allows small "nanopayments" of a few pennies or cents to be made at a level of transaction cost that makes them economically viable. This might seem surprising, given that a digital payment is, inherently, simply the transfer of a few bytes of data. Prior to blockchain payments, there were numerous attempts at creating digital or electronic cash mechanisms. Most failed, ultimately, due to their centralised approaches. Meanwhile, debit and credit cards impose charging structures with minimum fees that are too high (typically, 10-20 pence or cents fixed charge per transaction, plus a charge of 1% to 3% of the transaction value) and entirely at odds with nanopayments.

At the same time, the opportunity to apply nanopayment solutions to an array of applications and content repositories is large and growing. This gap in the market will simply get larger, as the sources of 'content' explode in number. The data streams generated by the Internet of Things (IOT) – autonomous driverless cars are one easy-to-comprehend example – will likely be a further major driver in this regard.

Internet advertising-centric revenue models are under pressure

Ad-blocking software is becoming increasingly prevalent, while major corporate advertisers continue to express discontent regarding the effectiveness and transparency of digital advertising. This is disruptive for the 'traditional' internet revenue model, which was based heavily on the notion that users would access content for free, while viewing adverts that would be chargeable to advertisers. In the face of impediments to advertising, publishers and other digital content owners are seeking to embrace additional means of monetising content offerings.

Online content is a key shorter-term opportunity

One of the most immediate opportunities for SatoshiPay is with online publishers. Subscription to online publications was the obvious starting point for many of these content providers. However, the on-demand manner in which much content is consumed online today is inconsistent with the creation of substantial subscriber bases for most publications. The leading national newspapers may be assumed to be an exception here, but even in that premium segment, user dynamics are evolving. The sizeable incentives and discounts being continually offered to new subscribers are one data point in support of these shifts.

Paywalls are only part of the monetisation story

Paywalls can be readily established, limiting or blocking content from non-subscribers, but there are inevitable sacrifices to be borne in terms of readership numbers, journalists' profiles, the relevance of these publications to the broader debate and, of course, advertising revenue. Given these factors, some newspapers have sought to avoid paywalls and simply ask readers for money/donations. We present some examples in this report – like *The Guardian* newspaper in the UK – but this is far from predictable as a source of funding for operating expenses for any business.

Nanopayments provide a monetisation mechanism

Many visitors to newspaper websites will have been directed there by Google searches or one of the many news aggregation platforms that collate content for users, such as Apple News, MSN or Google News. This is valuable content that has been created by experienced journalists at a substantial cost to the publisher, yet the content is being accessed free of charge by a multitude of individuals.

The likelihood is that, if these same readers were asked to pay a nominal fee of a few pennies to read their chosen article, a material proportion would agree to do so, particularly if the process to make the payments were easy and quick. This is an example of the immediate opportunity available to nanopayment providers such as SatoshiPay.

Advanced discussions with major European publishers

SatoshiPay is currently in late-stage discussions with a number of major content publishers regarding deployment of the nanopayments platform for their digital publications. These opportunities span websites and content apps for mobile devices. In some of these cases, the adoption of SatoshiPay would potentially unlock scope to add additional content and user-centric services to the current range of available content. For reasons relating to commercial confidentiality, SatoshiPay is presently unable to name these customers.

Blockchain technology is a key enabler

For SatoshiPay, it is the underlying blockchain platform that facilitates the processing of micropayment transactions, due to the essentially negligible transaction costs. Amid the hype of cryptocurrencies and some of the well-documented volatility, there can be no doubt that industrial-scale applications of blockchain are already emerging and will continue to transform many processes within major verticals globally. SatoshiPay is leveraging the Stellar blockchain, comprising a global network of distributed servers to deliver a highly advanced and scalable micropayment transaction platform. Stellar can today handle 1,000 transactions per second, which exceeds the total number of credit card transactions in Europe. The underlying technologies are explained in greater detail in this report, as are other key concepts, such as Smart Contracts and Utility Tokens.

SatoshiPay is a scalable, website-agnostic solution

The application takes the form of a web "widget" that removes the need for users to log in. Widgets are small, stand-alone applications that can be installed and run within webpages. Importantly, this approach removes the need for users to log in each time they come across content they wish to pay for and access using their SatoshiPay wallets.

Although its widget uses local browser storage, SatoshiPay offers users the ability to use their accounts across their various devices – for example mobile phones, tablets, laptops, etc. This is facilitated by means of a backup feature that allows users to anonymously log in and register details of the SatoshiPay account. This will also allow a user's SatoshiPay balance to be recovered if a device is lost.

The platform has been developed to ensure that content is unlocked immediately without delay. As it happens, Stellar processes transactions, i.e. it submits them into its blockchain, at high speed, typically within five seconds. However, SatoshiPay has developed mechanisms to allow content to be released in less than one second, even if there is a delay in verification of the transaction.

Blockchain platform change

SatoshiPay spent some time evaluating the right long-term blockchain technology and platform upon which to build its business. In 2015, the initial development was

undertaken on bitcoin. However, the segment has evolved rapidly, with the emergence of a number of fast-growing alternatives. Meanwhile, bitcoin has seen transaction cost inflation and processing congestion that render it unusable for many transaction platforms, especially those such as SatoshiPay, which require very low transaction costs and immediate responses.

In December 2017, SatoshiPay announced a formal partnership with the Stellar Development Foundation, making the Stellar Network SatoshiPay's default ledger. Stellar has a different approach to blockchain (which we discuss in this report), rendering its transaction costs negligible. Although launched only in 2014, Stellar is already firmly in the top 10 cryptocurrencies as measured by CoinMarketCap, and it is gaining large partners in the payments and money transfer segment. Many of these also cite Stellar's community-centric approach, rather than a perceived emphasis on creating market dominance on the part of other competing blockchain platforms.

Euro-pegged token implementation planned with TEMPO

One of the key current software development initiatives is to collaborate with TEMPO, a regulated French money transfer company that has obtained a banking licence. Since April 2017, TEMPO has issued a Euro token called EURT on the Stellar network. The EURT can be used for trading or to transfer to cash to European bank accounts within the Single Euro Payments Area (SEPA).

SatoshiPay is looking at ways to peg its content credits to the Euro via the EURT. This will be helpful to end-users as a means of building confidence in the platform, but the greatest benefit will be derived by the content provider customers. Their digital revenue will be protected from volatility in the Stellar price by this move. Once this implementation is complete, SatoshiPay should be the first provider to use a fiat currency-pegged token in a mainstream product offering, which will be a notable achievement in a blockchain industry context.

TEMPO itself is launching a series of new offerings for money transfer, based on the Stellar platform, especially relating to online money transfers overseas. The total number of locations where TEMPO's services are available has risen to 195,000, while the number of countries in which TEMPO is present has reached almost 120.

Revenue drivers span customer-acquisition and volume growth

SatoshiPay's revenue streams over the next two to three years will be driven primarily by the acquisition of content-provider customers and the progressive build-up of transaction volumes, as users pay for content using the SatoshiPay platform. The progression of these trends is inevitably subject to uncertainty, but our forecasts are conservative relative to management's own expectations and targets. Nonetheless, at this early stage, we would describe our forecasts and assumptions as illustrative.

Routes to market

SatoshiPay has divided the content provider segment into "A" and "B" publishers, the former representing the major publishers, each with multiple substantial titles, and the latter referring to small content providers with limited offerings. The route to market for each segment will be different.

- For the A-Publishers, the intention is to hire experienced sales people with relationships among the large content providers. Channels will also have a role to play. The Register deployment, for example, came through an agency agreement with a partner in the UK.

- The B-Publishers are a fragmented segment that will be targeted through indirect channels. Affiliate programmes and referral schemes will be established to address this segment, which, over time, is expected to overtake the A-Publishers in terms of revenue contribution.

Current customer numbers

The current user base comprises c.135,000 SatoshiPay wallets, and around 23,000 transactions have been processed to date. Today, about 200 publishers generate 10 or more transactions per month, equating to a run rate of c.2,000 transactions per month from the active base. These relatively modest metrics reflect the early stage of development in terms of live deployments across the size spectrum of content providers. From this starting point, our forecasts certainly display strong growth but, at the same time, they are intended to be conservative, given uncertain timing and conversion rates on new customer additions.

Pricing structure

SatoshiPay charges the recipient of payments a fee of 10.00% of the value of the transaction, with no minimum charge; this transparent and straightforward approach is therefore attractive for smaller payment amounts. It allows users to fund their wallets in multiple ways, including debit and credit cards and PayPal. SatoshiPay is charged an average of 2.00% for these top-ups, which it currently does not pass on to users, but recoups as transactions are processed.

Revenue drivers

Key drivers of SatoshiPay's revenue growth over the next four to five years will include the following:

- A growing proportion of user sessions will hit the SatoshiPay paywall, i.e. relating to content that is chargeable under the nanopayments model. The upward trend will, in turn, be a function of more content owners signing up to SatoshiPay, a growing base of end-user wallets and higher levels of successful conversion of app or website visits into payments. These fundamental trends could prove to be relatively linear in nature over a period of many years, but this is an unproven hypothesis at this juncture.

- €0.30 is the price per transaction that is assumed by management for planning purposes. This might ultimately be on the high side as an assumption, given that the revenue mix should eventually evolve to include material revenue from micrometering of streamed content, but this assumption would, in any case, need to be seen alongside accompanying transaction volume assumptions.

- For the A-Publishers, the assumed conversion rate could commence at a low level and then climb steadily over time. For the B-Publishers, the underlying assumption should probably be that almost all, if not all, content is chargeable.

- At this juncture, SatoshiPay's focus is on the digital content publishing segment. After a period of two to three years, with the benefit of a larger development team, we would expect to see an effort from the company to address a broader range of vertical segments.

Illustrative revenue assumptions

The tables below set out illustrative assumptions for each of the A-Publisher and B-Publisher categories. We present a 'cautious' case and 'base case' for each category.

- **For each A-Publisher deployment,** it is assumed that monthly sessions (i.e. the number of visits to the publisher's app or website by end-users) and conversion rates increase steadily over time. It is also expected that publishers will place a growing proportion of content behind the SatoshiPay paywall as they become more comfortable that the monetisation process is proving to be effective.

- **For the B-Publisher deployments,** which will comprise limited content, perhaps even a single online blog, it is assumed that all content accessed behind end-users

will sit behind the SatoshiPay paywall. The cautious case assumes that monthly sessions per B-Publisher decline over the first four years following the initial deployment, whereas the base case assumes a material uplift over the same period. These are average revenue-per-publisher assumptions, which seek to partly reflect the small levels of marketing expenditure typically available to these smaller content providers.

A-Publisher illustrative session and conversion assumptions – cautious and base cases

A-Publisher assumptions	Year 1	Year 2	Year 3	Year 4
Cautious case				
Avg. monthly sessions per A-Publisher	30,000,000	38,750,000	47,500,000	56,250,000
Annual sessions per A-Publisher	360,000,000	465,000,000	570,000,000	675,000,000
Share of sessions hit paywall	7.0%	10.0%	12.0%	16.0%
Sessions hit paywall	25,200,000	46,500,000	68,400,000	108,000,000
Conversion rate	2.0%	3.0%	4.0%	5.0%
Paid SatoshiPay transactions	504,000	1,395,000	2,736,000	5,400,000
Price per transaction in EUR	0.30	0.30	0.30	0.30
Total spend volume in EUR	151,200	418,500	820,800	1,620,000
SatoshiPay fees as % of spend volume	10%	10%	10%	10%
SatoshiPay revenue	14,556	41,850	82,080	162,000
Base case				
Avg. monthly sessions per A-Publisher	30,000,000	38,750,000	47,500,000	56,250,000
Annual sessions per A-Publisher	360,000,000	465,000,000	570,000,000	675,000,000
Share of sessions hit paywall	15.0%	18.0%	22.0%	25.0%
Sessions hit paywall	54,000,000	83,700,000	125,400,000	168,750,000
Conversion rate	3.0%	5.0%	7.0%	10.0%
Paid SatoshiPay transactions	1,620,000	4,185,000	8,778,000	16,875,000
Price per transaction in EUR	0.30	0.30	0.30	0.30
Total spend volume in EUR	486,000	1,255,500	2,633,400	5,062,500
SatoshiPay fees as % of spend volume	10%	10%	10%	10%
SatoshiPay revenue	46,786	125,550	263,340	506,250

Source: Company data, Hardman & Co Research

B-Publisher illustrative session and conversion assumptions – cautious and base cases				
B-Publisher assumptions	Year 1	Year 2	Year 3	Year 4
Cautious case				
Avg. monthly sessions per B-Publisher	60	50	45	45
Total sessions per annum	720	600	540	540
Share of sessions hit paywall	100.0%	100.0%	100.0%	100.0%
Number of sessions that hit paywall	720	600	540	540
Price per transaction in EUR	0.30	0.30	0.30	0.30
Total spend volume in EUR	216	180	162	162
SatoshiPay fees as % of spend volume	10%	10%	10%	10%
SatoshiPay revenue	21	18	16	16
Base case				
Avg. monthly sessions per B-Publisher	60	80	120	150
Total sessions per annum	720	960	1,440	1,800
Share of sessions hit paywall	100.0%	100.0%	100.0%	100.0%
Number of sessions that hit paywall	720	960	1,440	1,800
Price per transaction in EUR	0.30	0.30	0.30	0.30
Total spend volume in EUR	216	288	432	540
SatoshiPay fees as % of spend volume	10%	10%	10%	10%
SatoshiPay revenue	21	29	43	54

Source: Company data, Hardman & Co Research

New verticals

There can be no doubt that internet video traffic growth remains explosive, and this trend is set to continue for a number of years, especially on mobile devices.

Similar growth is expected for the IOT, where the number of connected devices worldwide is expected to grow from ca.20bn in 2017 to over 75bn by end-2025. All of these devices will be generating and receiving streams of data, which, in turn, will feed into analytics platforms and be subject to various forms of processing. Autonomous driverless cars are a good example here, as current forecasts suggest that a single car driving around for a day will generate over a terabyte of data alone.

The challenge of turning these enormous data points into revenue forecasts centres on the unknowns of when video content providers will sign up on a meaningful scale and, in turn, how consumers respond to the notion of paying for content that may not have been chargeable previously, and to using a new payments approach with a likely unfamiliar currency.

One approach would simply be to factor in modest revenue from new verticals relative to the overall potential opportunity. What is important, perhaps at this stage, is to recognise that SatoshiPay has a solution that is highly relevant to the monetisation of the IOT opportunity at a granular level.

SatoshiPay background

Company history

The company was founded in Berlin, Germany, in September 2014 by Meinhard Benn, and was formally incorporated in the UK in December 2014.

The company raised funding from Jim Mellon and two quoted UK funds. In November 2014, Axel Springer Plug and Play, the Berlin-based startup accelerator subsidiary of publishing company Axel Springer, invested €25,000, which was deployed on the first iteration of the payments platform.

More recently, SatoshiPay secured €566k of pre-IPO funding from Daniel Masters, an experienced blockchain investor, at a pre-money valuation of €17m.

Blue Star Capital Holding

In January 2017, Blue Star Capital, an AIM-listed investment company, announced that it had raised £0.70m by way of a Placing as a means to fund an investment of approximately €0.64m in SatoshiPay. Following this investment, it held approximately 10.7% of its issued share capital. In March 2017, Blue Star acquired further shares from an existing shareholder for €0.50m, taking its holding to approximately 19.1%. In July 2017, Blue Star bought out further shareholders for €0.73m, raising its stake to the current level of 30.1%.

Proposed IPO

In July 2018, SatoshiPay announced a proposed IPO of the business. The proposed listing will supply the company with a platform to raise development capital, allow shareholders to trade shares, and give stakeholders the confidence that comes with the levels of corporate governance and transparency required for a listed company.

SatoshiPay has signed an agreement with Blue Star Capital that gives Blue Star exclusivity over an all-share acquisition of SatoshiPay until December 2018. If completed, this acquisition would result in a so-called reverse takeover of SatoshiPay by Blue Star.

Current shareholder list

SatoshiPay shareholders (as at end-August 2018)	
Shareholder	Holding as at 31 August 2018
Meinhard Benn (Founder)	48.3%
Blue Star Capital	30.1%
Alex Wilke (Co-Founder)	5.1%
Henning Peters (Co-Founder)	3.7%
Daniel Masters	3.2%
Quan Wo	3.2%
Axel Springer Plug & Play Accelerator	3.1%
Jim Mellon	1.6%
KR1	1.0%
Kilian Thalhammer (Co-Founder)	0.6%

Source: Company data

SatoshiPay Team

- **Meinhard Benn (CEO):** Meinhard has been a coder for most of his life, and has been involved with web-related startups and organisations since the early days of the internet. He first discovered blockchain in 2011 and has focused on developing platforms using the technology since then.

- **Alexander Wilke (COO):** Alex is an entrepreneur and a business intelligence expert. He has worked as head of departments at Jamba and MyHammer, and as producer at Wooga.

- **Dr. Torsten Stüber (CTO):** Torsten holds a PhD in Computer Science, and was awarded summa cum laude by Technical University Dresden. He is a cryptography expert and entrepreneur.

- **Sven Roßbach (CRO):** Sven holds a Wharton MBA degree (Pennsylvania, US). He launched Adobe's programmatic advertising subsidiary, TubeMogul, in China.

- **Dr. Aaron Lindner (Product Lead):** Aaron is an experienced product expert and holds a PhD degree in Physics from the University of Heidelberg. He has implemented several internet projects for the Max Planck Society and successfully co-founded two start-ups.

- **Tansel Inanc (Finance Manager):** Tansel has a history of working in the financial services industry, particularly in mergers and acquisitions. Prior to joining SatoshiPay, he worked at a leading accounting firm in Frankfurt, an investment bank in London, an investment office in Istanbul, and a growth company in Berlin

- **Henning Peters (Technical Advisor and Investor):** Henning is a serial entrepreneur, and has been developing tech companies since 2007, including Absolventa, which he successfully exited in 2010 and, more recently, Skoobe.

- **Kilian Thalhammer (Payment Advisor):** Kilian is a FinTech expert and a former Managing Director at Paymill, a leading European payment provider, and at RatePay (acquired by Otto Group).

SatoshiPay in action

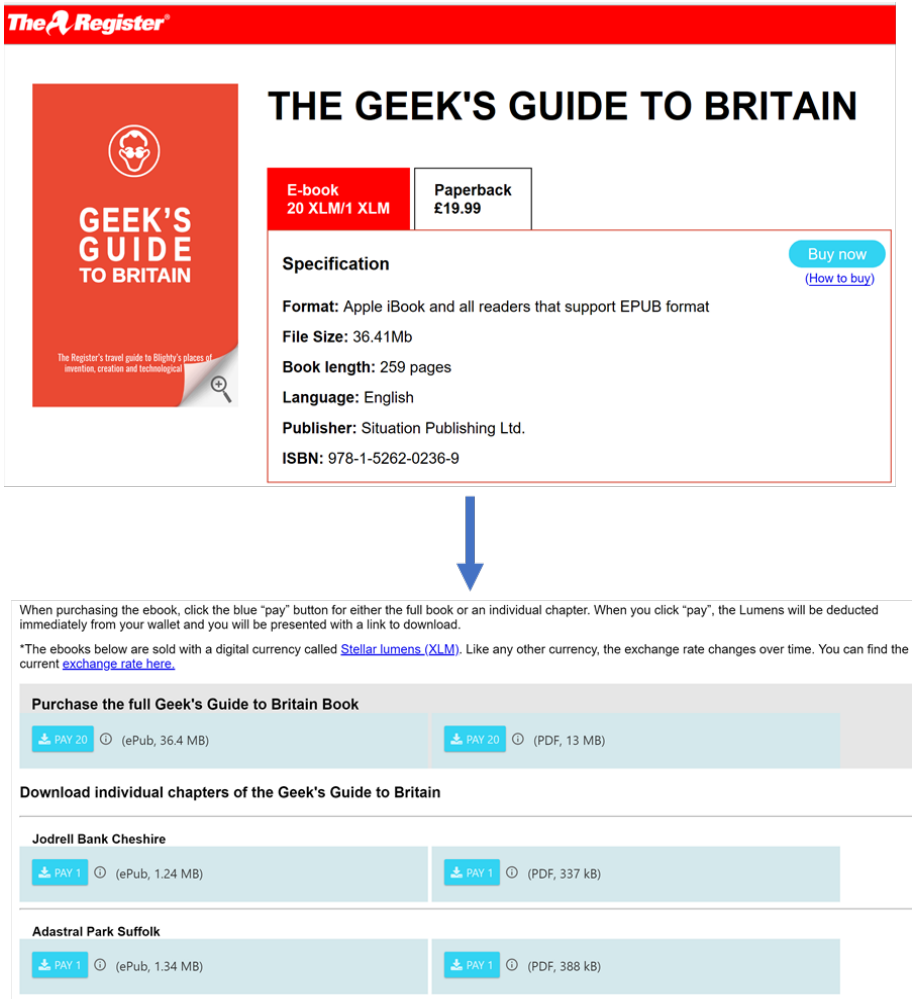
Easy to install for content providers

For content providers, the key steps are to i) register an account with SatoshiPay, ii) install the SatoshiPay plug-in on their website, iii) create a blockchain wallet with a third party, into which the payments will flow, and iv) select the content that will be masked and for which small charges will be imposed. Importantly, no complex or cumbersome software integration is required, as SatoshiPay works seamlessly with all WordPress websites.

A customer example: The Register

A recent deployment of SatoshiPay was with The Register, a leading global online technology sector publication, which reports in excess of nine million unique visitors worldwide per month (of which six million are in the UK and the US). The Register has, in the first instance, implemented SatoshiPay for specific pieces of content on its website. One example featured below is the "Geek's Guide to Britain", the download version of which is available through payment in 'Lumens' via SatoshiPay.

SatoshiPay – deployment on The Register website



Source: The Register website

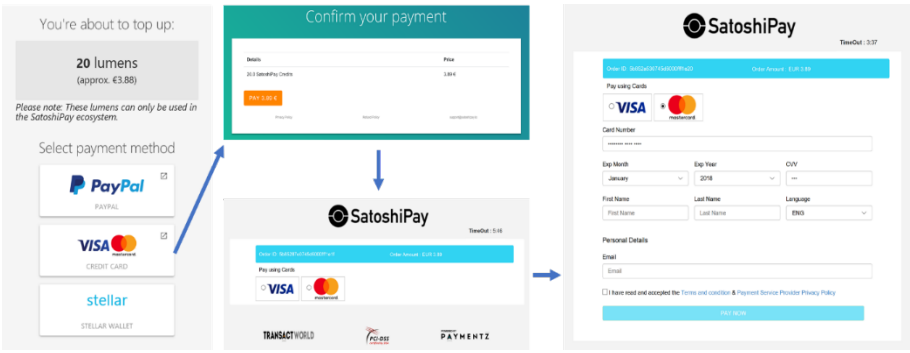
This is a first step in this relationship, and we would expect additional content to be made available in this way.

It is notable that the purchase options are not only for a download of the entire publication, but also for specific chapters from the book. Acknowledging that users will generally be unfamiliar with SatoshiPay and Lumens currency, there is a link to a user guide, as well as to an exchange rate source. At the time of the publication of this report, the price of the full e-book download was 20 Lumens (20 XLM), equivalent to £3.38, which compares with the paperback version, which is sold in GBP at a price tag of £19.99.

The 'Buy now' button will lead to a message that the SatoshiPay wallet needs topping up if there is a zero SatoshiPay balance – for example, for a new user. This will, in turn, lead to the user seeing a screen offering top-up options via PayPal, credit cards or other Stellar wallets, of which there are many. These types of screens will be familiar to anyone who has conducted an online transaction, as SatoshiPay uses a conventional retail checkout model.

Once the top-up has been completed, the wallet that is stored in the consumer's browser will be updated to reflect the number of credits that have been purchased. These can be used on any website where SatoshiPay has been installed.

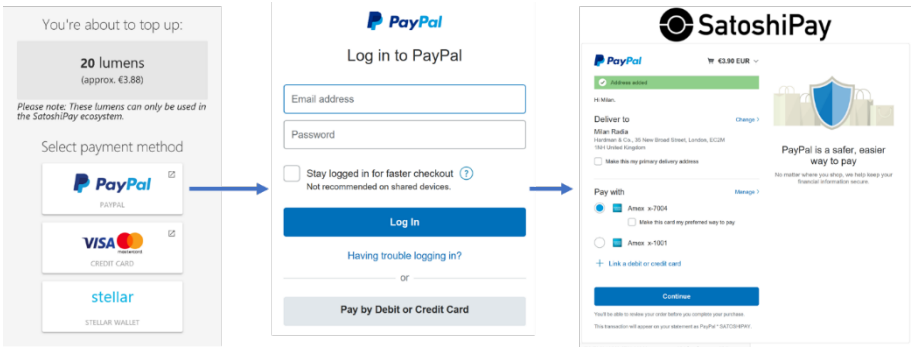
SatoshiPay – top-up screenshots using credit card



Source: Company data

PayPal is similarly a commonly-used online payment option. When this is selected for a SatoshiPay top-up, the user will have the option to log in to use pre-entered personal details and card information. Alternatively, PayPal also offers a card payment option similar to that set out above. The screenshots are set out below.

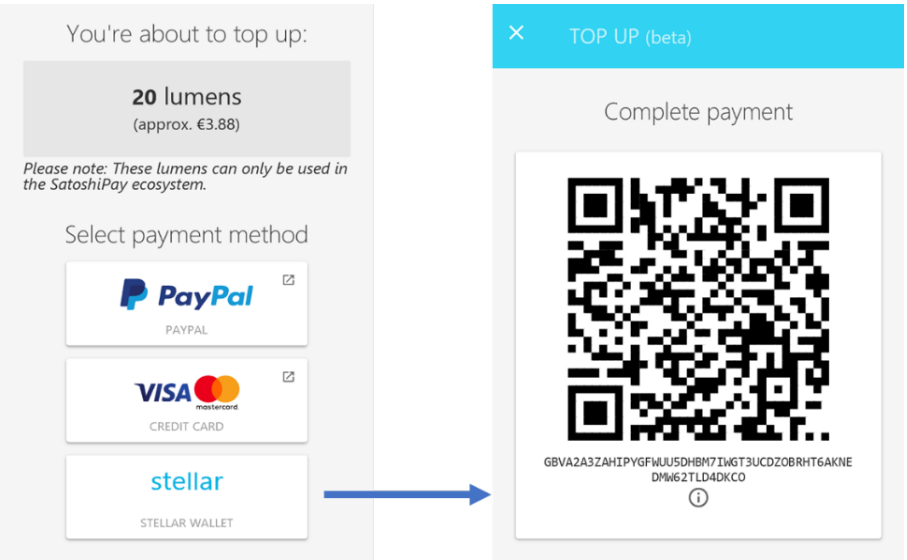
SatoshiPay – top-up screenshots using PayPal



Source: Company data

The final account top-up option is to make a Lumens transfer from another Stellar account to a SatoshiPay account. In order to complete this transfer, the user simply scans the QR code (shown below on the right-hand side) with a Stellar wallet app.

SatoshiPay – top-up by Stellar Lumens transfer



Source: Company data

There is a wide range of other Stellar wallets from which transfers can be made. Some of these are desktop-based, while others operate as mobile apps. Despite the growing presence of these types of wallet options, we would expect the majority of SatoshiPay top-ups to be using PayPal or direct credit card funding sources.

Stellar wallet options

Source: Stellar

SatoshiPay bears upfront card fees

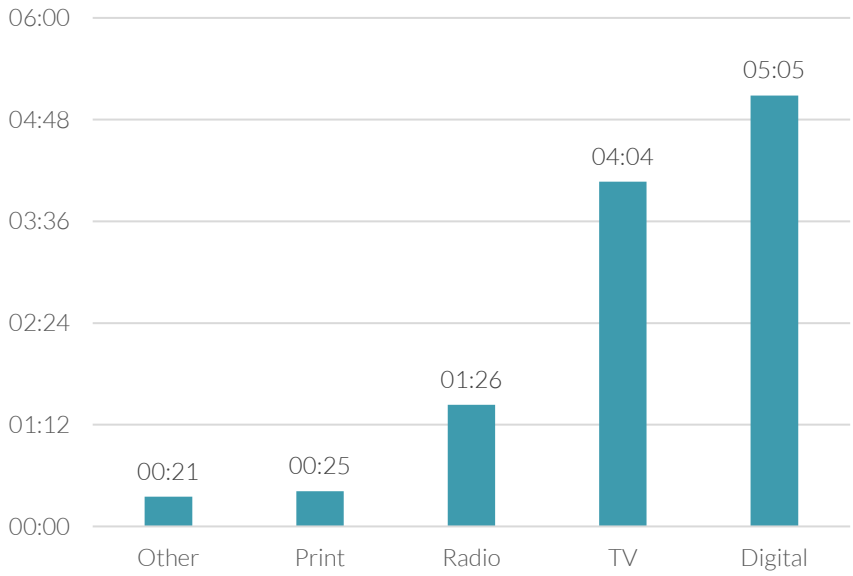
In each of these examples, the user is not charged any fee for topping up the SatoshiPay account. This is despite the credit card top-up options resulting in a fee of approximately 2.00% being charged to SatoshiPay by the merchant acquirer. The business model is that this fee is not passed on directly to the end-user. Rather, it is incorporated into the 10.00% fee on all transactions. The 2.00% fee *per se* will, therefore, be recovered only once users have exhausted their balance of credits. We discuss these arrangements later in the Financials section of this report.

Drivers of demand

The need for digital presence

It will not have escaped the attention of most investors that there are fundamental sweeping changes taking place in the way that individuals and businesses communicate, interact, conduct transactions, and consume content and media. The chart below sums up the state of play pretty well (these are US metrics but equally representative of European trends) – consumers and businesses are embracing digital formats at an accelerating rate, and this is happening at the expense of traditional media. The need for publishers to drive their digital content and associated monetisation strategies is clear. This is not new news – diminishing sales of printed publications are the backdrop for a universal emphasis on digital revenue for every media and publishing house.

Average daily time spent with media in the US in 2017 (hours:mins)



Source: eMarketer, Business Insider Intelligence

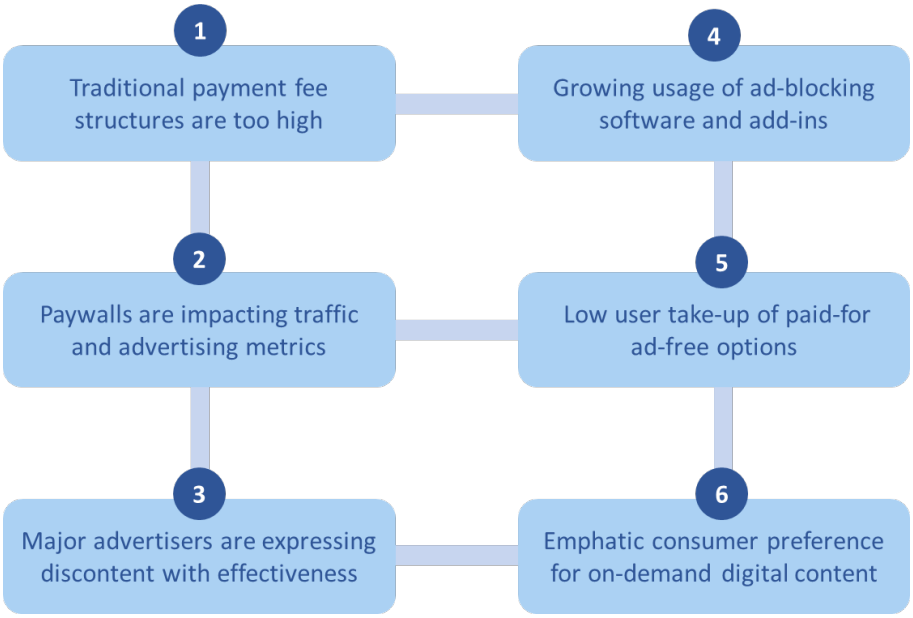
Alongside the move to digital content consumption, there are other clear trends at work. On-demand content is taking share at a rapid rate, whether delivered by Netflix, Amazon Prime or the online hubs of the terrestrial television channels (examples in the UK include iPlayer from the BBC and ITV Hub). Live broadcasts of sporting events or music concerts are in strong demand, but consumers want this content to be available seamlessly across devices anywhere, preferably with content information saved across viewing devices. For example, a programme can be commenced on one device and resumed mid-way on another device. Logins and payments need to be frictionless – Amazon 1-click and Sky on-demand are examples of easy-to-use payment options that need to be set up only once.

Whether the content provider is a large, established player or a smaller provider seeking greater digital share, the challenges of providing more granular and more real-time, on-demand broadcasting are shared. At the same time, the mobile operators face a continuously uphill battle to achieve premium pricing for connectivity, especially as they approach another major network rollout with 5G.

Internet content revenue models under pressure

Against a backdrop of reallocation of investment towards online digital presence, the content providers and publishers are finding that monetisation of digital assets is not as straightforward as they might have hoped. Certainly, there is a degree of transferability of subscription-centric approaches to the digital arena. However, there is a user expectation of swathes of free content. The implicit contract for online content between users and publishers has been that they get much of, or even all of, the content for free and, in return, they view digital advertising, for which the publisher gets paid. However, for a range of reasons, this relationship is breaking down, creating pain points for the content providers seeking to drive their digital revenue streams and evolve their revenue mix.

Digital challenges for content providers



Source: Hardman & Co Research

Ad blockers becoming more prevalent

One driver of pressure on digital advertising revenue is the growing prevalence of ad blockers. These are browser add-ons that filter out and prevent online adverts from being displayed on web pages. Many content-providing websites have reported attrition in display ad impressions due to consumer usage of ad-blocking software.

This remains a dangerous area for content owners, and is contrary to the implicit contract as the content websites perceived it. The expectation has been that users would benefit from free content in return for viewing ads. The ability to automatically prevent ads from being displayed strikes at the heart of the primary internet content-funding model.

Muted take-up of ad-free options

Many websites offering digital content have sought to offer paid-for options that eliminate adverts. This funding model is, of course, an alternative to subscription payments to access content on an advertising-free basis. However, take-up of these offerings has tended to be muted, perhaps impacted by the fact that ad-blocking software does the job for free.

Perception that digital advertising is ineffective

In August 2017, Proctor & Gamble (P&G) sent shockwaves through the advertising industry when said it had cut between $100m and $140m from its digital ad budget in 2Q 2017, to a large extent due to "ineffective" ads. A number of major consumer product companies have flagged the same issue, which is that increased spending in digital media is raising operating expenses, but not translating into a discernible benefit to sales growth. Inadequate transparency into how the metrics on effectiveness are compiled was being cited as a compounding factor. The CFO of P&G was quoted as saying, "Clearly we don't need to be spending money that is seen by a bot and not a person." One key reason for the lack of transparency at the time was that ad-blocking software was making a sizeable dent into ad-viewing.

Paywalls are an option, but are too obstructive

A great many publishers have imposed paywalls for their content in an attempt to drive subscription revenue. Many of these attempts have been quickly reversed due to an adverse impact on readership and advertising revenue. Paywalls come in various forms. *The Times* newspaper, for example, does not offer any articles in their entirety for free on an ad-hoc basis. It does, however, expose the headline of each article and typically the initial paragraphs. This is described as a "hard paywall". Other publications, such as *The Daily Telegraph* or *The Economist* allow registered users access to a certain number of articles for free per month, after which a subscription is required. These are examples of "soft paywalls".

An article entitled "Why Drop a Paywall", by Ananny & Bighash in the July 2016 edition of *The International Journal of Communication*, looks at the experience in the US with paywalls. They note that a series of major news titles such as *The San Francisco Chronicle*, *The Boston Globe* and *The Dallas Morning News* all essentially abandoned paywalls after they either failed to increase print advertising revenue or had a material negative impact on online traffic – in some cases dramatic. While there is scope for sponsored access to paywalled content and similar other temporary initiatives, the proportion of revenue that publishers derive from paywalls is small.

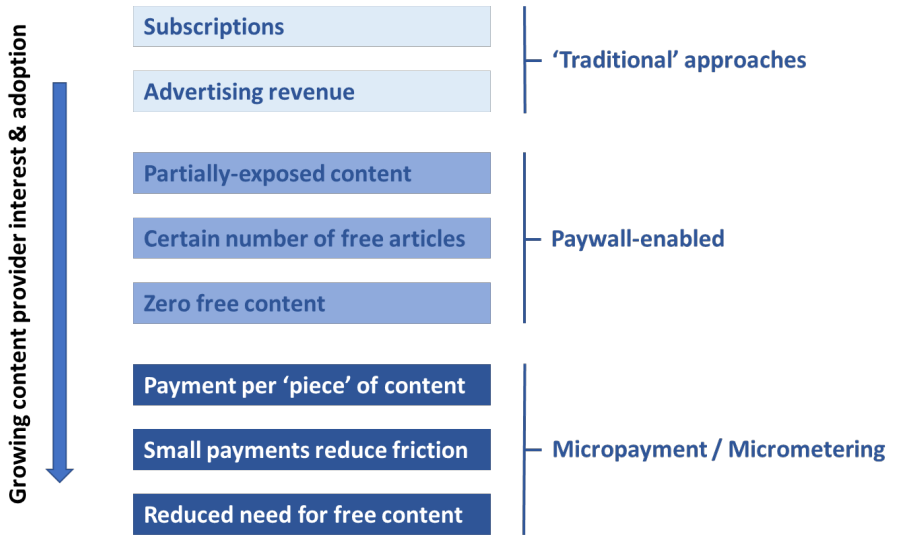
Alternative solutions are required

It is clear that none of the approaches above is proving to be particularly satisfactory from the perspective of monetising digital content in a consistent manner. Publishers of newspapers, magazines and online content are seeking to maximise readership to stay in the public eye and retain advertisers. These objectives are at odds with creating rigid paywalls that deter visitors who might be interested in a specific article and cannot justify taking out a subscription.

Publishers are seeking monetisation mechanisms

The chart below sets out the evolution of how content publishers are thinking about their monetisation opportunities. The future will likely bring a growing emphasis on granular and metered payments – the latter particularly appropriate for streamed content of any description.

Content publisher monetisation approaches



Source: Hardman & Co Research

A missed opportunity?

One needs only to visit the website of a newspaper such as *The Guardian* to realise the potential opportunity for micropayments. While this newspaper is averse to the notion of establishing a paywall, it is nonetheless seeking contributions, regular or one-off, from readers to "help secure its future", as the website extract in the chat below shows.

Many visitors to *The Guardian* website will have been directed there by Google searches or one of the many news aggregation platforms that collate content for users, such as Apple News, MSN or Google News. As we noted earlier, this is valuable content that has been created by experienced journalists at a substantial cost to the publisher, yet the content is being accessed free of charge by a multitude of individuals.

The likelihood is that, if these same readers were asked to pay a nominal fee of a few pennies to read their chosen article, a material proportion would agree, particularly if the process to make the payment were easy and quick. This is an example of the opportunity available to nanopayment providers such as SatoshiPay.

Extract from *The Guardian* newspaper website

Since you're here...

... we have a small favour to ask. More people are reading the Guardian than ever but advertising revenues across the media are falling fast. And unlike many news organisations, we haven't put up a paywall - we want to keep our journalism as open as we can. So you can see why we need to ask for your help. The Guardian's independent, investigative journalism takes a lot of time, money and hard work to produce. But we do it because we believe our perspective matters - because it might well be your perspective, too.

The Guardian is editorially independent, meaning we set our own agenda. Our journalism is free from commercial bias and not influenced by billionaire owners, politicians or shareholders. No one edits our Editor. No one steers our opinion. This is important because it enables us to give a voice to the voiceless, challenge the powerful and hold them to account. It's what makes us different to so many others in the media, at a time when factual, honest reporting is critical.

If everyone who reads our reporting, who likes it, helps to support it, our future would be much more secure. **For as little as £1, you can support the Guardian - and it only takes a minute. If you're able to, setting up a recurring contribution provides us with a dependable source of funding. Thank you.**

Support The Guardian →

Source: The Guardian Newspaper website

Wikipedia content might be another example that will be familiar to most readers of this report. The number of visits that this website receives per month is approaching 1 billion, with, on average, around three pages viewed per visit, i.e. 36 billion page views per annum. Even a fraction of a cent or penny charge per page view would equate to a very substantial revenue stream for the controlling foundation. Wikipedia is not a pipeline customer of SatoshiPay, but is illustrative of the broader opportunity that exists today.

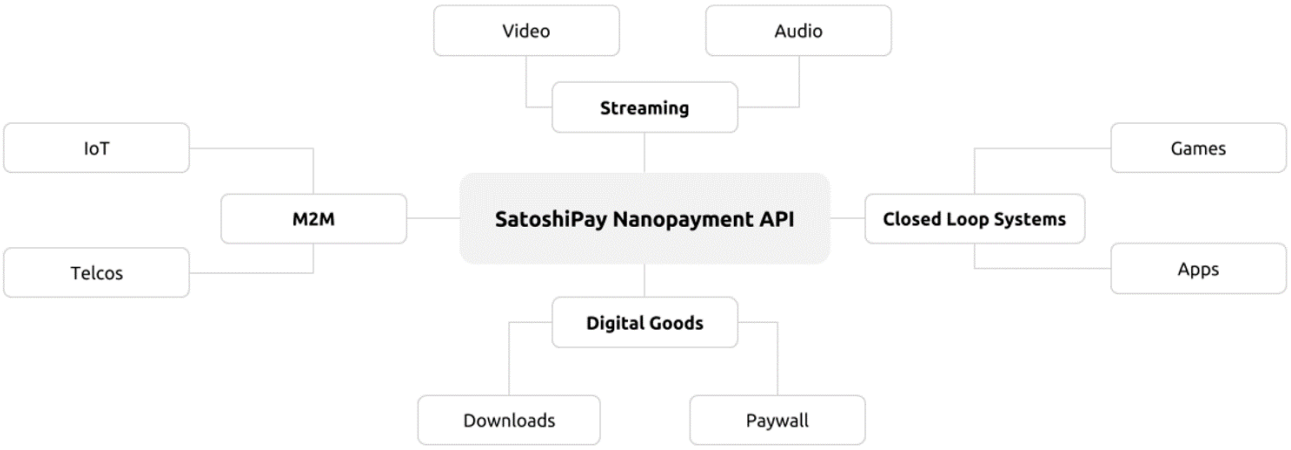
One primary solution to these issues would appear to lie in the introduction of micropayments that do not require a relatively sizeable subscription fee to remove adds, but that do impose small charges for access to pieces of content. This revenue stream would largely be complementary and incremental to advertising revenue, so there should be limited concerns regarding cannibalisation of existing subscription revenue streams. The micropayments and subscription propositions would target different user groups.

New segments for SatoshiPay

The content publishing segment is simply the first step for the company in terms of tackling its addressable markets. These are large areas with potentially complex requirements, and it is encouraging to hear management acknowledge that only some of these segments will see a direct focus from SatoshiPay. Other segments will see the company position itself as an external payment infrastructure open to usage by other payments providers or industry participants. Extensive effort is going into the APIs, which are being facilitated by open source development.

These are all potentially very significant market segments for SatoshiPay and micropayments in general. However, they are all potentially complex in nature, and will demand focused and systematic development and sales efforts. It is, therefore, encouraging that the company's development efforts are being targeted at the segment that offers the greatest near-term opportunity, which is digital publishing.

Potential applications of SatoshiPay



Source: Company data

Video streaming

One of the major opportunities available to SatoshiPay is that of micrometering of streamed content, whether live or stored, made available on demand. McKinsey addresses this opportunity in an August 2017 article, entitled "How can creative industries benefit from blockchain?". They note that blockchain can define "the smallest consumable unit of creative content". This unit might comprise even a few seconds of a streamed video, music track or a live broadcast.

Consumer IP traffic growth remains at high rates, with Cisco forecasting an internet IP traffic CAGR of 24% over 2016-21, and its mobile data consumption forecast has accelerated sharply, to a CAGR of some 47% for the same period.

Cisco consumer IP traffic forecasts, 2016-21

Consumer IP Traffic, 2016–2021	2016	2017	2018	2019	2020	2021	CAGR 2016–2021
By Type (PB per Month)							
Internet	52,678	67,081	83,518	103,696	127,152	154,023	24%
Managed IP	19,619	23,351	27,142	30,683	33,978	37,215	14%
Mobile data	5,953	9,345	14,029	20,556	29,343	41,417	47%

Source: Cisco VNI Report

Internet video and video are the primary drivers of this growth, as set out in the table below.

Cisco consumer internet video traffic forecasts, 2016-21

Consumer Internet Video 2016–2021	2016	2017	2018	2019	2020	2021	CAGR 2016–2021
By Network (PB per Month)							
Fixed	38,369	51,022	65,413	83,172	103,341	125,988	27%
Mobile	3,660	6,094	9,696	15,010	22,512	33,173	55%
By Category (PB per Month)							
Video	29,325	39,518	51,722	68,279	89,181	116,905	32%
Internet video to TV	12,704	17,598	23,387	29,903	36,672	42,255	27%

Source: Cisco VNI Report

The Internet of Things (IOT)

There is a clear consensus across the technology, media and telecoms industries that the number of connected devices globally will see a steep upward trajectory over the next decade. The 50 billion connected devices by 2020 forecast that Ericsson published a few years ago was rejected by many at the time, but it transpires that the phasing was out of synch by three or so years. Recent forecasts from Statista suggest that the total number of connected devices worldwide will grow from around 20 billion at the end of 2017 to over 75 billion by 2025.

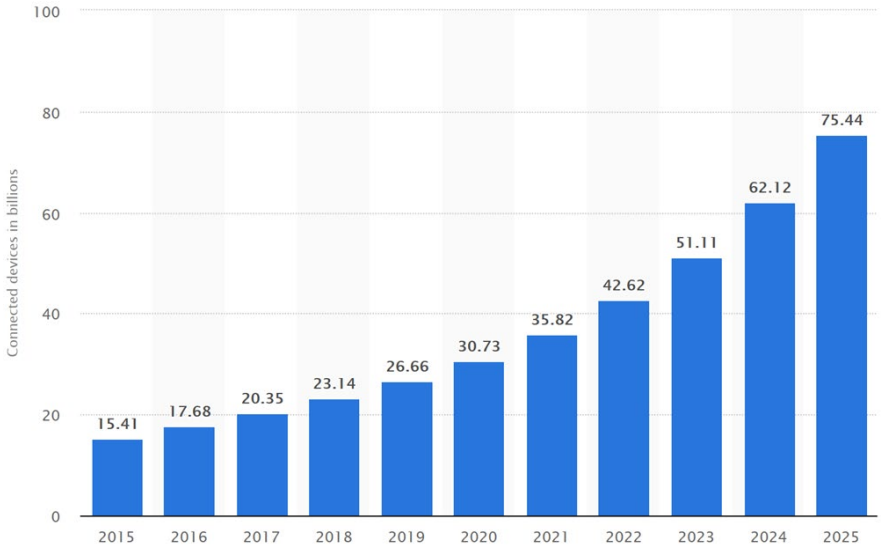
The data generated by a connected device, a sensor in an item of sports equipment or in a piece of machinery, for example, once it has been extracted, is potentially highly valuable. Predictive analytics is an area of huge activity, as industrial companies incorporate not only an increasing number of sensors into their equipment, but also intelligence to determine what can be processed locally and what should be sent back to core compute nodes for more intensive analytics. Compelling use cases are emerging across every industry – for example, optimisation of fuel consumption by aircraft engines depending on flying conditions and weather, real-time fraud detection in financial services through to scheduling of maintenance and restocking of connected vending machines.

The flows of data will be very substantial. Indeed, substantial investment will be required to deliver the enormous connectivity and processing requirements of IOT. It is perhaps no surprise that Edge data centres are a hot topic within the data centre industry, as much of the data processing for latency-sensitive applications is expected to be required to happen in real time.

Returns on this investment demand monetisation. The industry has barely scratched the surface in terms of considering how granular, data-specific pricing for particular streams of analysis or data will be undertaken. There are multiple pricing scenarios, ranging from charging for units of data to flows of data being purchased for specific periods of time.

SatoshiPay is not currently directly selling into this opportunity, and we would anticipate that sales cycles will be lengthy, given the large corporates that will likely dominate this evolving discussion. Partner channels, perhaps the IOT practices of large systems integrators, may be the optimal way to address this opportunity. As a consequence, we do not include the IOT piece within our revenue estimates at this juncture, but certainly consider it to offer a material medium-term opportunity for the company.

IOT connected devices – installed base worldwide, 2015-25 (billions)



Source: Statista

Closed-loop applications

What we mean by closed-loop applications is segments such as in-game purchases, where all of the transactions are i) contained within the virtual environment comprising the game, and ii) if they were done in a currency limited to this one game or publisher. So, in a war game of some description, additional weapons or armoured clothing might be available for purchase. The value of each transaction will typically be very small, falling firmly into the nanopayment sphere of SatoshiPay.

Regulatory landscape

Blockchain regulatory environment relatively light

The regulatory environment for blockchain and cryptocurrencies is relatively absent today. This will undoubtedly change, as regulatory authorities and governments get to grips with what blockchain is, the multitude of potential applications, and how these platforms and processes differ from what happens today. In 2016, the European Parliament members voted to take "a hands-off" approach to regulating blockchain technology. A new task force was announced, to be overseen by the European Commission (EC), which would build expertise in the underlying technology of virtual currencies. The result was the EU Blockchain Observatory and Forum, which was launched in early 2018 with the following mandate:

> *"The European Union Blockchain Observatory and Forum aims to accelerate blockchain innovation and the development of the blockchain ecosystem within the EU, and so help cement Europe's position as a global leader in this transformative new technology."*

Source: European Commission

There is widespread acknowledgement that excessively early regulation of blockchain could limit its further development and potential. Nonetheless, approaches vary by geography, and blockchain progress could be affected as a consequence.

Greater concerns around cryptocurrencies

Cryptocurrencies are more likely to see greater regulatory focus and, indeed, have already attracted scrutiny. The European Central Bank typifies virtual currency as a digital representation of value, not issued by a central bank, credit institution or e-money institution, which, in some circumstances, can be used as an alternative to money.

However, cryptocurrency is not considered electronic money, as defined in the e-Money Directive 2009/110/EC. Similarly, the Payment Services Directive 2015/2366/EC does not regulate blockchain-based payment service providers.

SatoshiPay does not hold client monies (these are held in the distributed blockchain ledger) – so it does not require an e-Money licence. Nonetheless, it is proactively putting in place more detailed compliance checks for content providers being added to the platform. This will assist with addressing Anti-Money Laundering regulation that is implemented for the cryptocurrency segment, which we see as the likely next step in Europe and elsewhere.

Key technologies explained

Blockchain

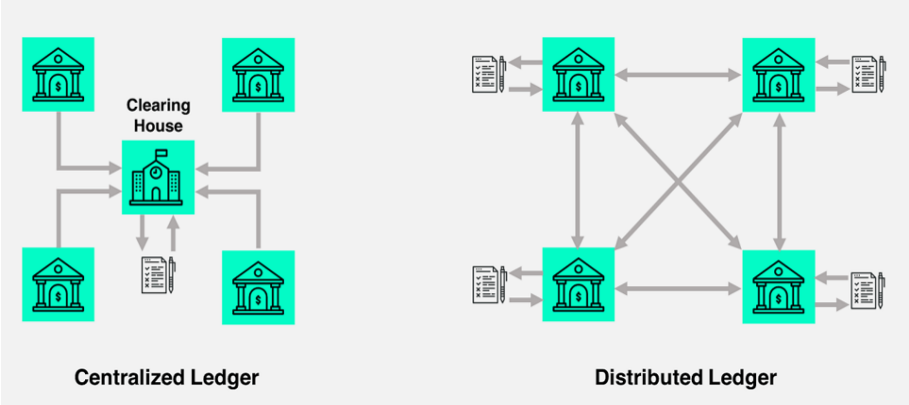
The origins of blockchain are generally agreed to lie in the work of Haber and Stornetta in the early 1990s, which focused on methods by which digital documents could be securely time-stamped. Evidently, the central aspect of these efforts was to develop mechanisms by which these time-stamps could not be altered at any stage thereafter, by any means. The first approaches involved a centralised server that would receive documents, and sign and timestamp them. There are many other contributors of various components of blockchain as we now understand it.

The concept of a "blockchain" was invented by Satoshi Nakamoto, the name used by the person who developed bitcoin and the first blockchain database. Nakamoto has never been identified, although many have tried to do so. In October 2008, Nakamoto published a whitepaper entitled "Bitcoin: A Peer-to-Peer Electronic Cash System". A few months later, he followed with the release of the bitcoin software to launch the network and the bitcoin cryptocurrency. The bitcoin runs on a blockchain architecture, which has potential applications across the global economy.

What is a blockchain?

A blockchain is a distributed asset ledger that keeps a permanent track of every transaction ever processed on its decentralised network on a time-stamped basis. This ledger can be private, public or semi-private, but it is distributed, i.e. all "nodes" must be updated periodically so that they all reflect the same content and include newly-added blocks. Different blockchains use different methods to determine how nodes agree on what content is to be added. We will cover this aspect later in this section.

Blockchain is a decentralised system



Source: TradeIX

It is worth taking a look at the components of the blockchain to simplify these concepts:

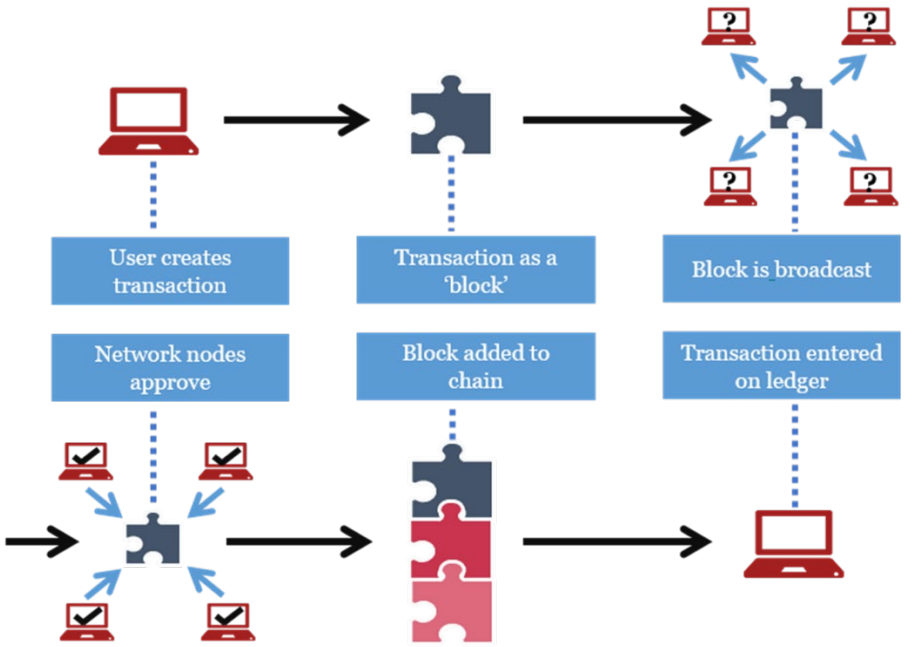
- A ledger is simply a list of records. In a financial context, the ledger comprises a list of the balances and transaction history of each account that has ever been established on the network.
- A distributed ledger is one that is replicated on servers across the network – in fact, on every server. Each server acts as a node that hosts a full copy of the global blockchain ledger.

- **The blockchain architecture is entirely decentralised,** with no reliance on a central 'trusted' server. Rather, each node in the network is 'untrusted', but, because each of many nodes keeps a copy of the ledger, the need for a trusted party at the heart of the network is removed.

Blockchain is a highly secure system

Anything recorded on a blockchain cannot be amended, creating a permanent record of the transaction history of an asset once it has been added to the blockchain. The links between blocks and their content are protected by cryptography – so previous transactions cannot be destroyed or forged. Similarly, hacking into the ledger to amend any details of a transaction is virtually impossible, as every copy of the ledger on every node would need to be hacked and amended simultaneously. This all makes blockchain highly secure.

Blockchain technology flow



Source: PWC Digital Services

Stellar

Stellar is a blockchain-based platform that is increasingly focusing on money transfers and payments. It operates differently from bitcoin in that it operates on a distributed consensus protocol, where nodes have identifiers and need to be aware of one another. Ripple is another example of a system of this type. In both cases, there is a native currency (Lumens in the Stellar example), and a payment network that is supported by the consensus protocol.

Stellar was established in 2014 but is already firmly within the top 10 cryptocurrencies and gaining ground, especially in the payments and money transfer segments. Inevitably, the price of the Lumens currency has seen some volatility in line with the wider cryptocurrency segment. However, the current initiatives to peg a Stellar-based token to the Euro could be transformational in this regard. Stellar incorporates Anti-Money Laundering and KYC capabilities, adding to its attributes as a platform for payments transactions.

Stellar price – September 2017 to September 2018

Source: Prices.org

How nodes are updated: Stellar versus bitcoin

Bitcoin

When a transaction is entered into a bitcoin blockchain, there is a transaction fee, which represents the financial reward paid to the miner that builds the transaction into a block, thereby relaying the transaction to the other nodes in the network. Proof-of-Work (PoW) is the algorithm used to establish consensus among all of the nodes as to whether the block should be added. Miners compete against one another to solve computational puzzles to generate blocks. The answer to the puzzle is called "hash", which represents a block. The hash of each block contains the hash of the previous block, which is important to maintain the integrity of the blockchain.

Fees are, in principle, determined according to the number of bytes required. However, over time, bitcoin has experienced a considerable uplift in transaction fees, as miners are able to prioritise certain transactions and process them on the basis of the fees they are receiving. The resulting fee escalation, which perhaps also reflects the growing computational power required to mine new blocks, was one of the factors that prompted SatoshiPay to look at alternatives to bitcoin.

Stellar

Stellar uses a different approach to establishing consensus, which it calls a federated Byzantine Agreement. We do not wish to get into the complexities of these approaches. In simple terms, in this environment, each node decides which other nodes in the network it trusts. For example, if a bank is a trusted party, other nodes may acknowledge transactions only if the banking node also does so.

Stellar consensus protocol

Source: Stellar

When a transaction takes place, a block representing the transaction is created online and broadcast to every node in the network. The nodes in the network approve the transaction so that it can be validated. This is the consensus protocol, which requires at least a majority of the nodes to agree on the details and value of every transaction. Once the transaction has been approved, the block is added to the blockchain, and the transaction is completed. At this stage, a transaction confirmation would lead to automatic release of the content – which was unlocked by the payment, for example. The key difference, therefore, between bitcoin and Stellar is that a reward for mining is not required in a Stellar environment, as there is no PoW utilised.

Stellar is fostering a community

One of the comments made by a financial services provider that selected Stellar over Ripple was that Stellar was focusing on creating a community, whereas some other blockchain platforms were targeting becoming the next Visa or Mastercard. Certainly, Stellar's efforts to drive awareness and activity levels on its platform suggest a genuine commitment to creating a large-scale community of users.

One of the key current initiatives from Stellar is a giveaway of Lumens, which remains ongoing. The giveaway is primarily to cryptocurrency exchanges and should be spent by mid-2019, providing a substantial boost to awareness of Stellar and liquidity within the platform.

SatoshiPay is receiving an allocation of 50 million Lumens to give away as a pledge by the Stellar Development Foundation. These are being deployed tactically as part of marketing initiatives. New sign-ups to wallets are given 50 Lumens free of charge, which is equivalent to between €10 and €15. A Facebook verification is required for this, which assists with social media marketing.

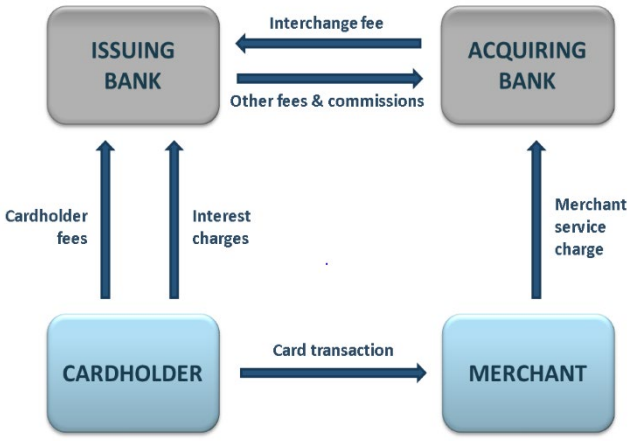
Transaction fees

Amid the excitement of blockchain and the drive by many existing businesses to associate themselves with blockchain and cryptocurrencies, there are certain propositions where blockchain is an absolutely central enabler of the offering. SatoshiPay is one notable example, leveraging the inherently low transaction cost structure to make its nanopayments model feasible. Transaction costs are an important barrier to entry for SatoshiPay against the incumbent payments providers, which are burdened by structurally high fees.

Existing payments options have structurally high fees

It might be helpful to take a brief look at why existing payments systems and processes, debit and credit card payments in particular, are simply not suited to nanopayments, due to the multiple parties that are involved in pretty much all transactions. The diagram below sets out the flows of fees between the key protagonists in the payments value chain.

Traditional four-party card payments process



1. When a request for a payment comes to the bank that issued the customer's credit card **(issuing bank or issuer)**, it authorizes the transaction, say for €100, but retains 0.70% as an **interchange fee**.
2. The bank may pay-out €0.05 per transaction, from that interchange fee, to a **third-party payment processor** to handle the processing. Typically these are the same payment processors that also provide acquirer processing services.
3. The **issuing bank** then sends back €99.30 through the **card network**.
4. The **Card network** deducts an assessment fee of €0.05 **(scheme fee)** from the money that the **merchant acquirer or acquirer** will receive.
5. The acquirer deducts its own mark-up of €0.25, and if a third-party processor is used for acquirer processing, from that €0.25, a €0.04 fee will be paid to that acquiring processor.
6. The remaining €99 is then credited to the **merchant's account**. The difference between the €100 paid by the customer and the €99 received by the merchant is known as a **merchant services charge (MSC).**
7. Paying the merchant €99 is called **net settlement**, where a **gross settlement** is when the merchant is paid the whole €100, and later invoiced for the €99 by the **merchant acquirer**.

Source: Hardman & Co Research

Multiple siloed roles in the process

- Merchants (which could be retailers or online digital content publishers) will generally procure their payment engines from third-party specialist providers.
- Merchant acquiring is split between front-end activities (accepting and approving payments at the point of sale) and back-end functions (clearing and settlement). The merchant acquirer provides connectivity between the large payment networks (Visa/MasterCard), the issuing and acquiring banks, and the merchant.
- Credit card issuer processors provide a potentially wide range of services, including authorisation, clearing and settlement, mailing of plastic cards, generation of statements, fraud prevention, customer service, and management of chargeback claims.

SatoshiPay uses the card payments process

In fact, when users top up their SatoshiPay account with a debit or credit card, this is the process that takes place to transfer the users' funds into their SatoshiPay wallet in the form of credits (which are, in turn, based on the Stellar currency of Lumens). In this case, TransactWorld is the payment services provider for SatoshiPay.

However, as we have already noted, SatoshiPay bears the approximate card processing cost of 2.00% that is generated by the upload of funds into its platform. Therefore, this removes a potentially significant financial source of friction from the process. Over time, as SatoshiPay's transaction volumes grow, we would expect the 2.00% figure to trend downwards.

Transaction fees vary substantially by blockchain. For Stellar, its model does not involve PoW, as we have discussed. As a consequence, there is no need to pay an escalating reward for the addition of blocks to the blockchain. Stellar is, therefore, able to maintain very low transaction fees – almost negligible, in fact, at 0.000002 Euros. The other key benefit of Stellar's approach is that transactions can be completed very quickly, which is an important feature for facilitation of real-time payments. Payments are typically confirmed by SatoshiPay within 200 milliseconds.

Competitive landscape

The competitive environment for SatoshiPay in terms of providers specifically focused on, and able to deliver, micro or nanopayments capabilities is relatively thin. We have already discussed the structural challenges that existing card-based providers face in this segment. Beyond these providers, there are two players that might be seen as providing directly competing offerings, namely Blendle and Piano. Both are focused on journalistic content and neither has, from what we can see, expressed an intention to evolve into other segments such as video streaming or IOT.

Traditional four-party card payments process

	SatoshiPay	Blendle	piano	brave	PayPal
Miniumum payment of less than €0.10	✓	✓	✗	✓	✓
Login-free usage across websites	✓	✗	✗	✗	✗
1-click payment option	✓	✓	✗	✓	✓
Aggregate transaction fees <= 10%	✓	✗	✗	✓	✗
Granular pricing by web page elements	✓	✗	✗	✗	✗
Payout of earned revenue within 24 hours	✓	✗	✗	✗	✗
Ad-blocker detection	✓	✗	✓	✓	✗
In-page payment	✓	✓	✗	✓	✗

Source: Hardman & Co Research

Blendle

- Blendle is headquartered in the Netherlands and provides a pay-per-article service that is focused on journalistic content. The company was founded around the same time as SatoshiPay in 2014, and shares Axel Springer with SatoshiPay as a shareholder.
- Blendle's aim is to provide an ad- and paywall-free offering to users who would like to access a range of premium newspaper and magazine articles. The company is seeking to position itself as the Spotify of journalism. The beta launch took place in Q2 2016, and the business has subsequently scaled its registered user base to over 650,000 individuals, with a stated bias to users under the age of 35.
- The list of publications included in the service is impressive, spanning some of the largest titles in key markets. There is little reason for a publication to refuse to participate. However, data on conversion rates and revenue per user have not been disclosed.
- The company's positioning is firmly in the premium segment, and its pricing reflects this, with average pricing in the range of €0.45 to €0.70 per piece of content accessed. This compares with SatoshiPay's target price of €0.01 to €0.39 (we assume an average of €0.30 in our revenue model).
- Perhaps the more fundamental difference is that a user registration and login for each session are required. In addition, there is no scope to use funds lodged with

Blendle on the websites of other content providers, which essentially makes this a walled garden of content.

- Our observation would be that many other companies have tried this, and consumers have been resistant to a limited selection of content. The mobile operators are among the highest-profile examples in this regard. Spotify is also an interesting comparison, as it thrives on providing access to pretty much all music, rather than a limited subset of what is available in the market. The table above summarises the other functionality differences between Blendle and SatoshiPay.

Piano

- Piano is a more complex proposition, spanning online commerce and business process software for media companies. Paywalls are at the heart of its payments offerings.

- The company was founded in 2010 in Slovakia, Eastern Europe, by the former CEO of an online media advertising company. Over the subsequent few years, the company launched nationwide paywall platforms in Slovakia, Poland and elsewhere in Eastern Europe. The platform was licensed to various companies in other geographies for local deployment.

- Once users have registered, they are able to access behind the paywall that unifies a wide group of publishers. Access is limited to the publications signed up in that territory.

- In August 2015, Piano merged with Tinypass, a US paywall provider, and a customer migration is ongoing to the acquired platform.

- Piano's fees range from 18% for content prices below $1.99 to 2.9% + $0.30 [numbers correct? Or should it be a percentage on its own?] for content priced at over $1.99. SatoshiPay management notes that this will, in the vast majority of instances, be substantially higher than SatoshiPay's 10% standard pricing.

- There are evidently significant functionality gaps for Piano versus SatoshiPay, as set out in the table above. One key additional difference we would highlight is that the geographically siloed approach for paywalls is rather at odds with the borderless way in which content of all types can now be accessed online.

PayPal

- PayPal is a major player in the payments industry, providing a payments system that is commonly found to be integrated into retail websites or used as a payment method for online auction websites, for example eBay. Peer-to-peer payments are a further substantial activity for the company.

- In Q2 2018 alone, PayPal posted revenue of $3.9bn and processed 2.3bn payment transactions – so this is a business that operates on a huge scale globally.

- We include PayPal here, as it offers a micropayments capability for transactions with a value under $5 or £5. However, the proposition is rather different from that of SatoshiPay in that users are required to log in to their PayPal accounts in order to make purchase transactions on websites where PayPal has been integrated. SatoshiPay transactions, in contrast, do not require any form of login. Rather, the browser holds the account balance of the user, and payments can be made very easily without a login. The latter is a critical part of SatoshiPay's competitive differentiation from traditional online payments solutions such as PayPal.

- It remains the case that, where leaders emerge in segments where PayPal has a functionality gap, the company has not been reluctant to make acquisitions to fill these product gaps in its broader portfolio.

Brave

- Brave is a payments system within a browser that is seeking to provide publishers with an entirely alternative revenue model to digital advertising. When browsing the internet through the Brave browser, all advertising is blocked by default.

- Brave users are required to create a wallet using cryptocurrency. Users also create a list of websites that are eligible for payment through the Brave wallet up to a pre-defined monthly budget.

- When users visit any of these websites, payments are automatically made to each website on the users' list, based on the amount of time that the user spends on each website in a given period.

- Brave's underlying technology is Basic Attention Token (BAT), which is based on the Ethereum blockchain. Every month, the BAT wallets are transferred to the relevant content partners.

- Although some of the potential demand drivers of Brave are shared with SatoshiPay, given the pressures on digital advertising revenue that we described earlier, the major disadvantage of the Brave offering is that it is dependent on users adopting Brave, rather than Google Chrome or Microsoft Edge. This is clearly an ambitious objective given that the major browsers are essentially ubiquitous.

SatoshiPay technology platform

Blockchain is central to the proposition

The list below sets out the benefits of blockchain to the business. We return to an explanation of how the various elements function in more detail later in this section.

- SatoshiPay uses the multi-signature capabilities of blockchain technology to keep users in charge of their own funds, so that e-Money licences are not required.
- The particularly low transaction fee structure of the Stellar blockchain network facilitates the nanopayment capabilities of SatoshiPay, which would not be feasible using conventional credit card processing, due to minimum fee levels.
- The ability to embed and trigger smart contracts creates opportunities to ensure immediate payment to entitled parties upon release of content.
- The multi-signature feature of Stellar means that every payment transaction can require confirmation by several parties, which allows the creation of a walled garden for SatoshiPay within the Stellar environment. The company would, in principle, be able to create restricted zones for particular websites or groups of sites. This would, in turn, allow the creation of a dedicated token for a major publisher, for example.

It is acknowledged that browser-based wallets, such as those installed by SatoshiPay, do not provide the same level of cryptocurrency security as cold storage (i.e. storage of details in environments that are unconnected to networks). However, one needs to bear in mind that the sums required for micropayments are, by definition, very small – so users will typically top up with modest amounts, say €10 or €20.

Bitcoin issues and challenges

Post its launch, between 2015 and 2017, SatoshiPay's payments engine was based on the bitcoin blockchain network. In 2017, the company made a decision to migrate away from bitcoin, ultimately to Stellar. There were multiple reasons for the decision to move, but at the heart of the decision was SatoshiPay's view that platforms launched subsequently to bitcoin offered superior technology and performance.

- Speed: One of the primary challenges facing bitcoin is speed. Mining a block is highly resource-intensive, and even more so over time as a function of how network growth is handled. As a consequence, transactions are not verified immediately – they will wait in a queue until the transaction is accepted and verified. This creates problems for applications that depend on an instantaneous verification. SatoshiPay is an example of the latter, where publishers require undelayed and guaranteed access to funds paid by users. This was an important factor in SatoshiPay's decision to move away from bitcoin to Stellar.
- Transaction costs: These are another key factor. Data points confirm the sharp increases in bitcoin fees over the last two to three years. Coindesk, for example, recently reported that, in 2Q 2018, bitcoin's average transaction fee was around $2.41 per transaction, up from below $0.02 in 2015. There have also been material spikes in fees in the interim period well above these levels. These higher fee structures, in turn a function of high demand for transactions to be processed on bitcoin, are evidently entirely incompatible with the nanopayment end-market of SatoshiPay.

SatoshiPay's blockchain platform changes

In July 2017, SatoshiPay announced that it would be seeking to migrate away from the bitcoin blockchain as its underlying transaction platform in favour of a partnership with the IOTA foundation. At that time, IOTA was the eighth-largest cryptocurrency measured by market capitalisation. SatoshiPay noted IOTA's zero-fee transactions and lack of limits on transactions per second as attractions relative to bitcoin. SatoshiPay highlighted a series of difficulties with bitcoin, including escalating transaction fees, congestion due to scalability limits being breached and resulting scenarios where users' funds became locked pending processing.

At this stage, SatoshiPay and IOTA were simply working on a proof-of-concept project to assess the suitability of IOTA's ledger technology. At the same time, SatoshiPay continued to assess other alternatives, in particular looking at a collaboration with Stellar, a rising star in the blockchain arena. In December 2017, SatoshiPay announced a formal partnership with the Stellar Development Foundation, making the Stellar network SatoshiPay's default ledger.

Running on Google Cloud with AWS backups

The majority of SatoshiPay's platform runs on Google Cloud, with no application servers located on the company's own premises. The product runs on Kubernetes, which is an open-source system developed by Google for containerised applications, automating the deployment of these applications (the platform was migrated from Docker Cloud). The system is highly flexible, and the container-based approach means that the workloads can be readily migrated to other infrastructure, whether hybrid Cloud or an alternative public Cloud if the company were to choose to do so. That said, the costs of running the infrastructure on the Google Cloud are low. Three concurrent server sets are run and there are four daily backups to Amazon Web Services, which, together, create more than adequate resilience.

Modular architecture

The software architecture is modular in nature, based on microservices. Functional modules can be updated and upgraded independently without disrupting the other parts of the platform, in sharp contrast to legacy, monolithic platforms, where all of the components are intertwined and need to be upgraded together.

SatoshiPay integration with websites

SatoshiPay has sought to ensure that its plug-ins for websites are as easy as possible to use. In the first instance, it focused on WordPress, noting that almost one-third of websites are built on this platform. The product roadmap includes initiatives to improve this plug-in further.

For more complex websites and for third-party integration, an API will be required. API development has already been undertaken on an open-source basis, which is encouraging as it suggests that a development community is already building around the platform.

Development priorities

The company is firmly focused on agile code development, with new pieces of code released almost daily. The key priorities are in the following areas:

- a Euro-pegged token in collaboration with TEMPO;
- improvements to the user interface and a login facility;
- open API with software development kits (SDKs) for mobile platforms such as Android or iOS to facilitate connectivity with the platform, especially for connected devices;

- fiat payouts, allowing content providers to receive earned revenue directly into their bank accounts; and,

- two-way payments, which allow websites to credit funds to users in return for certain actions, e.g. responding to an offer or completing a survey.

Development resources

The development team today comprises eight engineers. Over the next 12 months, as increased funding becomes available, the intention is to grow this to between 10 and 15 developers. These will largely be full-stack developers to maximise flexibility around workstreams. Over time, there may be an argument for recruiting specialised front-end and back-end developers.

From a recruitment perspective, SatoshiPay is increasingly seen as an exciting place to work within the software industry and is benefiting from a flow of high-quality candidates for engineering roles. Being based in Berlin is also helpful, given that the city has emerged as a technology hub, for blockchain in particular.

Risks

Content providers need to be persuaded

Timing of mass adoption is inevitably unpredictable, but end-user adoption will, to some extent, be driven by widespread implementation and marketing efforts by significant content providers, all of which may take time. The proposed initiatives to introduce a SatoshiPay token pegged to the Euro in conjunction with TEMPO, the regulated French money transfer operator, may be a key driver here. Addressing the perceived volatility of cryptocurrencies with a Euro-peg should appeal to enterprises considering charging for digital content using the SatoshiPay nanopayments solution.

A paradigm shift for consumers

Nanopayments using a cryptocurrency is a paradigm shift for consumers, which creates uncertainties in terms of timing of adoption. First, they need to get accustomed to using an entirely unfamiliar method of payment (with exchange rates that may not be immediately intuitive to them). Second, they need to accept that the content concerned is now chargeable, albeit for very small amounts – previously, the likelihood is that the content would have been free or available only to subscribers. Third, this payment method needs to become a habit, with regular top-ups and usage on SatoshiPay-enabled websites.

Routes to market and sales cycles

The company will require substantial additional sales resources to address the content provider opportunity. The A-Publishers (i.e. SatoshiPay's definition of larger content providers) will demand substantial vertical and technical knowledge, and sales cycles could be lengthy. The B-Publishers will be addressed by affiliate and referral programmes, and indirect channels – some volatility in customer additions is to be expected. Our revenue estimates are conservative versus management targets to reflect these uncertainties.

Competition

This is essentially a new market segment, and relatively few players are currently positioned to take advantage of it. Importantly, there is no established major player in the micropayments segment against which SatoshiPay needs to compete. The credit and debit card-centric platforms are unable to deliver micropayment solutions due to structurally high fees. However, execution will be key, especially on larger publisher opportunities. The proposed IPO of the company will provide market visibility and credibility that could facilitate market share gains.

Regulatory uncertainties

We discussed regulation in more detail earlier in this report. However, it remains to be seen how regulators address cryptocurrencies and the underlying blockchain platforms. Anti-money laundering is an area that is most likely to be regulated strongly, but none of this should be especially harmful to SatoshiPay's business given its nanopayment focus.

About the author

Milan Radia is a leading Technology research analyst, focusing on coverage of European data centre operators, software vendors, payments processors and IT services providers.

He has 25 years of equity market experience at major investment banks and in asset management and has worked on many high-profile successful IPOs and other capital markets transactions. In recent years, Milan has won several significant awards. In 2017, he was ranked the number one earnings estimator in the UK for his sector in the Thomson Starmine Awards. This followed number one Starmine rankings for Europe in 2010 and 2011, and a number two ranking in the UK in 2011. In 2015, Milan and his team were ranked number one in the Extel Awards by corporate management teams for UK Small & Mid-Cap technology research. Milan has also been techMARK Analyst of the Year and achieved top three Institutional Investor sector rankings for his coverage of the software and telecoms sectors. Milan started his career at Prudential Portfolio Managers, where he was latterly a fund manager responsible for portfolios worth in excess of £350m. Milan is a regular presenter and panellist at major industry conferences and is a long-time member of the voting panel for the UK Tech Awards.

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