The Global Language of Business

Towards Digital Receipts

White Paper on Drivers and Concerns Towards Digital Receipts

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1 Executive Summary

Many say that everything that can be digitalized will be digitalized. Consumer receipts are no exception. Several business megatrends such as sustainability, transparency, health & wellness and e-commerce all point toward a desire for consumers to access and use more of the data generated by their consumption. This data can be used by consumers to track their own purchase and consumption behaviour. At the same time, regulators in some regions (i.e. Europe) change the playing field by granting the rights for consumers to access and own all data related to them, through the General Data Protection Regulation (GDPR).

Giving consumers access to their purchase history, materialized in form of a collection of digital receipts, opens new opportunities for industry to meet the expectations of today's and tomorrow's market. Although regulators in some regions are supporting the concept of consumers accessing and owning their data, there are also some important business drivers for implementing digital receipts.

Some of the drivers are:

- Sustainability – not having to print paper receipts for each purchase
- Efficiency – both in the retail checkout process and in expense management applications
- Marketing – through close individual consumer interaction
- Consumer trust – through the ability to actively recall products already sold to the consumer
- Registration of guarantee – product activation in "Product Life Log" services for durable goods

Some of the concerns include:

- Data Privacy – some consumers are unwilling to identify themselves to the retailer
- Lack of standards and infrastructure – too many incompatible service providers
- Retailer hesitation – despite regulations, some retailers are still hesitant to share data with consumers
- Preference for paper receipts – some consumers prefer getting the receipts on paper

Digital receipts offer different benefits for consumers, retailers and brand owners. In fact, a Finnish study estimates that through the digitalization of paper-based receipts and invoices significant economic benefits of 5-7 Euros per transaction are to be realized, as digitized transaction details allow all stakeholders in the value chain to benefit in a variety of ways. In their calculations, most of these savings materialize because digital receipts allow for an unprecedented automation and can help companies in their decision-making, forecasting and administrative reports. For example, retailers can benefit from faster and more automated checkouts, saving paper and eliminating the costs of printing receipts. Likewise, both retailers and brand owners can use automated digital receipts to accelerate decision making by shifting from historic data analysis towards leveraging real-time information. But also, public stakeholders benefit from digital receipts, as in Finland alone, governmental offices currently manually handle millions of printed receipts and invoices per year.

Through the improved productivity, prevention of grey economy and mitigation of tax fraud, the public administration can generate significant economic benefits for the society. In general, for all participants, the benefits of digital receipt seem to outweigh the concerns, if managed appropriately.

Today there exist a number of service providers, both start-ups and traditional companies, that offer various types of digital receipt solutions. However, most of them are incompatible with each other. Some offer digital receipts as a standalone service, but in many cases the digital receipt capability is combined with other services such as mobile payments, bank applications or digital mailbox. The lack of standards and commonly accepted infrastructure, including business models, between service providers might make it difficult to reach mass adoption.

It is recommended that companies evaluating implementing digital receipts consider solutions that focus on a small number of use cases, but is designed to be expanded to other features if and when industry and consumers so desire. Basing implementations on open GS1 standards increases compatibility when expanding the feature set to previously unknown service offerings.

2 Definition: Digital Receipts

A receipt is a document acknowledging that a person or company has received money or property in payment following a sale or other transfer of goods or provision of a service. A digital receipt is its digital equivalent, but in a form that is machine-readable, can be transferred between computer systems and apps, can be automatically understood and processed by a receiving application, and meets any legal requirements for what a receipt must contain.

Typical technical implementations store purchased products as line items, transaction time and location, basket size and corresponding value-added tax amounts within a structured file (e.g. XML format). A digital receipt can for example be received after the payment e.g. by credit card or mobile payment, or after a cash payment after the consumer has been identified. In this context, digital images of paper receipts (i.e. PDF) are not considered digital receipts.

3 Benefits and Concerns of Digital Receipt Adoption

Conditions for digitalizing receipt management in the retail industry have never been more favourable. Digital receipts enable a new channel for communication between brand owner, retailer and consumer than printed receipts. This can be used to benefit all involved parties in multiple ways. This section highlights some of the most significant benefits and drivers for adoption and some of the still existing concerns.

The benefits and concerns are organized by stakeholder category, i.e. consumers, retailers and brand owners. As many of the benefits are valid for more than one stakeholder category, they are listed under the most significant one.

3.1 Benefits for Consumers

3.1.1 New Apps Based on Access to Loyalty Program Data

The paradigm that consumer data is only accessible to retailers and not shared with the individual consumer is changing, as regulators are introducing new data protection laws such as the European General Data Privacy Regulation (GDPR) that equip consumers with the right to access their own data in a machine readable format and share it with others (data portability). See section 5 Regulatory Background.

This creates new opportunities to build novel applications that process consumer data outside the retailer managed services. These new services may understand consumer behaviour better and deliver additional value on existing data to the consumers themselves and to other interested parties, such as brand owners. Examples of such services are expense tracking and monitoring of food ingredient consumption.

Important aspects of managing consumer data (both for the retailer and any external service provider) covering digital receipts include providing the consumer with consent management and an option to review and select the data shared.

3.1.2 Active Consumer Recalls

A use case for digital receipts that gets a lot of attention from industry and regulators is targeted product recalls to consumers. Today, targeted recalls in the retail industry work well in e-commerce – in such cases it is usually known which consumer purchased what and when. Recalls for purchases made in physical stores can be more difficult. Many stores publish recall information on their websites or use the media to inform consumers when necessary. With digital receipts, push notifications can be sent to all consumers who have purchased a recalled item, allowing consumers to find out about recalls much faster and secure than they would are able to today.

3.1.3 Product Life Log Services

Today digital receipts can be used to activate digital guarantees/warranties, and thus connecting the consumers with the brand owners in a simple manner. Especially the promise that the access to guarantee is not dependent on a paper slip is very appealing to consumers and consumer rights organizations.

Future opportunities include more advanced consumer facing services by which consumers can store information about products they have purchased, like a "life log" of each product and full provenance transparency of each product. Life log services are most relevant for durable goods. Digital receipts can be used to trigger activation of products in a specific consumer's library of product life logs. Each product can then be linked to the right user manuals, repair instructions, spare parts and the corresponding disposable products (the right dust bag for a vacuum cleaner), all managed by the brand owner and/or retailer.

Combined with the use of high capacity data carriers in which the individual product's Global Trade Item Number and serial number is encoded, in a web enabled format such as GS1 Digital Link, the product registration and activation process might be seamless.

In a circular economy, the life log may follow the product throughout its whole life cycle, even if the ownership is changed.

3.2 Possible Consumer Concerns

3.2.1 Data Privacy

Fearing misuse of private data, consumers expect transparent communication and intuitive consent options to give, review and withdraw their approval for processing their data. For example, consumer might hesitate to present their email address or mobile phone number at the point of sales, e.g. when wanting to identify a consumer for sending a digital receipt after a cash payment. The fact that people have doubt to share personal information with strangers might make ubiquitous digital receipt adoption very hard or even impossible when consumers cannot be identified automatically, e.g. via login, credit card or mobile payment. Therefore, solution providers aiming to process digital receipts need to ensure compliance with user consents, including allowing users to request the deletion of their digital receipts.

3.2.2 Preference for Paper Receipts

The use of digital receipt requires a change in consumer behaviour and a lot of consumers still seem to favour paper-receipts over digital receipts. Changing habits of the population is a slow process and requires time. In the field of payments for many years people paid with cash and exchanged goods for cash. Through the digital transformation new ways of payments came up, e.g. credit cards and, later, mobile payment. In regions and contexts (i.e. eCommerce) with a significant share of cashless payments, it can be expected that consumers may be more positive also to digital receipts.

3.3 Benefits for Retailers

3.3.1 Automation and Reduced Labor Cost

Like e-invoices, digital receipts are expected to also have a positive impact on labour cost and transaction cost due to more efficient processes at the point of sale and in any expense management processes. Today, transaction cost includes preparing, sending and receiving printed receipts or invoices. The Finish government estimates, that the introduction of digital receipts can generate savings of 800M Euros per year in Finland alone ('eReceipt standardisation application'). For retailers, these savings will primarily be realized through faster and more automated checkouts as well as saving receipt printing and material costs.

3.3.2 New Channel for Interaction with Consumers

Digital receipts offer a new way for retailers to interact with individual consumers through a new channel. For the consumers, digital receipts mean that the receipt is always available, which is very convenient for things like returns processes and expense management.

For retailers, digital receipts offer an easy and cost-efficient way to communicate with the consumer after products have been purchased. This can be used to simplify things like complaint management and activation of guarantees.

Based on consumer consent, also areas like cross-selling, digital coupons and other post purchase services based on the consumer's purchase history can be offered. On consumer consent, retailers may even offer brand owners to communicate with targeted consumers based on their individual purchasing history.

3.3.3 Personalized Recall Ability

With digital receipts, push notifications can be sent to all consumers who has purchased a recalled item, allowing consumers to find out about recalls much faster and secure than they would be able to today which contributes to building consumer trust.

The retail industry will most likely migrate from the traditional EAN/UPC barcode to high capacity data carriers (2D barcodes and/or RFID tags) in which supplementary data and attributes such as batch numbers and best-before-dates can be encoded in addition to the Global Trade Item Number. This has already happened for certain regulated health care items across all regions of the world. When implemented and combined with digital receipts, this opens the possibility to enable more granular recall processes, in which only the consumers that have purchased products from a recalled batch receive recall notifications through their digital receipt app. This may have large positive financial and environmental effects, since fewer products will be scrapped, reducing costs and product waste.

3.4 Possible Retailer Concerns

3.4.1 Lack of Infrastructure

Providing the consumer with digital receipts require a compatible infrastructure that allows capturing user identifiers and sending digital receipts to the web. This may require some investments and time to implement. Therefore, the motivation for the retailer to invest in digital receipt is relatively low, unless the receipts are distributed via the retailer-controlled mobile applications or customer emails. Additionally, digital receipts do not generate revenue directly but should be viewed as a long-term investment in consumer convenience. While the customers might benefit from digital receipts, they are not expected to be willing to pay for the added service.

3.4.2 Lack of Standards

In order to lower the complexity for each digital receipt implementation and to allow inter-organizational as well as international interoperability between retailers and consumers, standards are needed, both for the digital receipts themselves and for the infrastructure needed to distribute digital receipts to retailer agnostic consumer apps. There are multiple initiatives in various countries and regions to create digital receipt standards (e.g. Swedish Digital Receipt Standard, SDRS). As e-invoices are similar to digital receipts, established e-invoice standards (e.g. Factur-X, Zugferd) could be candidates for digital receipts as well. However, so far, no relevant standards organization with a global reach has released a digital receipt standard. Such a digital receipt standard should support three-corner, as well as four-corner implementations of digital receipt eco-systems and contain references for the data objects as well as interfaces for the digital receipt implementation. See section 6 Technical Standards for more details.

3.4.3 Hesitation on Data Sharing

Amongst many retailers, there still exists some hesitation to share transaction data with external organizations, which might slow down short-term digital receipt adoption. The transaction data (POS – point of sale) is usually used to forecast and analyse the consumer's behaviour, and in addition shared in aggregated form with companies like GfK and Nielsen for providing market research related services.

3.5 Benefits for Brand Owners

3.5.1 Consumer Interaction over the Product Life Cycle

Digital receipts and consumer friendly barcodes (QR) are used to initiate brand owner's consumer interaction. Digital receipts can be used to authorize product registration with the brand owner and activate digital guarantees. There are some initiatives around product life logs, in which consumers can manage their product throughout its life cycle.

This allows brand owners to build loyalty with consumers and support them with the right instructions for maintenance, while collecting data about how the product is used (with consumer consent). And when the product is reaching the end of its life cycle, the brand owner may be able to offer a new product to the consumer.

3.5.2 Reduced Time & Cost for Recalls

Sellers of products can issues a targeted product recall, as the receipt info indicates to whom a potentially faulty or hazardous product has been sold. When product recalls are initiated by brand owners, there is often an agreement between the brand owner and the retailer that the brand owner carries the cost for products that must be scrapped. When brand owners are able to make more granular recalls and the retailer are able to notify only the consumers that have purchased products from a specific batch, less products will have to be scrapped. Making recalls more granular and automated, will increase consumer trust while at the same time reduce costs and product waste.

In addition, recalls initiated by brand owners can reach consumers using digital receipts much faster and more secure than other consumers.

3.6 Possible Brand Owner Concerns

3.6.1 Increasing Consumer Expectations for Transparency

Brand owners unwilling to share data about the provenance of its products or other information may find themselves being pressured by new consumer expectations on transparency.

3.7 Benefits for Others

3.7.1 Small and Medium Enterprises

Digital receipts can lower the administrative burden in small and medium enterprises, as receipt information does not have to be saved manually to the financial systems, and the companies can automate receipt processing. Further, structured receipts allow companies to automate VAT processing, as well as any other process or new service requiring an original purchase receipt (e.g. customs clearance). Broader receipt information enables superior, automated reporting of purchases and expenses.

3.7.2 Taxation Administration

Taxes are the base of every government, and therefore a reliable tax collection process is needed. The digital transformation changes the interaction between tax authorities and taxpayers. There are some industries, for example the gastronomy industry, where tax fraud is frequently happening. In some European countries, such as Poland and Croatia, the tax agency is requiring real-time connection with all point-of sale systems, receiving copies of all transactions to make sure that proper sales taxes are paid.

This opens an opportunity for also digitalizing the consumer receipts, as the POS infrastructure is upgraded nationally and from now on connected to the internet. In Finland alone, governmental offices currently have to manually handle 600 000 receipts and 1’1M invoices per year. Through the improved productivity, prevention of grey economoy and mitigation of tax fraud, the public administration can generate significant economic benefits for the society.

3.7.3 Sustainability

In times where climate demonstrations and strikes are becoming increasingly frequent, a permanent shift in the mind of consumers has most likely taken place. Sustainability and the environmental impact of our consumption is gaining importance for more and more citizens. Also, in early-adopting regions like Northern Europe, sustainability and protection of the environment are key drivers to adoption of digital receipts.

Paper receipts have two main environmental effects; paper consumption and use of bisphenol. In Sweden only there are estimates that 60 000 trees are used to produce paper for around 4 billion receipts each year. While this number might not appear large for a single country like Sweden (10M citizens), the global potential is much greater and could indeed make a difference in the mitigation of deforestation and climate change. The bisphenol issue should not be underestimated as well, since it is related to workers’ health conditions for staff working at store check-out.

3.8 Summary of Benefits and Concerns by Stakeholder Category

Brand Owners			Retailers			Consumers	
Benefits	**Concerns**		**Benefits**	**Concerns**		**Benefits**	**Concerns**
More Granular Recalls	Increased Consumer Expectations for Transparency	← more relevant	Increased Customer Satisfaction & Trust through Personalized Recall Ability	Sharing GDPR Data With Consumers	← more relevant	Digital Guarantee / Warranty	Data Privacy
Faster and More Granular Recalls			Increased Transaction Speed	Missing financial Incentives		Increased Transparency	Having to Switch from Habit of Cash Payment
Consumer Registration and Life Cycle Management of Durable Products			Real Time Data Analysis	Missing Signature for Tax Authorities		Active Product Recalls	Losing Access to Digital Receipt Wallet
High Precision Direct Marketing Channel (if Retailers Permit)			Consumer Interactions	Need for Investments		Sustainability	Complexity of Consent Management
Stronger Consumer Relation (if Retailers Permit)			Reduced Labour Cost	Missing Infrastructure / Standards		Personal Expense Tracking and Reporting	Unwanted Behaviour Monitoring
			Reduced Expenses on Paper and Printing	Effectiveness of Consumer Protection		Mitigating Tax Fraud	Missing the Preferred Paper-based Receipt
		less relevant →			less relevant →	Monitoring of Food Ingredient Consumption	
						Increased Transaction Speed	
						Automated Tax-free Re-Imbursement of VAT	

Table 1 Benefits and Concerns of Digital Receipt Adoption for Brand Owners, Retailers and Consumers. Adapted and extended from Digital Receipts Study by Auto-ID Labs ETH Zürich (2019).

4 Selected Service Providers

Digital receipts are still a niche solution in the overall digitalization process of payment in retailer chains. While digital receipts are still not the main focus of retailers or payment providers, there exists quite a number of solution providers and start-ups active in the space and there are early adopting retailers that are already providing digital receipts to their consumers.

Overall, more than 30 providers offer services related to digital receipts, each with a different service model. These service providers operate in different industries, including in-house solutions for retailers, loyalty / cash back cards, third-party solutions, receipt storage services and mobile payment services.

Many service providers are emerging aiming to substitute paper-based receipts with digital alternatives. While the trend towards digital receipts seems clear, a dominant channel to distribute digital receipts has not been established just yet. Still, banks seem to play an important role in the digital receipt development, as the examples of Flux (UK) and Slyp (Australia) indicate. KPMG mentioned in an article that banks could generate new revenue streams by providing services to the retail and food service checkout industry. Banks could leverage their position of already having existing relationship with customers with new services and offer start-ups or retailers to integrate digital receipts into their banking applications. Such a service could be paid by the merchants and warranties and could add post-purchase value to customers. The table below contains a non-exhaustive list of service providers, a brief description and region in which they operate.

Name	***Description***	***Country***
Adminapp	The Adminapp is directly fed from the POS network partner. The app enables digital receipt management / archive.	Germany
Bitsaboutme	Bitsabout.me enables an overview about your purchases and your generated data in the internet. Thanks to digital receipts bitsabout.me creates a Nutri-Score based on the purchases from the grocery store.	Switzerland
Cardivation	Cardivation offers digital receipts and loyality offers to customers plus insights to merchants eg. petrol industry.	Sweden
Digibon	Digibon is providing a smart receipt when paying at the cashier when paying by credit card. The receipt is stored where the user wishes (App, ebanking). Digibon provides a QR code at the cashier to scan and download the receipt for other payments.	Netherlands
EcoSlips	EcoSlips Digitalization Service enables digital receipts when entering the EcoSlip PIN at the till.	South Africa
Flux	Flux provides full digital receipts automatically in the customers' banking app as they pay with their bank card at any store in the Flux network. It offers loyalty card functionality, collects stamps in the banking app, and allows personalised offers sent straight to consumers that are opted in.	UK
Foreceipt	Foreceipt is an easy way to turn consumer's receipts, bills and invoices into digital data they can use. Through scanning receipts or directly processing email receipts an expenses report is created.	Canada
GooglePay	Google Pay is enabling payments online and instore with the app or on the desktop, including purchase items (e.g. apps, subscriptions, movies, products)	USA
Hadley	Hadley is a consumer-facing assistant that uses artificial intelligence (AI), machine learning and natural language processing (NLP) to facilitate conversations with the shoppers after they make a purchase in-store and online. Hadley powers Live Receipts and Returns, two solutions that work together seamlessly thanks to a single platform and synced data.	Australia
Kivra (powered by Findity)	Kivra is a digital hub that allows consumers to create a digital mailbox to receive and store digital letters, invoices and digital receipts. Once linked to the E-Banking the invoices are paid with one click.	Sweden
iZettle	Infrastructure provider - When the payment has been completed through the app the customer can send the receipt via email, SMS or print the receipt.	Sweden
receiptHero	ReceiptHero delivers receipts automatically from merchants to your banking & accounting apps or other third-party apps.	Finland
Slyp	Slyp's proprietary retail technology enables an interactive and intuitive smart receipt (digital receipt) to be automatically delivered to a customer's banking app post-purchase, without collecting customer data at point-of-sale.	Australia
Storebox	Application which enables the storage of digital receipts. The app is integrated into the merchant's app and generate automatically a digital receipt.	Denmark

Table 2: Some examples of digital receipt service providers. A subset of an overview in the Digital Receipts Study by Auto-ID Labs ETH Zürich (2019)

5 Regulatory Background

With the introduction of the European General Data Protection Regulation (GDPR) that allows users to retrieve their own transaction data in 2018, the first building block on the road towards digital receipts seems to have been paved. An increasing number of politicians (e.g. in EU, Sweden, California, but also Switzerland) and petitions (USA, UK) are now calling for a transition away from paper- to digital receipts. At the same time the basic infrastructure is being rolled out, also because a growing number of regulators require points of sale to be online and to sync their transaction data in order to prevent tax fraud.

In Europe, through GDPR, the transaction data generated by retailers is available for the consumer. With data portability, consumers can request electronic, machine readable exports of personal data. Therefore, similarly to financial transaction exports mandated by the European Payment Services Directive (PSD2), consumer's transaction data can be merged via consumer consent with third party service providers, enabling more transparency for the consumer. As a result, the consumer owns his data and can share it with third parties to access value-added services. An example of such third-party service providers that allow their users to import their digital receipts into their applications include Bitsaboutme (Switzerland). Currently, the European GDPR mandates the right to request personal data (e.g. loyalty card records) but does not include single transactions that have been paid via credit card or cash, as they are not considered personal data. To this day, it still remains unclear whether and when a European regulation mandating a 'right to a digital receipt' on all transactions can be expected.

In the United States, the data protection law is different than in the European Union, namely consumers do not have the right to access their data in machine-readable format yet.

In summary, regulatory developments are not hindering the introduction of digital receipts. On the contrary, lawmakers are encouraging the market to digitalize. The European GDPR is important when processing data in the EU and will be important in building the framework for a digital receipt solution with global applicability.

6 Technical Standards

From a technical perspective, digital receipts are standardized, structured and machine-readable data entities. Digital receipts are usually transferred in a three-corner or four-corner model (described below). The possibility of building a new real-time economy on top of digital receipts becomes feasible when digital receipts follow an internationally interoperable standardization.

Further, digital receipt stakeholders should implement data privacy compliance and security measures into their infrastructure, as it remains a high priority and barrier towards adoption. Finally, with not every consumer having a preference for digital receipts, it should be clear for which retailers a consumer receives a paper- and for which a digital receipt will be sent. The digital receipt introduction should therefore follow an opt-in process at first, before digital receipts become an opt-out standard.

6.1 Architectures

In the following, potential architectures are introduced that can be leveraged when introducing digital receipts in the retail domain.

6.1.1 Three-corner Architecture: Integration via Loyalty Card Systems

The European General Data Protection Regulation (GDPR) allows consumers to retrieve their own transaction records from retailers via data portability. This enables third parties to integrate transaction data, i.e. digital receipts, via a three-corner model and consumer opt-in.

Retailers offering digital receipts directly at check-out may use a similar model, where a third party is selected to distribute digital receipts to a consumer app service provider selected by the retailer.

This architecture usually requires three stakeholders, i.e. consumer, retailer, and solution provider (i.e. application), and is therefore also referred to as three-corner architecture for digital receipts.

Kivra in Sweden follows this architecture in their integration of digital receipts from the Swedish retailer ICA. Similarly, Bitsaboutme in Switzerland leverages GDPR to import digital receipts from the two largest national retailers' loyalty card services on behalf of the user.

Unless a market has only one digital receipt service provider, (which seems to be the plan for some service providers) three-corner models typically lead to consumers having to use different digital receipts apps for different retailers, which may reduce the value of digital receipts for consumers.

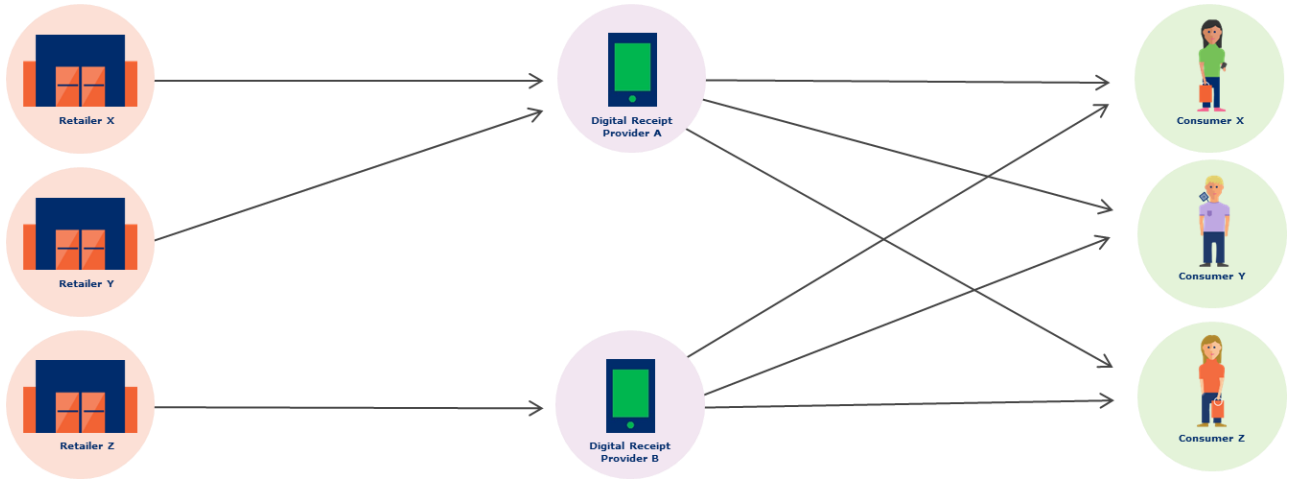


Figure 1: Three-corner models force consumers to use multiple digital receipt apps selected by different retailers.

In theory, three-corner models could lead to retailers having to invest in integrations with multiple digital receipt service providers to satisfy the consumers in their market. This might be different in the four-corner model, as their payment terminal operators, acquiring and issuing banks would be expected to set up the digital receipt infrastructure.

6.1.2 Four-corner Architecture: Integration into Card-based Payment Systems

In four corner models, the retailer that generates digital receipts and the consumers receiving them do not have to use the same service providers. This allows each party (retailer and consumer) to connect to a single digital receipt service provider independent of each other. For consumers, this means that digital receipts from all retailers can be collected in the same digital receipt app. At the same time, each retailer can choose to only work with one digital receipt service provider to integrate with (e.g. to comply with GDPR regulation).

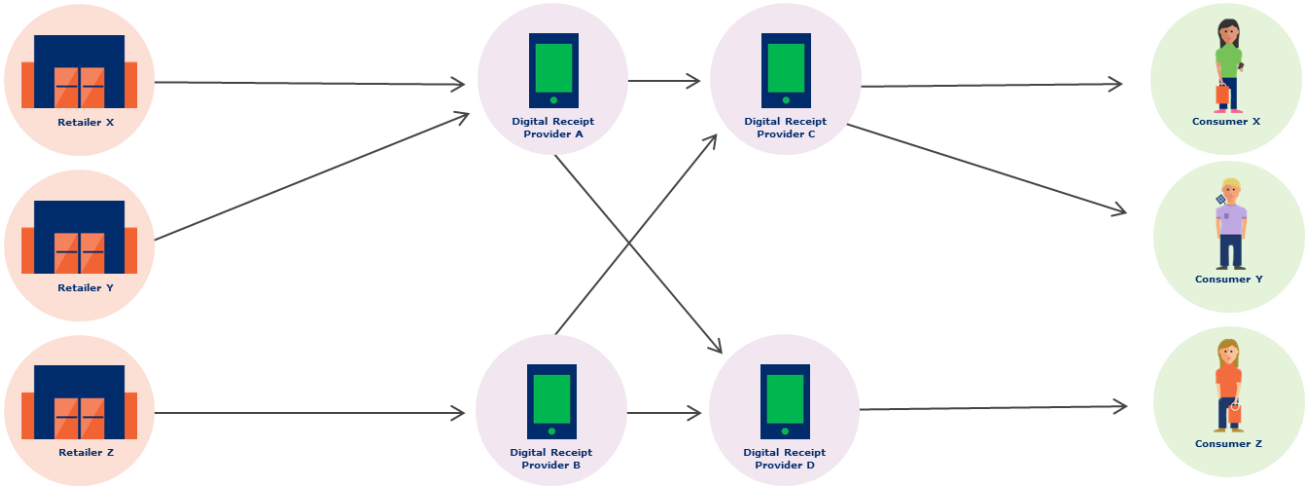


Figure 3: Four-corner models allow each party to select only one digital receipt service provider.

Four corner models rely on agreed methods and formats for the seamless exchange of data across multiple stakeholders. It also requires business models that can be accepted by all relevant parties. Current successful implementations of four-corner implementations of digital receipts include Flux (United Kingdom) and Slyp (Australia). Both have integrations in multiple national banking applications and are integrated with multiple retailers' POS systems.

In four corner models, consumers must be identified in ways that can be understood by all service providers involved, in order for the digital receipts to be routed to the right consumer within a very short time (less than two seconds in a POS scenario).

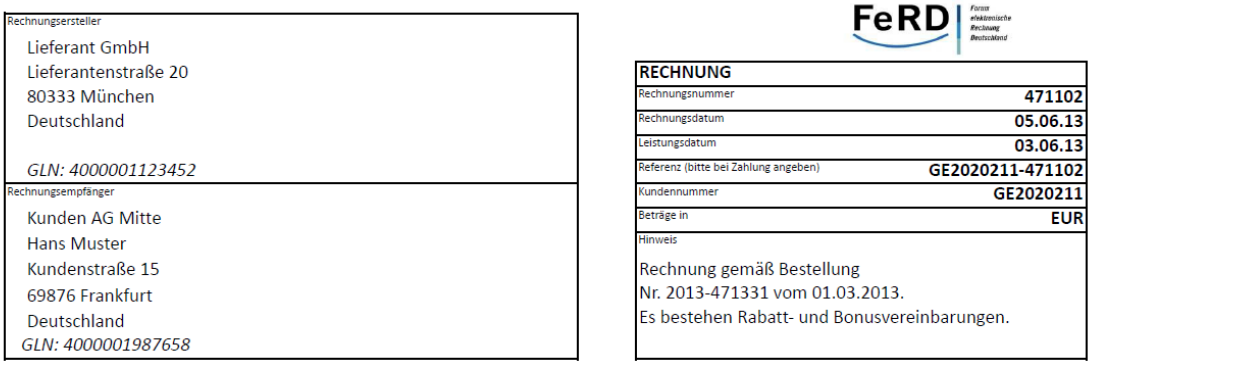
The identification can rely on the consumers' credit/debit cards presented at POS. However digital receipts may also need to be offered for cash payments and cashless payments using other means than traditional credit/debit cards (i.e. mobile payment apps not based on credit/debit cards). So, there is a need to accept multiple ways to identify the consumer in four corner models.

6.2 Standardization of the Digital Receipt

In order to enable the flow of digital receipts between retailers, consumers, banks and other ecosystem stakeholders, possible standardisations of the digital receipt data object should be discussed. There are multiple possible ways forward to create the standards needed to facilitate the introduction of digital receipts.

6.2.1 Expanding Scope of E-invoice Standards

Multiple standards for e-invoices that have already been implemented could be adapted towards digital receipts. By 're-using' the e-invoice standards also for digital receipts, the implementation could be easier, as most retailers are already using the same standards for their B2B and B2G invoices.



Rechnungsersteller

Lieferant GmbH
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80333 München
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GLN: 4000001123452

Rechnungsempfänger

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Hans Muster
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69876 Frankfurt
Deutschland
GLN: 4000001987658

FeRD

RECHNUNG

Rechnungsnummer	**471102**
Rechnungsdatum	**05.06.13**
Leistungsdatum	**03.06.13**
Referenz (bitte bei Zahlung angeben)	**GE2020211-471102**
Kundennummer	**GE2020211**
Beträge in	**EUR**

Hinweis

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Nr. 2013-471331 vom 01.03.2013.
Es bestehen Rabatt- und Bonusvereinbarungen.

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Depicted above, is a paper-based invoice, as well as its e-invoice counterpart, which could be embedded into a PDF file, which is still machine-readable and structured. Information about buying and selling party are given, including addresses, names and tax registration numbers.

6.2.2 Expanding ARTS Digital Receipt Standard for International Use

Another approach is to base implementations on already existing standards for digital receipts. One that exists is called ARTS DR200 and was previously managed by the National Retail Federation (NRF) in the US, based on retailer business needs in the US. This standard is now managed by Object Management Group, OMG.

One implementation of ARTS DR200 is the Swedish Digital Receipt Standard (SDRS), which is based on the ARTS DR200 standard with a Swedish extension. The digital receipts include all information needed to replace the paper receipt with a digital equivalent and communicate it to the right consumer. The solution has been approved by the Swedish Tax Agency and is being implemented by some major retailers and travel operators in Sweden.

6.2.3 International Interoperability / GS1

Ideally, digital receipts are generated, sent, transmitted, received and processed automatically. Full interoperability means to interoperate on three various levels; semantic (content of the receipt), the format used (syntax) and the method of transmission.

Semantic interoperability means that the digital receipt contains all necessary information resulting in clear understanding of the exchanged information, independently of physical or digital transmission. Syntactic interoperability means that between the sender and the recipient the data elements of a digital receipt can be processed automatically. In Scandinavia, there already exists a first pilot implementation for cross-border distribution of digital receipts, for example between Finland, Sweden and Estonia. This is operated by a single operator (Nets), and thus an example of a three-corner model.

To provide as much value as possible of digital receipts for all relevant stakeholders, four-corner models are needed. If there is a strong enough market need, it may be relevant for GS1 to be the facilitator of such an initiative, regardless of the technical approach chosen.

7 Recommendations & Implementation Considerations

1. Use GS1 Identifiers

To reach the full potential of implementing digital receipts it is important to pave the way for as many of the benefits mentioned in this paper as possible, and potentially others, already from start. To make a digital receipt implementation as ready as possible to be expanded to new use cases, it is vital that it is based on GS1 standards, i.e. that products are identified by GTINs in digital receipts and that supplementary data encoded in 2D barcodes can be processed correctly.

2. Use GS1 Digital Link

With the introduction of GS1 Digital Link syntax for encoding data carriers it may be possible to include the same link in the digital receipt itself, allowing the consumer to get more information about the product directly in the receipt app.

3. Enable interoperability between service providers

Many digital receipt service providers use proprietary digital receipt formats that can only be used with their tailormade retailer integrations and their specific mobile app. This may lead to a lock-in situation for retailers and consumers in which retailers can only send digital receipts to consumers that have their service provider’s mobile app, and consumers may have to have multiple digital receipt apps for different retailers.

To avoid lock-in, retailers should require that their digital receipts service provider is willing to connect with other consumer apps than their own. By doing so the relevance for consumers becomes much greater, since one of the benefits for consumers is to monitor their spending habits in one place.