

FURTHER

Autonomous
Smart Travel
Ecosystem

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This paper is subject to Semantic Versioning¹ 2.0.0.

¹ <http://semver.org/spec/v2.0.0.html>



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Abstract

helping to accomplish the settlement and payment process.

Travel & Tourism is a key industry for economic development throughout the world, contributing over 7 trillion USD in 2017. In a more globalized world, our travel options are expanding continuously. We now have a plentitude of diverse travel and lodging options at our fingertips. The creation of online booking systems, coupled with the ever-growing use of smartphones, tablets, and laptops, has created an accessibility to the travel and tourism industry that has never been seen before. However, as a result of this new and direct style of travel booking, there are also increasing issues relating to payment and the available methods of settlement. For a single booking, participating parties must do the settlement and payment with legacy systems using old methods. Us fellow travelers, in turn, pay extra for these transaction costs and settlement disputes.

We believe that Further's ecosystem, consisting of its own Blockchain technology and digital currency, will be the solution to these problems. Further's Blockchain will provide a real-time solution for Billing, Settlement, and Payment problems; furthermore, it will introduce new functionalities, such as customizable airline tickets and an exchange market for tickets and reservations. Ticket and/or hotel reservations will be made through exchangeable smart tokens, which can also be divided, combined, and reclaimed by a new owner, while



Executive Summary

The e-ticket transformation took 15 years to be established by the airline industry. Legacy systems, which mimic paper-based tickets and reservations, dominates the majority of the Travel and Tourism. With the widespread use of the internet, airlines and hotels have become vastly more accessible. Even though this helps, the widespread data distribution is still only available to a small proportion of market participants. The electronic reservation and payment systems make it simpler for the customer to buy from certain vendors, however, the providers and the agencies are still struggling with the settlement and payment operations. Also, since not all airlines or hotel providers are accessible through current systems, if a traveler wants to fly and stay in a destination where it is only accessible locally, the operation and payment process presents other difficulties. These would include problems such as lack of online data, lack of trust between parties, lack of payment methods and/or additional costs. Moreover, when considering the airline industry, we must also take into account the unaddressed issues of identity matching and loyalty, which are among the biggest issues yet to be resolved.

The travel and tourism industry is expanding; direct and indirect economic input to the industry is expected to reach more than 13 trillion USD in 2020. However, the speed of

advancements in operational matters is not correlated with the acceleration of economic growth. We at Further Network would like to tackle these major issues by introducing our own technology - the Smart Travel Record (STR).

STR is a smart token consisting of necessary data relating to flights, hotels, reservations, and/or any other travel product. STR will help solve the issues of settlement and payment using the system's own digital currency and any airline, agency, hotel wholesaler or the hotel itself will be able to create a smart contract for the sale of their products such as a flight ticket or hotel booking. This would convert their product into digital assets. This contract will be available for one-time transactions or will be recurring for certain periods if pre-defined on the digital asset itself with a ruleset of its own.

With the use of blockchain technologies, we will be able to control and provide necessary data for real-time settlement and payment services. We will also introduce new functionalities like dividing and/or exchanging the STR with other users in the system. STR will also bring more structured data and automation, helping vendors create rules for the operational usability and allowing them to define their own rule sets. These rules would cover certain periods of time like seasonal agreements or certain dates specific to a customer.



STR will be available to any travel industry provider, including cruise ship operators, hotels, airlines, and car rental companies. Every step of an individual's travel will be combined into one STR. With every asset defined in a traveler's STR, there will be access to operations consisting of all assets or specific assets. STR will hold the key to the identity of the traveler and their itinerary, allowing the holder of the STR to make changes on the itinerary. STR will be a proof of ownership for the assets within so that it will permit a traveler to check in flights and hotels directly .

We aim to build and maintain an autonomous smart travel network where any travel product provider, from small to large, will be able to create their own assets and rules, as well as be able to transfer them using their own smart contracts and get real-time payment throughout the system by using blockchain and cryptocurrencies. We will begin with the tokenization of current assets from proprietary systems, by converting a single flight ticket to an accessible, easily operable asset on our network. This will be the first step for doing settlement and payment in real time. We will continue with identity management and data aggregation. We will also introduce a fully integrated management system for airlines which will directly tokenize the asset without any middleware. We will, ultimately, achieve an open network where every software

provider can integrate their system to our network.

Vision

The transformational power of technology reshapes the way we live, travel, and even interact with technology itself. For instance, you can have an app in your pocket that allows you to keep track of trains and when to jump from train to a taxi to help you to make it on time. In the near future, the taxi you took will be transformed to an autonomous vehicle and may even become airborne given the current path of rapid advancements.

Technology has permitted us to have paperless travel and the ability to track our flight's gate and even find our way through the airport. However, we still do not have the ability to interact with our tickets directly, in order to change the details without a human's involvement. It is due to the technological sheet has covered the current systems. The real leap forward will come when we transform the monolithic core beneath that cover.

We envision a future where travel products are customizable, interactive, and autonomous. An airline ticket can be a personalized product, solely for a specific travel for the personal preference of the customer. We may very well customize the ticket from the legroom of the row to the in-flight entertainment package the frequent flyer receives. Airlines may generate a peer-to-peer interline agreement



contract within minutes of demand and offer them automatically. We may distribute and enable this personalized pass in your digital wallet, proving your true identity to be used from the autonomous vehicle taking you to the airport, throughout your flight and at the door of your destination hotel room.

This vision can be realized by transmuting the structure of the underlying systems and redefining the layers to automate various tasks and institutions that are involved in the processes. Self-evolution is key to this evolution. We will start with tackling the current world problems and smooth the way to the future, where your ticket to Mars will include bespoke in-flight preferences and travel plans.

Current World

In a more globalized world, our means of travel and options are expanding simultaneously. With the help of Online Travel Agencies (OTA) like Expedia and Booking.com, we are achieving more diverse options for travel tickets and rooms are at our fingertips. As the distances are shortening, the complexity and variety of the operations are changing.

There are three main parts to this operation:

1. Distribution of availability of data and reservation.
2. Operations and settlement between all parties.

3. Circulation of payment through means of domestic and over-the-border transactions.



The first part is partially solved with Global Distribution Systems (GDS) like Sabre, Amadeus, and Hotel Wholesalers (HW) like Hotelspro and HotelBeds. Whilst these are technology savvy companies where availability data is distributed through them, they are nevertheless bound to those systems where the data is provided, like the ticketing and/or reservation systems of the providers. Another issue with wholesalers is that the data they have is limited. In the case of airlines, GDS's only offer availability data of the member airlines of International Air Transport Association (IATA) airlines and the rest of the world doesn't get visibility due to the domination of the IATA. In the case of hotels, the lack of standardized data is the real problem. Second and third parts are dominated by legacy systems where the



transaction costs and settlement issues impact upon us fellow travelers as costs. Another alternative to using GDS's and HWs is to use direct distribution. Some companies establish this via their own network of sales or their websites. Most are stuck in their network islands where interoperability and exchange of data are very difficult.

At the beginning of the millennium 1.674 billion passengers flew; this number more than doubled by 2016 where almost 3.7 billion travelers² chose airline travel. In other words, 10 million daily passengers traveled by air. When we look at the distribution of these passengers, 2.4 billion passengers used IATA Member Airlines whereas 1.3 billion passengers used non-IATA Airlines. Additionally, World Bank data from 2016 shows there were 1.2 billion hotel guests recorded. As of 2020, the estimate is over 8.5 billion passengers. To give more insight into the corporate side of this world, approximately 620 commercial airlines of which 460 are non-IATA airlines have generated those tickets. Also, there are more than 250,000 travel agencies and 150,000 of them are non-IATA agencies.

These sheer numbers bring us the size of the travel market, which is over 2.3 trillion USD for 2016 and is expected to be 4 trillion USD³ by 2027. Figures

released for 2017 show that the indirect contribution of the industry has reached more than 7 trillion USD⁴ worldwide. This makes the travel and tourism industry one of the key sectors for economic development throughout the world.

Upon closer examination of the data, we see that these numbers are not just high-end customers. Airline passengers now have more diverse income profiles than before. This brings two outcomes. First, because airline travel is now a common form of transport, more and more new companies are appearing in the industry as airlines, airport operators or other service providers. Second, there is a vast amount of data that needs to be processed safely and securely, not just for airlines but for the entirety of the travel and tourism industry.

The very first step of any travel plan begins with transportation and accommodation plans at the destination and their eventual purchase. This would trigger several transactions between the agency, airline, and hotel, affiliate, or service providers. The accumulated cost of each service is reflected upon the ticket and reservation prices. This also means that there is a lot of data and value transactions between multiple parties of a single reservation. The cost of these transactions, even for a single reservation, consumes

² The World Bank Data - <https://data.worldbank.org/indicator/IS.AIR.PSGR>

³ World Travel & Tourism Council 2017 Report

⁴ World Travel & Tourism Council 2017 Report



considerable time and money. Likewise, airlines, hotel wholesalers, and travel agencies need to maintain ongoing settlement processes within themselves and with each other to reconcile and settle these transactions. This process of billing, making a settlement and performing the actual payment, in other words Billing Settlement Payment (BSP) process, is also very painful and error prone. In light of the above data, one can imagine the total cost of maintaining this model is high.

The Basic Problems of the Travel Industry

To define the structure and the problems of the industry, let's examine the counterparts in a conventional ecosystem. Currently in the system we have Airlines, Hotel Wholesalers, Cruise Operators, and Railway Operating Companies as asset providers – an asset being a ticket or a reservation – and we have Travel Agencies, Corporate, and Individual customers as consumers of this asset. And the asset is issued and consumed through the provider's own proprietary system. The problems start with where and how the data of the product is created and when, how, and to whom that product is sold and consumed. To explain further, let's start with problems related to the data itself.

Data Structure

There are lots of different Passenger Service Systems (PSS) where airlines

create and sell their inventory. Almost all the systems are derivations of ancient paper-based systems. These systems are bound to similar limitations because, even if there is room for innovation, by design, the current ecosystem enforces these limitations.

The move from paper-based airline tickets to electronic tickets took place over a 15-year period between 1994 and 2009. Even now, the e-ticket contains only the basic data about our tickets and it is not configurable or actionable, as it is just data. Other transportation models followed suit but then again it is the same basic data.

The ticket should be more than just a manifest of flight information. It must be customizable or even personalizable for a traveler's needs and preferences. It must include the rules of returning or changing dates that should also be calculated actions and callable automatically, without requiring a human interaction. This can only be achieved with a structural change of the data. These problems can also be adopted for train or cruise tickets or even for hotel reservations or car rentals, where the lack of standardization is the main distinction from airline tickets. There is more room for innovation.

Sticky Ticket Problem

Ever had a day when you had a trip planned just for it to be canceled at the last minute and you had someone



nearby that would be a suitable replacement for you but you couldn't transfer your ticket and you had to buy a new one for that person and return yours? This is just one example of the incompetence of the legacy systems which are open to further improvement. Most Airline PSS's couldn't do the changes without human interaction and you couldn't just transfer your ticket to any other person that would be able to fly instead of you. Most current PSS's are not suitable for this kind of change and couldn't track the ownership of this ticket due to security reasons. A similar situation can be applied to railway or cruise tickets, car hires, and hotel reservations where their respected management softwares are in the same situation.

What kind of software would we need just to change the ownership of the entire business trip we planned from airline tickets to car rental and hotel reservations, like transferring contact information over a smartphone? These and many other examples are barriers to the usage of data in current systems. This also highlights the specific problem of data: the identity.

An Identity

"Who is who" is a problem not because the identity is needed for verification but because truly identifying the customer would change the "customer's journey" throughout the system. Is the John Milton buying a ticket now to Istanbul the same John Milton who bought a

ticket last week to New York? Or is he the one who made the reservation to Dubai through an agency?

There are some identifiers like passport number or a cellphone number, but these cannot assure uniqueness of a customer as these are open to error and/or change. The provided info can also be falsified. Companies try to solve this problem by enabling a login through their website or with a loyalty program. This, however, is not a common denominator for all and not as commonly used as needed. Sometimes agencies provide this data but, again, this is not always reliable. As the companies gather this information they keep a big pool of big data, though few have a chance to tap into this pool. The ultimate use of this data would be the customization of the travel asset. Let's look at some business problems that providers and agencies face.

Business Problems

On the business side of things, there is a common pattern that emerges for almost all of the parties in the travel industry. As the operation keeps on going, the providers create their assets from their proprietary system and the ownership of the asset is defined at the time of sale. At that moment, a credit line is recorded between the provider and the agency in question. As we explained in the previous section, the availability of the asset is dealt with in GDS's or direct distribution channels but the credit line



here is the main reason for almost all the items outlined below. For example; when a flight ticket is issued combining two different airlines with a stop along the way, the money from the seller agency is collected and distributed to corresponding airlines by IATA. Those operations for collection and distribution create other issues, as shown below.

Problems from the travel product providers' perspective are:

- IATA or Airline Clearing House (ACH) dependency
- High commissions and transaction fees upon receiving and sending
- Barriers to expanding sales channel
- Trust and Traceability
- Currency Risk
- Difficulties with keeping their money in their own country
- Long payment intervals, 15 to 45 days

Problems from an agency's perspective are:

- Multiple deposit accounts for multiple providers (high capital barrier)
- Difficulties in provider settlement
- High cost of a letter of guarantee
- Barriers to expanding provider channel and product option

- High cost of payment transactions

Inefficient Reconciliation Process

Basically, the aforementioned credit line brings us to an inefficient reconciliation process. The case of a travel agency working with only one provider is quite an easy equation to solve. From the agency's point of view, there is a single reconciliation point with a single provider.

However, currently, this single reconciliation can only be carried out within certain periods because of the mutual control of the records in the systems of both parties involved in the realized sale. This can be effective only during certain periods and may require a need for third parties for money transfer. This situation also brings along a heavy operational process that needs to be carried out. For example, nowadays, this reconciliation between airline and agency can only be done within certain periods; a minimum of 15 days to an average of one month. Sometimes the processes take even longer. Even if an agency sells tickets through a single system, it needs to pay through a third party. Since both the transaction cost and the control of the transactions are necessary, it is only possible to carry out this process at certain periods. But the real world is much more complex in many ways.

First and foremost, the agency usually works with more than one provider, and the providers also work with more than one agency. Although this is still a single settlement, it is becoming



increasingly difficult to operate with more than one party involved. Second, if several providers jointly offer the asset, in that case that the agencies and providers involved need to offset between and within themselves. We call this process multi settlement. Along with all these, reconciliation also needs to be done in monetary terms in order to complete the settlement process.

In addition, IATA member airlines and agencies can make the reconciliation through IATA on an average of once per month, with high commissions paid and guarantee deposit money kept aside. But for those who are not members of IATA, this process can be much more uncertain, require a third-party involvement, take a long time, and be painful.

Agency Idle Money

Airlines or any provider generally require agencies to block a certain amount of money or give a guarantee letter due to the risk that the agencies bear. This is because they cannot reconcile instantaneously and the provider keeps the money on hold, with a certain delay. In this case, a large amount of money remains idle in the bank account.

For example, IATA requires a 360,000 USD minimum guarantee letter for travel agencies and this increases according to the transaction, volume, or risk degree. Also, other providers may require a minimum-security deposit ranging from 3,000 USD to

10,000 USD or more to open a new agency account even if the agency does not immediately sell this amount of products. When the agency works with 10 providers, idle money multiplies respectively, causing a requirement of a vast amount of pre-paid money.

Path to Solution

Blockchain as a distributed ledger opened the gates of opportunities for real-time online payment solutions. The adoption of this technology in the travel industry has always been on the digital currency side, giving us just another way of payment for our reservations. Although this is a very important feature as the payments would no longer need extra fees, there is an unseen cost machine at the back of the transactions, thus explaining the higher prices. We believe that blockchain technology and digital currencies will eventually solve the transaction fee problem. To take it a step further, we will revolutionize how the travel product is defined and consumed while providing a real-time solution for BSP. Let's take a further look.

Further Network's Solution

Blockchain, by its nature, offers a basic and fundamental solution. It is the immutable history of the transactions and, thus, expressing the final ownership of the asset. An asset can be money, a license, or a ticket. Its



elegant design in keeping a secure, distributed chain of information would help real business scenarios, as discussed in the former section. The key points Further is aiming to achieve are:

- Real-time settlement between all interacting parties
- Decentralizing the process of settlement, thus removing the mediator
- Reducing the amount of money kept or blocked in deposit or safety accounts
- Cost reduction on payments
- Simultaneous cross-border payments
- Customizable travel asset
- Interoperability like merge, divide or exchange of the travel assets

And here is how we aim to achieve this.



Smart Travel Record

We are introducing Smart Travel Record (STR), which is a smart token holding key data about your travel. Conventionally your flight ticket or your hotel reservation is not just data, it is a contract with terms and conditions. Let's take a look at an airline ticket more closely where flight data and tickets are more structured compared to other kinds of tickets. On your ticket, you would have your standard data consisting of your travel details and personal information as the passenger and also a value of the ticket you are holding. As passenger you also are bound to its presented rights and obligations. Within these limits presented you can use, return, or burn your ticket. If you put a travel agency into this equation, this is a multisignature contract with lots of unseen mechanisms in place. We can transform this conventional ticket to Smart Passenger Record (SPR) for airline tickets using blockchain technologies. SPR is a sub model for STR, consisting of any transportation related data. We also introduce Smart Guest Record (SGR) for hospitality related smart tokens. STR will be a go-to standard smart token for the travel and tourism industry. Let's dig in.

The Data

The real revolution for the internet was the availability, distribution, and shareability of data. We believe that the Smart Travel Record (STR) will provide this for the travel industry.

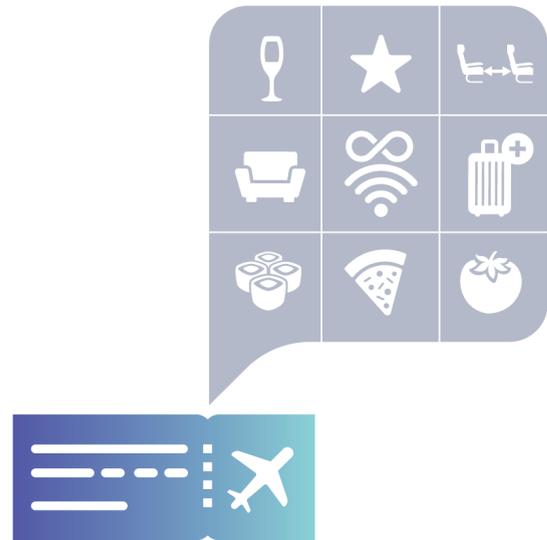


STR will contain or will be able to grant access to all the necessary data related to travel, including the itinerary with the value and transaction regarding the security and contract rules. Let's look at the lifecycle of this smart token.

The birth of an STR will be when a travel product provider issues the document with necessary rules. We will be providing several different tools to generate an STR. While for larger, more established, companies this would be communicating with their proprietary software, for smaller, agile companies we will have a tool to create the token on the fly. This will allow the industry to become more robust. An example is a small to midsize travel agency that may sell reservations for a local hotel via token creation and getting paid with a cryptocurrency for a special, once in a while convention in town that helped to book almost all of the rooms available. Everyone authorized by the network would be able to create an asset, tokenize it with STR and sell through the network. This will ease the international sales while opening many opportunities.

The life of an STR will consist of many standard actions like returning and changing some info allowed by the provider. But there is one significant difference - it requires minimal to zero human interaction. An STR, containing pre-defined rules, will be able to determine the returning or changing of date policies according to the rules set

by the provider. Aside from that, we will provide many other actions using the capabilities of a smart token. The new abilities will only be available if the issuer desires and uses certain tools. New abilities would include transfer, division, exchange, and customization of the STR.



A customizable STR would be customizable in a way that every item in an STR will be like a Lego brick. To give an example, in an airline, a class of ticket would have a baggage capacity of, let's say, 15 kilos. To be able to change it to 30 kilos, the airline may need to do a change on the ticket class. This can involve a whole series of processes as the legacy systems are ill-equipped to handle numerous small operations effectively, requiring the whole ticket class change and resulting in a ticket refund and then a reissue. With STR, it will be possible to simply alter the baggage allowance package and STR will calculate any necessary value change instantly. All the parts of STR would be



customizable for a single time for a single reservation or, let's say, for a flight with different choosable options.

Transferring a flight ticket, by means of changing the passenger name on the ticket, is currently not possible considering how the conventional systems work. An STR would be transferable if generated in a certain way, allowing an exchange market for the assets. The conditions of ability and cost of transferring an asset will be set and controlled by the issuer via smart token algorithms. Conditions may vary from the origin and destination ports to a certain time before the flight or to the number of transfers available at the time of the purchase.

An STR would also be divisible. Like the Lego bricks example, the assets you have combined can be taken apart. For example, a fellow traveler can combine their flight tickets with their hotel booking and car rentals into a single STR and then it can be put in parts and used separately. Even the round-trip ticket can be divided into separate tickets if the rules permit. Also, in another example, to change the current flight ticket to a new one still requires human involvement. An STR would be changeable in terms of itinerary details, from date or origin to your meal preferences, and also would be exchangeable with other travel assets or allow for change of ownership, which will be achieved with a more structured set of rules run on smart contracts. This makes STR

fungible. The main reason these new abilities can't be achieved today is the traceability of these operations and results throughout the whole process within the proprietary software. We will get more into how to accomplish this in the next chapters.

The death of an STR will be triggered by combinations of several conditions like expiration, usage, and clearance. As a record of the transaction, an STR simply shows the owner holding the right to a cruise ticket or a reservation of a car in a rental shop. In the future, an STR can very well be actively used to trigger a check-in to a flight or in a hotel where it can even be granted as a key to the room you are checking into. When an STR is actively used or passively expired due to its usage conditions, it will become absolute and will be terminated on the system, keeping the privacy of the traveler intact.



The Identity

An STR will be accessible through a wallet, which will be the base for all



the operations available. Besides controlling the lifecycle of the STR, a traveler's wallet will contain the proof of identity needed for the STR. Therefore, the wallet will supply the needed biometric functionality identity verification. However, once the purchase of the asset has occurred, the wallet will supply the necessary ID to be matched with the systems that need the ID verification.

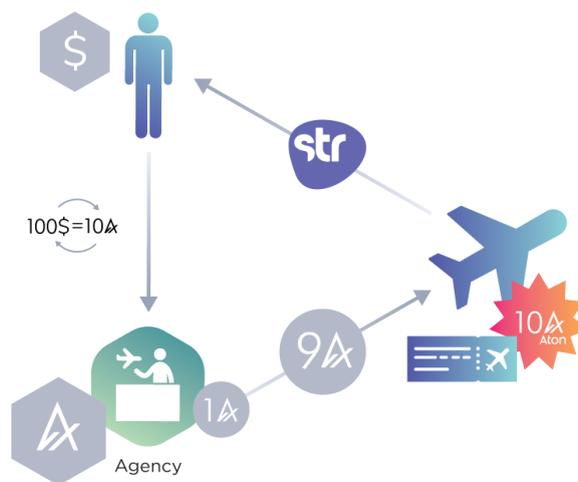
As explained in the previous chapters, "who is who" is the most vital question to the industry for properly setting out the customer journey. Identity is a big part of this equation. A controlled identity verification system would be very useful for the industry. The identity verification system will be closed to the outside world, as the entrusted information will not be shared directly with the counterparts in the network but only the verification of the identity of the wallet holder for certain operations. You, fellow traveler, will be in control of your identity and with whom to share your identity. This will give more security both to the wallet holder and to the other parties on the network, as the identity system will work on a need-to-know basis and only the proof of your ID will be shared, not the underlying information

that may contain a broad set of sensitive information.

The Value

With the help of blockchain technology, the value of the smart token holding the asset is consistent within the system. When a travel agency sells a ticket to a customer, the system will divide the money paid in terms of ticket value to the airline and service charge to the travel agency. As explained in the previous chapter, the settlement is an issue between these peers. As the token is issued from the provider and transferred to the buyer,

we will keep the record of creation and circulation. The value of the ticket can be any fiat currency or a cryptocurrency. This solves the issue of settlement on a very fundamental level. The track record of the token will



automatically present the current state of the world for all parties to see the real-time settlement.

By using blockchain, the process of settlement does not require a central authority to check and balance the accounts. It is done automatically through a series of checks and rules that run against the smart contract. A centralized authority's main function is to oversee the process, which gives the ability to solve the inconsistencies



and control the transactions. This may give the authority more power than required as a mediator. In some other cases where there is no controlling authority, the parties bring either a mediator or talk to each other directly and try to solve the settlement with old fashioned ways where they run each other's records against theirs to check for inconsistencies. We believe that STR with a well-defined consensus, using a well-defined smart contract, will solve most of the problems in the industry's settlement processes. We will discuss more on the subject in the coming chapters.

The Coin

As an STR contains the real value of the ticket in a predefined currency, however, it does not solve two big problems; the currency of the written value against the local currency's exchange and balancing the settlement. That is why we introduce the network's own currency, Aton (ATON). An STR will hold the value of both the local or desired currency, and in Aton. When a smart contract is used with Aton, this will allow the smart contract to be run properly and complete the required payments simultaneously and according to the rules.

The first use case of Aton will be in a similar fashion as the gas price in Ether⁵. In the network, every allowed node will have the right to deploy their

asset with a smart contract and that will require a transaction cost. The cost will depend on the type and complexity of the transaction. For this reason, all the institutions that are in the ecosystem will need Aton. In other words, Aton is the money that runs Further Ecosystem.

Aton will be the main driving force that Further Ecosystem will be running on. For this reason, as the number of operations in the Further Blockchain increases, we expect the demand for Aton to increase as well. At the same time, when the demand for Aton greatly increases, the transaction costs will be adjusted accordingly so that the costs will not increase too much.

The second use case is for settlement purposes; all transactions that have a value in the Further Ecosystem will both be kept in the desired currency and Aton. This will allow the system to calculate the entirety of the transactions and set the balance independent of the currency used by the issuer or the purchaser. This is important for ease of calculation and conversion to other currencies. In an example of an agency in Brazil working with other agencies around the globe, we can see the balance of all the operations in Aton and its conversion in Brazilian Reals without depending on a counterpart's particular currency or another third currency, where another conversion is necessary.

The third use case is the completion of the contract with the payment. If the

⁵

<http://ethdocs.org/en/latest/contracts-and-transactions/account-types-gas-and-transactions.html#gasprice>



issuer requires or opts for the use of Aton, it will be used for real-time payment. Since STR holds both the desired currency value and the value in Aton, the system will calculate the settlement over Aton. The value of the transferred STR will be met by the Aton, making the payment automatic. If the accounts don't have sufficient funds, the transaction will not be completed, keeping a clear real-time balance. This establishes trust between parties, where otherwise using traditional methods takes time and bureaucracy requiring a third-party involvement. Depending on the issuing and purchasing parties, they may choose to use Aton for specific types of transactions.

We will incentivize peers to do business in Aton by reducing the cost of the transaction sufficiently if Aton is the choice as the payment method. As explained in previous chapters, the cost of the money transfer on many occasions is much higher than the actual money earned from the sale itself. Aton will also help solve international money transfer by using its own network instead of traditional methods. As the adoption increases, overall transaction costs will be much lower for the airlines. The businesses will benefit from using Aton with each other in regards to the ease of money transfer. Using the same example of the Brazilian agency, which is working internationally, the whole settlement and payment process will be complete while using STR and Aton. Settlement will be done when using the asset and

transfer of it will be completed in accordance with the transfer of Atons required to the opposite direction in real time, which will complete the payment process in real time. And both they and their counterparts will not need to worry about the conversion, say, from Brazilian Reals to US Dollars to Thai Baht and all the intermediary banks and their commissions. Aton will help peers do transactions very easily at a fraction of the current cost of money transfer.

Aton will also help solve another business problem, where a big sum of money must be blocked in deposit accounts to establish trust and to be later used for transactions. The money kept in the deposit or safety accounts grows as the company makes more transactions. So, the company must compensate for the money kept there. With Aton, there is no such problem as the transactions occur instantaneously, so the buyer or the agency is as good as the balance of their current account. Some cases may require a minimum amount of Aton kept in a deposit account by some providers. Even in that case the amount of Aton kept would reduce considerably in relation to present day examples. And the reserve amount would be useful for more than one requiring peer, thus solving the problem of doing a settlement with multiple counterparts. Thanks to the real-time settlement, the amount kept can directly be in use for the live transactions if certain rules are set and met. The deposit accounts kept in the



system will be checked against its ruling via smart contracts during the transactions. This is sometimes required by the issuing peer depending on the sale location and type. Our goal is to totally eliminate the deposit accounts.

In the near future, as the adoption of cryptocurrencies increases and countries' central banks issue their currencies as cryptocurrencies, the set value for STR will shift from traditional fiat currency to a cryptocurrency. In that case, we will support other cryptocurrencies as instant payment methods. This will only be possible by establishing an inter blockchain mechanism within Further Network's Blockchain. This is a milestone further down the road.

And lastly, our long-term goal is to encourage the use of Aton within and out of the Further Ecosystem. We aim to establish Aton as the traveler's default currency and act as a traveler's check where Travel Agencies can act as small cash centers to convert to local currency. As a traveler, the money you carry will be more secure and funds can easily be transferred and used in cases of emergency. We want to achieve widespread use and value stability. Along with the needs of institutions in Further Ecosystem, we will introduce new tools to achieve this gain in coverage. As the adoption of Aton expands, another advantage it brings will be that providers are able to offer advantageous prices in such areas as airline tickets, room rentals,

and ancillary service sells like lounges, car rentals, etc.

How does it Work?

Considering the legacy systems, we will introduce many tools to control the lifecycle of an STR and Aton. Further Network's backbone will manage the lifecycle of an STR and we provide more technical details in the following chapter. The tools we plan to introduce will include the following and more depending on the market's needs:

- API infrastructure to integrate with provider's system.
 - APIs will be created specifically for:
 - Airline Management Systems (i.e., Sabre, Amadeus or proprietary)
 - Hospitality / Property Management Software
 - Channel Managers
 - Online Travel Agencies
 - APIs will essentially include:
 - Check if the buying counterpart has enough Aton to fulfill the transaction.
 - Create the STR with basic rules and data, setting the smart contract and returning the result
 - Checking the status of the STR



- A dashboard for all the nodes to check their balance and settlement if they don't use the real-time settlement.
- An STR Management App for companies with small transaction numbers.
- A special digital wallet for both the institutional and individual nodes with different capabilities to manage the Aton and the STR they have issued, purchased, or owned.
- A new online STR integrated Passenger Service System (PSS) and Hospitality Management Software (HMS) for all the asset providers, where STR is directly created on the network without extra integrations.

The STR will be triggered whenever a ticket or a reservation is created using one of the above systems. Each provider will be able to add and edit their rule set for all the actions defined for the STR, in general, or even individually. The smart contract in STR will then determine the outcome of the transactions according to the rule set defined for the actions. In many cases where the issuer and buyer (who can be an agency or a customer) are in the system, they must have Aton so that the settlement and the payment will be instantaneous. In other conditions, the system will generate a settlement report for all the parties involved, and in real time everyone will be able to see their balances. For activities like secondhand airline tickets or the exchange of STR to work, we will introduce more integrated systems

where the STR lifecycle will be deeply integrated into the issuer's own system. With each transaction or operation, the system will calculate a transaction fee, which will be deducted from the wallet.

Benefits...

As we explained some of the benefits in previous chapters, let's sum up the overall benefits in two parts.

...For Companies

- Real-time settlement and payment will reduce the waiting times and need for security deposits agencies are facing in the current system.
- In an example of a settlement between two Airlines or Travel Agencies, the settlement process is still error prone and many disputes occur since the transaction is not validated with a trustable, immutable system. Having a real-time settlement will clearly reduce the number of disputes and resolution time.
- Big companies will be more agile and have more control over their distribution systems by completing the settlement processes in real time.
- Small companies will also benefit from the quick transactions and they will be able to offer assets they haven't ever had before.
- These will also lower the operational costs as the transactions and settlements are



done autonomously, thus requiring less human involvement.

...For Individuals

- Us fellow travelers will benefit from the cost reduction in the travel industry.
- New properties like exchanging or transferring the ticket will give more control over the assets and decrease the time spent for these actions.
- An exchange market, which will be a peer-to-peer market, will emerge within the controlled limits and will offer benefits for all parties involved.
- As Aton's usability increases, it will become the go-to cryptocurrency for travelers. Instead of carrying money and worrying about the conversions and rates, travelers will first of all pay for the service they receive with Aton and Aton will be readily available as conversion currency for withdrawals from Travel Agencies. It will be easier and more secure to transfer money and get the conversion in local currency rather than carrying a bunch of bills for your travel expenses.

Further Blockchain and Development

The capabilities we would like to achieve require a certain type of blockchain system. STR and Aton will

live on the chain and it will be a secure, private network and withhold the operational load targeted within the network, considering the cryptocurrency transfers as well. Here is how we are going to accomplish this.

Further Essentials

At its core, the structure is to establish a B2B environment including interactions with the outside world. We are planning a closed, permissioned, scalable, and consortium⁶ type blockchain. To establish this, first we need to define some essentials like the nodes, consensus, validation, and contracts in the system.

Nodes vs Well-Known Nodes

It is not possible for everyone to get into the system as a proper node. We will divide all the peers in the system depending on their capabilities. Nodes' common functionality will be executing transactions. Asset issuing, rule-defining nodes will be well-known nodes. Institutions with the conditions specified by the system will be well-known nodes by authentication.

⁶

<https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/>



A Well-Defined Consensus Mechanism with Predefined Validators

In the case of an asset being sold, transferred or, in other words, for all the lifetime actions, it is absolutely necessary for the asset issuer and the intermediary counterparts to take an active role. However, a certain number of other relevant third-party counterparts will also be required to approve the integrity of the contract and provide consensus. For example, in an airline ticket sale with multiple flights, regardless of STR generation node, where the ticket is first sold, other airlines of the travel will be involved in validation of the generated STR. When all involving parties reach consensus, the system will execute the smart contract.

In a consortium type blockchain, a consensus is typically reached by a preselected set of nodes. This is a more appropriate approach for reaching consensus in the system, where only institutions are involved in such a process and end-users only trigger actions on STR.

High Performance and Scalable Environment for Smart Contracts

In a world where 3.7 billion airline tickets and 1.1 billion hotel reservations are booked annually, we can safely assume that approximately 6 billion transactions have been made in a year, assuming one-third of the transactions are grouped and the

money being transferred for those aggregates. In other words, there are 190 transactions per second on average. Of course, this load is not expected to be reached in the short term but it will be an arithmetic average of the calculation and more instantaneous processing will actually be done. Bitcoin can do 5–7 transactions per second and Ethereum can do 50–100 transactions per second. Nowadays, it has been lower because of congestion. That is why we keep to the consensus of having issuing and consuming nodes far from each other. We should be able to reach much higher transaction speeds. This will lower the transaction times, thus reducing the operational costs.

Privacy

The confidentiality of the information contained within an STR is essential. This information is only for the current owner of the STR. However, the issuing node and the related agent can also access the required information for the operation on a need-to-know basis. In the case of tickets with more than one provider, each provider should only see the relevant section. And in certain conditions the information will be purged, leaving only the necessary track info for the settlement process to be complete. This will help with GDPR compliance.

Cheaper and Faster Transactions

One of the main goals is to reduce the operational and financial costs that companies have to bear. Real-time



reconciliation, a reduction in the need for a bank transfer to a minimum, with minimum to zero amount that needs to be held in lock will result in a substantial reduction in costs. A faster transaction time is a must and it will help to lower the operational costs as well.

The Roadmap

First of all, Further Network's Ecosystem will be developed and introduced, which will include the concept of the Smart Travel Record. Further blockchain and ecosystem development will take account of the issues outlined in this document. With the Smart Travel Record, the means of system integration for providers and the user interface will be developed for agencies or other organizations that do not want to integrate with the system. In this light, we divide the development into 5 phases.

Phase 1 – Billing, Settlement, and Payment Platform

Our aim here is to solve the industry's main problems. Settlement and Payment take, in some cases, up to 45 days and have substantial cost considering the required third parties and amount of operations that need to be done. Further will first deploy a Billing, Settlement, and Payment Platform (BSP Platform) for B2B network, doing settlements and payments in real time. In this phase,

we will deploy and realize the following:

1. Full feature set of APIs connecting with legacy systems. This will be faster than renewing existing systems and establishing a base for future change.
2. Ticketing or Reservation systems of the asset issuer will connect to the network through APIs as soon as the sale is ready to be finalized.
3. We will create an STR that includes the necessary data and value of the asset in choice of currency (fiat or crypto) and also in Aton, thus fully tokenizing the ticket.
4. These transactions between counterparties will be on the chain and the settlement can be observed in real time.
5. Two scenarios apply here.
 - a. If the choice of payment is in Aton or in any crypto, which we support, we will finalize the settlement with full payment.
 - b. If not, we will only finalize the settlement depending on settlement rules.
6. We will provide tools for settlement reports and reconciliation can be done using APIs if needed.
7. We will also create Wallet Apps for individuals and businesses for



them to see and operate on their STRs and Aton.

Phase 2 – Wallet and Identity

Our aim here is to solve the industry's other problem of "really" identifying the customer. Even though airlines have almost all the necessary data required to know each customer individually, many companies still struggle to know the real customer journey. Customers can come from travel agencies, from GDS's or from direct sales and the provider has no tool for understanding if the customer is the same customer. The customer could also book a hotel from the airline's website but the only thing the airline would know is the referral it gave to the hotel booking website. The airline has no means to follow the customer's journey through these referrals going in and out. This is also a fundamental step toward Phase 3 & 4. In this phase, we will improve and implement the following:

1. Further Network's wallets will be updated with Biometric Proof of Identity.
2. No unnecessary Identity information will be shared unless the wallet owner permits it.
3. This will be deeply integrated with STRs to know the current owner of the wallet and current user of the asset. This way, we will distinguish

who bought the ticket and who is actually flying.

4. We will deploy an infrastructure for future integration with asset providers' IoT systems.
5. We will also improve API calls to include identity management and proof checks.
6. Identity information will be available depending on the functionality and the location chosen. For example, while for the moment of check-in only the ticket and passenger information will be available, for the ticket buying the issuer may require more information.

Phase 3 – Peer-to-Peer Travel Product Distribution

Our aim here is to combine the data distribution, which will lead to ticket issuing, with Billing, Settlement, and Payment processes. This will create one seamless flow for all. We will expand the Network's and Travel Agency App's capabilities. This will also set the stage for the upcoming phase. In this phase, we will expand and improve the following:

1. Further Network will carry availability data of the BSP Platform participating airlines.
2. We will expand the Travel Agency App with more capabilities to search and book.



3. We will provide a better and more capable distribution platform.
4. We plan to provide a two-way integration with other GDS's, where both availability data from our members will be shared and their data will be available through our app.
5. We also plan to provide our BSP platform for other GDS's and payment with Aton will be available to non-participating airlines.
3. We plan to build a fully customizable structure base for larger airlines.
4. The system will natively support real-time blockchain-based ticket creation.
5. Tickets created in the system will be fully customizable for the end user; STR will be deployed instantaneously as the reservation is confirmed.
6. We will integrate the necessary tools for fully customizable smart contract creation, with rule sets for the asset provider.

Phase 4 – Blockchain based Passenger Service System

Our aim here is to disrupt the industry by providing a native blockchain-based ticketing and inventory control system for airlines. We want to provide a lightweight system for small to midsize airlines. As our main focus is on non-IATA airlines, most of that market is in need of a good quality lightweight system but, most importantly, an easy connection to the outside world, which we will provide. In this phase, we will develop and implement the following:

1. We will develop an inventory management system for small to midsize airlines.
2. The system will be cloud-based, lightweight, robust and with a modular structure for extensibility.

7. Connectivity to the outside world (GDS's, Airports, etc.) will be ready for all the current major providers / third parties through their APIs.

Phase 5 – Open Network Standards and Peer-to-Peer Exchange Market

Our aim here is to bring a new approach and a breath of fresh air to the industry. This phase is where we set the stage of the network for the coming third-party applications or platforms. We will standardize the technical and contractual aspects of our network as the network will be open for every travel application that wants to create and operate on STR. Also, we will open a peer-to-peer exchange market where the airline ticket or a whole travel package is actually an intangible asset and, within



rules, the ownership can be changed like any asset. Any STR which falls in line with the rules set by the issuer will be exchangeable on our peer-to-peer marketplace. In this phase, we will implement and deploy the following:

1. Exchange Market for STR search and transfer within the wallet.
2. We will publish exchange marketplace APIs for external systems.
3. Developing and publishing Open Network Standard and Tools for Further Network will be in this phase.
4. We will help develop a Property Management System for Hotels and incentivize other third-party applications that would run on the network.
5. We will also publish our APIs for other system integrations.

Business Model

In this expanding ecosystem, Further Network will require a certain number of fees to continue the development and maintain the system. We can quickly summarize the types and costs of the fees below:

- Reservation and Ticketing will require a certain fee per transaction.

- For each action defined in the STR model, there will be a fee per transaction.
- Billing, Settlement, Payment fees.
- For peer-to-peer exchange of STR defined by the rules.
- There will be no additional cost per distribution and clearance.

The Network will calculate the fees depending on the type and info of the transaction. But, overall, the fees calculated will be very low in relation to the current world markets.

Conclusion

We believe blockchain has paved the road for a new version of the Internet and doing business. Many different models are emerging in many different fields and are becoming increasingly popular.

In the coming years, many kinds of institutional business models will change with the influence of blockchain. We anticipate that individuals will become more powerful in B2B domains where the trust machine is evolving from intermediary parties to the system itself. It would not be a stretch to guess that many mediators will change shape or disappear altogether. This also applies to the travel and tourism industry. It is a foreseeable diversification of the agencies in the tourism sector and maybe the individuals will provide services acting as a small agency. If



the risk of payment and the costs of operation are removed, it is likely to turn into a more personalized service. These kind of shifts from the current models will cultivate different, not yet imagined, changes throughout the world.

We also foresee that a different kind of thinking will be needed to conceive a better, distributed future where blockchain and cryptocurrencies are running the trust machine. This is where Further Network will be, in the front seat guiding the change with the technology.