Block Hotel

Hotels Decentralized

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Introduction

The following paper has been prepared to describe in detail the Block Hotel concept and how this could be implemented on the EOS Blockchain. This paper will cover the core features that will be provided by Block Hotel and how they are enhanced by deployment onto the EOS blockchain. This paper will look at aspects such as t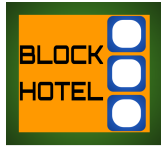ransaction types, latency and volume that would be supported by on-chain activities as well as a review of some of the business considerations of the deployment.

What is Block Hotel?

Block Hotel is a decentralized platform built on EOS that enables hotels to convert their room inventory into Non Fungible Tokens (NFTs). These NFTs are configurable, composable and openly tradeable. This allows for the creation of on-chain rule bound travel stays, creation of bespoke travel packages, the use of travel stays in DeFi and receipt of transfer royalties by hotels, a revenue stream that is not available to today.

The goal of Block Hotel is to create a system where travelers can be afforded a variety of exciting new booking options as well as use of a brand new DeFi primitives. With Hotels being afforded new ways to maximize their revenue, whilst simultaneously reducing their financial operating risks.
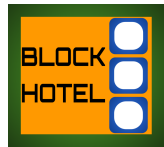
The Challenge

Today travelers face the growing problem of rising travel costs and increasingly inflexible travel options. Even with digital technology providing a plethora of high speed solutions, for the cash strapped traveler, booking a non-refundable excursion can prove disastrous in the face of sudden changes. Added to this travel insurance reimbursement times are inordinately long[1]. On the service provider front the situation is more grim, hotels are facing increasingly smarter digital travelers that book, hog and cancel at the last minute forcing the hotels to dispose of late breaking inventory at discounted prices. To combat this, hotels have resorted to pricing inflexible offerings at cheaper price points than flexible ones, as well as relying heavily on Online Travel Agencies to dispose of unsold inventory, consequently resulting from losses in terms of commissions and price drops. Along with the increasing incidence of travel impacting events such as pandemics and war it makes for serious challenges to the hotel industry specifically.

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[1] https://www.financial-ombudsman.org.uk/consumers/complaints-can-help/insurance/travel-insurance, accessed 29/10/2022

The Block Hotel Solution

Block Hotel offers a solution that enables hotels and travelers to exit the above quandary by utilizing blockchain technology to intermediate concerns enabling both travelers and hotels to minimize their risks in the face of sudden changes. The solution also creates the basis of a new kind of DeFi primitive. This primitive can be leveraged by travelers to enable them to flexible ways of balancing their travel plans against their regular day to day activities and by hotels to provide a greater level of operational stability in the face of challenging times. The Figure (**Figure - Block Hotel - RBI NFT Lifecycle**) below describes the lifecycle of a typical Room Booking Inventory NFT (RBI NFT).
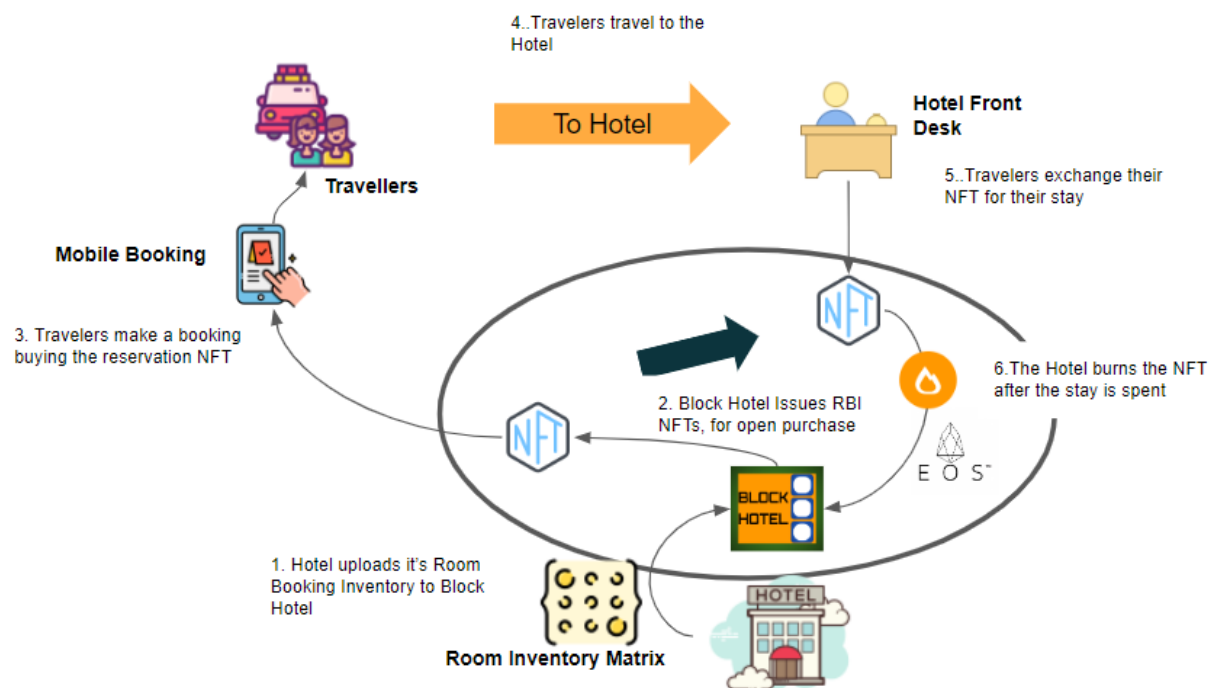
Figure - Block Hotel - RBI NFT Lifecycle

Inventory as NFTs

Block Hotel works by converting the inventory of a hotel i.e. the Room Booking Inventory (RB! i.e. room space + occupancy dates) of a hotel into Non Fungible Tokens (NFTs). These RBI NFTs represent the various inventory configurations that a Hotel might allow such as, amenities, partner discounts etc. Block Hotel enables the Hotel to issue these configurations to various sales channels such as Travel Warehouses, Online Travel Agents (OTAs) and even direct to travelers through marketplaces and the hotel's own dApp or Website. This is illustrated in the Figure (**Figure - Block Hotel - Inventory as RBI NFTs**) below.

Figure - Block Hotel - Inventory as RBI NFTs

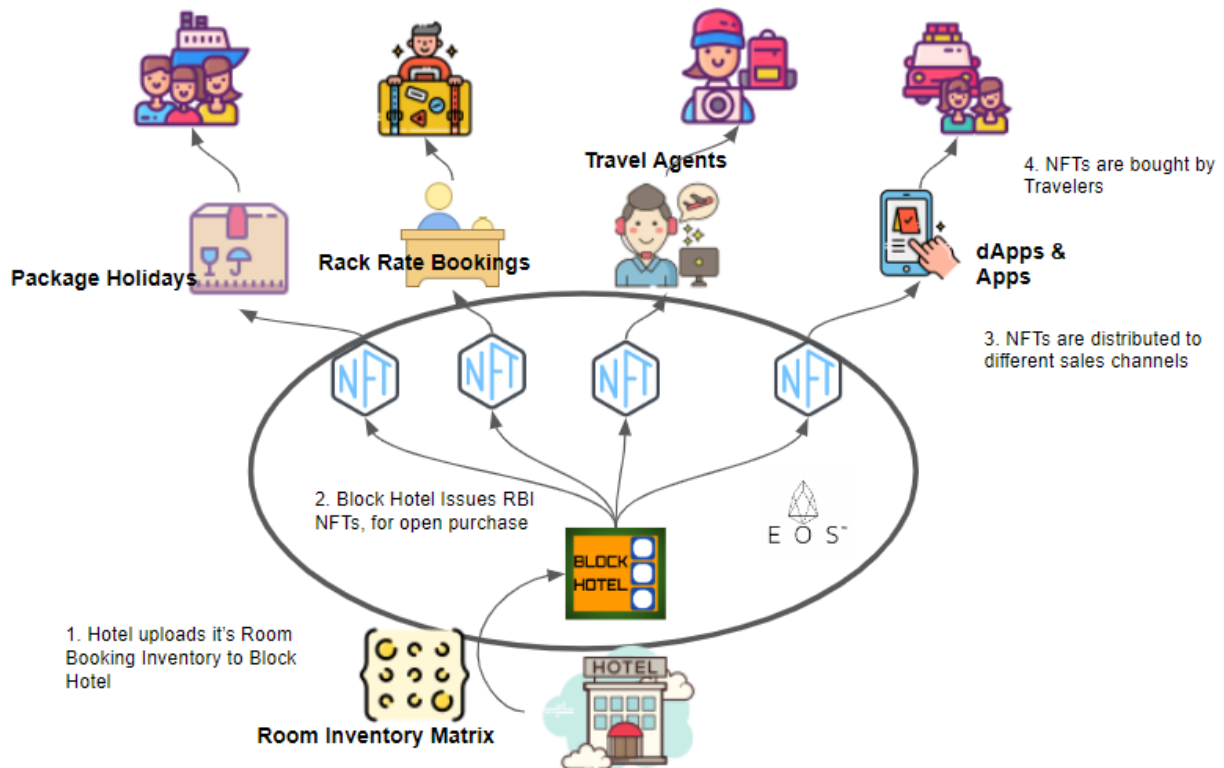## Royalties on Inventory

Once issued the inventory configuration of each RBI NFT becomes permanently immutable. As this NFT is passed down the value chain to the end consumer each transaction is designed to incur a nominal royalty fee that is sent directly back to the issuing hotel augmenting the early revenue received from first sale.

Traveler flexibility

Once purchased by the traveler, the RBI NFT and its stay configuration are owned by the traveler and are freely tradeable on the open market. Thus in the face of a plan change the traveler and/or intermediary will be able to simply resell their NFT on any travel market place or venue either at profit or at loss. This is illustrated in the Figure (**Figure - Block Hotel - Traveller Flexibility**) below. To combat brand damage associated with discount sales the RBI NFT can be equipped with an internal price limit that is enforced by the implementing EOS Smart Contract.
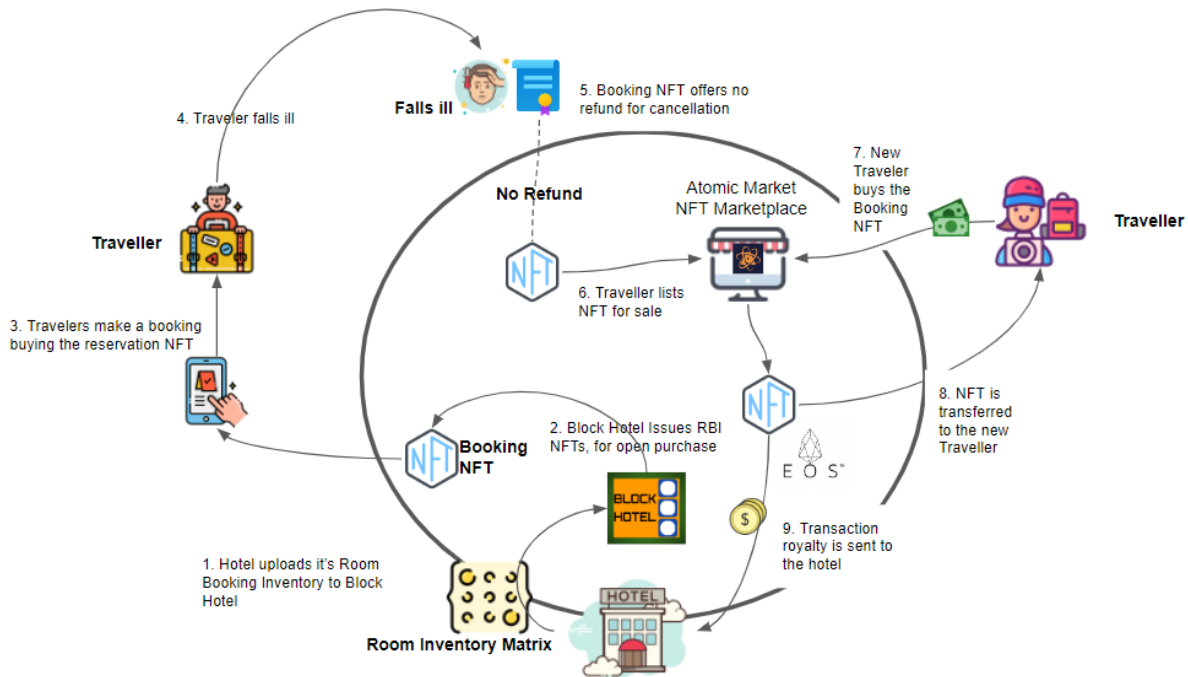
Figure - Block Hotel - Traveller Flexibility

Traveler DeFi

Further opportunities that are opened up by this approach to hotel inventory are that travelers can now collateralise their vacations, using DeFi. DeFi enables the traveler to buy their stays earlier when prices are cheaper and then borrow against their purchased RBI NFT. At a predetermined liquidation date closer to the time of travel, the traveler can repay their DeFi loan (which will still be far cheaper than rebooking) and execute on their travel plans. This is not possible today. This flow is illustrated in the Figure (**Figure - Block Hotel - Traveller DeFi**) below
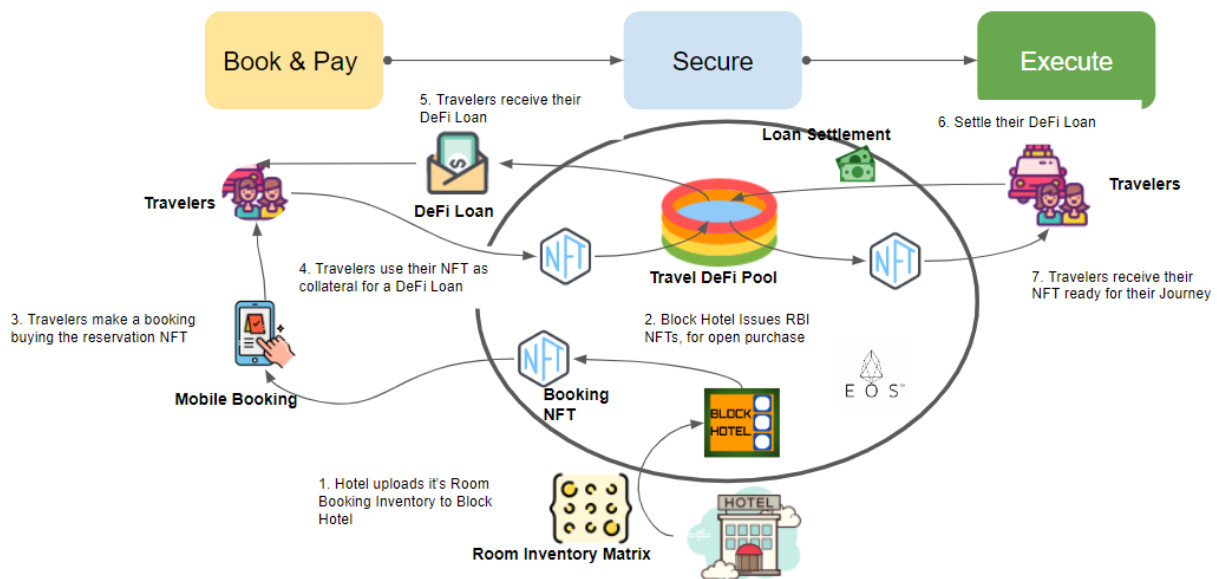
Figure - Block Hotel - Traveller DeFi

Hotel DeFi

For Hotels, Block Hotel marks a new financial primitive that they can leverage to finance operations. This is achieved by collateralising against future inventories allowing hotels to borrow directly against future room revenues using the open market. This would be implemented by Hotels issuing Future RBI NFTs to special DeFi pools on EOS, whereby the fRBI NFT would be tied to a real RBI NFT. Where the hotel settles its obligations it simply pays into the pool and withdraws the fRBI NFTs to be burnt. Where the hotel defaults on its obligation all the revenue from the real RBI NFT would be channeled into the pool until the obligation is settled whereupon the fRBI NFT is slashed and burned.
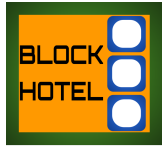
How it's built

The Block Hotel platform requires industrial grade blockchain services to operate hence the EOS blockchain has been selected for use. To give context to support the entire hotel industry c the chosen blockchain has to be able to support at least 4.7 billion first booking transactions and then an additional 20% (950 million transactions) for cancellations along with another approximately 10% (470 million transactions) for supply chain activities. In total approximately 6.2 billion transactions annually.

The Block Hotel platform also requires decentralized ID services which would be provided by integration with the Omni One protocol on the EOS chain. Data Storage for NFTs would be achieved using Decentralised Storage powered by IPFS. The solution would be held together by smart contracts on the EOS blockchain.The diagram below describes the architecture
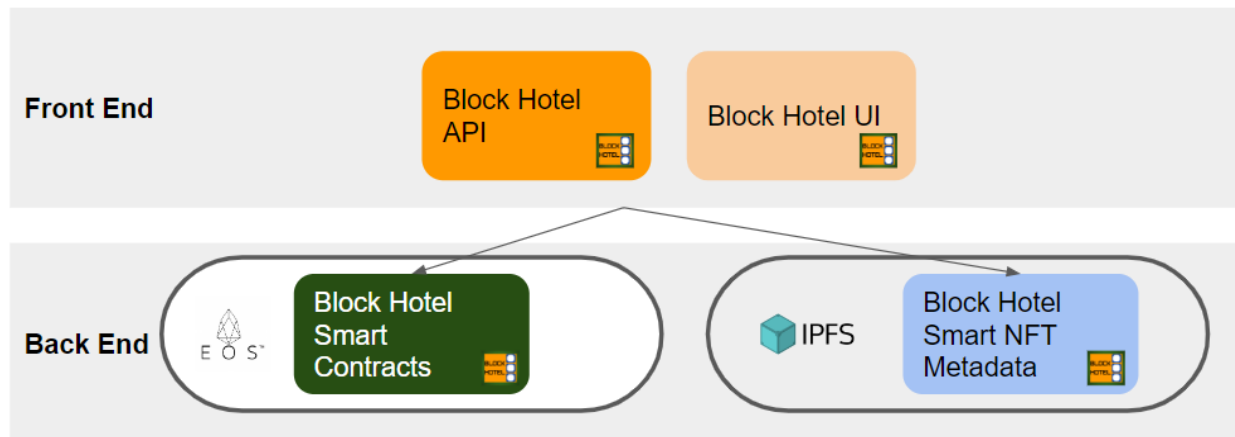
Figure - Block Hotel High Level Architecture
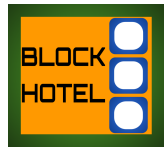
Smart Contract Architecture

The Figure (**Figure - Block Hotel - Smart Contract Architecture**) below represents the highlevel smart contract factory for Block Hotel.
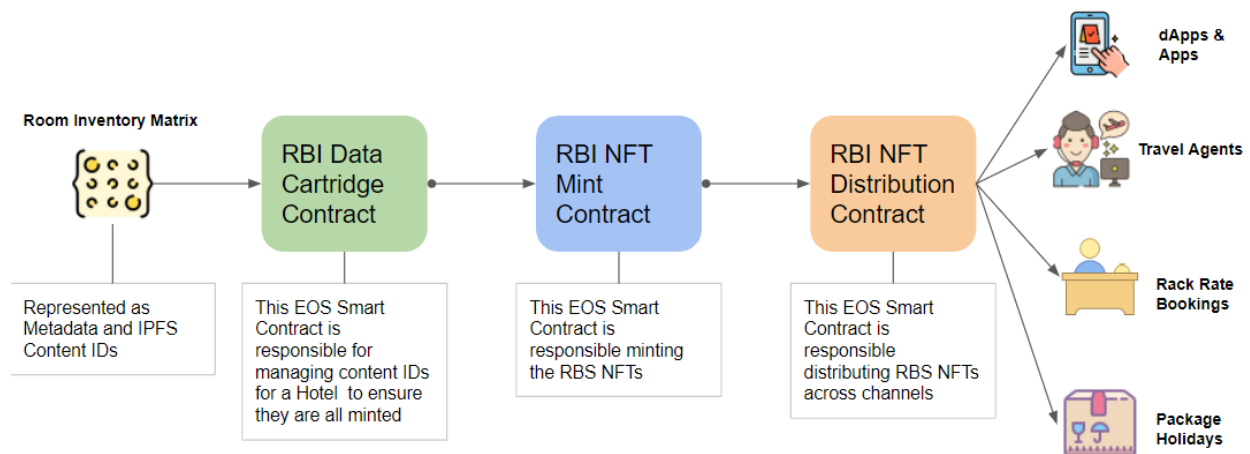
Figure - Block Hotel - Smart Contract Architecture
The smart contract configuration for Block Hotel has been primarily broken up to manage the scale of the operation. The Cartridge Model has been used as the amount of data that will be provided by hotels is likely to be massive even with only content IDs being forwarded from IPFS. Added to which onchain error tracking and management tools will be needed for each stage of processing.

The Mint Contract is viewed as a bulk minter capable of minting a large number of RBI NFTs in one session.

The RBI NFT Distribution contract has been separated out as each RBI NFT is likely to have different distribution rules specific to its typical channel and market. Hence the complexity needs to be separated out so as to simplify operational issue handling.
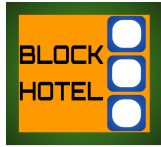
Why Now

For the travel industry the incidence of industry impacting events has grown phenomenally in present times, from September 11th closing the skies to the Icelandic ash cloud and more recently the COVID pandemic. This has led to travel venues being exposed to previously unheard of risks to their operation. To balance this risk for a typical hotel there is a strong need to acquire guaranteed revenue to sustain operation. The typical approach to this being to offer discounted early purchase contracts that include highly restrictive covenants for distributors and travelers.

For travelers as the onset of the "Cost of Living" crisis creates an even greater squeeze on traveler pockets, Block Hotel represents a natural and necessary change in the way hotels need to do business.

Market Size

The UK accommodation industry is worth over £16.4 billion[2] at an average occupancy rate of 70%[3], this represents a missed revenue opportunity of approximately £6.8 billion, in the United Kingdom alone. In the US the market size is US$171.1 billion at an average occupancy rate of 57.6% which represents a missed market opportunity of approximately USD$125.9 billion. These two markets represent a sizable market opportunity that would bring significant stability to the blockchain and cryptocurrency ecosystem.

The global accommodation market is forecast to reach $1.9 trillion in 2034. The market was valued at $632.8 billion on 2021[4].

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[2] https://www.ibisworld.com/united-kingdom/market-size/hotels/, accessed 29/10/2022
[3] https://www.statista.com/statistics/473271/occupancy-rate-hotels-uk/, accessed 29/10/2022
[4] https://www.alliedmarketresearch.com/travel-accommodation-market, accessed 29/10/2022
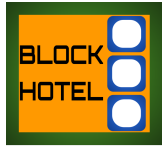
Competition

The primary competition for this solution are integrated hotel management systems. The table below describes the advantages and disadvantages of each platform against Block Hotel:

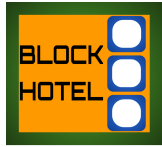| Platform	Advantage	Disadvantage	Block Hotel Unique Feature
Site Minder	All in One	Direct reservation management	Fire and forget inventory management
Alice	All in One	Direct reservation management	Fire and forget inventory management
RMS Property Management	All in One	Direct reservation management	Fire and forget inventory management
Little Hotelier	All in One	Direct reservation management	Fire and forget inventory management
Elina	All in One	Direct reservation management	Fire and forget inventory management
Clock PMS	All in One	Direct reservation management	Fire and forget inventory management
Smoobu	All in One	Direct reservation management	Fire and forget inventory management
Maestro	All in One	Direct reservation management	Fire and forget inventory management
Hostaway	All in One	Direct reservation management	Fire and forget inventory management
Guesty	All in One	Direct reservation management	Fire and forget inventory management

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As can be seen from the table above the hotel industry is served extensively by All in One systems that merge both reservations and stay delivery (e.g. room cleaning etc). Block Hotel represents a significant shift away from the above model as it enables hotels to release their inventory with operation compatible configurations and rely on travelers to self manage their reservations.

Block Hotels Rooms

The first product we will offer is called **Block Hotel Rooms**. This service will enable Hotels to mint, distribute and monitor NFTs once they are in the wild. This pilot service will aim to help hotels understand exactly how travelers respond to their reservations as NFTs and the new flexibility that is offered to them with respect to their travel plans.

The objective of this product will also be to test the scalability of the EOS blockchain when dealing with a wide variety of transaction types.
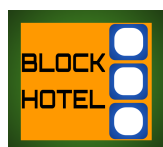
Business Model

The Block Hotel business model is to support the issuance and sale of RBI NFTs. The business will operate by establishing relationships and deals with hotels and hotel chains, as well as establishing partnerships with NFT market places within the EOS ecosystem.

The business will acquire revenue through the transactions that happen through the contracts on the platform. This is represented by:
- **Minting Revenue** - hotels will be charged a nominal fee to mint on the platform
- **Transfer Revenue** - along side transaction royalties we will look to receive a nominal fee for the service
- **DeFi Revenue** - we will look to receive additional fees for providing DeFi services
- **Partnership Revenue** - we will be looking to establish new types of partnership that build on our unique technology and enhance partner operations leading to revenue share

Team

Tony Ushe is the Founder and creator of Block Hotel. Tony began his career in technology with Lastminute.com going on to serve with accommodation giant GTA Travel now a part of the Hotel Beds Group, and Expedia now a part of the Liberty Group. Tony has also served with the likes of Royal Bank of Scotland and Lloyds Banking Group as well as time at Heathrow Airport, giving him a well rounded understanding of Hotels, finance and travel industries.
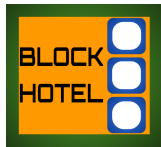
Financials

The estimated net revenue for Block Hotel for a pilot running for 1 year on a base of 67 hotels with 300 rooms each and an average occupancy of 70% is approximately $12,7 million. This on a total cost base for the period of $1.3 million.

The detailed profit and loss statement is in the table (**Table - Block Hotel - Year 1 Financials**) below:

P&L													
Revenue	$95,094	$132,088	$234,991	$381,439	$560,379	$772,601	$1,019,050	$1,300,856	$1,619,356	$1,976,130	$2,373,033	$2,812,239	$13,277,257
Costs of Goods Sold													
Payment processing	$2,853	$3,963	$7,050	$11,443	$16,811	$23,178	$30,572	$39,026	$48,581	$59,284	$71,191	$84,367	$398,318
Hosting & bandwidth	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$6,000
Support	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$11,500	$138,000
Total Costs of Goods Sold	$14,853	$15,963	$19,050	$23,443	$28,811	$35,178	$42,572	$51,026	$60,581	$71,284	$83,191	$96,367	$542,318
Gross Profit	$80,241	$116,126	$215,941	$357,996	$531,568	$737,423	$976,479	$1,249,830	$1,558,776	$1,904,846	$2,289,842	$2,715,872	$12,734,939
Gross Profit margin		87.92%	91.89%	93.85%	94.86%	95.45%	95.82%	96.08%	96.26%	96.39%	96.49%	96.57%	95.92%
Sales & Marketing	$19,500	$23,000	$26,500	$30,000	$33,500	$37,000	$40,500	$44,000	$47,500	$51,000	$54,500	$58,000	$465,000
% of revenues		17.41%	11.28%	7.86%	5.98%	4.79%	3.97%	3.38%	2.93%	2.58%	2.30%	2.06%	3.50%
Research & Development	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$10,583	$127,000
% of revenues		8.01%	4.50%	2.77%	1.89%	1.37%	1.04%	0.81%	0.65%	0.54%	0.45%	0.38%	0.96%
General & Adminstrative	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$15,583	$187,000
% of revenues		11.80%	6.63%	4.09%	2.78%	2.02%	1.53%	1.20%	0.96%	0.79%	0.66%	0.55%	1.41%
EBIT	$34,574	$66,959	$163,275	$301,829	$471,901	$674,256	$909,812	$1,179,664	$1,485,109	$1,827,679	$2,209,175	$2,631,705	$11,955,939
EBIT margin		50.69%	69.48%	79.13%	84.21%	87.27%	89.28%	90.68%	91.71%	92.49%	93.10%	93.58%	90.05%
Sanity checks & other interesting metrics													

Headcount	10	10	10	10	10	10	10	10	10	10	10	10
Customer acquisition costs for trackable customers		$17,250	$9,826	$8,775	$8,077	$7,576	$7,196	$6,898	$6,655	$6,453	$6,281	$6,133
Blended customer acquisition costs for all customers		$11,471	$7,640	$6,884	$6,346	$5,934	$5,601	$5,319	$5,071	$4,848	$4,642	$4,449
New signups per pre-sales support agent	3	6	7	9	10	12	14	15	17	19	21	23
Paying customers per support agent	1	1	3	4	6	8	10	13	16	19	22	26
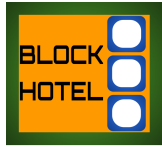
Table - Block Hotel - Year 1 Financials

Appendix

Technical Considerations

The following are the technical considerations that would need to be deliberated:

Operations

The primary considerations for operations would be the following:
- EOS latency at scale - the view is that Block Hotel would aim to secure 1 or 2 major hotel chains as partners each with thousands of rooms, for a duration of 12 months. Hence the latency that is incurred when the blockchain is being used heavily as an operational system needs to be considered
- Error management - error handling options available on EOS would have to be considered as users are known to find outlier cases and unlike with Web2 redeployment of code that may have tokens flowing through it is a non-trivial task.
- Blockchain monitoring Tools - Apart from standard EOS monitoring tools being employed additional tools specific to Block Hotel will need to be developed.

Finance

The following are some of the technical financial considerations that need to be borne in mind for the Block Hotel implementation:
- EOS staking requirements will need to be considered with respect to onboarding hotels and determining their service consumption costs.
- Additionally the fiat onramp/offramp support for EOS for travelers and hotels will need to be considered as this may necessitate the establishment of banking relationships in operational jurisdictions.

Tech

The following are some of the technology considerations that need to be borne in mind for the Block hotel implementation:
- Provision of APIs to interact with the EOS blockchain will need to be considered for those hotels and partners that opt not to integrate directly with the blockchain
- Security on the EOS blockchain is a big consideration as the targeted volume of transactions and capital even at the pilot is significant.
- Scalability testing to meet the transaction throughput anticipated in the first year will need to be done extensively on the EOS testnet