ATLENDIS PROTOCOL V2

WHITE PAPER

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Introduction

Lending protocols such as Compound, Aave, and Maker have created a solid foundation for the lending market in DeFi. Such protocols represent a significant advancement for DeFi due to the importance of these operations to an economy. They allow cryptocurrency holders to earn interest rates on their assets in a permissionless manner, but almost exclusively through highly collateralized borrowing. Agents can only borrow an amount provided they can front at least the same amount as collateral. Therefore, the extent to which DeFi lending protocols facilitate true borrowing where an agent gets into a position of net debt is limited, creating a gap with traditional finance offerings.

The Atlendis protocol is here to help fill this gap by offering under-collateralized borrowing to real-world companies, also making alternative financing possible. On the lender side, Atlendis offers all crypto assets holders the opportunity to diversify their exposure and access higher yields than on existing over-collateralized lending protocols.

This document presents Atlendis V2, the second version of the Atlendis protocol. Through its lending pools, Atlendis V2 offers several credit instruments. This whitepaper focuses on Atlendis' revolving credit line product. More information on Atlendis' other credit instruments can be provided upon request.

Atlendis protocol V2 will be deployed on the Polygon blockchain.

Contents

This whitepaper describes the functioning of the V2 of the Atlendis protocol as allowed by the deployed smart contracts. The availability of all the functionalities described in this document is subject to further developments of the dApp, some of which are still ongoing at the time of writing.

Section 1

Revolving Credit Lines

Contents

1.1 Defining Revolving Credit Lines on Atlendis

To satisfy entities with regular and short term liquidity needs, the Atlendis protocol offers revolving credit lines. Atlendis' revolving credit lines slightly differ from traditional revolving credit lines. They can be likened to successive bullet loans and are enabled through the creation of lending pools tailored to individual borrowers.

The borrower has the flexibility to access their line of credit and borrow funds from their pool at any given point, subject to a predetermined maximum borrowing limit. Every time the borrower uses their credit line, this initializes a new borrow cycle with a set end date defined as the **maturity date**. The borrowed amount plus interest must be repaid at maturity. If the full borrow capacity has not been used and the loan has not yet matured, the borrower has the ability to further borrow from their liquidity pool. However, it does not change the initial maturity date. Once the principal and interest have been repaid at maturity, the borrower is able to initiate a new borrow cycle. In a way, Atlendis' **revolving credit lines lending pool** enables successive bullet loans with the same **maturity**.

Example 1.1.1 *Let's consider a borrower that has access to a revolving credit line on Atlendis with one month maturity and* $10,000$ *maximum borrowable amount. On January 1st, the borrower borrows* $5,000$ *from their revolving credit line at a* 4% *interest rate. This initiates a borrow cycle that will end on February 1st. On January 15th, the borrower borrows an additionnal* $2,500$ *at a* 5% *interest rate and finally* $1,000$ *on January 30th at a* 7% *interest rate. On February 1st, the borrower must repay*

$$5,000 * (1 + 4\%/365)^(30/365) + 2,500 * (1 + 5\%/365)^(15/365) + 1,000 * (1 + 7\%/365)^(2/365)$$

1.2 Atlendis' Lending Pools

Atlendis' revolving credit lines are enabled by the creation of ***lending pools*** *that are tailored to individual borrowers.*

1.2.1 Set of Ticks - Order Book

To enable the borrowing **rate discovery**, Atlendis sets up a discriminatory auction process via the creation of sub-pools called **ticks**. A tick is a sub-pool of funds within the borrower's pool that corresponds to a specific lending rate. Lending

pools are composed of multiple ticks. When adding liquidity to the pool, **lenders** choose their lending rate and their funds are then placed into the corresponding tick.

Example 1.2.1 *If a lender is willing to lend to a borrower at* 5%*, their funds will be placed in the* 5% *tick.*

Here is a visual representation of a lending pool with ticks on Atlendis:

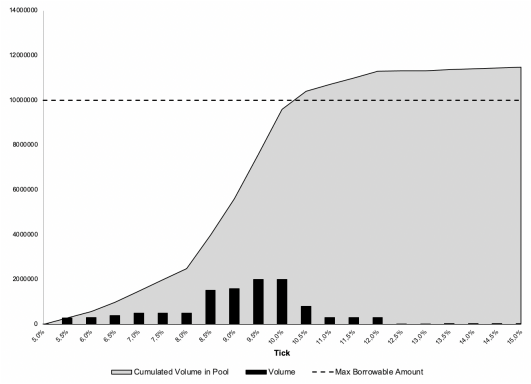

Figure 1.1: Borrower's Pool and Composing Ticks

As lenders have the possibility to set their own lending rate, they are able to choose the amount of risk they are willing to take for the level of potential return.

1.2.2 Transposing Ticks to an Order Book

The lending pool's ticks can be transposed to a limit order book. We define the actualization factor as the amount that the lender would be willing to lend now to receive 1 at maturity. The actualizaton factor is derived from the position's tick rate and maturity, or the time remaining until maturity if the loan is ongoing.

Example 1.2.2 *A lender who deposits in the* 5% *tick wishes to make a return of* 5% *on their loan. They are thus willing to lend* 100 *to receive* 105 *in one year. If they were to replace someone else halfway through maturity who had a borrowed position, they would be willing to replace their position for*

$$\frac{\textit{position value at maturity}}{(1+5\%)\hat{}(1/2)}$$

where $1/(1+5\%)\hat{}(1/2)$ *is the actualization factor.*

Let's consider a borrower's lending pool with maturity T, let $r_1, \cdots, r_n$ be the ticks' rates and $d_t^1, \cdots d_t^n$ the amount of deposit available in each tick at time t. We can derive the following bid order book:

Side	Rate	Deposit Available	Actualization Factor
bid	r_1^t	d_1^t	F_1^t
bid	$\vdots$	$\vdots$	$\vdots$
$\vdots$	r_i^t	d_i^t	F_i^t
$\vdots$	$\vdots$	$\vdots$	$\vdots$
bid	r_n^t	d_n^t	F_n^t

where:

- $F_i^t = 1/(1+r_i^t)^{\Delta T}$ is the actualization factor, and $\Delta T = T - t$ is the time remaining until maturity.

- $0 \leq r_1^t \leq r_i^t \leq r_n^t$,
- $F_1^t \geq F_i^t \geq F_n^t \geq 0$,
- and $d_i^t \geq 0 \; \forall$ i in $[0, n]$.

Having a limit order book where lenders set their rate enables both the loan origination and lenders' exits. The exit mechanisms will be further described in the section (1.4.5).

Pool Specificities

Each lending pool is customized based on the borrower's specific requirements and preferences. The pool's parameters are the following:

- Assets in the pool: each pool is composed of only one asset type, for instance USDC.
- Maturity.
- Max borrowable amount: it corresponds to the maximum amount that the borrower can withdraw from their pool.
- Tick range and rate spacing: the lending rates, that can be chosen by lenders when depositing into the pool, must remain within a preset range. The upper and lower bounds are fixed in accordance with the borrower. The rate spacing between two ticks is also a characteristic of the lending pool. A low rate spacing gives more flexibility to the lenders, but increases the amount of gas costs paid by the borrower when borrowing from their pool.
- Repayment period duration (see section Repayment 1.3.2).
- Late repayment fee: in the event of late repayment, a penalty fee will be paid by the borrower to discourage late repayment. This is detailed in a dedicated section below (see section Late Repayment 1.3.3).
- Roll over period duration: optional period pre-maturity that prevents lenders from withdrawing liquidity from the pool during that specific period (see section Rolling Over 1.3.4).
- Fees parameters (see section Protocol Fees 1.5).

The choice of these parameters influences the lenders' behavior with the pool. The pools are opened with their own characteristics and they are clearly stated to encourage participation in the pool. Note that pools are not limited in size.

1.3 Borrower Side

1.3.1 Borrowing

Fixed Borrowing Rate

The borrowing rate is simply the lowest volume-weighed rate that corresponds to the amount borrowed. It is derived from the ticks and is the result of the amount available in each tick. The borrowing rate does not change during the life period of the loan.

Let T be the maturity, K the amount initially borrowed, d_i the amount available in the tick i, d_i^b the amount borrowed in the tick i, the borrowing rate r_b is the following:

$$r_b = \frac{1}{K} \min_{d_b^i} \sum r_i \times d_i^b$$

such that:

$$\begin{cases} 0 \leq d_i^b \leq d_i \\ \sum d_i^b = K \end{cases}$$

The borrower must repay $K \times (1 + r_b)^T$ at maturity, each tick receives $d_i^b * (1 + r_i)^T$. The position status and amount that should be received at maturity can be deducted from the position's tick and amount deposited.

Example 1.3.1 *Let's consider a borrower with a revolving credit line that has a one year maturity. A lender that deposits in the* 5% *tick wishes to make a return of* 5% *on their investment. By depositing* 100 *into the* 5% *tick of a lending pool, the lender is expecting to receive* 105 *in one year if all their deposit ends up being borrowed. Let's say a borrower borrows 100 from the* 5% *tick and 100 from the* 6% *tick, the borrowing rate is* 5.5%*. At maturity, lenders in the* 5% *tick receive 105 and lenders in the* 6% *tick receive 106.*

Further Borrowing

If the full borrow capacity has not been used and the loan has not yet matured, the borrower has the ability to further borrow from their liquidity pool. However, it does not change the initial maturity date.

1.3.2 Repayment

The repayment must happen during a time period (defined as the **repayment period**) preceding the maturity date.

1.3.3 Late Repayment

If the borrower misses their repayment period, a penalty fee will be applied that corresponds to the interest accrued past the maturity date at a mark-up interest rate defined as the late repayment rate.

1.3.4 Rolling Over

As a new borrow cycle can be initiated in the same block as repayment, the borrower has the ability to roll over their loans. However, there is no guarantee that the conditions will remain the same for the two successive loans. The borrowing rate will most probably be different and the amount available to be borrowed might differ depending on market conditions.

In order to guarantee the amount that can be rolled over and the borrowing rate, a specific feature can be activated at the borrower's request. It introduces a short **roll over period** pre-maturity that prevents lenders from withdrawing liquidity from the pool during that specific period. Even though rolling over will be made possible for all pools, that specific feature will be pool dependent.

1.4 Lender Side

1.4.1 Deposit

At any point in time, lenders can freely deposit into the lending pool of their choice at their chosen lending rate, as long as it remains within the pool's tick range. In exchange, they will receive an NFT with some original artwork that represents their **position**: pool's identifier, amount deposited, chosen lending rate. Atlendis' position NFTs are non-transferable.

The funds in lenders' positions can become borrowed on three occasions:

- The borrower initiates a new borrow cycle.
- The borrower further borrows from their pool.
- A lender with borrowed funds wants to exit the pool (see 1.4.5).

It's important to note that pools are not limited in size, therefore, even if the amount in the pool is higher than the maximum borrowable amount, any lender can add liquidity to the lending pool and challenge the lending rates. This creates market dynamics and gives access to a fair market rate discovery for borrowers and exiting lenders.

1.4.2 Withdraw

As long as their position is not borrowed, lenders can either totally or partially withdraw funds in their positions. For partially borrowed positions, the lender can withdraw the totality of the unborrowed funds.

Lender APY following Withdraw

Lenders that have had some funds borrowed (either through the borrower borrowing or other lenders exiting) and that don't exit before maturity, realize an APY that corresponds exactly to their chosen lending rate during the time that

their position was borrowed. It is important to note that interest are **compound interest** between two borrow cycles, this means that Atlendis' lenders earn interest on their realized interest.

Example 1.4.1 *Let's say a lender deposits* 100 *in the* 5% *tick of a lending pool with one month maturity. If the borrower borrows from their pool for a 6 month period without any interruption and the lender's position has been borrowed every time. The lender's position after 6 months equals* $100 * (1 + 5\%/12)^6 = 102.53$ *which corresponds to a* 5% *APY.*

1.4.3 Rate Update

As long as their position is not borrowed, lenders can freely change their lending rate. Their position will be updated accordingly.

1.4.4 Opt Out

A lender with a borrowed position who doesn't want to exit their position in the current market conditions but would rather wait for the loan to mature, can choose to signal their position as exiting. Their position will remain unchanged until maturity. However, if a new borrow cycle is initiated before the withdrawal of deposited funds, their funds won't be used, preventing them from being involved in a new loan. This ensures predictability in the withdrawn amount. The lenders can withdraw their initial deposit plus the interest earned on Atlendis that corresponds to their set rate, and the interest earned on the third-party yield provider. The lenders are not subject to the current market conditions. Opting out is only permitted on borrowed positions and is irreversible.

1.4.5 Exit

When exiting a position with loaned out capital, the exiting lender enables lenders with non-borrowed positions to replace them as lenders. There is no position transfer, the exiting lender's position is burnt and the replacing lender's positions are updated accordingly. The amount received by the exiting lender depends on the market conditions, hence the order book.

Let's consider a lender A that deposited at a rate r_A, is expecting to receive q_A at maturity and wishes to exit their position at time t. Let's consider that the current state of the limit order book on Atlendis is:

Side	Rate	Deposit Available	Actualization Factor
bid	r_1^t	d_1^t	F_1^t
bid	$\vdots$	$\vdots$	$\vdots$
$\vdots$	r_i^t	d_i^t	F_i^t
$\vdots$	$\vdots$	$\vdots$	$\vdots$
bid	r_n^t	d_n^t	F_n^t

where:

$$\begin{cases} F_i^t = 1/(1+r_i^t)^{\Delta T} \text{ is the actualization factor, and } \Delta T \text{ is the time remaining until maturity.} \\ 0 \leq r_1^t \leq r_i^t \leq r_n^t, \\ F_1^t \geq F_i^t \geq F_n^t \geq 0, \\ \text{and } d_i^t \geq 0 \; \forall i \in [0, n]. \end{cases}$$

By exiting their position, they will receive:

$$\sum_i F_i^t * q_{i,A} \tag{1.1}$$

where $q_A^1, \cdots, q_A^i, \cdots$ correspond to

$$\text{argmax}_{q_{i,A}} \sum F_i^t * q_{i,A}$$

such that

$$\begin{cases} 0 \leq q_{i,A} \leq d_i^t / F_t^i \\ \text{and } \sum q_{i,A} = q_A \end{cases}$$

In the case where there is not enough liquidity to exit the position, the lender can decide to either partially exit their position or wait for better market conditions. Note that opted out positions cannot be exited. The position's holder shall wait for the loan termination and is free to withdraw after repayment.

Lender APY following Exit

If lenders exit their position before maturity, their realized APY can slightly differ from their chosen lending rate, as their APR on the last borrow cycle will depend on market conditions. Indeed, for an exiting lender to be able to realize their desired APY, they must have their position replaced by remaining lenders that asked for the same tick rates. If a lender exits at a lower rate than the position's tick rate, they will realize a higher APY than the position tick rate. However, if there is no liquidity at the same rate or lower, then they will have to give up part of their yield to make up for the desired rate of the remaining lenders. The lowest PnL that can be achieved for the lender who set a rate r, and was expecting to receive q at maturity after being borrowed at time t_1 and exists at time t_2 is the following:

To illustrate this, we will consider a simple example and four different scenarios.

Example 1.4.2 *Let's consider the following:*

- *Alice deposits 100 at rate of* 6%.
- *The borrower borrows 100 at* 6% *for a maturity of one year. The borrower must thus repay 106 at maturity.*
- *Half through the time to maturity, Alice wants to exit.*

and four different example scenarios.

Scenario 1

There is not enough liquidity left in the pool, Alice cannot exit.

Scenario 2

- *After the loan started, Bob had deposited at* 6% .
- *Bob's position doesn't have any borrowed funds. Given the fact that Bob wants to lend at* 6%*, that there is still half a year left until maturity and that the borrower will repay 106 at maturity, in order to realize the* 6% *on the remaining time to maturity, he is willing to lend* $106/(1+6\%)^(1/2) = 102.95$ *where* $(1/2)$ *corresponds to the time left until maturity.*
- *Alice receives* 102.95 *minus an exit cost taken by Atlendis (for simplification purposes here, we'll assume it's zero). Her PnL is* $(102.95 - 100) = 2.95$*, her realized APY is* 6%.
- *At maturity Bob receives 106, his PnL is* $(106 - 102.95) = 3.05$*, his realized APY is* 6%.

Scenario 3

- *After the loan started, Bob had deposited at* 5% .
- *Bob's position doesn't have any borrowed funds. Given the fact that Bob wants to lend at* 5%*, that there is still half a year left until maturity and that the borrower will repay 106 at maturity, in order to realize the* 5% *on the remaining time to maturity, he is willing to lend* $106/(1+5\%)^(1/2) = 103.45$ *where* $(1/2)$ *corresponds to the time left until maturity.*
- *Alice receives 103.45 minus an exit cost taken by Atlendis (for simplification purposes here, we'll assume it's zero). Her PnL is* $(103.45 - 100) = 3.45$*, her realized APY is* 6.8%.
- *At maturity Bob receives 106, his PnL is* $(106 - 103.45)$*, his realized APY is* 5%.

Scenario 4

- *After the loan started, Bob had deposited at* 7%.

- *Bob's position doesn't have any borrowed funds. Given the fact that Bob wants to lend at* 7%*, that there is still half a year left until maturity and that the borrower will repay 106 at maturity, in order to realize the* 7% *on the remaining time to maturity, he is willing to lend* $106/(1+7\%)^(1/2) = 102.47$ *where* $(1/2)$ *corresponds to the time left until maturity.*
- *Alice receives 102.47 minus an exit cost taken by Atlendis (for simplification purposes here, we'll assume it's zero). Her PnL is* $(102.47 - 100) = 2.47$*, her realized APY is* 4.9%*.*
- *At maturity Bob receives 106, his PnL is* $(106 - 102.47) = 3.53$*, his realized APY is* 7%*.*

Summary

Bob's Deposit Rate	Alice PnL	Bob PnL	Alice APY	Bob APY
6% = Alice's rate	2.95	3.05	6%	6%
$5\% \leq$ Alice's rate	3.45	2.55	6.8%	5%
$7\% \geq$ Alice's rate	2.47	3.53	4.9%	7%

Adjustment

When an exit occurs, computations of the replacement positions' value at repayment are based on the theoretical original loan amount, which could slightly disadvantage replacing lenders as they would not realize interest on the already accrued interest. To ensure that the replacing lenders receive their desired annual percentage yield (APY), exiting lenders must compensate for this difference.

Example 1.4.3 *Coming back to example 1.4.2, scenario 2, to make sure Bob realizes a PnL of*

$$100 \times (1 + 6\%) - 100 \times (1 + 6\%)^(1/2)$$

and not

$$100 \times (1 + 6\%)^(1/2) - 100,$$

Alice is required to compensate the unaccrued interest when exiting, enabling Bob to realize his desired APY at maturity. The difference here represents 0.087*. Hence Alice receives* $102.95 - 0.087 = 102.86$ *when exiting and Bob receives* 106 *at maturity.*

Hence recalling the exiting amount formula 1.1, the amount received at exit time is actually the following:

$$\sum_i F_i^t * q_{i,A} - \sum_i [(q_{i,A} - q_{i,A} * F_i^t) - (q_{i,A} * F_i^t - q_{i,A} * F_i^0)]$$

where $q_{1,A}, \cdots, q_{i,A}, \cdots$ correspond to

$$\text{argmax}_{q_{i,A}} \sum F_i^t * q_{i,A}$$

such that

$$\begin{cases} 0 \leq q_{i,A} \leq d_i^t / F_t^i \\ \text{and } \sum q_{i,A} = q_A \end{cases}$$

1.4.6 Matching Engine

Along with the tick's rate, Atlendis' matching engine that connects lenders and borrowers includes a concept of time periods known as epochs. An epoch corresponds to a period of time between two borrowing (or further borrowing) actions. Any deposits before an initial borrow correspond to the same epoch. Any deposits past the initial borrow date correspond to a new epoch. The same applies to further borrow actions. When matching the borrower (or accommodating exiting lenders) and lenders, lenders are matched firstly according to their tick's rate (the lower first), and secondly according to their deposit's epoch (the early depositors first). Within the same tick, lenders are matched in a priority order that corresponds to their epoch, meaning that depositors in the tick's oldest epochs are matched first. All epochs are merged at repayment time.

Example 1.4.4 *Let's consider a borrower with a revolving credit line pool with a* $2,000$ *borrow capacity. Let's say Alice deposited* $1,000$ *in the* 5% *tick and the borrower borrowed* 500 *from their pool. Let's say Bob deposited in the* 5% *tick past the initial borrow. Alice and Bob's deposits are not part of the same epoch, as Bob's deposit came after the initial borrow date. If the borrower further borrows an additional* 500*, only Alice's deposit will be used. However, if the borrower borrows* 750*, both deposits will be used (an additional* 500 *of Alice's deposit and* 250 *of Bob's deposit). Once the borrower repays, both deposits are now part of the same epoch, meaning that if the borrower borrows again, Alice and Bob will be matched proportionally to the amount they provided to the tick's epoch vs. the rest. Note that if Bob had deposited in the* 4% *tick, his deposit would have been prioritized over Alice's deposit, as it would have been placed at a more favorable rate than Alice's.*

1.5 Protocol Fees

There are four types of fees on Atlendis that go to Atlendis' treasury.

1.5.1 Borrowing Fee

At borrow time, a fee defined as the borrowing fee is applied to the borrower. This corresponds to a fixed percentage applied on the amount borrowed. The current borrowing fee on Atlendis corresponds to a 1% annualized rate.

Example 1.5.1 *A borrower that borrows* 100 *for 1 year, only receives* 99 *at borrow time, the* 1% *is sent to Atlendis' treasury.*

1.5.2 Interest Fee

At repay time, an interest fee is applied to interest earned by lenders. The current interest fee rate corresponds to 10% meaning that a 10% cut is applied to interest earned by lenders. Interest fees go to Atlendis' treasury.

Example 1.5.2 *A lender, who lent* 100 *at a* 6% *for one year, receives* 105.4 *at maturity.*

1.5.3 Withdrawal Fee

At withdraw time, a fee is applied to the withdrawn amount. The current withdrawal fee on Atlendis corresponds to $15bp$. Withdrawal fees go to Atlendis' treasury.

1.5.4 Exit Fee

An exit fee is applied to exiting positions. It corresponds to a $\%$ applied on the position value. It increases closer to maturity to discourage exiting right before maturity.

Let t be the time elasped since the beginning of the loan cycle and T be the pool's maturity, the current exit fee rate is the following:

$$\begin{cases} 0.25\% + \frac{(0.75\% - 0.25\%)}{0.9} * t/T \text{ if } t/T \leq 0.9 \\ 0.75\% + \frac{(20\% - 0.75\%)}{0.1} * (t/T - 0.9) \text{ if } t/T > 0.9 \end{cases} \tag{1.2}$$

with

- initial fee 0.25%.
- first cliff duration 0.9.
- final fee end first cliff 0.75%.
- final fee end second cliff 10%.

Parameters are subject to evolution. Exit fees have the possibility to be redistributed to the remaining lenders via the reward module.

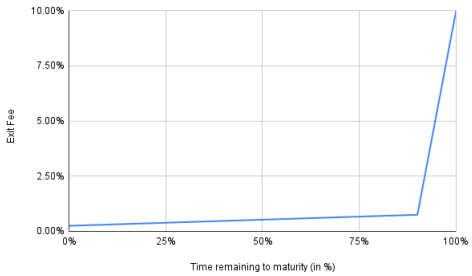

Figure 1.2: Exit Fee Visualisation

1.6 Computations Approximation

To limit gas usage, power functions are approximated using a 1st Order Taylor Series. For instance, when computing actualization factors and repayment amount, we use the following approximation:

$$(1+r)^{\Delta T} = 1 + \Delta T * r$$

where r is the rate per second and ΔT is the number of seconds until maturity.

In the event of any conflict between the information reflected in the Atlendis' smart contracts or embedded in the NFT and the detailed calculation provided here, the Atlendis' smart contracts takes precedence.

Appendix A

Atlendis Governance

The Atlendis protocol being a technology layer to facilitate under-collateralized lending, it relies heavily on governance to organize the lifecycle of the pool. In that regard, governance has important privileges in the protocol. For these reasons, what the governance address can and can't do should be understood by users.

Governance actions can be separated into four categories:

- Maintain protocol : deploy new products factories, upgrade contracts etc
- Pool day to day operations : deploy pools, allow and disallow users addresses (borrowers, lenders, fees operator)
- Manage Pool parameters : change pool parameters (for example update maximum borrowable amount, update minimum deposit amount)
- Handle Pools non standard resolution paths : start and execute non standard repayment procedure (early repay, partial default, default - see Appendix B), and start and execute rescue procedure

Note that the non standard resolution paths are the only instances in which governance might have access to users funds, mainly to recover them in case of unforeseen issues. For that reason, these operations are behind timelocks, which means that there will have to be a fixed amount of time between the starting of the procedures and their execution, leaving the time for users that don't agree with the procedures to manage their positions accordingly.

For all the reasons described above, governance addresses management is very sensitive and will be handled with great attention by the Atlendis Labs team.

Appendix B

Non-Standard Repayment Procedure

In special circumstances, for instance an event of default under the Master Loan Agreement, the governance has the ability to place a lending pool into a non-standard repayment procedure. Only the governance has this capacity. The borrower and the lender no longer interact with the lending pool itself, but with a non-standard repayment module instead. The lending pool ceases to exist after that. The non-standard repayment module enables the following actions.

B.1 Borrowing Side

The borrower can perform four actions:

Borrower Action	When	Repaid Amount	Uncovered Amount
Default	before or after the maturity date	none	yes
Partial Default	before or after the maturity date	partial	no
Repay	after the maturity date	full	no
Early Repay	before the maturity date	full - interests accrued up to early repayment date	no

B.2 Governance

The governance can declare the pool as defaulted. This can be done past maturity date in the absence of repayment or pre-maturity after the opening of insolvency proceedings against the borrower, for instance, as defined in the Master Loan Agreement.

B.3 Lending Side

Lenders with borrowed positions can send their position to the nonstandard repayment module. In exchange, they will receive their portion of the repaid amount (if existing) and if required an NFT displaying the amount of "bad debt" that corresponds to the uncovered amount (amount due - partially repaid amount). The NFT is not transferable. One of the specificities of the nonstandard repayment module is the withdrawal mechanisms to enable a different withdrawal method tailored to the situation.

Appendix C

Legal Framework

by Bruno Pousset [1], Atlendis Labs

C.1 Terms of Use

In order to be able to use the Atlendis protocol, all users (both borrowers and lenders) must agree to the terms of use of the Atlendis protocol.

The terms of use define who is legally permitted to use the services provided by the platform and how these services can and cannot be used. For example, it is prohibited to use the Atlendis protocol in order to pay for, support, or otherwise engage in any illegal activities including, but not limited to, fraud, illegal gambling, money laundering, or terrorist activities.

The terms of use also include a code of conduct for borrowers that prohibit them from, among other things, engaging in abusive lending practices (fraudulent, manipulative, or deceptive) in order to execute transactions that otherwise would be prohibited.

These terms of use are thus meant to reduce the risk of malicious use of the Atlendis protocol by borrowers and the credit risk associated with it.

C.2 Master Loan Agreement

Peer-to-peer loans of digital assets through the Atlendis smart contract are subject to a Master Loan Agreement between the lender and the borrower.

The Master Loan Agreement shall comply with the standards of the Atlendis protocol specified in the terms of use of the platform.

In case of an event of default by the borrower under the Master Loan Agreement, the lender shall be entitled to all legal recourses provided for by the law applicable to this agreement.

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Glossary

compound interest compound interest (or compounding interest) is the interest on a deposit calculated based on both the initial principal and the accumulated interest from previous periods. 7

lender lender on the Atlendis protocol who deposits funds into the borrower's pools, also referred as LPs or lenders. 4

lending pool each borrower has access to a dedicated lending pool. There are several types of lending pools on Atlendis, that correspond to different credit instrument. 3

maturity loan duration. 3

maturity date the date by which the loan must be repaid. 3

position result of a deposit action initiated by a lender, representing the liquidity provided to a specific pool. It can consist of borrowed and/or unborrowed funds. The positions are represented by a non-transferable NFT. 6

rate discovery process to determine the borrowing rate on Atlendis. 3

repayment period time period preceding the maturity date during which repayment must take place . 6

revolving credit lines lending pool Atlendis' revolving credit lines are materialized by the creation of lending pools. 3

roll over period short period pre-maturity that prevents lenders from withdrawing, opting out, exiting and updating their rate. That period only exists for pools with that feature activated.. 6

ticks sub-pools of funds within the borrower's pool that correspond to a specific lending rate. 3