



WHITEPAPER

July 20, 2019

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THE dREALMS VISION

Imagine a vast collection of different gaming spaces where a variety of game characters and assets can work together regardless of what game or publisher they come from. Easy to use, professional tools allow almost anyone to create digital assets with unique properties and blockchain-empowered true ownership—and these items are designed to work together in a wide variety of ways. Game makers can build new games around existing digital assets as well as those not yet created. Asset creators can author new types of game assets to play into existing games, or just to exist as cool items that someone may one day build games around. Players can take their digital character from game to game, bringing their favorite vehicles, weapons, and spells with them. World builders can create unique gaming “realms” with their own physical and gaming rules determining what types of assets can enter and whether their powers get any limitations or normalization equalizing play, or if it’s “anything goes.” Everyone can have true ownership of their assets meaning they can buy, sell, rent, and add value to them through play.

dRealms will realize this vision by providing the tools to allow users to create their own interoperable, cross-game, multi-chain tokenized digital assets and games that use them, and to sell them into a marketplace that only grows larger and more valuable and fun with each new creation. Modders who previously created skins, mods, and items for single games will take their creativity to dRealms where their creations can exist in a broader and more exciting gaming universe. These creators will also enjoy more rewards from their authorship, earning not only the initial sale price of the assets, but ongoing micropayment “royalties” from all future sales as well. Gamers will enjoy a never before seen wealth of digital assets that can work together, become part of each other, and behave in ways previously unimagined. The power of masses of user-generated content will turn dRealms into a lush ecosystem of items to use in games. Even the concepts of what we would consider a game or game asset will be radically redefined as new types of interactions and ownable tokenized objects proliferate and remix one another.

THE PROBLEM WITH DIGITAL GAME OWNERSHIP

Today, digital assets that are part of games are the sole property of the game publishers, even when gamers have paid money to “purchase” them. These items exist only on the game publisher’s computer systems; the publisher alone tracks who owns what and how many; there’s typically no way to sell items to other players; and if the publisher decides to shut down the game—or often even just release a major upgrade—the items disappear forever. And certainly, the “purchasers” cannot take those assets and play with them within another publisher’s game. This is an illusion of ownership. A sleight of hand that allows purchasers to believe they have bought something, when in fact they paid good money to temporarily borrow it, but just until the real owner decides they want it back...and, by the way, they can’t take it out of the yard.

None of these problems exist when a person buys an actual toy or physical game. A toy such as an action figure cannot be made to disappear because the manufacturer changed its policy or had lax security at their factory. A person is free to play with action figures from many different brands or properties without first obtaining a license. The owner of an action figure can sometimes even pull the head off of one figure and replace it with the leg of another—if this is the owner’s desire. And if an action figure has gained additional value due to its rarity or special traits, its owner can freely sell it to another person. When a person owns a toy, they can do with it what they like, free from any control. This is true ownership, which means the ability to control and sell an asset, but also to use it however and wherever the owner chooses.

Contrasting the type of pretend asset “ownership” that digital gamers pay billions of dollars a year for with the true ownership of physical toys calls the problems of digital game ownership into stark relief. Every digital asset that any gamer has ever purchased from a major game publisher up to this point in time will eventually be discarded with no chance to recoup the money spent, nor to preserve cherished or potentially valuable assets that are rare or have received additional traits or powers through extended play and game progress. Gamers tend to be highly attuned to the inherent economies built into games—this is a core trait of many gamers—so they are

very aware that they are paying to purchase assets that they never really own and that lose their value faster than a brand new car about to drive off the dealer's lot.

Gamers must accept this untenable state of affairs because game publishers have a lock on how anything and everything works within their game's world. Games are programmed through their own rules and items in one cannot transfer to another. Each game publisher has controlled a self-contained gaming world where they have had to laboriously build each item based on that game's specific definitions and where nothing can pierce the veil of the game's closed world. Assets from one game could not exist in another because their programming is so different that the very definition of an asset is different in each game. Crossover is utterly impossible. Every game is an island in a world where there are no boats.

Gamers have resigned themselves to this reality. However, gamers are keenly aware of eventual loss of all the money they pay into this system and it reduces their willingness to purchase assets that will have no hope of resale or extended use. When calculating the problems of digital game ownership, therefore, we must include not only the lack of control of the purchaser, but also the extra work publishers must perform to build siloed game worlds, and the reduced spending interest of gamers. Publishers to date have happily accepted their godlike control over items in their game, but are less excited about the reduced spending on digital items by gamers who see through the purchase ruse. All parties could benefit from a system of true ownership and asset interoperability, but they are mired in their vision of the current model, fear over loosening control of their games, and a lack of imagination for how to achieve the interactive digital playground seen in science fiction gaming universes. This is a pity because if game assets could trade freely, be used in multiple games, and leverage the power of user-generated content, a massive new economy would emerge.

THE PATH TO DISRUPTION

The way to achieve the vision for gaming's interoperable asset future is to devise a standard set of rules and tools that game creators can use to allow games and items to work together. It would be as if every game were programmed with the exact same system for defining, processing, and using items. Other aspects of the game's

programming might be radically different, but the digital asset systems would be identical, so that an object in one game could have the possibility of existing in another game using the same computer code definitions. In essence, creating a standard system of tracking the in-game definitions of what any given asset is and how it works, would technically allow different games to use the same assets. However, this only addresses part of the problem.

Even if different games could technically understand the standardized definitions of game assets, they still need to be accounted for somewhere. In today's games, this accounting is also built into each game and handled internally. For a disruptive system to exist, the tracking of ownership and sales must be recorded somewhere outside of each game, yet accessible to and agreed upon by all of them. This method of recording ownership must also not be under the control of any one entity, or else that entity will have the ability to change these records. The party that controlled the method of accounting could make any changes they desired and would therefore be the true owner of every asset. A system that can record an accounting of ownership with shared consensus from many parties without being under the control of any one of them is called a distributed ledger or blockchain.

To create this form of disruption, then, requires first a common standard about how items behave and are defined within each game so that different games can all understand the definition of a given object. The second requirement is that the ownership records of these assets—as well as records of important actions that change the value of an asset such as leveling up or receiving damage—must be stored on a decentralized public blockchain that is under no one party's control. A third requirement is functions that allow owners to sell their assets to others, ideally also with a full marketplace connecting buyers and sellers. A set of easy-to-use asset creation tools to allow many creators to contribute would be optional but highly desirable. dRealms combines these four components to create a gaming universe driven by true ownership, cross-game assets, and the creativity of millions of creators.

THE FOUR COMPONENTS OF dREALMS

dRealms consists of four core components:

- A standard set of definitions about how assets are defined within any game
- A decentralized blockchain where item ownership and important traits are recorded
- A marketplace and transfer functions to allow sales
- A set of creator tools to empower game and asset creation

THE dREALMS TOKENIZED GAME ASSET STANDARD

The dRealms token standard is a standardized definition of game asset properties that allows multiple games to understand the definitions of each other's game assets. This standard encompasses both non-fungible tokens typically thought of as ownable assets, and fungible tokens such as in-game currencies.

The dRealms standard envisions many levels of control between creators and owners. It also defines assets that can have different states of being. At the moment, most blockchain-based digital assets are non-fungible tokens (NFTs) that are essentially immortal and will continue to persist as long as the contract or blockchain exists. However, there are many possible modalities of existence for game assets. It is perfectly appropriate for a game asset to have true ownership, and yet also be consumed by usage. This would be a "consumable" asset which is one of the models of asset defined within the dRealms token standard. This broader set of definitions within the dRealms standard enables more possibilities for designers and gamers.

THE dREALMS MULTI-BLOCKCHAIN LEDGER

dRealms asset ownership must be recorded on a decentralized public blockchain, but they do not all have to be recorded on the same blockchain. dRealms will deploy on multiple blockchains and be agnostic about which dRealms blockchain any particular asset resides

upon. It will leverage the power of EOSIO-based third-generation blockchains due to their speed, high capacity, fee-less transactions, and active and ongoing platform development. dRealms will initially record ownership of items on both of the leading EOSIO-based public blockchains, EOS and Telos, and allow games and realms to read and interact with tokens from either blockchain within the same game experience. Additional blockchains may be incorporated into dRealms in the future.

THE dREALMS MARKETPLACE

To enjoy the benefits of true ownership, gamers need a marketplace to buy, sell, rent, and discover items. The dRealms Marketplace will be a marketplace that removes counterparty risk or the need for escrow from transactions. It enables discovery of items for sale or rent and provides all information that potential buyers may wish as recorded on the blockchain. dRealms items will also be tradeable from in-wallet exchanges and decentralized exchanges due to functions incorporated within the standard. These transfer functions are intended to interoperate with other EOSIO-based digital asset token standards through maintaining commonalities to transfer functions across standards wherever possible. Every sale will pay the current owner of the item, but also pay a small royalty to the original creators so that they can receive ongoing benefits as their work appreciates, and to the dRealms platform itself to fund ongoing development and expansion. The dRealms asset creator tools allow creators to program these fees into the tokens and control their percentages at the time of asset creation.

THE dREALMS ASSET CREATOR'S TOOLS

A rich set of easy-to-use tools for asset creators will empower creation limited only by imagination.

dRealms Asset Factory

A fill-in-the-blanks modular asset creation tool that allows creators to set the properties of an asset, connect them to graphics, 3D models, animations, skins, sounds, or other properties, and then turn out new assets imbued with all of the cross-game, multi-chain power of the dRealms standard. Turnkey creation of tokens with a wide variety of features and properties allows most users to quickly create digital assets of great variety.

dRealms ATI

The dRealms ATI (application token interface) is a common set of rules that defines and describes the properties included in any given dRealms digital asset. This is much like the better-known API (application program interface) used throughout computing to allow programs to interact with one another efficiently. The dRealms ATI does the same thing with digital assets (tokens).

Crucially, this is a *descriptive* model meaning that creators will have virtually unfettered abilities to make any type of digital assets they choose. The ATI is a JSON file automatically generated by the dRealms Asset Factory or SDKs upon creation which then defines the parts of the asset and describes their properties and links to components stored on IPFS decentralized storage. These components can include graphics files, 3D models, animation data, player data, sound effects, music, or any other type of digital file associated with an asset. Digital assets are not constrained to fit into certain parameters; that would be a *prescriptive* model of interoperability. A prescriptive model dictates the only ways that assets can interact, but limits creator choice. dRealms will use the descriptive model to maximize freedom of creation even at the expense of some areas of standardization. The ability to work outside previously dictated standards allows dRealms items to evolve new, creator built standards over time.

dRealms SDKs

The dRealms Asset Factory will be powerful enough for the majority of digital assets creation. However, dRealms does not impose any upper limit on functionality within the standard. For those creators who wish to build more enhanced, ground-breaking assets, or who build games, dRealms will provide SDKs (software development kits) for major development platforms, starting with Unity. An SDK for the Unreal game engine and other game development environments will follow. However, the Unity SDK alone will allow creation by a very large population of game creators.

The SDKs will provide creators the ability to author games that can read and interact with assets based on the dRealms standard. These will also be ease-of-use functions that creators can create to best remove the friction that typical gamers previously experienced when trying blockchain games.

dRealms Program Plug-ins

There are a number of software tools that are commonly used by asset creators. These include 2D and 3D programs such as Photoshop and Blender. dRealms will provide plug-ins to help users easily create standard-compliant elements which are already prepared for use in the dRealms Asset Factory or SDKs.

dRealms Gamified Tutorials and Documentation

To facilitate asset and game creation, dRealms will provide fun, gamified tutorial series that walk creators through the dRealms asset creation process. Anyone can earn unique digital asset tokens in the process of learning how to create these assets and games. dRealms will also maintain thorough technical documentation for those who prefer this form of learning.

IMPLEMENTING dREALMS

The dRealms token standard and the ATIs created from it form the core functionality of the dRealms gaming universe and are central to its implementation. A deeper understanding of these can be gleaned from the technical documentation, but for the purposes of this paper, it is useful to examine its core components. It is defined by a series of data tables and contract actions which define how programs can interact with digital asset tokens. The dRealms token standard was authored by GoodBlock engineer S. Craig Branscom.

FEATURES OF THE dREALMS STANDARD

Several features of the dRealms token standard enhance its usefulness to gamers and game creators. One key differentiator between the dRealms standard and other standards for tokenized game assets is that the dRealms standard is game asset-specific and designed by a team of highly experienced game designers and blockchain builders as an outcome of the real-world problems of creating an actual game and marketplace.

Design Driven by Real Game Development

The team behind dRealms has decades of experience creating games for major brands and game publishers. This same team led the launch of the Telos blockchain

and conceived of and built many of its important technical innovations. The dRealms standard, itself, evolved out of the game-making process of an innovative blockchain game, Drakos Keep. Creating the standard as a result of building a real game leads to a more mature result than the approach of first authoring a standard and then trying to make games from it. There is essentially an additional development and testing cycle built into the process of creating the dRealms standard compared to what goes into other standards. The dRealms standard is an expression of the needs discovered in the actual process of creating games, not the anticipated needs, untested by real game design. Many of the unique features of the dRealms standards grew out of deep explorations of real-world game-making problems.

Lightweight and Scalable

The dRealms standard aims to be lightweight in how it handles system RAM. In EOSIO blockchains, RAM is a system resource that must be purchased and is non-renewable. Therefore, judicious management of RAM requirements is an important design element. The dRealms standard uses lean contract tables and avoids contract actions unrelated to gaming assets. As a result, dRealms assets can be expected to require much less RAM than similar tokens based on other standards. This is particularly important where multiple games may store their own data on a game asset, multiplying the RAM requirements. (The dRealms standard is the first to address this type of usage.)

Game and Asset Stats Sharing and Licensing

As multiple games may use a given tokenized game asset, it is highly beneficial to give games the opportunity to store their own additional data along with the token. dRealms assets may be used across many games without them needing to ever store their own data on the token. However, allowing games the opportunity store on-token data enhances the possibilities for game design.

Original token creators control whether or not other games may store information within the asset's token. This is called "licensing" and is generally analogous to more traditional IP licensing used in game development. Licensing may be completely *open*, meaning any game may store additional game data on the token, *disabled*, meaning no game may store data, or *permissioned*, meaning that only game makers who have made licensing

arrangements with the creators will be allowed to store data. The creators of dRealms believe, from their many years of working with top IP licensors, that this type of control will be necessary to bring such licensors into the dRealms gaming universe.

Fungible and Non-fungible Tokens

dRealms supports non-fungible tokens as well as fungible tokens. Fungible tokens may commonly be used as in-game currencies. Non-fungible tokens (NFTs) are rare or unique items that are not interchangeable, such as "tangible" game assets like weapons, vehicles, characters, or skins. These NFTs can be *immortal* (standard NFTs), but also *consumable* or *retireable*.

A consumable token is one that has a limited number of uses before it ceases to exist. This could be a magical potion that is consumed with use or a powerful weapon that can only be used a limited number of times.

Retireable digital assets can also be removed or deleted by their creators under certain conditions, such as tokens that are designed to exist only for a limited amount of time. Special assets that only exist during a specific campaign, or only for a limited time after purchase, or that must be transferred from one user to another or else disappear are all examples of retireable assets. A limited-time pass (essentially a license) to use a specific game or realm is another example of a retireable token. No doubt, the use cases for such tokens will expand as the dRealms gaming universe evolves, expanding the possibilities for innovative game design.

Purchasers will always be able to easily see which assets are retireable or consumable and the status of the consumption (number of days or uses remaining, etc.) so that marketplace discovery is fair.

Assets may be *transferrable* (any item that can be sold or rented) or *nontransferable*, such as an award that remains with a particular account.

These various traits can be combined in a variety of ways to fit the needs of game designers. For example, the pass or license to access a certain realm or game could be stored as a retireable NFT that is either transferrable—allowing a user to resell this pass to another if they grow tired of the game or if the passes rise in value—or non-transferrable similar to most current game licenses. The creators will determine these traits based on their creative and commercial intentions.

dREALMS STANDARD ACTIONS

Each dRealms standard token must be deployed as a contract on an account on the blockchain where it resides. A contract may define multiple tokens and token types within a single contract. There is no reason to deploy contracts on more than one blockchain because the dRealms system will manage reading from multiple chains and allowing digital assets to interact within games and realms. dRealms standard actions are discussed in overview below. Detailed information about the dRealms standard contract actions can be found in the [dRealms Developer Guide](#) in the dRealms repository on Github.

Contract Setup Actions

When the dRealms contract is deployed on a blockchain, it needs to be configured with some basic information such as the name of that blockchain's system token and the minimum and maximum amounts of time that a license may be issued for all tokens/digital assets deployed from this contract. This is handled by the `setconfig()` action.

Non-fungible Token Actions

Several actions exist to manage non-fungible tokens throughout their life cycles. These actions include creating, issuing, transferring, consuming, retiring NFTs as well as updating the checksum of a given NFT. (Respectively, `createnft()`, `issuenft()`, `transfernft()`, `consumenft()`, `retirenft()`, and `newchecksum()`.)

License Actions

A number of dRealms standard actions manage the licensing of tokens. (In this context, licensing refers to allowing other games to store game data on the asset's token. It may be used as part of traditional IP licensing or without it.) This includes setting the model of a particular token for licensing—disabled, open, or permissioned—via the `setlicmodel()` action. The model may be changed by the creator after creation.

Issuing or eliminating licenses is handled via the `newlicense()` and `eraselicense()` actions, respectively. In creating this model, it is presumed that the licensor retains the ultimate control over the license and can eliminate a license without the approval of a given licensee. The system must be designed either in this way or else by giving priority to licensees to not have their

licenses removed without their permission. Based on practical experience working with many licensors of AAA-level brands, the dRealms creators have opted for the former method because it is the only one that such brands will support. In practice, large brand licenses will be negotiated via licensing contract and the brands (licensor) will always retain the ability to pull licenses from licensees for violations, so the dRealms contract is built with this reality in mind.

Four actions deal with setting the ATI associated with the token, setting the algorithm used to determine the checksum for the token, and setting or deleting the URI associated with the token. (Respectively, `setati()`, `setalgo()`, `newuri()`, `deleteuri()`.) The URI (uniform resource identifier) is a name or pointer to any given game asset within the dRealms system. To maximize the creative options for defining assets, a URI may be one of three types: *full*, *base*, or *relative*. A full URI is complete and does not need to be added to any other URI to point to an asset. The combination of base and relative URI pointers creates a full URI where the base defines the first or common part of a URI to which the relative URI is added.

Fungible Token Actions

While most true ownership game assets are non-fungible tokens, many games use some forms of in-game currency such as "gold" or "experience" which can also be tokenized. (Note: In some cases, creating fungible tokens can open up concerns about creating a monetary token. In many cases, however, such fungible tokens could simply be components of game design. Creators should familiarize themselves with the legal and regulatory issues surrounding the creation of fungible tokens. They are included in the dRealms standard because of their necessary, non-currency, uses in game design.)

The actions included for managing the life cycle of fungible tokens are common across blockchain fungible token standards. These include the ability to create, issue, and transfer tokens, to open and close an account's wallet for a specific fungible currency, as well as dRealms-specific functions consume and retire, previously described under non-fungible actions. (Respectively, `create()`, `issue()`, `transfer()`, `open()`, `close()`, `consume()`, `retire()`.)

APPLICATION TOKEN INTERFACE (ATI)

Each dRealms NFT game asset describes its features to games and other assets via its ATI (recorded as a JSON file). The use of the ATI simplifies the development of NFTs and allows them to communicate with games and realms within the dRealms gaming universe without restricting the assets to a prescribed form.

The use of the ATI allows game systems, such as those authored using the dRealms Unity SDK, to query the NFT data on-chain (including multi-chain querying) and empowers just-in-time creations of game assets within games. Therefore, assets can be brought into a game as needed, without needing to be pre-loaded at the start or creation of the game. This is necessary to be able to accommodate a vast and ever-growing collection of game assets.

Games that “license” a game asset’s NFT token, as previously described, may supply a custom ATI for that token so that data from their game can be associated to the asset. This extensible model allows different games to represent game assets in different ways within the context of their games. Games without their own custom ATI for an NFT game asset will use the traits of the primary ATI or of another subsequent ATI and will appear and behave based on one of those. This will be appropriate for many types of third-party games.

THE FUTURE OF GAMING

Gamers have long imagined the ability to truly own and resell game assets and to take characters and objects from one game to another. Game creators have long wished to be able to build off of existing game worlds and assets. And fans have expressed their love of games by creating their own assets to insert into those gaming worlds as mods. Until now, empowering these drives in a cohesive gaming experience has only been a dream. The dRealms Gaming Universe will combine all of these drives into a movement in gaming that combines true ownership, cross-game assets, and masses of user-generated content to disrupt the way that games and assets are currently sold. The resulting model will better favor the gamer/purchaser, will enable rich worlds populated with untold items, and will benefit even large publishers by expanding the game asset market where users feel more comfortable spending money on assets that they can resell when they wish—and even increase their value through play. Driven by the desires of gamers and creators, and mindful of the needs of all stakeholders, dRealms represents the future of gaming.