



Overview of Non-Fungible Tokens and dApps Quinn Lawlor (quinn@satisgroup.io)

Introduction

Ethereum tokens are unique smart contracts that sit on top of the Ethereum blockchain and utilize common structuring standards. ERC20 is currently the most widely adopted token standard. ERC721 is an alternative Ethereum Improvement Proposal (EIP) created by Dieter Shirley in late 2017 and is utilized primarily within gaming and collectibles, as exchanges dedicated to trading ERC721 tokens. The key is that ERC721 tokens are fundamentally different from ERC20 because they are non-fungible tokens (NFT).

Fungible: being something of such a nature that one part or quantity may be replaced by another equal part or quantity in paying a debt or settling an account (such as money or a commodity)

However, we should flag that the tokens have some cross compatibility with the existing ERC20 infrastructure. For instance, ERC721 tokens can be stored and viewed in many Ethereum wallets which accept ERC20 tokens and existing wallets continue to add support. But most implantation of ERC721 support is not automatic.

Each ERC721 token is cryptographically unique and non-replaceable. ERC721 tokens are essentially highly modifiable smart contracts that can represent a variety of claims on digital assets and in the future, tangible assets such as real estate deeds and stock certificates. To date, the most well-known implementations revolve around games where users can buy and sell unique assets on-chain such as [CryptoKitties](#) and [Decentraland](#), a marketplace for digital real estate. The interest and utilization of NFT has spiked rapidly in Q2-3 of 2018 and we aim to give an overview of common types of NFT and their popularity.

Applications

Games: The top games are typically either collectible assets such as animals or cards ([Crypto Kitties](#), [Gods Unchained TCG](#)) that can be traded and used in-game, or alternatively traditional games with in-game collectibles / access purchased with a proprietary ERC20 token or ETH. Crypto Kitties kicked off the original collectibles craze late last fall and has been unable to maintain user engagement after their peak in January from 10,000 daily active users (DAUs) to only approximately 200 DAUs today. It is worth noting that the fall in DAUs for Crypto Kitties is more a function of market sentiment across all dApps (see the total dApp DAUs chart in the appendix). It remains to be seen whether Crypto Kitties will be a one-hit wonder, however, they are well-funded with notable investors behind them. Gods Unchained TCG is another well-funded project building a blockchain enabled trading card game similar to the classic trading card game Magic the Gathering. Gods Unchained has the most ETH stored in its smart contract at 4,203 ETH (~\$1.2M) relative to other NFT dApp games. But we should flag that many of the games (and also collectibles) attracting the most ETH volume / DAUs at the moment seem questionable, rather more like Ponzi schemes / gambling apps than games.





Collectibles: The collectibles ecosystem sees much lower transaction volume and user engagement than games, but a few games flirted with viral popularity over the last year such as [CryptoPunks](#), [FortunePandas](#), and [PepeDapp](#). Collectibles can be digital pictures, cards, eggs, and creatures. They can also represent a claim on a unique real-world asset. For instance, FortunePandas in theory allows users to “buy” a claim on a unique panda from the China Conservation and Research Center. Few collectibles games have been able to keep strong user engagement after initial launch, but it’s a niche worth watching.

Gambling: This niche sees the highest user engagement volume, value stored in smart contracts, and daily ETH volume (excluding decentralized exchanges (DEXs)). The top volume games are either self-proclaimed Ponzi schemes ([Fomo3D](#), which peaked at 10k DAU in July and [POWH3D](#), currently at 4-5k DAUs) or hybrid decentralized casino platforms such as [Zethr](#) or [Lynia](#). Many of these apps claim to run autonomously via smart contracts that the developers no longer control. Frequently, the apps are structured such that new users receive a cut of future transaction volume on the platform by contributing ETH to the pot or holding the platform’s proprietary token.

Exchanges/Other: Aside from gambling, decentralized ERC20 based exchanges occupy the highest share of dApp ETH volume, DAUs and ETH stored in their smart contracts. [IDEX](#) is the current market leader. [Augur](#), decentralized prediction market, is one of the oldest dApp projects that recently launched their main net after years of development, unfortunately to a collapse of their DAU number.

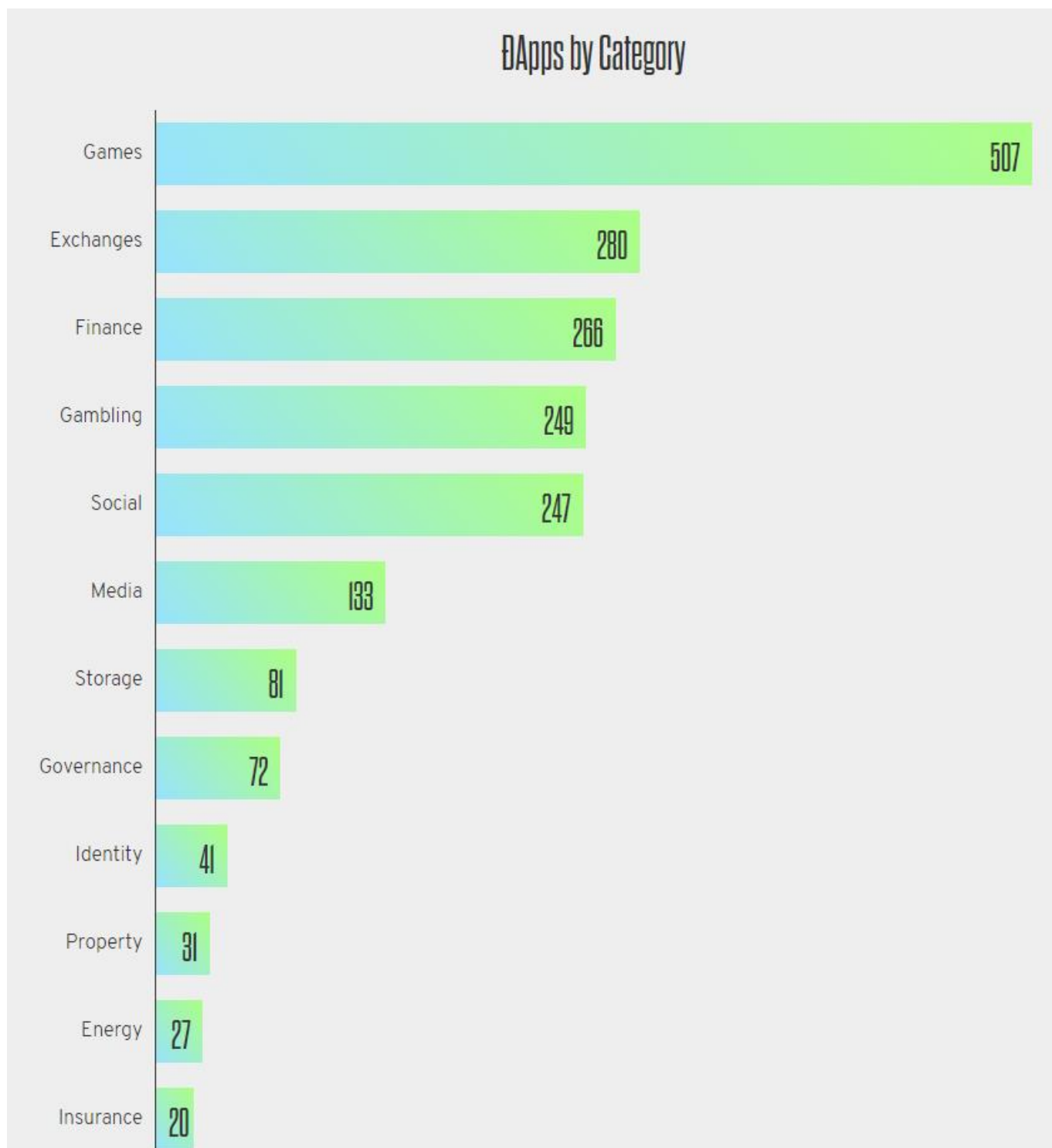
ERC721 enabled market places do a fraction of the volume relative to ERC20 enabled exchanges, however, the ecosystem is rapidly expanding. [OpenSea](#) and [RareBits](#) are popular market places for exchanging ERC721 collectibles and support many of the top games. Users can buy and sell assets much like on eBay.

dApp Statistics

Total dApps	Daily active users ?	24 hr transactions ?	24 hr volume (ETH) ?	Smart contracts
1,784	10.36k	62.73k	8.54k	2.13k

Source: stateofthedapps





Source: stateofthedapps



An overview of the top decentralized applications running on Ethereum

TOP 5 GAMES			TOP 5 EXCHANGES				
#	Name	Users 24h	Volume 24h	#	Name	Users 24h	Volume 24h
1	CryptoKitties	470	◆ 30.85	1	IDEX	1,385	◆ 2,157.60
2	Ethereumon	448	◆ 5.82	2	ForkDelta	1,234	◆ 1,059.75
3	Gods Unchained TCG	211	◆ 43.57	3	Bancor	320	◆ 1,535.02
4	ETH.TOWN!	185	◆ 6.59	4	The Token Store	228	◆ 69.96
5	0xUniverse	132	◆ 1.81	5	LocalEthereum	174	◆ 215.91

[Explore all dapps](#)

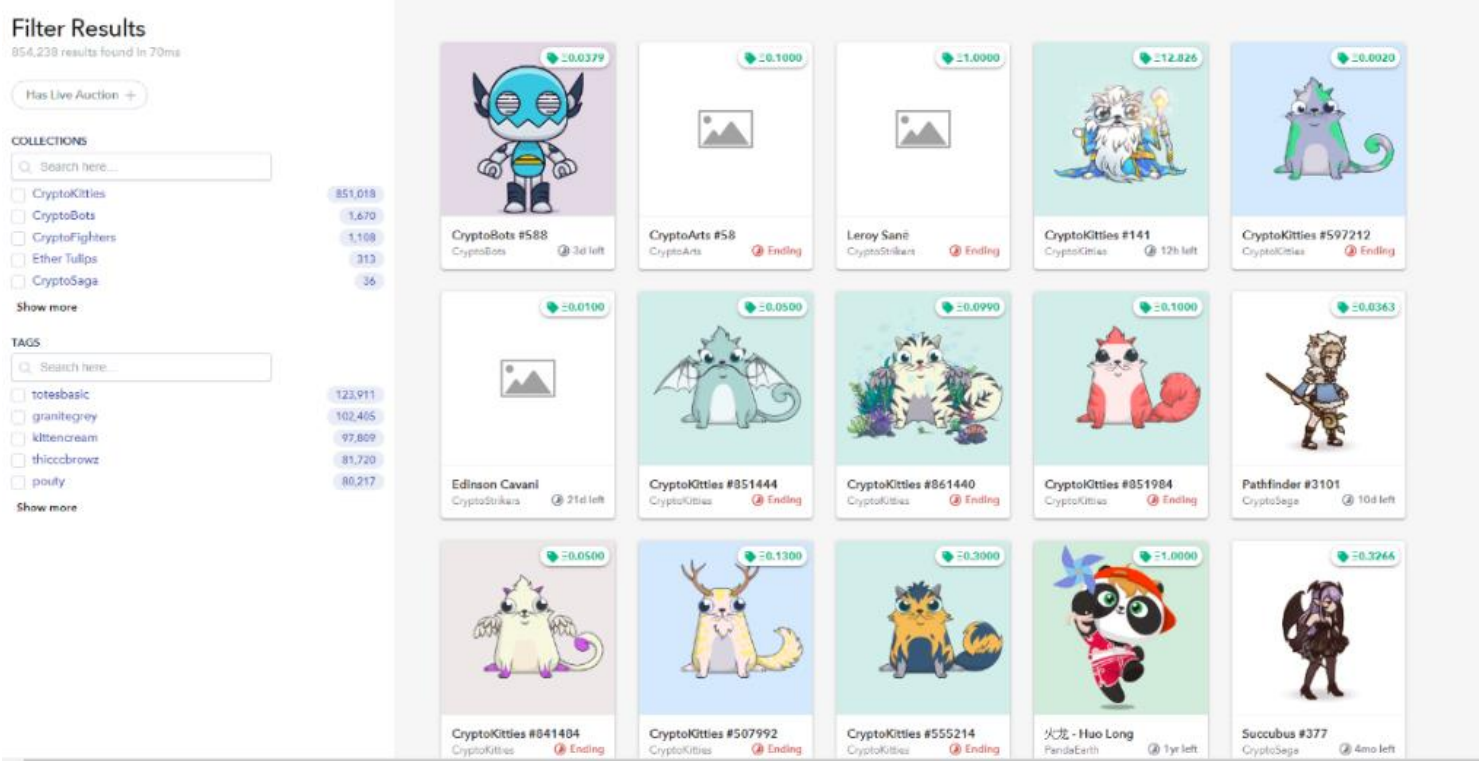
TOP 5 COLLECTIBLES			TOP 5 MARKETPLACES				
#	Name	Users 24h	Volume 24h	#	Name	Users 24h	Volume 24h
1	Cryptogirl 加密少女	229	◆ 0.02	1	OpenSea	45	◆ 3.29
2	Crypt-Oink	33	◆ 0.35	2	Decentraland Marketplace	19	◆ 0.00
3	Panda Earth	33	◆ 0.81	3	Totle	8	◆ 1.99
4	CryptoSoccr	5	◆ 1.15	4	Emoon	5	◆ 0.08
5	Star Cards	5	◆ 0.01	5	TradePass	2	◆ 20.66

TOP 5 GAMBLING			TOP 5 OTHER				
#	Name	Users 24h	Volume 24h	#	Name	Users 24h	Volume 24h
1	Fomo3D	600	◆ 22.55	1	Ethereum Name Service	95	◆ 34.42
2	Zethr	261	◆ 83.13	2	0x Protocol	94	◆ 0.00
3	dice2.win	104	◆ 750.17	3	Dai Stability System	68	◆ 0.00
4	Etheroll	46	◆ 1,345.45	4	Peepeth	55	◆ 0.10
5	Fire Lotto	30	◆ 0.33	5	Augur	44	◆ 434.82

Source: Dappradar



Excerpt from the RareBits marketplace, showing assets for sale from multiple game universes



The screenshot displays a marketplace interface with a left-hand sidebar for filtering and a main grid of asset cards. The sidebar includes 'Filter Results' (854,238 results found in 70ms), a 'Has Live Auction' button, and sections for 'COLLECTIONS' and 'TAGS'. The 'COLLECTIONS' section lists: CryptoKitties (851,018), CryptoBots (1,670), CryptoFighters (1,108), Ether Tulips (313), and CryptoSaga (36). The 'TAGS' section lists: totesbasic (123,911), granitegrey (102,465), klttencream (97,809), thicccbrowz (81,720), and pouify (80,217). The main grid shows 15 asset cards, each with a unique digital character or creature, its name, collection, and price. Prices range from 0.0020 to 12.826 ETH. Some cards indicate 'Ending' or 'left' status.

Source: RareBits

Conclusion

The fundamental difference between the two most-common ERC token standards in use, ERC721 and ERC20, is their fungibility. In addition, ERC721 has greater customization around ownership and transfer controls than ERC20.

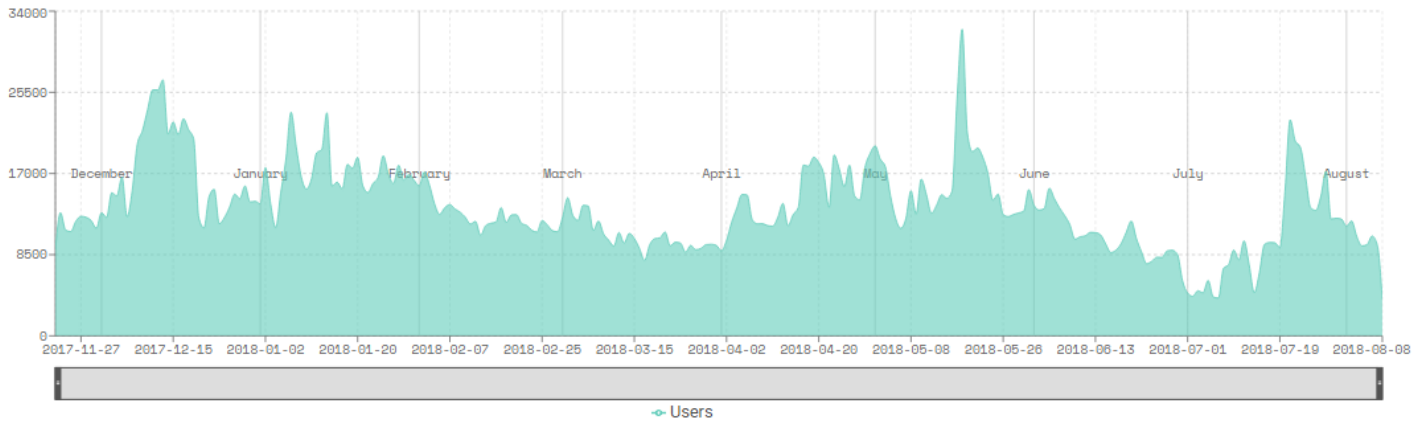
We think the first dApp to go mainstream will be a hybrid gambling / gaming app. If a Fomo3D type app were to accumulate a \$50mm or \$100mm prize pool, it could attract media attention in the way that the large Powerball pots do. It would likely attract significant regulator attention as well if the space has not done so already. The Fomo3D pot sits at ~21k ETH (~\$6.7mm) and actively encourages its users to exit scam with all the proceeds. To date, the app has taken in ~96k ETH and distributed ~74k ETH in rewards. But it does beg the question of how one regulates an autonomous smart contract driven by human greed, although we have no doubt that the developers can be found, and calling something a scam or a Ponzi scheme doesn't relieve those responsible of legal liability.



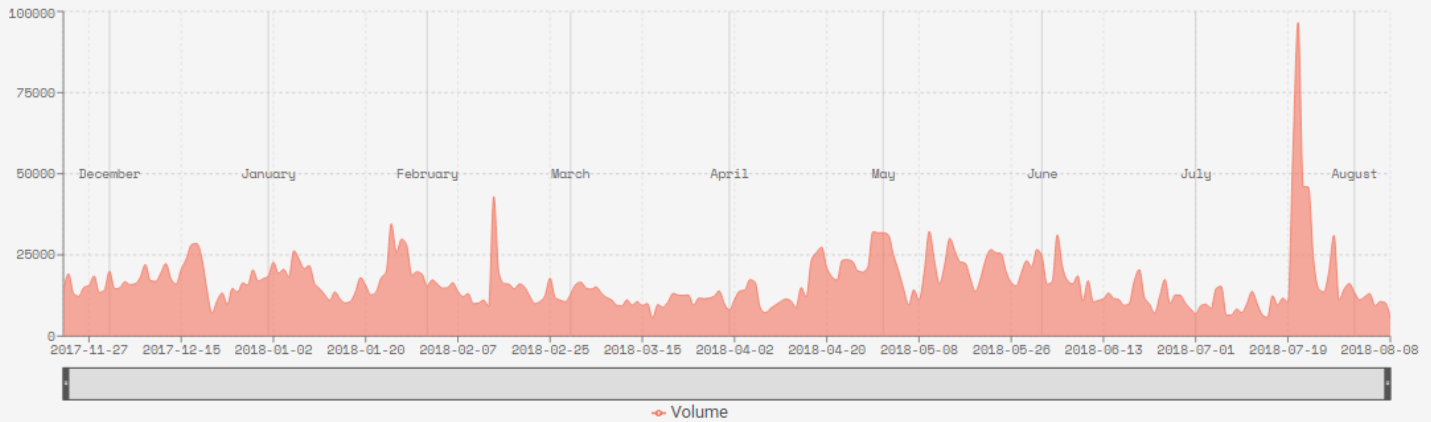
As the market matures, greed and speculation will cede ground to user utility i.e. pure entertainment. ERC721 and ER20 tokens don't have to be mutually exclusive either – for example several of the games we highlight are utilizing a hybrid model with unique in-game ERC721 digital assets in conjunction with a proprietary ERC20 payment token for the in-game economy. It is important to note the average crypto user does not use dApps (25k peak DAUs in December versus 10s of millions of crypto users). A function of this is that many dApps use a Chrome web browser add on called MetaMask which allows Chrome to interact with the Ethereum blockchain through the browser without running a full Ethereum node. But it does require a basic level of understanding of Chrome and such dApps, without MetaMask running the webpage will mostly appear blank. This is the largest impediment for mainstream adoption at the moment. Overall while DAUs on dApps has steadily fallen since November '17 with sporadic spikes, the total volume flowing through the apps has oscillated between ~12-25k ETH in a relatively trendless manner. It will be interesting to observe the total DAUs across dApps as we eventually transition out of the current bear market.

Appendix

Daily users of all dapps



Daily volume of all dapps




Source: dAppadar



Declaration of an example ERC721 contract:

```
1  contract ERC721 {
2      // ERC20 compatible functions
3      function name() constant returns (string name);
4      function symbol() constant returns (string symbol);
5      function totalSupply() constant returns (uint256 totalSupply);
6      function balanceOf(address _owner) constant returns (uint balance);
7      // Functions that define ownership
8      function ownerOf(uint256 _tokenId) constant returns (address owner);
9      function approve(address _to, uint256 _tokenId);
10     function takeOwnership(uint256 _tokenId);
11     function transfer(address _to, uint256 _tokenId);
12     function tokenOfOwnerByIndex(address _owner, uint256 _index) constant returns (uint tokenId);
13     // Token metadata
14     function tokenMetadata(uint256 _tokenId) constant returns (string infoUrl);
15     // Events
16     event Transfer(address indexed _from, address indexed _to, uint256 _tokenId);
17     event Approval(address indexed _owner, address indexed _approved, uint256 _tokenId);
18 }
```

erc721-definitions.sol hosted with  by GitHub

[view raw](#)

Non-fungible Token Standard #721: <https://github.com/ethereum/EIPs/issues/721>

DISCLOSURES AND DISCLAIMERS

Analyst Certification

The analyst, Sherwin Dowlat, primarily responsible for the preparation of this research report attests to the following: (1) that the views and opinions rendered in this research report reflect his personal views about the subject companies or issuers; and (2) that no part of the research analyst's compensation was, is, or will be directly related to the specific recommendations or views in this research report.

Analyst Certifications and Independence of Research.

Each of the Satis Group analysts whose names appear on the front page of this report hereby certify that all the views expressed in this Report accurately reflect our personal views about any and all of the subject securities or issuers and that no part of our compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views of in this Report.

Satis Group (the "Company") is an independent equity research provider. The Company is not a member of the FINRA or the SIPC and is not a registered broker dealer or investment adviser. [Firm name] has no other regulated or unregulated business activities which conflict with its provision of independent research.

Limitations of Research and Information.

This Report has been prepared for distribution to only qualified institutional or professional clients of Satis Group. The contents of this Report represent the views, opinions, and analyses of its authors. The information contained herein does not constitute financial, legal, tax or any other advice. All third-party data presented herein were obtained from publicly available sources which are believed to be reliable; however, the Company makes no warranty, express or implied, concerning the accuracy or completeness of such information. In no event shall the Company be responsible or liable for the correctness of, or update to, any such material or for any damage or lost opportunities resulting from use of this data.

Nothing contained in this Report or any distribution by the Company should be construed as any offer to sell, or any solicitation of an offer to buy, any security or investment. Any research or other material received should not be construed as individualized investment advice. Investment decisions should be made as part of an overall portfolio strategy and you should consult with a professional financial advisor, legal and tax advisor prior to making any investment decision. Satis Group shall not be liable for any direct or indirect, incidental or consequential loss or damage (including loss of profits, revenue or goodwill) arising from any investment decisions based on information or research obtained from Satis Group.

Reproduction and Distribution Strictly Prohibited.

No user of this Report may reproduce, modify, copy, distribute, sell, resell, transmit, transfer, license, assign or publish the Report itself or any information contained therein. Notwithstanding the foregoing, clients with access to working models are permitted to alter or modify the information contained therein, provided that it is solely for such client's own use. This Report is not intended to be available or distributed for any purpose that would be deemed unlawful or otherwise prohibited by any local, state, national or international laws or regulations or would otherwise subject the Company to registration or regulation of any kind within such jurisdiction.

Copyrights, Trademarks, Intellectual Property.

Satis Group, and any logos or marks included in this Report are proprietary materials. The use of such terms and logos and marks without the express written consent of Satis Group is strictly prohibited. The copyright in the pages or in the screens of the Report, and in the information and material therein, is proprietary material owned by Satis Group unless otherwise indicated. The unauthorized use of any material on this Report may violate numerous statutes, regulations and laws, including, but not limited to, copyright, trademark, trade secret or patent laws.