

# Game Theoretical Analysis of Resource Allocation in the InterPlanetary File System

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# Background

# IPFS

- P2P hypermedia distribution protocol
- Content-addressed, versioned filesystem
- Git repo in a torrent
- Many use-cases
  - **Goal:** Replace HTTP, decentralize Internet

# IPFS Stack

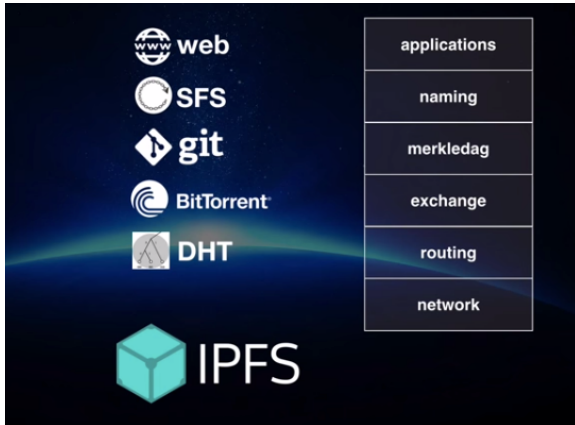


Figure 1: The IPFS Stack

# Bitswap

- IPFS's block exchange protocol
- Inspired by BitTorrent
- *Strategy function*
  - Input metrics

# Objectives

- Classify Bitswap strategy functions
  - Conditions where useful
- **Analytical work:** Repeated game model
- **Empirical work:** Simulations

# Plan

# Analytical Work

1. Repeated game analysis
2. Evolutionary game theory



# Simulations

1. **Straetgy simulator**
2. **Bitswap tests**

## Progress and Preliminary Results

# Strategy Simulator

- 3 node network
- Parameters
  - Resource distribution
  - Initial peer-wise reputations
- Tests whether given strategy function gives NE

**TODO: full exchange example?**

# Repeated Game Analysis

- Verified results of strategy simulator
- Mathematica notebook
- Intractable for nontrivial strategy functions
  - **Next step:** Alternative functions/representations

# Go-IPFS and IPTB

- Beta strategy-integration into go-ipfs
- IPTB: IPFS nodes in Docker containers
- Scripted tests

# Timeline