

XyloNet - Complete Project Documentation

Table of Contents

- 1. [Executive Summary](#)
- 2. [Project Vision & Mission](#)
- 3. [Technical Architecture](#)
- 4. [Smart Contracts Deep Dive](#)
- 5. [Frontend Application](#)
- 6. [Feature Breakdown](#)
- 7. [Deployed Infrastructure](#)
- 8. [Integration Guide](#)
- 9. [User Flows](#)
- 10. [Security Model](#)
- 11. [Grant Alignment](#)
- 12. [Future Roadmap](#)
- 13. [Technical Specifications](#)

Executive Summary

XyloNet is a comprehensive DeFi protocol built exclusively for Arc Network, combining three core primitives into a unified stablecoin SuperExchange:

Component	Description	Status
XyloSwap	StableSwap AMM for stablecoin trading	✔ Live
XyloBridge	Circle CCTP V2 cross-chain bridge	✔ Live
XyloVault	ERC-4626 yield aggregation vault	✔ Live

Key Metrics

- **Network:** Arc Testnet (Chain ID: 5042002)
- **Contracts Deployed:** 6 verified contracts
- **Supported Tokens:** USDC, EURC, USYC
- **Bridge Chains:** 7 networks (Ethereum, Arbitrum, Base, Optimism, Polygon, Avalanche, Arc)
- **Transaction Cost:** ~\$0.01 per operation
- **Finality:** <350ms deterministic

Project Vision & Mission

Vision

To become the premier stablecoin exchange infrastructure on Arc Network, enabling seamless trading, bridging, and yield generation for the internet economy.

Mission

1. **Democratize Stablecoin Access:** Enable anyone to swap, bridge, and earn yield on stablecoins with minimal friction

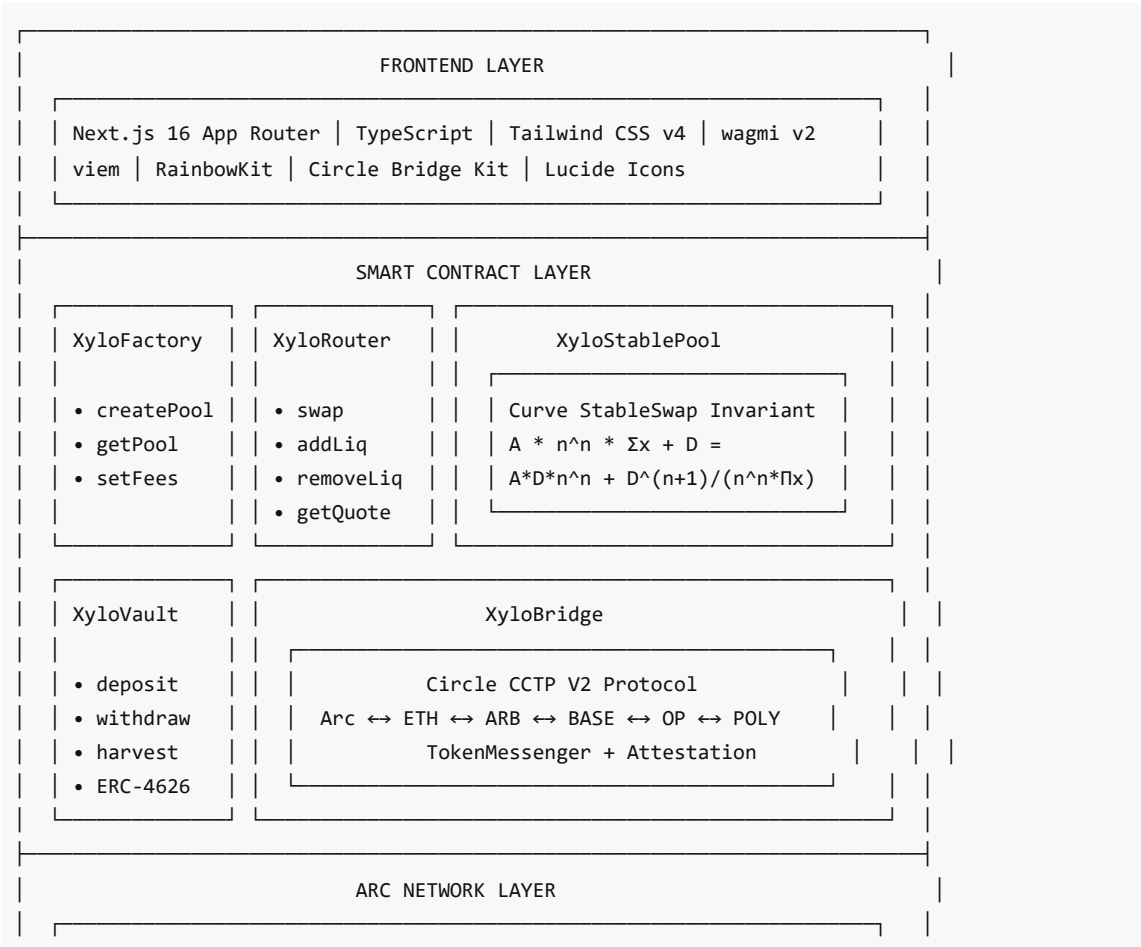
- 2. **Maximize Capital Efficiency:** Use StableSwap curves for minimal slippage on large trades
- 3. **Enable Global Payments:** Leverage CCTP V2 for instant cross-border USDC transfers
- 4. **Generate Sustainable Yield:** Provide safe, auto-compounding yield strategies

Core Value Propositions

Value	How XyloNet Delivers
Instant Settlement	<350ms deterministic finality on Arc Network
Predictable Costs	~\$0.01 per transaction, denominated in USDC (not volatile ETH)
Native Cross-Chain	Circle CCTP V2 - no wrapped tokens, native USDC everywhere
Real Yield	USYC integration for Treasury-backed yields
Enterprise Ready	Compliance-friendly with opt-in privacy features
Mobile First	Fully responsive UI for mobile traders
Immersive UX	Revolutionary animations, 3D effects, and glassmorphism

Technical Architecture

System Overview



Native USDC	Sub-second Finality	USDC Gas	Circle CCTP V2
Permit2	Multicall3	Gateway Wallet	FxEscrow (StableFX)

Directory Structure

```
XyloNet/
├── contracts/                                # Solidity smart contracts
│   ├── src/
│   │   ├── core/                            # Core DEX infrastructure
│   │   │   ├── XyloFactory.sol              # Pool deployment factory
│   │   │   ├── XyloRouter.sol               # Swap routing & execution
│   │   │   ├── XyloStablePool.sol           # StableSwap AMM
│   │   │   └── XyloERC20.sol                # LP token standard
│   │   ├── bridge/
│   │   │   └── XyloBridge.sol               # CCTP V2 bridge wrapper
│   │   ├── vault/
│   │   │   └── XyloVault.sol                # ERC-4626 yield vault
│   │   └── interfaces/                      # Contract interfaces
│   ├── scripts/
│   │   ├── deploy.js                        # Deployment automation
│   │   └── add-liquidity.js                 # Liquidity bootstrap
│   ├── artifacts/                          # Compiled ABIs
│   ├── hardhat.config.js
│   └── package.json
├── frontend/                                # Next.js application
│   ├── src/
│   │   ├── app/                             # App Router pages
│   │   │   ├── page.tsx                    # Home / Swap interface
│   │   │   ├── bridge/                     # Bridge interface
│   │   │   ├── pools/                      # Liquidity pools
│   │   │   ├── vault/                      # Yield vault
│   │   │   ├── history/                    # Transaction history
│   │   │   ├── layout.tsx                  # Root layout
│   │   │   └── globals.css                  # Global styles + mobile CSS
│   │   ├── components/
│   │   │   ├── swap/
│   │   │   │   └── SwapWidget.tsx          # Token swap component
│   │   │   ├── bridge/
│   │   │   │   └── BridgeWidget.tsx        # Bridge component
│   │   │   ├── ui/                         # Reusable UI components
│   │   │   │   ├── Toast.tsx               # Transaction notifications
│   │   │   │   ├── TokenLogos.tsx         # Token & chain logos
│   │   │   │   ├── Skeleton.tsx           # Loading states
│   │   │   │   ├── Tooltip.tsx            # Info tooltips
│   │   │   │   ├── Confetti.tsx           # Success celebration
│   │   │   │   └── EmptyState.tsx          # Empty state components
│   │   │   ├── Header.tsx                  # Navigation header
│   │   │   └── Footer.tsx                  # Site footer
```

```
| | | └─ Providers.tsx      # Web3 providers
| | | └─ config/
| | |   └─ wagmi.ts         # Wallet configuration
| | |   └─ constants.ts     # Contract addresses
| | |   └─ abis/            # Contract ABIs
| | |   └─ lib/
| | |     └─ utils.ts       # Utility functions
| | |     └─ transactions.ts # Transaction history
| | └─ package.json
|
└─ README.md               # Quick start guide
└─ XYLONET_PROJECT.md      # This detailed documentation
└─ PROJECT_OVERVIEW.md     # Project summary
└─ IMPLEMENTATION_PLAN.md  # Development roadmap
└─ SECURITY.md             # Security considerations
└─ CONTRIBUTING.md         # Contribution guidelines
└─ LICENSE                 # MIT License
```

Smart Contracts Deep Dive

1. XyloFactory

Purpose: Manages pool deployment and protocol configuration.

Address: 0x60EDeFB094B84BBC6430cc130B358A43Ba1979e2

Key Functions:

Function	Parameters	Description
createPool	tokenA, tokenB, A	Deploy new StableSwap pool
getPool	tokenA, tokenB	Get pool address
setSwapFee	fee	Update global swap fee (owner)
setFeeRecipient	recipient	Set protocol fee recipient
setPaused	status	Emergency pause (owner)

Protocol Parameters:

Parameter	Value	Description
Swap Fee	0.04% (4 bps)	Fee charged on each swap
Protocol Fee	50%	Portion of swap fee to protocol
Default A	200	Amplification parameter

2. XyloRouter

Purpose: User-friendly interface for swaps and liquidity operations.

Address: 0x73742278c31a76dBb0D2587d03ef92E6E2141023

Swap Interface:

```
struct SwapParams {
    address tokenIn;
    address tokenOut;
    uint256 amountIn;
    uint256 minAmountOut;
    address to;
    uint256 deadline;
}

function swap(SwapParams calldata params) external returns (uint256 amountOut);
```

Liquidity Interface:

```
function addLiquidity(AddLiquidityParams calldata params) external returns (uint256 lpTokens);
function removeLiquidity(RemoveLiquidityParams calldata params) external returns (uint256, uint256);
```

Quote Functions:

```
function getAmountOut(address tokenIn, address tokenOut, uint256 amountIn)
    external view returns (uint256);
```

3. XyloStablePool

Purpose: Implements Curve's StableSwap invariant for minimal slippage.

Deployed Pools:

Pool	Address	Tokens
USDC-EURC	0x3DF3966F5138143dce7a9cFDdC2c0310ce083BB1	USDC ↔ EURC
USDC-USYC	0x8296cC7477A9CD12cF632042fDDc2aB89151bb61	USDC ↔ USYC

StableSwap Curve Formula:

$$A * n^n * \sum x_i + D = A * D * n^n + D^{(n+1)} / (n^n * \prod x_i)$$

Where:

- **A** = Amplification parameter (200) - controls curve tightness
- **n** = Number of tokens (2)
- **D** = Total liquidity invariant
- **x_i** = Reserve of token i

Why StableSwap?

- Near-zero slippage for stablecoin pairs at normal volumes
- 10-100x better rates than constant product AMM for pegged assets
- Ideal for USDC ↔ EURC (both pegged to fiat)

4. XyloBridge

Purpose: Cross-chain USDC transfers via Circle's CCTP V2.

Address: 0xf7Df65Ce418E938ee8d9a0A0d227A43441fe4641

CCTP V2 Integration:

```
function bridgeToChain(
    uint256 amount,
    string calldata chainName,
    address recipient
) external returns (bytes32 nonce);
```

Supported Chains (CCTP Domain IDs):

Chain	Domain ID	Network	Status
Ethereum	0	Sepolia	✓ Active
Avalanche	1	Fuji	✓ Active
Optimism	2	Sepolia	✓ Active
Arbitrum	3	Sepolia	✓ Active
Base	6	Sepolia	✓ Active
Polygon	7	Amoy	✓ Active
Arc Network	26	Testnet	✓ Active

Bridge Flow:

1. User initiates bridge → Approve USDC
2. XyloBridge calls `depositForBurn` on TokenMessengerV2
3. Circle attests the burn
4. Bridge Kit automatically mints on destination chain
5. User receives native USDC (~30 seconds for fast mode)

5. XyloVault

Purpose: ERC-4626 compliant yield vault for USDC deposits.

Address: 0x240Eb85458CD41361bd8C3773253a1D78054f747

ERC-4626 Interface:

```
// Deposit assets, receive shares
function deposit(uint256 assets, address receiver) external returns (uint256 shares);
```

```
// Withdraw assets by burning shares
function withdraw(uint256 assets, address receiver, address owner) external returns (uint256 shares);

// Preview functions
function previewDeposit(uint256 assets) external view returns (uint256);
function previewWithdraw(uint256 shares) external view returns (uint256);
```

Fee Structure:

Fee Type	Rate	Description
Deposit Fee	0%	No entry fee
Withdraw Fee	0.1%	Small exit fee
Performance Fee	10%	On profit only

Frontend Application

Technology Stack

Technology	Version	Purpose
Next.js	16	React framework with App Router
TypeScript	5.x	Type safety
Tailwind CSS	4.x	Utility-first styling
wagmi	2.x	React Hooks for Ethereum
viem	2.x	TypeScript Ethereum client
RainbowKit	2.x	Wallet connection
Circle Bridge Kit	Latest	Cross-chain UI
Lucide React	Latest	Icon library

Pages

Route	Description	Features
/	Swap	Token swap with slippage control, price impact display
/bridge	Bridge	Cross-chain USDC transfer with chain selector
/pools	Pools	Liquidity management, TVL, APY display
/vault	Vault	USDC yield vault with APY tracking
/history	History	Transaction history with filtering

UI Components

| Component | Location | Purpose | |-----|-----|-----|| | SwapWidget | components/swap/ | Token swap interface || BridgeWidget | components/bridge/ | Cross-chain bridge UI || Header | components/ | Navigation, wallet connect || Footer | components/ | Social links, credits || Toast | components/ui/ | Transaction notifications || TokenLogo | components/ui/ | Official token/chain logos || Skeleton | components/ui/ | Loading states || Tooltip | components/ui/ | Info tooltips for DeFi terms || Confetti | components/ui/ | Success celebration || **AnimatedBackground** | components/ui/ | Canvas particle system with aurora effect || **TiltCard** | components/ui/ | 3D perspective cards with glare || **AnimatedElements** | components/ui/ | Magnetic buttons, animated numbers || **CommandPalette** | components/ui/ | Keyboard navigation (Ctrl+K) |

Mobile Responsiveness

The entire application is fully mobile-responsive with:

- **Touch-friendly targets:** Minimum 44-48px height for all interactive elements
- **Bottom sheet modals:** Slide-up modals on mobile for better UX
- **Safe area insets:** Support for notched devices (iPhone X+)
- **Active state feedback:** Visual feedback on touch (scale animations)
- **Responsive typography:** Scaled text sizes for different screens
- **Horizontal scroll:** Filter pills with horizontal scroll on mobile

Revolutionary UI/UX Features

XyloNet implements cutting-edge visual effects that create an immersive, premium experience:

AnimatedBackground

- **Canvas-based particle system** with 120+ particles
- **Aurora borealis effect** using radial gradients
- **Connection lines** between nearby particles
- **Mouse interaction** - particles attracted to cursor
- **GPU-accelerated** with requestAnimationFrame

TiltCard

- **3D perspective transforms** with customizable tilt (0-20°)
- **Dynamic glare effect** that follows mouse movement
- **Holographic shine** on hover
- **Floating animation** for emphasis

AnimatedElements

Component	Effect
AnimatedNumber	Counting animations with easing
MagneticButton	Buttons attracted to cursor
GlowButton	Pulse glow effects on hover
RippleButton	Material Design ripple effects
FloatingElement	Continuous floating animation
ParallaxLayer	Mouse-following parallax

CommandPalette (Ctrl+K)

- **Keyboard-accessible** command palette
- **Fuzzy search** across all pages
- **Actions:** Navigate, Connect Wallet, Toggle Theme
- **Arrow key navigation** with instant execution

Advanced CSS Effects

Effect	Description
Glassmorphism 2.0	Multi-layer blur with saturation boost
Holographic Shine	Animated gradient overlay
Depth Shadow	Layered shadows for 3D appearance
Stagger Fade	Sequential fade-in for list items
Gradient Text	Animated color cycling
Reduced Motion	Accessibility support for users who prefer minimal motion

Feature Breakdown

1. XyloSwap (Token Exchange)

User Journey:

1. Connect wallet → Select input token (USDC/EURC/USYC)
2. Enter amount → See real-time quote
3. Adjust slippage tolerance (0.1%, 0.5%, 1.0%)
4. Click "Swap" → Approve token (if needed) → Execute swap
5. See confetti celebration on success

Features:

- Real-time price quotes via Router contract
- USD value display for amounts
- MAX button for full balance swaps
- Price impact indicator (green/yellow/red)
- Network fee display
- Slippage tolerance settings
- Token switcher with flip animation

2. XyloBridge (Cross-Chain)

User Journey:

1. Connect wallet → Select destination chain
2. Enter USDC amount → See estimated output
3. Click "Bridge" → Approve USDC → Execute bridge
4. Wait for Circle attestation (~30 seconds)
5. USDC automatically arrives on destination chain

Features:

- Chain selector with official logos
 - Fast transfer mode (~30 seconds)
 - Step-by-step progress indicator
 - Real-time status updates
 - Auto-delivery via Bridge Kit
 - Estimated fees and time display
-

3. XyloPools (Liquidity Provision)

User Journey:

1. View available pools → See TVL, APY, your position
2. Click "Add" → Enter token amounts
3. Approve tokens (if needed) → Add liquidity
4. Receive LP tokens representing pool share
5. Earn 0.04% of all trades

Features:

- Pool analytics (TVL, 24h volume, fees)
 - Your LP position and share percentage
 - Add/remove liquidity modals
 - Real-time reserve data
 - Volume sparklines
-

4. XyloVault (Yield Generation)

User Journey:

1. View vault stats → See TVL, APY, your position
2. Click "Deposit" → Enter USDC amount
3. Approve USDC → Execute deposit
4. Receive xyUSDC vault shares
5. Earn auto-compounding yield

Features:

- Real-time APY display (calculated dynamically)
 - Your position value in USDC
 - Deposit/withdraw modals
 - Strategy description
 - APY history sparkline
-

5. Transaction History

User Journey:

1. View all past transactions
2. Filter by type (swap, liquidity, vault, bridge)
3. See status (success, pending, failed)
4. Click to view on block explorer

Features:

- Type badges with colors

- Status indicators
- Time formatting (relative)
- Explorer links
- Local + API data merge
- Clear history option

Deployed Infrastructure

XyloNet Contracts

Contract	Address	Explorer Link
XyloFactory	0x60EDeFB094B84BBC6430cc130B358A43Ba1979e2	View
XyloRouter	0x73742278c31a76dBb0D2587d03ef92E6E2141023	View
XyloBridge	0xf7Df65Ce418E938ee8d9a0A0d227A43441fe4641	View
XyloVault	0x240Eb85458CD41361bd8C3773253a1D78054f747	View
USDC-EURC Pool	0x3DF3966F5138143dce7a9cFDdC2c0310ce083BB1	View
USDC-USYC Pool	0x8296cC7477A9CD12cF632042FDDc2aB89151bb61	View

Arc Network Native Contracts

Contract	Address	Purpose
USDC (Native)	0x3600	Native stablecoin
EURC	0x89B50855Aa3bE2F677cD6303Cec089B5F319D72a	Euro stablecoin
USYC	0xe9185F0c5F296Ed1797AaE4238D26CCaBEadb86C	Yield-bearing stablecoin
TokenMessengerV2	0x8FE6B999Dc680CcFDD5Bf7EB0974218be2542DAA	CCTP V2 messenger
MessageTransmitterV2	0xE737e5cEBEEBa77EFE34D4aa090756590b1CE275	CCTP V2 transmitter
Gateway Wallet	0x0077777d7EBA4688BDeF3E311b846F25870A19B9	Fiat on/off ramp
FxEscrow	0x1f91886C7028986aD885ffCee0e40b75C9cd5aC1	StableFX escrow
Permit2	0x000000000022D473030F116dDEE9F6B43aC78BA3	Gasless approvals
Multicall3	0xcA11bde05977b3631167028862bE2a173976CA11	Batch calls

Network Configuration

Parameter	Value
Network Name	Arc Testnet
Chain ID	5042002
RPC URL	https://rpc.testnet.arc.network

WebSocket	wss://rpc.testnet.arc.network
Block Explorer	https://testnet.arcscan.app
Currency	USDC
Block Time	<350ms

Integration Guide

Quick Start

```
# Clone repository
git clone https://github.com/Panchu11/XyloNet.git
cd XyloNet

# Install frontend dependencies
cd frontend
npm install

# Start development server
npm run dev
```

Contract Integration (JavaScript/TypeScript)

```
import { createPublicClient, http } from 'viem';
import { CONTRACTS, ARC_NETWORK } from './config/constants';
import { XYLO_ROUTER_ABI } from './config/abis';

// Create client
const client = createPublicClient({
  chain: {
    id: 5042002,
    name: 'Arc Testnet',
    rpcUrls: { default: { http: ['https://rpc.testnet.arc.network'] } },
  },
  transport: http()
});

// Get swap quote
const quote = await client.readContract({
  address: CONTRACTS.ROUTER,
  abi: XYLO_ROUTER_ABI,
  functionName: 'getAmountOut',
  args: [CONTRACTS.USDC, CONTRACTS.EURC, parseUnits('100', 6)]
});

// Execute swap
const hash = await walletClient.writeContract({
```

```

address: CONTRACTS.ROUTER,
abi: XYLO_ROUTER_ABI,
functionName: 'swap',
args: [{
  tokenIn: CONTRACTS.USDC,
  tokenOut: CONTRACTS.EURC,
  amountIn: parseUnits('100', 6),
  minAmountOut: quote * 99n / 100n,
  to: userAddress,
  deadline: BigInt(Math.floor(Date.now() / 1000) + 3600)
}]
});

```

React Integration (wagmi)

```

import { useReadContract, useWriteContract } from 'wagmi';
import { parseUnits } from 'viem';
import { CONTRACTS } from '@config/constants';
import { XYLO_ROUTER_ABI } from '@config/abis';

function SwapComponent() {
  // Read quote
  const { data: quote } = useReadContract({
    address: CONTRACTS.ROUTER,
    abi: XYLO_ROUTER_ABI,
    functionName: 'getAmountOut',
    args: [CONTRACTS.USDC, CONTRACTS.EURC, parseUnits('100', 6)]
  });

  // Write swap
  const { writeContract } = useWriteContract();

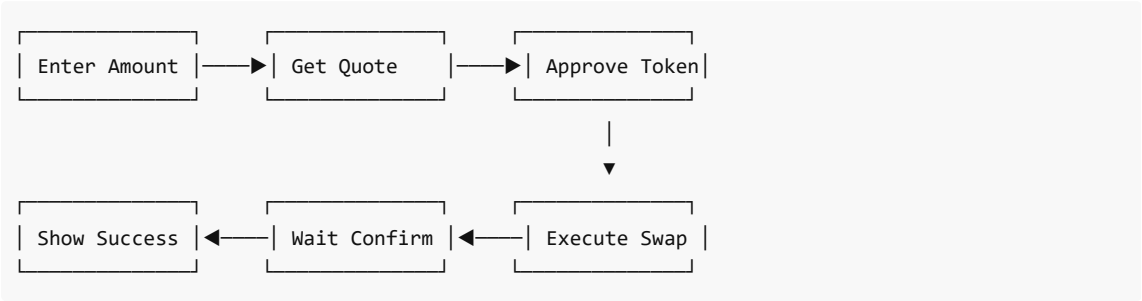
  const handleSwap = () => {
    writeContract({
      address: CONTRACTS.ROUTER,
      abi: XYLO_ROUTER_ABI,
      functionName: 'swap',
      args: [{
        tokenIn: CONTRACTS.USDC,
        tokenOut: CONTRACTS.EURC,
        amountIn: parseUnits('100', 6),
        minAmountOut: quote * 99n / 100n,
        to: address,
        deadline: BigInt(Math.floor(Date.now() / 1000) + 3600)
      }]
    });
  };

  return <button onClick={handleSwap}>Swap</button>;
}

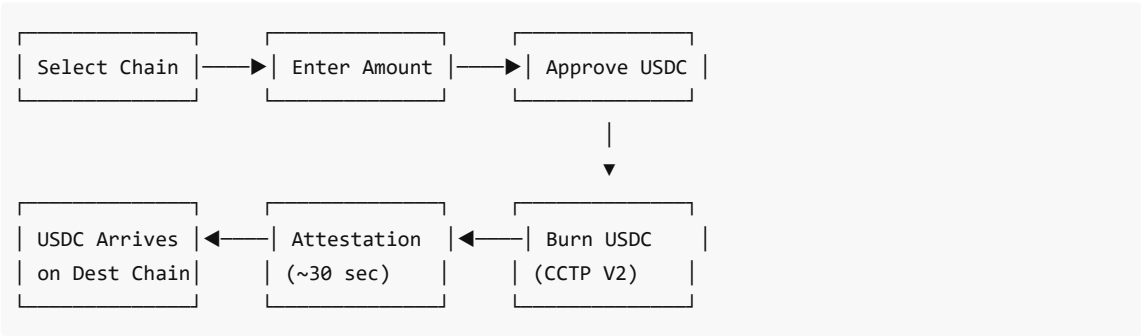
```

User Flows

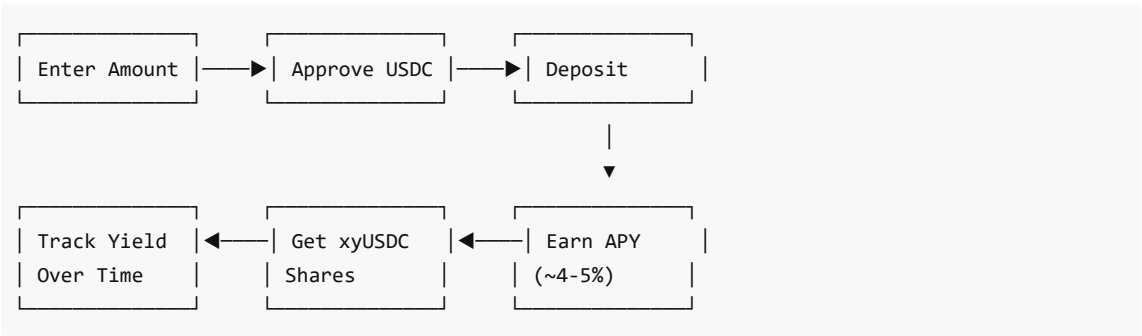
Swap Flow



Bridge Flow



Vault Flow



Security Model

Smart Contract Security

Safeguard	Implementation
Reentrancy Protection	lock modifier on all state-changing functions
CEI Pattern	Checks-Effects-Interactions ordering
Access Control	Owner-only for sensitive operations

Deadline Validation	All trades require valid deadline
Minimum Output	All swaps enforce minAmountOut
Zero Address Checks	Validate all address parameters
Safe Math	Solidity 0.8+ built-in overflow checks
Decimal Handling	Proper scaling for 6/18 decimal tokens

Known Limitations

- 1. No emergency pause (planned for v2)
- 2. StableSwap assumes tokens maintain peg
- 3. Pool imbalance can increase slippage
- 4. Single owner for protocol contracts

Audit Status

- Internal review completed
- External audit planned for mainnet launch

Grant Alignment

XyloNet directly addresses the [Arc Builders Fund](#) priority verticals:

Arc Builders Fund Vertical	XyloNet Implementation
Always-on Markets & Capital Formation	24/7 DEX with instant settlement, concentrated liquidity
Onchain FX	Multi-stablecoin swaps (USDC ↔ EURC ↔ USYC)
Offchain Assets & Credit	USYC yield integration for Treasury-backed returns
Cross-border Payments	CCTP V2 bridge for instant global USDC transfers
Account Abstraction	Planned: Gasless transactions via Pimlico
AI Agents	Planned: MCP tool definitions for automated trading

Future Roadmap

Phase 4: Advanced Features (Planned)

Feature	Description	Status
StableFX RFQ	Integration with FxEscrow for large trades	Planned
Account Abstraction	Gasless transactions via Pimlico/ZeroDev	Planned
AI Agent Interface	MCP tools for automated trading	Planned
Limit Orders	Time-weighted average price orders	Planned

Phase 5: Governance & Token (Planned)

Feature	Description	Status
XYLO Token	Protocol governance token	Planned
Staking	Lock XYLO for fee sharing	Planned
DAO Governance	On-chain proposal system	Planned
Fee Distribution	Protocol fees to stakers	Planned

Phase 6: Mainnet Launch (Planned)

Milestone	Description	Status
Security Audit	External audit by top firm	Planned
Mainnet Deployment	Deploy to Arc mainnet	Planned
Liquidity Mining	Bootstrap liquidity program	Planned
Exchange Listings	CEX listings for XYLO	Planned

Technical Specifications

Gas Estimates

Operation	Gas Units	Cost (USDC)
Swap	~120,000	~\$0.0012
Add Liquidity	~180,000	~\$0.0018
Remove Liquidity	~150,000	~\$0.0015
Bridge Out	~100,000	~\$0.0010
Vault Deposit	~80,000	~\$0.0008
Vault Withdraw	~90,000	~\$0.0009
Token Approval	~45,000	~\$0.00045

Performance Metrics

Metric	Value
Block Time	<350ms
Transaction Finality	Deterministic
RPC Response Time	<100ms
Frontend Load Time	<2s

Mobile Compatibility	100%
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Browser Support

Browser	Version	Status
Chrome	90+	✓ Supported
Firefox	90+	✓ Supported
Safari	14+	✓ Supported
Edge	90+	✓ Supported
Mobile Safari	iOS 14+	✓ Supported
Mobile Chrome	Android 10+	✓ Supported

Resources

Resource	Link
GitHub Repository	https://github.com/Panchu11/XyloNet
Arc Network Docs	https://docs.arc.network
Arc Testnet Explorer	https://testnet.arcscan.app
Circle Faucet	https://faucet.circle.com
Circle CCTP Docs	https://developers.circle.com/stablecoins/cctp-getting-started
Arc Builders Fund	https://www.circle.com/blog/introducing-the-arc-builders-fund
X (Twitter)	https://x.com/XyloNet

License

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Built with ❤ by ForgeLabs for the Arc Network ecosystem