BLUEPRINT

Circuit Technical Blueprint

Version 2.0.0 March 2026

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1. Executive Summary

Circuit is a production-grade video streaming platform built on modern cloud-native infrastructure with native Base (Coinbase L2) blockchain integration. Released in early 2026, the platform combines live streaming, Video-on-Demand (VOD) delivery, and creator monetization with blockchain-native payment rails and token-gated content access.

Core Value Propositions

For Viewers:

- Watch-to-Earn rewards through the XP system
- Token-gated exclusive content access
- Native wallet authentication (browser wallets or social login)
- Real-time interactive features

For Creators:

- Multiple revenue streams (tips, PPV, advertising, ticket sales)
- 100% of base tip amounts (platform fee added on top)
- Token-gated content for premium experiences
- Comprehensive analytics dashboard
- Automatic stream archiving to VOD
- Subscription tiers with usage-based billing

For the Ecosystem:

- Base-first payment infrastructure
- Multi-token support (USDC, ETH)
- On-chain transaction verification
- Transparent, immutable payment records

Platform Highlights

Aspect	Description
Platform Version	1.5.0 (Production)

Infrastructure	Enterprise-grade, globally distributed
Security	Comprehensive multi-layer protection
Blockchain	Native Base (L2) integration

2. Platform Overview

2.1 Feature Summary

Live Streaming

- Professional RTMP ingest infrastructure
- HLS delivery via global CDN
- Secure publish token authentication
- Multi-camera broadcasting with Director controls
- Automatic stream archiving
- **Roadmap:** Adaptive bitrate transcoding and WebRTC ultra-low latency

Video on Demand

- Direct-to-cloud upload (up to 2GB)
- Global CDN delivery
- Signed URL protection
- Automatic thumbnail generation
- View tracking with analytics

Monetization

- Pay-Per-View (PPV) with Base USDC payments
- Creator tipping (USDC and ETH support)
- Watch-to-Earn advertising
- Token-gated premium content
- Event ticketing with on-chain NFT minting
- Creator subscription tiers with Stripe billing
- Creator payout system

Social Features

- Real-time live chat
- Threaded comments on VOD
- Follow system
- Content moderation tools

- Creator-assigned moderators

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3. Technology Architecture

3.1 Core Technology Stack

Layer	Technology	Purpose
Frontend	Next.js 14+	React framework with App Router
UI Components	Shadcn/ui + Radix UI	Accessible component library
Styling	Tailwind CSS	Utility-first CSS
Language	TypeScript	Type-safe development
Database	PostgreSQL	Primary data store
ORM	Prisma	Type-safe database access
Caching	Redis	Rate limiting, session cache
Streaming	Ant Media Server	RTMP ingest, HLS delivery
CDN	BunnyCDN	Global content delivery
Storage	S3-Compatible	Object storage
Blockchain	Base L2 (Ethereum)	Payment verification
Billing	Stripe	Creator subscriptions
Deployment	Vercel	Serverless hosting

3.2 Application Structure

The platform follows a modular architecture with clear separation of concerns:

- **App Router** - Next.js pages and API routes
- **Components** - 174+ reusable React components
- **Libraries** - Core utilities and integrations
- **Hooks** - Custom React hooks for state management
- **Contexts** - React Context providers
- **Widget App** - Separate embedded widget application

3.3 API Architecture

The platform exposes a comprehensive REST API organized into functional domains:

Domain	Key Functions
Authentication	Wallet auth, social login
User Management	Profiles, settings, follows
Video Management	CRUD, likes, comments
Live Streaming	Create, manage, status
Payments	PPV, tips, verification
Playback Gateway	Token auth, session management
Chat & Comments	Real-time messaging
Moderation	Content moderation
Advertisements	Ad serving and tracking
Ticketing	Event creation, ticket sales, redemption
Multi-Camera	Angle management, Director controls
Billing	Stripe subscriptions, usage

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4. Authentication & Identity

4.1 Wallet-First Architecture

Circuit implements a **wallet-first authentication system** where every user has an EVM wallet. This approach provides:

- **Simplicity**: Single identity model - all users have wallets
- **Web3-Native**: True wallet ownership for all users on Base
- **Web2 UX**: Social login provides familiar onboarding experience
- **Security**: Industry-standard cryptographic verification via SIWE (Sign-In with Ethereum)

How Users Connect

Method	Description
Browser Extension	Direct connection via MetaMask, Coinbase Wallet, or WalletConnect
Coinbase Smart Wallet	Passkey-based wallet with gasless onboarding

All wallets are fully functional EVM wallets capable of:

- Sending and receiving ETH and ERC-20 tokens (USDC)
- Signing transactions for tips, PPV purchases, and token operations
- Holding tokens for gated content access
- Full EIP-1193 compatibility

4.2 Coinbase Onramp & Smart Wallet

Coinbase Smart Wallet enables mainstream users to join Circuit without any blockchain knowledge. Users create a passkey-based wallet instantly with no browser extension required.

Key Benefits

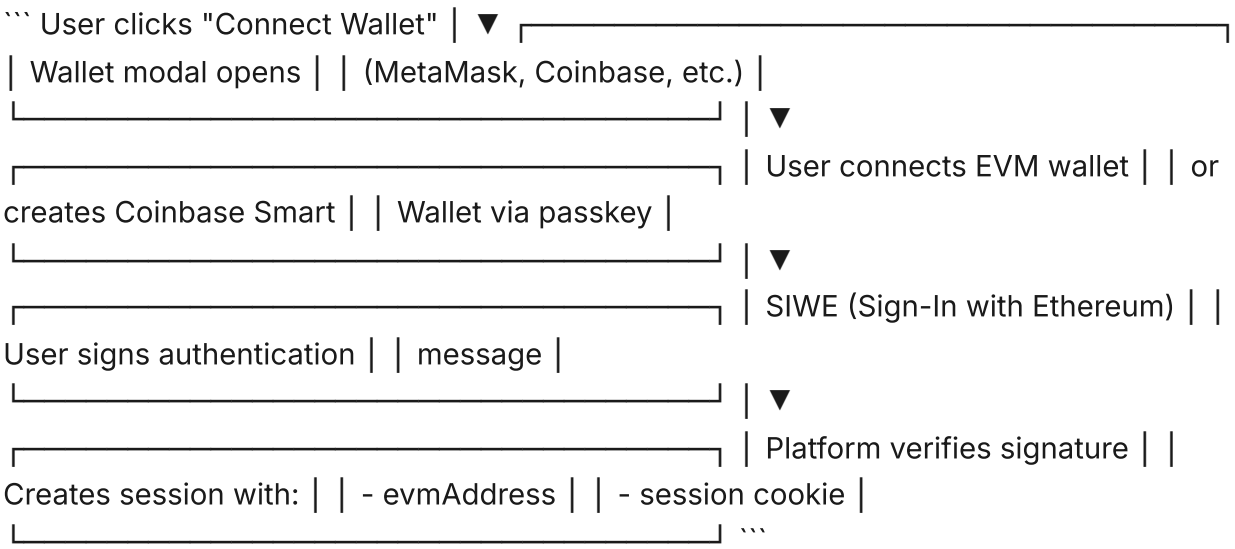
For Users:

- Zero friction onboarding - no wallet extension installation required
- Passkey-based wallet creation (biometric or device PIN)
- Gasless transactions via paymaster sponsorship
- Built-in fiat on-ramp for purchasing USDC directly

For the Platform:

- Dramatically lower barrier to entry for mainstream audiences
- Email captured during onboarding for Stripe billing compliance
- Full feature parity with browser extension wallet users

Authentication Flow



Feature Parity

All wallet types have **complete feature parity**:

Feature	MetaMask / WalletConnect	Coinbase Smart Wallet
Watch Content	Yes	Yes
Earn XP	Yes	Yes
PPV Purchases	Yes	Yes
Send Tips	Yes	Yes
Token Gating	Yes	Yes
Token Balance Gate	Yes	Yes

Creator Subscriptions	Yes	Yes
Stripe Billing	Yes (with email)	Yes (with email)

Email & Stripe Billing

Users who want Stripe subscriptions can add an email address in Settings. This email is stored and used for:

- Stripe subscription billing (required for compliance)
- Usage alerts and notifications
- Account recovery communications

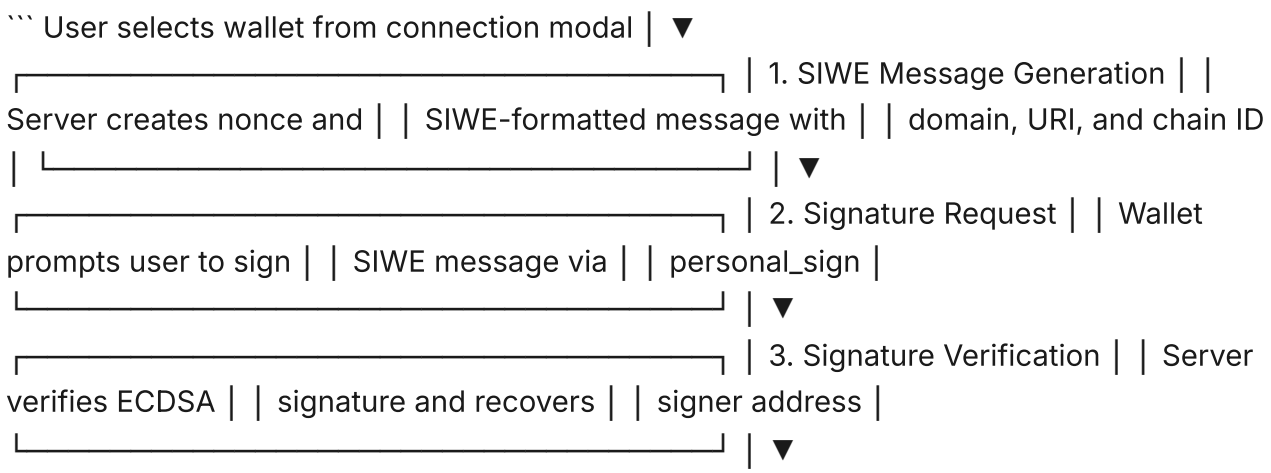
4.3 EVM Wallet Authentication (SIWE)

For users who prefer browser extension wallets, Circuit supports any EIP-1193 compliant EVM wallet.

Officially Supported Wallets

Wallet	Description
MetaMask	Most popular EVM browser extension wallet
Coinbase Wallet	Coinbase's self-custody wallet with smart wallet support
WalletConnect	Protocol supporting 300+ mobile and desktop wallets

Authentication Flow (SIWE)



┌──┐ │ 4. Session Creation │ │ 7-day session created │ │ HttpOnly cookie set │ └──┘ ```

Security Features

Feature	Description
SIWE Standard	EIP-4361 compliant authentication messages
Single-Use Nonces	Automatically deleted after verification
10-Minute Expiration	Short window prevents replay attacks
Address Recovery	Signature verification recovers signer address
Session Fixation Protection	Old sessions deleted on re-authentication

4.4 Session Management

Session Characteristics:

- Duration: 7 days
- Storage: Database-backed
- Cookie Type: HttpOnly, Secure, SameSite=Lax
- Identifier: UUID session ID

4.5 User Roles & Permissions

Role Hierarchy

Role	Level	Capabilities
USER	0	Watch, like, comment, earn XP
CREATOR	1	Upload content, earn tips, receive payments
MODERATOR	2	Moderate chat, manage users, delete content
ADMIN	3	Full platform access, user management

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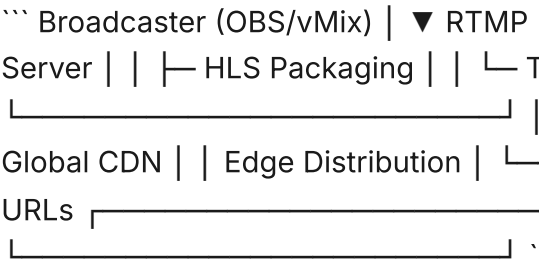
5. Streaming Infrastructure

5.1 Live Streaming Architecture



Current Delivery: Single-bitrate HLS at the broadcaster's output quality. Viewers receive the same quality stream that the creator sends from their broadcasting software (e.g., OBS).

Roadmap: Adaptive bitrate transcoding (1080p, 720p, 480p, 360p) and WebRTC ultra-low latency delivery are planned for a future infrastructure upgrade.

5.2 Stream Security

Security Model:

- Cryptographically random publish tokens
- Secure hashed storage (irreversible)
- Webhook validation before broadcast
- One-time token display with regeneration support

5.3 Streaming Specifications

Current Delivery:

- Single-bitrate HLS at broadcaster output quality
- Recommended broadcast settings: 1080p at 4000-6000 kbps
- MPEG-TS segment format via HLS

Planned ABR Profiles (Roadmap):

Profile	Resolution	Bitrate
Source	1080p	4000 kbps
High	720p	2000 kbps
Medium	480p	1000 kbps
Low	360p	600 kbps

HLS Specifications:

- Optimized segment duration
- MPEG-TS segment format
- Configurable live window

5.4 Stream Archiving

Automatic conversion of live streams to VOD:

Status	Description
`none`	Archive not enabled
`recording`	Currently recording
`processing`	MP4 being generated
`ready`	Ready for publishing
`published`	Video created

Archive Retention by Tier

Tier	Retention Policy
Free	30 days (auto-delete unpublished)
Creator	Unlimited (counts against 100 GB storage)
Creator Pro	Unlimited (counts against 500 GB storage)
Creator Pro+	Unlimited (counts against 2 TB storage)

Note: Published archives are never auto-deleted regardless of tier.

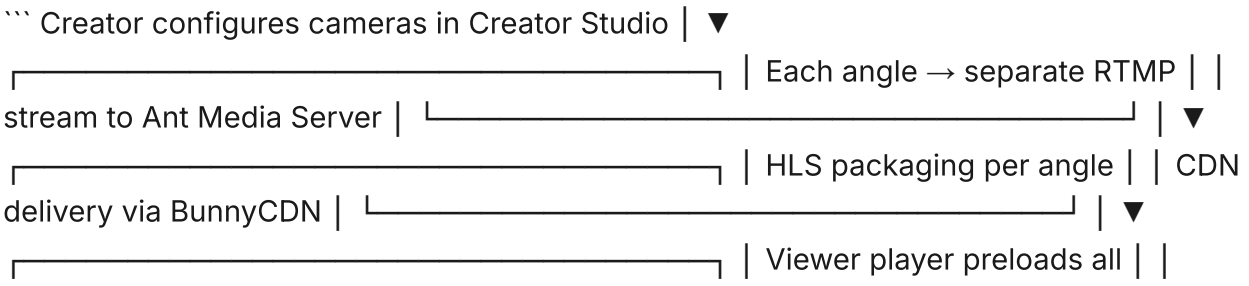
Entitlement Migration: Users with live stream access automatically receive archive access.

5.5 Multi-Camera Broadcasting

Circuit supports multi-camera live streams, allowing creators to broadcast multiple camera angles simultaneously with real-time switching.

Aspect	Detail
Max Cameras	Device-dependent (typically 4-8)
Switching Latency	Sub-200ms (CSS visibility swap)
Sync Method	PDT (Program Date-Time) via HLS tags
Sync Accuracy	±500ms across angles
Audio Mode	Follow active camera or primary-only
Billing	1 stream = 1 live hour (angles deduplicated)

How It Works



angles as hidden

Viewer Experience

- **Single Camera Mode:** Watch one angle at a time with numbered camera buttons
- **Grid Mode:** View all cameras simultaneously in a mosaic layout
- **Camera Switching:** Click any camera button to switch instantly

- **Grid Exit:** Clicking a camera in grid mode switches to single view

Director Widget

Creators and assigned directors can control the broadcast in real-time via the Director widget:

- ATEM-style camera switching interface
- Grid/mosaic toggle for multi-view monitoring
- Camera status indicators (broadcasting, pending, offline)
- Secure postMessage bridge between widget iframe and player

Technical Details

- **Buffer Management:** Active camera gets full buffer, preloaded cameras get minimal buffer, stopped cameras load nothing
- **PDT Synchronization:** Uses `#EXT-X-PROGRAM-DATE-TIME` HLS tags to sync angles. Nudges playback rate ±3% for small drift (200ms-2s), hard seeks for larger drift (>2s)
- **Device Adaptation:** No artificial limits on modern devices. Only restricts on genuinely slow connections (2G/slow-2G via Network Information API)
- **Billing Deduplication:** Angle streams share the parent stream's billing period. A 2-hour broadcast with 4 cameras = 2 live hours, not 8

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6. Content Delivery Network

6.1 CDN Integration

Architecture:

- Pull zone configuration from object storage
- Global edge distribution via BunnyCDN's worldwide network
- Token authentication for protected content
- Separate zones for VOD and live streaming

Security:

- Cryptographically signed URLs
- Time-limited access tokens
- Anti-hotlinking protection

6.2 Playback Gateway

Three-layer security for content access:

Layer	Purpose	Description
Playback Token	Request authentication	Validates user authorization
Database Session	Business rules	Enforces concurrency limits
CDN Signed URL	Content delivery	Secures actual media files

Heartbeat System:

- Regular client-server communication
- Session extension on activity
- Watch time tracking for analytics

6.3 Concurrent Stream Limiting

Strategy: Newest Device Wins

When a user watches on multiple devices:

1. Detect active sessions
2. Terminate older sessions
3. Allow newest to continue
4. Notify terminated sessions gracefully

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7. Monetization Systems

7.1 Base Payment Architecture

All payments are processed on Base (Coinbase L2) using USDC or ETH:

Component	Description
Payment Token	USDC (default) or ETH
Network	Base (Ethereum L2)
Verification	On-chain transaction confirmation
Fee Collection	Separate platform fee transfer

Benefits:

- Low gas fees via L2 scaling
- Near-instant transaction finality
- On-chain fee transparency
- Immutable payment proof

7.2 Supported Tokens

Token	Description	PPV	Tips	Tickets
USDC	Circle stablecoin on Base (~$1 USD)	Yes (default)	Yes (via TipSplitter)	Yes
ETH	Native Base chain currency	No	Yes (via relay)	No

> PPV and ticket payments use USDC exclusively. Tips support both USDC and ETH.

7.3 Pay-Per-View (PPV)

Fee Structure:

- Platform fee: 10% (added on top)
- Creator receives: 100% of base price

- User pays: base price + 10%

Example ($10 USDC content): ``` Base price: $10 USDC → Creator (via CircuitPaymentSplitter) Platform fee: $1 USDC → Platform (min $1, enforced on-chain) Total paid: $11 USDC ```

Transaction Verification:

- 1-confirmation finality on Base (no reorgs)
- On-chain verification via viem (decodes PaymentSplit event)
- Automatic entitlement creation on confirmation

7.4 Tipping System

Two-Step Flow:

1. Payment info generation (no DB record until confirmed)
2. Record creation after wallet submission
3. On-chain verification and confirmation

Fee Structure:

- Base fee: 5% (added on top)
- Minimum fee: $1 USDC / 0.0005 ETH
- Creator receives: 100% of tip amount

Example ($20 USDC tip): ``` Tip amount: $20 USDC → Creator (via CircuitTipSplitter) Platform fee: $1 USDC → Platform (5% = $1, matches minimum) Total paid: $21 USDC ```

7.5 Creator Subscription Tiers

Creators can subscribe to paid tiers for increased resource limits and professional features.

Tier Comparison

Tier	Monthly	Bandwidth	Storage	Live Hours
Free	$0	100 GB	25 GB	10 hrs
Creator	$39	500 GB	100 GB	30 hrs
Creator Pro	$99	3 TB	500 GB	120 hrs

Creator Pro+	$299	12 TB	2 TB	400 hrs

Overage Billing

Paid tier creators can opt-in to overage billing to exceed their limits:

Resource	Overage Rate
Bandwidth	$0.02/GB
Storage	$0.04/GB-month
Live Hours	$1.00/hour

Spend Cap: Creators can set a maximum monthly overage spend to prevent unexpected charges.

Usage Tracking

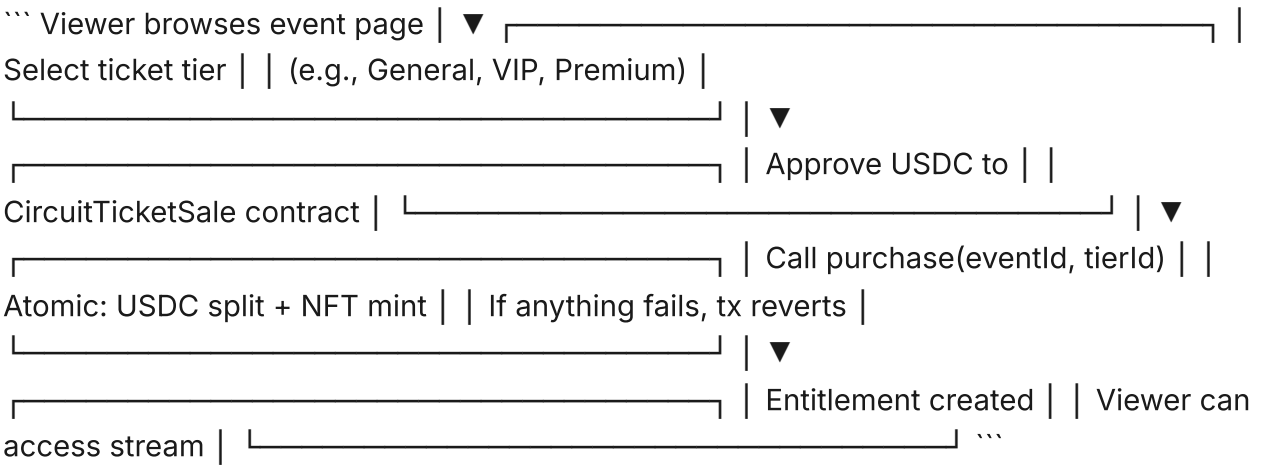
- Real-time usage dashboard
- Alerts at 50%, 80%, and 100% thresholds
- Daily usage aggregation from CDN logs
- Prorated billing for mid-cycle tier changes

7.6 Event Ticketing

Creators can sell tickets to scheduled events (concerts, premieres, watch parties) with on-chain NFT minting for ticket proof-of-purchase.

Aspect	Detail
Ticket Format	ERC-721 NFT on Base (CircuitTicket contract)
Payment Token	USDC (on-chain via CircuitTicketSale)
Purchase Model	Atomic — USDC payment + NFT mint in one transaction
Inventory	Per-tier with on-chain supply caps
Fee Model	10% platform fee enforced on-chain

Purchase Flow



ERC-721 Ticket Metadata

Each ticket NFT includes OpenSea-compatible metadata:

- Event name and description
- Tier name and tier-specific imagery
- Event date and time
- Unique ticket number
- Creator information

Fee Structure

- Platform fee: 10% (added on top of ticket price)
- Creator receives: 100% of ticket price
- Buyer pays: ticket price + 10%

Inventory Management

- Creators set per-tier supply caps
- Real-time inventory tracking
- Automatic sold-out detection
- Draft → Active → Ended event lifecycle

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8. Token Gating

8.1 Token-Gated Content

Creators can restrict content access using token ownership or balance requirements:

Gating Types

Type	Description	Duration
Token Gating (NFT)	Any ERC-721 token from specified contract address	24-hour windows
Token Balance Gate	Minimum ERC-20 or ETH balance (not spent)	24-hour windows
Ticket Gating	Atomic USDC + ERC-721 purchase via CircuitTicketSale	Permanent (per-event)

Verification Flow

1. User requests gated content
2. System retrieves user's EVM address
3. **NFT gating:** ERC-721 `balanceOf()` checked on-chain via viem
4. **Balance gating:** ERC-20 `balanceOf()` or ETH balance checked via viem
5. **Ticket gating:** CircuitTicketSale purchase verified on-chain
6. Entitlement created (24-hour expiry for NFT/balance, permanent for tickets)
7. Access granted or denied

8.2 EVM Address Support

All users have a single EVM address (`0x...`) on Base chain. This address is used for:

- Authentication (SIWE signature)
- Token ownership verification
- Payment transactions
- NFT profile picture verification

8.3 NFT Profile Pictures

Users can set owned NFTs as profile avatars:

- Real-time ownership verification
- Automatic cache invalidation
- Fallback to default avatar

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9. XP Reward System

9.1 Watch-to-Earn Mechanics

The XP system rewards users for watching content, preparing for future native token distribution.

Base Rate: 1 XP per minute watched **Daily Cap:** 240 XP (4 hours of content)

Earning Sources

Source	XP Rate	Cooldown
Watch Time	1 XP/minute	24h per content
Ad Completion	Variable	Per campaign
Bonus Events	Variable	None

9.2 Diminishing Returns

To ensure fair distribution and prevent farming:

Watch Count	Multiplier	Example (5-min video)
1st (new)	100% (1.0x)	5.0 XP
2nd (rewatch)	50% (0.5x)	2.5 XP
3rd	25% (0.25x)	1.25 XP
4th	10% (0.1x)	0.5 XP
5th+	1% (0.01x)	0.05 XP

Key Feature: Users can rewatch indefinitely at 1% XP - never reaches zero.

9.3 Level Progression

Default Formula (Square Root): ``` Level = floor(sqrt(totalXP / 100)) ```

Level	XP Required
1	100 XP
5	2,500 XP
10	10,000 XP
20	40,000 XP
30	90,000 XP

9.4 Multiplier Tiers

Viewer Multipliers:

Level	Multiplier
0+	1.00x
5+	1.05x
10+	1.10x
20+	1.15x
30+	1.20x

9.5 Anti-Abuse Protections

The platform implements layered anti-abuse measures:

- **Velocity Monitoring** - Flags abnormal earning patterns for review
- **Session Integrity** - Validates continuous viewing
- **Rate Limiting** - Prevents automated abuse
- **Server-Authoritative Calculations** - All XP computed server-side
- **Daily Cap Enforcement** - Hard limits on daily earnings

9.6 Bootstrap Mode

Temporary phase for fair initial growth:

- All multipliers normalized to 1.00x

- Exit criteria: Sustained user engagement thresholds
- Prevents early adopter advantage

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10. Advertisement System

10.1 Ad Types

Type	XP Reward	Completion Requirement
WATCH_TO_EARN	Variable	80% watch time
DISPLAY	None	N/A (CPM model)
SURVEY	Variable	Response submitted
POLL	Variable	Option selected

10.2 Placement Types

Placement	Use Case	Description
PRE_ROLL	Before content	Full-screen video ad
MID_ROLL	During content	Triggered at content midpoint
POST_ROLL	After content	Full-screen video ad
REWARDS_WIDGET	User-initiated	Sidebar opt-in ads
PLAYER_OVERLAY	During playback	Non-intrusive banner

10.3 Creator Revenue Share

- Creators earn a percentage of XP from ads viewed on their content
- Transparent tracking and attribution
- Stored separately for analytics

10.4 Daily Limits

- Maximum daily XP from ads enforced
- Resets at midnight

- Server-side validation

10.5 Fraud Prevention

The platform implements multi-layer fraud detection:

- **Behavioral Analysis** - Detects abnormal interaction patterns (rapid actions, click frequency)
- **Timing Validation** - Identifies impossible user actions (clicks before impressions)
- **Session Verification** - Ensures valid playback context
- **Device Fingerprinting** - Flags multiple accounts on the same device
- **IP Reputation** - Detects IP addresses shared by unusually many accounts

All suspicious activity is flagged and reviewed, with confidence-based scoring to minimize false positives.

10.6 Poll & Survey System

The platform supports comprehensive polling and survey functionality for audience engagement and market research.

Survey Types

Type	Use Case	Creator
AD_CAMPAIGN	Brand-sponsored research	Advertisers
CREATOR_POLL	Audience engagement	Creators

Question Types (8 Total)

Type	Description
SINGLE_CHOICE	Radio button selection
MULTIPLE_CHOICE	Checkbox selection
RATING_SCALE	Numeric scale (configurable)
NPS	Net Promoter Score (0-10)
STAR_RATING	1-5 star rating

TEXT_SHORT	Single line text
TEXT_LONG	Paragraph text
YES_NO	Boolean selection

Features

- XP rewards for survey completion
- Duplicate response prevention
- Live results with real-time polling
- Question randomization option
- Fraud detection (fast response + pattern checks)

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11. Community Features

11.1 Real-Time Chat

Features:

- Character limits for manageable messages
- Rate limiting to prevent spam
- Slow mode (configurable interval)
- Followers-only mode
- Subscribers-only mode
- Profanity filter
- Custom banned words

Message Flow:

1. Authentication check
2. Rate limiting
3. Chat settings validation
4. Ban/timeout check
5. Message creation
6. Automatic broadcast to subscribers

11.2 Comments System

Features:

- Threaded discussions
- Generous character limits
- Rate limiting
- Soft delete with audit trail

11.3 User Badges

Badge	Criteria
Creator	Content owner

Admin	Platform administrator
Moderator	Platform or content moderator
Founder	Beta supporter (future)

11.4 Moderation Tools

Actions:

- Message/comment deletion
- User timeout (temporary)
- User ban (permanent)
- All actions logged for accountability

Protections:

- Cannot ban platform admins
- Cannot ban content creators on their own content
- Audit trail for all moderation actions

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12. Security Architecture

12.1 Security Overview

Category	Status
Authentication	Production-ready
Authorization	Production-ready
Payment Security	Production-ready
Input Validation	Production-ready
Data Protection	Production-ready
Infrastructure	Production-ready

12.2 Rate Limiting

Comprehensive rate limiting protects all API endpoints:

- **Authentication endpoints** - Strict limits to prevent brute force
- **Sensitive operations** - Additional restrictions for high-risk actions
- **Payment endpoints** - Balanced limits for legitimate transactions
- **Public endpoints** - Higher limits for general access
- **Admin endpoints** - Appropriate limits for administrative functions

All rate limits use sliding window algorithms for fair enforcement.

12.3 Input Validation

- **Schema validation** - Type-safe runtime validation on all inputs
- **ORM parameterization** - Automatic SQL injection prevention
- **Whitelist validation** - Strict validation for enums and options
- **XSS prevention** - Automatic output escaping

12.4 Role-Based Access Control

Role	Level	Capabilities
USER	0	Watch, like, comment
CREATOR	1	Upload, earn, receive tips
MODERATOR	2	Moderate chat, manage users
ADMIN	3	Full platform access

12.5 Data Protection

Encryption at Rest:

- AES-256-GCM for sensitive data
- Industry-standard password hashing

GDPR Compliance:

- Right to Access: Account settings
- Right to Rectification: Profile updates
- Right to Erasure: Grace period deletion
- Data Anonymization: Complete PII removal

12.6 Security Headers

The platform implements comprehensive security headers:

- Strict Transport Security (HSTS)
- Frame protection
- Content type enforcement
- XSS protection
- Content Security Policy
- Referrer control

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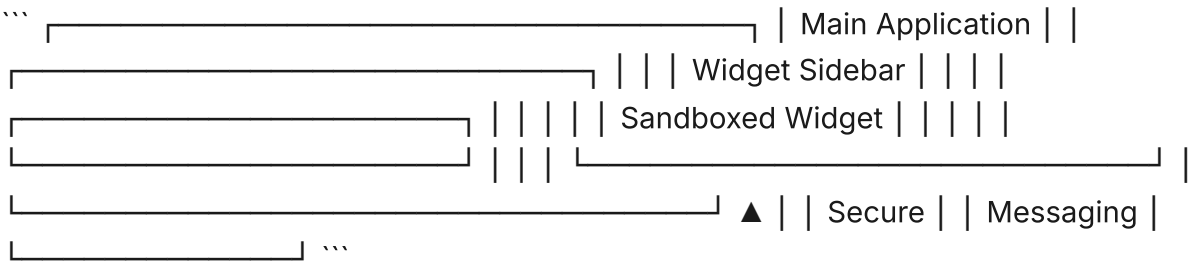
13. Widget Ecosystem

13.1 Architecture

Widgets operate as a separate application embedded via sandboxed iframes:



13.2 Widget Types

Widget	Purpose	Content Type
Bio	Creator profile & links	All
Tip	USDC/ETH tips on Base	All
Embed	Custom content (Twitter, YouTube)	All
Card	Promotional poster with CTA button	All
Chat	Real-time messaging	Streams
Comments	Discussions	VOD
Rewards	Watch-to-earn ads	All
Interact	Polls & surveys	All
Director	Multi-camera switching controls	Multi-cam Streams

13.3 Security Measures

- CORS validation with origin whitelisting
- Short-lived authentication tokens
- Iframe sandboxing

- Message type validation
- Secure cross-origin communication

13.4 SDK Capabilities

The Widget SDK provides:

- Ready state signaling
- Event communication
- Message listening
- Authentication token management
- Authenticated API requests

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14. Database Architecture

14.1 Schema Overview

The platform uses a comprehensive relational database schema:

Core Model Groups

Group	Purpose
Authentication	User accounts, sessions, settings
Content	Videos, streams, metadata
Social	Follows, likes, comments, watchlist
Payments	Transactions, entitlements, tips, payouts
Chat	Messages, settings, moderation
Ads	Campaigns, placements, tracking
XP	Configuration, balances, transactions
Multi-Camera	Multi-cam configs, angle streams
Ticketing	Events, tiers, purchases, redemptions
Billing	Usage tracking, tier management

14.2 Key Models

User Model:

- Authentication data (EVM address, wallet source)
- Profile information
- Statistics and metrics
- Billing fields (Stripe, subscription tier)
- Preferences and settings

Video Model:

- Content metadata
- Delivery configuration
- Gating settings
- Analytics data

Stream Model:

- Stream configuration
- Status tracking
- Security settings
- Widget configuration

MultiCam Model:

- Parent stream reference
- Camera angle configuration
- Layout and switching preferences

TicketEvent Model:

- Event metadata and scheduling
- Linked stream reference
- Ticket tiers with pricing and inventory
- Purchase tracking and NFT minting status

14.3 Performance Optimization

- Strategic indexing on frequently queried fields
- Composite indexes for complex queries
- Query optimization for common access patterns

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15. Performance & Scalability

15.1 Caching Strategy

Multi-Layer Caching:

Cache Type	Purpose
Session Cache	Reduce authentication queries
Concurrent Checks	Optimize limit enforcement
User Profiles	Cache infrequently changing data
Stream Metadata	Fast access to live data
XP Tracking	Accurate reward calculations

Performance Impact:

- Significant reduction in database queries
- Sub-10ms response times for cached data
- Graceful degradation when cache unavailable

15.2 Database Optimizations

- Connection pooling for efficient resource use
- Singleton client patterns
- Strategic indexing
- Query optimization

15.3 Client Optimizations

- Server-side rendering where beneficial
- Dynamic imports for code splitting
- Image optimization (WebP format)
- Infinite scroll with intersection observer

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16. Technical Specifications

16.1 File Upload Limits

Type	Maximum Size
Video Files	2 GB
Thumbnails	10 MB
Ad Creatives (Video)	100 MB
Ad Creatives (Image)	5 MB

16.2 Supported Video Formats

Extension	MIME Type
.mp4	video/mp4 (recommended)
.mov	video/quicktime
.webm	video/webm
.avi	video/x-msvideo
.mkv	video/x-matroska

16.3 Cooldown Systems

System	Duration	Scope
Content XP (VOD)	24h	Per video/user
Content XP (LIVE)	None	While broadcasting
View Tracking	24h	Per video/user
Ad Rewards	24h	Per campaign/user

17. Glossary

Term	Definition
Angle Stream	Individual camera feed within a multi-camera broadcast
Base	Coinbase's Ethereum Layer 2 rollup — Circuit's primary blockchain
CDN	Content Delivery Network for global content distribution
CDP	Coinbase Developer Platform — social login with embedded EVM wallets
CircuitPaymentSplitter	Smart contract for atomic USDC PPV payment splitting
CircuitTipSplitter	Smart contract for atomic USDC tip splitting
CircuitTicketSale	Smart contract for atomic USDC payment + ERC-721 ticket mint
Director	Real-time camera switching interface for multi-cam broadcasts
Entitlement	Access grant for gated content
ERC-721	Non-fungible token standard used for ticket NFTs
ETH	Native Base chain currency, used for gas and tips
HLS	HTTP Live Streaming protocol
Heartbeat	Periodic client-server ping for session maintenance
Multi-Cam	Multi-camera broadcast configuration with synchronized angle streams
PDT Sync	Program Date-Time synchronization for aligning multi-camera HLS streams
PPV	Pay-Per-View, one-time purchase model
RTMP	Real-Time Messaging Protocol for streaming
SIWE	Sign-In with Ethereum (EIP-4361) authentication standard
Smart Wallet	Coinbase Smart Wallet for gasless onboarding

Ticket Event	Scheduled event with purchasable ticket tiers and atomic on-chain NFT minting
Token Gating	Access control via ERC-721 ownership or ERC-20/ETH balance verification
USDC	Circle-issued USD stablecoin on Base (6 decimals)
VOD	Video-on-Demand, pre-recorded content
XP	Experience Points, platform reward currency

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