

Product Requirements Document: Global Streaming Platform

1. Executive Summary

A next-generation global streaming platform combining VOD (AVOD/TVOD/SVOD), Live TV (FAST channels), and Pay-Per-View capabilities with advanced CDN infrastructure and AI-powered features.

2. Product Vision

Create a unified streaming platform that rivals Netflix, PlutoTV, and YouTube TV combined, with superior global reach through proprietary CDN infrastructure and AI-driven personalization.

3. Core Features

3.1 Video-on-Demand (VOD)

- **AVOD:** Ad-supported free content with SSAI/CSAI
- **SVOD:** Subscription tiers (Basic, Standard, Premium, Family)
- **TVOD:** Rent/purchase individual titles (48hr rental, permanent ownership)
- Content library: 50,000+ titles at launch
- Multiple audio tracks and subtitle support (100+ languages)
- Download for offline viewing (mobile/tablet)

3.2 Live Streaming

- **FAST Channels:** 100+ curated 24/7 linear channels
- **Live Events:** PPV boxing, football, concerts
- **Live TV:** 200+ global TV channels (region-specific)
- DVR functionality (Cloud DVR, 50-500 hours based on tier)
- Start Over, Pause Live TV, Catch-up TV (7-30 days)

3.3 Monetization Models

- **Subscriptions:** Monthly/Annual recurring billing
- **Transactional:** PPV events (\$4.99-\$99.99)
- **Advertising:** Pre-roll, mid-roll, post-roll, display ads
- **Hybrid:** Ad-supported tiers with premium upgrades

3.4 User Experience

- Unified EPG across broadcast, FAST, and VOD
- AI-powered recommendations (watch next, because you watched)
- Personalized home screen per profile
- Multi-profile support (up to 5 profiles per account)
- Parental controls with PIN protection
- Continue watching across devices
- Watchlist and favorites

3.5 Technical Capabilities

- **Streaming Protocols:** HLS, DASH, LL-HLS, WebRTC
- **Codecs:** H.264, H.265/HEVC, VP9, AV1
- **Resolutions:** 480p, 720p, 1080p, 4K UHD, 8K (future)
- **HDR:** HDR10, Dolby Vision, HLG
- **Audio:** Stereo, 5.1, Dolby Atmos
- **Adaptive Bitrate:** 500 kbps - 25 Mbps based on network
- **Low Latency:** <3s glass-to-glass for live events

4. Platform Support

4.1 Mobile

- iOS 14+ (iPhone, iPad)
- Android 8.0+ (phones, tablets)
- Download for offline playback
- Picture-in-Picture support
- Chromecast/AirPlay support

4.2 Web

- Modern browsers (Chrome, Firefox, Safari, Edge)
- Responsive design (desktop, tablet)
- WebRTC for low-latency live streams
- Progressive Web App (PWA)

4.3 Smart TVs & Streaming Devices

- Android TV / Google TV
- Samsung Tizen
- LG webOS
- Amazon Fire TV
- Roku TV/Devices
- Apple tvOS
- Titan OS, XClass TV, VIDAA, Sky OS, PatchWall

4.4 Game Consoles (Phase 2)

- PlayStation 4/5
- Xbox One/Series X|S

5. Infrastructure Requirements

5.1 CDN Architecture

- **Tier 1 PoPs:** London, Ashburn, Lagos, Singapore, São Paulo
- **Technology:** Apache Traffic Server + Apache Traffic Control
- **Caching:** Aerospike for hotness tracking and TTL management
- **Edge Nodes:** 100+ globally (via on-demand providers)
- **SLA:** 99.99% uptime, <400ms edge latency globally

5.2 Transcoding

- **Engine:** GStreamer + OvenMediaEngine
- **On-demand:** VOD transcoded to ABR ladder (6-8 profiles)
- **Live:** Real-time transcoding for FAST/Live TV
- **SmallPixel SDK:** Client-side AI upscaling for bandwidth efficiency

5.3 Storage

- **Hot Storage:** NVMe/TCP (Longhorn) for active content
- **Warm/Cold:** MinIO with erasure coding
- **Global:** Cloudflare R2 + Cache Reserve
- **Database:**
 - PostgreSQL (user data, metadata)
 - Cassandra (analytics, time-series)
 - Aerospike (session, hotness scores)
 - Redis (real-time caching)

5.4 Security

- **DRM:** Widevine L1/L3, PlayReady, FairPlay
- **Encryption:** AES-256 for content, TLS 1.3 for transport
- **Authentication:** JWT tokens, OAuth 2.0
- **Geo-blocking:** IP-based content restrictions
- **Watermarking:** Forensic watermarks for premium content

6. AI/ML Features

6.1 Recommendation Engine

- Collaborative filtering (user-user, item-item)
- Content-based filtering (genre, actors, directors)
- Deep learning (neural collaborative filtering)
- Real-time personalization (<100ms inference)
- A/B testing framework for recommendation algorithms

6.2 Content Understanding

- Automatic tagging (scene detection, object recognition)
- Thumbnail generation (AI-selected key frames)
- Content moderation (NSFW detection)
- Sentiment analysis on user reviews

6.3 Network Optimization

- **CDN Selection:** ML-based optimal PoP selection per user
- **ABR Logic:** Predictive quality adjustment
- **Pre-fetching:** Predict next episode/content

6.4 SmallPixel Integration

- Client-side SDK for AI upscaling
- Reduce bandwidth by 30-50% for same perceived quality
- Real-time super-resolution (480p → 1080p)

7. Analytics & Monitoring

7.1 User Analytics

- Watch time, completion rate, drop-off points
- Engagement metrics (likes, shares, watchlist adds)
- Cohort analysis, churn prediction
- Revenue attribution (ads, subscriptions, transactions)

7.2 Content Analytics

- Performance by title, genre, region
- Trending content (real-time)
- Content ROI analysis

7.3 Technical Metrics

- CDN hit ratio (target: $\geq 90\%$)
- Buffering rate (target: $< 0.5\%$)
- Startup time (target: $< 2\text{s}$)
- Quality of Experience (QoE) score per stream
- Error rates, crash analytics

7.4 Tools

- Real-time dashboards (Grafana)
- Business intelligence (Looker, Tableau integration)
- Alerting (PagerDuty integration)

8. Content Management

8.1 CMS Capabilities

- Multi-tenant architecture
- Metadata management (IMDb, TVDB, TMDB integration)
- Artwork management (posters, banners, thumbnails)
- Rights management (territories, windows, blackouts)
- Scheduling system for FAST channels and live events

8.2 Content Ingestion

- Professional feeds (AT&T Vyvx, Lumen, Globecast)
- Cloud storage (S3, Aspera, Signiant)
- Live capture from satellite (DVB-NIP) and 5G Broadcast
- API integration for third-party content

8.3 Workflow Automation

- Automated transcoding pipelines
- Quality control (automated and manual review)
- Metadata enrichment
- Distribution scheduling

9. Business Requirements

9.1 Pricing Tiers

- **Free (AVOD):** 3-4 min ads/hour
- **Basic:** \$4.99/mo (HD, 1 screen, ads)
- **Standard:** \$9.99/mo (HD, 2 screens, fewer ads)
- **Premium:** \$14.99/mo (4K, 4 screens, no ads, downloads)
- **Family:** \$19.99/mo (4K, 6 screens, 5 profiles, no ads)

9.2 Payment Processing

- Stripe (primary), PayPal, Apple Pay, Google Pay
- Local payment methods (region-specific)
- Recurring billing engine with retry logic
- Tax calculation (Avalara integration)

9.3 Subscriber Management

- Self-service account management
- Plan upgrades/downgrades (prorated)
- Grace period for failed payments (7 days)
- Cancellation flow with retention offers

10. Compliance & Legal

10.1 Privacy

- GDPR compliance (EU)
- CCPA compliance (California)
- Data retention policies (user data, logs)
- Cookie consent management

10.2 Accessibility

- WCAG 2.1 AA compliance
- Closed captions, audio descriptions
- Screen reader support
- Keyboard navigation

10.3 Content Ratings

- MPAA, TV Parental Guidelines (US)
- BBFC (UK), FSK (Germany), etc.
- Age-gate enforcement

11. Launch Strategy

11.1 Phase 1 (Months 1-6): MVP

- VOD platform (AVOD/SVOD)
- Web + Mobile (iOS, Android)
- 3 Tier 1 PoPs (London, Ashburn, Lagos)
- 10,000 titles
- Basic recommendation engine

11.2 Phase 2 (Months 7-12): Expansion

- FAST channels (50+)
- Smart TV apps (top 3 platforms)
- All 5 Tier 1 PoPs operational
- 30,000 titles
- Advanced AI recommendations

11.3 Phase 3 (Months 13-18): Premium Features

- Live PPV events
- DVR functionality
- All TV platforms
- 50,000+ titles
- Full analytics suite

12. Success Metrics (Year 1)

- **Subscribers:** 5M (target), 2M (minimum viable)
- **Monthly Active Users:** 10M
- **Avg. Watch Time:** 45 min/day per user
- **Churn Rate:** <5% monthly
- **CDN Hit Ratio:** ≥90%
- **P95 Startup Time:** <2s
- **Buffering Ratio:** <0.5%
- **Revenue:** \$50M ARR (70% subscriptions, 20% ads, 10% TVOD/PPV)

13. Key Risks & Mitigation

| Risk | Impact | Mitigation |
|-------------------------|--------|--|
| Content licensing costs | High | Negotiate multi-territory deals, invest in originals |
| CDN scalability | High | Multi-CDN strategy, auto-scaling edge nodes |
| Competitive market | Medium | Differentiate via AI features, global reach |
| Regulatory changes | Medium | Legal team monitoring, compliance framework |
| Technical debt | Medium | Microservices architecture, continuous refactoring |

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