

PSA Selection System Documentation

Executive Overview

The PSA (Public Service Announcement) selection system is a sophisticated content scheduling mechanism that **combines deterministic scoring with minimal randomization** to ensure fair, diverse, and contextually appropriate PSA placement throughout broadcast schedules. Contrary to common perception, PSAs are **not selected randomly** but through a carefully designed algorithm that balances multiple factors to achieve optimal distribution.

Key Principles

- **Deterministic Selection:** PSAs are chosen based on calculated scores, not random chance
- **Smart Distribution:** Ensures PSAs don't cluster or repeat themes
- **Fairness Through Rotation:** All PSAs get airtime through systematic rotation
- **Context Awareness:** Considers surrounding content to avoid theme conflicts

PSA Classification

Content Type Definition

PSAs are identified by the content type code **PSA** in the database. They typically fall into the “**spots**” duration category (30-120 seconds), though some may be classified as “**id**” (5-30 seconds) for very brief announcements.

Common PSA Themes

- Public Safety (gun safety, emergency preparedness)
- Health Awareness (vaccination, medical screenings)
- Community Services (housing assistance, job programs)
- Environmental Messages (recycling, conservation)
- Civic Engagement (voting, census participation)

Selection Algorithm

1. Base Score Calculation

Every PSA starts with a base score of **100 points** plus a small random variation (-5 to +5 points) to break ties between otherwise identical content.

```
score = 100 + random.uniform(-5, 5) # Base score with minimal randomization
```

2. Scoring Factors

Freshness Component (Implicit)

- Newer PSAs receive priority through lower play counts
- Recently encoded content appears higher in initial queries

Play History Penalties PSAs that have aired recently receive progressive penalties: - **Within 1 hour:** -100 points (heavy penalty) - **1-2 hours:** -50 points (medium penalty) - **2-4 hours:** -25

points (light penalty) - **4-6 hours**: -10 points (very light penalty) - **3+ plays in schedule**: -50 points \times (plays - 2)

Content Type Specific Rules PSAs have a **2-hour minimum replay delay** by default, which is shorter than most content types, allowing them to rotate more frequently throughout the day.

Theme Conflict Prevention PSAs in the “spots” category are subject to strict theme checking:
- **Same theme back-to-back**: -200 points (heavy penalty) - Prevents viewer fatigue from repetitive messaging - Ensures diverse public service messages

Featured Content Boost PSAs can be marked as “featured” for time-sensitive campaigns:
- **Featured boost**: +150 points - Used for urgent public safety messages - Emergency announcements get priority placement

3. Selection Process

1. **Query Available PSAs**: System retrieves PSAs that:
 - Haven't exceeded replay delays
 - Aren't expired
 - Match the requested duration category
 - Haven't been explicitly excluded
2. **Calculate Scores**: Each candidate PSA receives a score based on:
 - Base score (100 ± 5)
 - Play history penalties
 - Theme conflict penalties
 - Featured status bonuses
3. **Select Best Candidate**: The PSA with the highest score is selected
 - Ties broken by the small random component
 - If all scores are negative, first available is used
4. **Update Tracking**: Selected PSA is recorded to prevent immediate replay

Randomization Elements

Minimal Random Components

1. **Tie Breaking**: ± 5 points added to base score
 - Prevents identical content from always appearing in same order
 - Ensures variety when multiple PSAs have similar scores
2. **Query Ordering**: SQL queries include `ORDER BY RANDOM()` as final sort
 - Only affects items with identical priority
 - Provides variety in candidate pool
3. **No Pure Random Selection**: System never randomly picks from available PSAs
 - Every selection based on calculated scores
 - Randomness only provides minor variations

Diversity Mechanisms

1. Rotation Through Inventory

- All PSAs get airtime through score-based rotation

- Recently played content penalized, giving others opportunity
- Natural cycling through entire PSA library

2. Theme Distribution

- Strict theme conflict prevention for spots category
- Ensures variety of public service messages
- Prevents clustering of similar topics

3. Time-Based Distribution

- 2-hour minimum spacing between same PSA
- Shorter delay allows more frequent rotation than other content
- Ensures important messages reach different audiences

4. Category Mixing

- PSAs scheduled as part of “spots” rotation
- Mixed with other short-form content
- Prevents PSA clustering

Special Handling

1. Emergency PSAs

- Can be marked as “featured” for immediate priority
- Bypass normal rotation for urgent messages
- Still subject to minimum replay delays

2. Campaign PSAs

- Time-sensitive campaigns use expiration dates
- Automatically removed from rotation when expired
- Featured status for launch periods

3. Themed Periods

- Special handling during awareness months
- Increased priority for relevant PSAs
- Manual featuring of campaign content

Configuration Parameters

Default PSA Settings

```
{
  "content_type_delays": {
    "psa": 2 // 2-hour minimum between plays
  },
  "scoring_weights": {
    "base_score": 100,
    "category_weight": 0.5
  }
}
```

```

    "featured_boost": 150,
    "theme_conflict_penalty": 200,
    "recent_play_penalty": 100
  }
}

```

Tunable Parameters

- **Replay Delay:** Minimum hours between same PSA (default: 2)
- **Featured Boost:** Score bonus for featured PSAs (default: 150)
- **Theme Penalties:** Penalty for theme conflicts (default: 200)

Common Misconceptions

“PSAs are selected randomly”

Reality: PSAs are selected through deterministic scoring with only minimal randomization for tie-breaking. The selection process is highly predictable and based on objective criteria.

“Some PSAs never get played”

Reality: The scoring system ensures all active PSAs eventually play through natural rotation as others accumulate penalties from recent plays.

“PSAs cluster together”

Reality: Theme conflict prevention and category rotation specifically prevent PSA clustering, ensuring they’re distributed throughout the schedule.

“Important PSAs can’t be prioritized”

Reality: The featured content system allows urgent or important PSAs to receive significant scoring boosts while still maintaining fair rotation.

Best Practices

1. Content Preparation

- Assign clear themes to enable conflict prevention
- Set appropriate expiration dates for campaigns
- Use descriptive titles for better tracking

2. Campaign Management

- Mark time-sensitive PSAs as featured
- Set expiration dates to auto-remove outdated content
- Monitor play counts to ensure distribution

3. Inventory Balance

- Maintain diverse PSA library (15+ active PSAs)

- Regular content refresh to prevent staleness
- Balance themes across inventory

4. Performance Optimization

- Monitor replay delays to ensure adequate rotation
- Adjust featuring based on campaign needs
- Review theme conflicts in reports

Monitoring and Reporting

Available Metrics

- PSA play frequency by content
- Theme distribution analysis
- Replay delay compliance
- Featured content performance

Key Performance Indicators

- **Unique PSA Ratio:** Variety of PSAs played daily
- **Theme Diversity Score:** Distribution of different themes
- **Replay Compliance:** Adherence to minimum delays
- **Coverage Metrics:** Reach across different dayparts

Technical Implementation

Database Structure

PSAs are stored in the `assets` table with:

- `content_type = 'PSA'`
- `duration_category` (usually 'spots')
- Theme information in metadata
- Featured flags in `scheduling_metadata`

Selection Query

The system uses sophisticated SQL queries that:

- Filter by availability and expiration
- Calculate play history
- Order by multiple factors
- Include slight randomization

Score Calculation

Implemented in Python with:

- Clear scoring logic
- Extensive logging for debugging
- Configurable parameters
- Performance optimization

Conclusion

The PSA selection system represents a careful balance between predictability and variety. While not truly random, it achieves the appearance of randomness through intelligent rotation and scoring that ensures:

1. **Fair Distribution:** All PSAs receive airtime
2. **Contextual Appropriateness:** Theme conflicts avoided
3. **Campaign Effectiveness:** Priority content gets visibility
4. **Viewer Experience:** Diverse messaging without repetition

The system's sophistication ensures that public service messages reach their intended audiences effectively while maintaining the quality and variety expected in professional broadcast operations.