The Smart TV Operating System

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UHD In China

- UHD is developing fast in China
  - Policy support
  - 2 formal UHD channels
  - Transmission Bandwidth increase
  - More than 100M UHD terminals
UHD Trend

- Customer recognition of UHD
  - Focus more on User Experience
  - Willing to pay for UHD
- More services
  - VR/AR
  - Online Education
  - UHD games
  - ...

Problems

- Fragmentation
  - High Cost to develop new services
  - Difficult to deploy services
  - No unified security scheme
  - ...

The main purpose of TVOS is to solve the problem of technology fragmentation
TVOS Vision

To be a global leading Smart Media Terminal OS

✓ Collaborate with key technologies to build a smart media terminal OS with ultimate experience, green & security, rich services, and future-oriented.

✓ Build an application ecosystem to support long-term development of smart media terminals.
TVOS Target

✓ Service Extension Efficiency
✓ User Experience Consistency
✓ Development Efficiency
✓ Cross-hardware Platform
✓ System-level security scheme
✓ Sustainable development
TVOS Architecture

- **Application Layer**
  - Java Apps: Reuse mature ecosystem
  - Web Apps: For the future long term evolution
  - Python Apps: For Headless & Lightweight apps

- **Application Framework**
  - TVOS Java API
  - Java Application framework
  - TVOS Web API
  - Web Application Framework
  - TVOS Python API
    - Python Application Framework

- **Execution Environment**
  - TVM
  - Web Runtime
  - Python Runtime

- **Component Layer**
  - Component API (different frameworks share the same APIs)
    - DTV
    - CAS/DRM
    - Media Engine
    - Application Manager
    - Video Phone
    - Other Component

- **HAL**
  - Linux Kernel
  - DTS
  - DRV

- **SOCs and Hardware reference design**
TVOS Architecture Features

- **Layered architecture:** Cross-hardware platform; Basic media services; Supports multiple application frameworks. Can be tailored and combined.

- Security framework based on REE/TEE

- Application Manager supports multiple application types

- Unified Media Engine based on Gstreamer

- HTML5 Engine based on chromium
TVOS Key Features

TVOS embeds many Broadcast and Broadband features

- DTV broadcast (-C/-T/-ABS) with CAS
- IP broadcast (multi-cast) with CAS
- VOD through QAM
- VOD through IP (HLS/Dash) with DRM support
- Video Phone
- Cloud Game
- VR (Local & Cloud)
- Second-screen
- ...
The TVOS team is officially set up by Technology Division of NRTA. Currently, there are more than 120 members.
The Organization Structure of TVOS

Manager Groups

- Linux Kernel
- Broadcast
- Media
- Security
- Device Management
- API Management
- User Interface
- HTML5
- Smart Home
- Smart TV with DVB
- Value Added Service
- Commercial Support

Topic Groups

- Strategy & Requirement
- Version Integration
- Test
- IT Support
Collaborative Work Platform

- Jira
- Git
- Gerrit
- TVOS
- Confluence
- Test tool
TVOS Standards

Industry standards in China

- 2016.12 GY/T 303.1 《Functions and Architecture》
- 2016.12 GY/T 303.2 《Security》
- 2018.7 GY/T 303.3 《API》
- 2018.7 GY/T 303.4 《HAL》
- 2018.7 GY/T 303.5 《Component API》
- 2018.7 GY/T 303.6 《TEE API》
- 2018.7 GY/T 303.7 《Conformance test》
TVOS Standards

International Standards

✓ J.1201(J.stvos-spec-req) in ITU-T SG9
✓ J.stvos-spec-arch in ITU-T SG9
✓ J.stvos-sec in ITU-T SG9
✓ J.stvos-hal in ITU-T SG9
What’s Next—General

- Commercial Promotion
- Full Open Source
- Internationalization
- Application Ecosystem Construction
What’s Next—Technical

- Python Runtime
- Gateway profile
- AI framework
- Voice control framework
- Secure OS → OP-TEE
- Emulation
- Big Data collection
- TVOS link for smart home connection
- Video Communication enhancement
- Audio Manager
- ...
Welcome to join TVOS
Thank you!