冠捷科技
用心專注　領航視界

TPAPI For Power

Xiamen Innovation Center
厦门创新中心
TPV Display Technology (Xiamen) Co.,Ltd.
冠捷显示科技企业（厦门）有限公司
Addr: No.1, Xianghai Road, Xiamen Torch Hi-Tech Industrial Development Zone, China
地址：中国厦门火炬高新区（翔安）产业区翔海路1号
邮编：361101
Ext Tel: 6792
E-mail: jielong.lin@tpv-tech.com

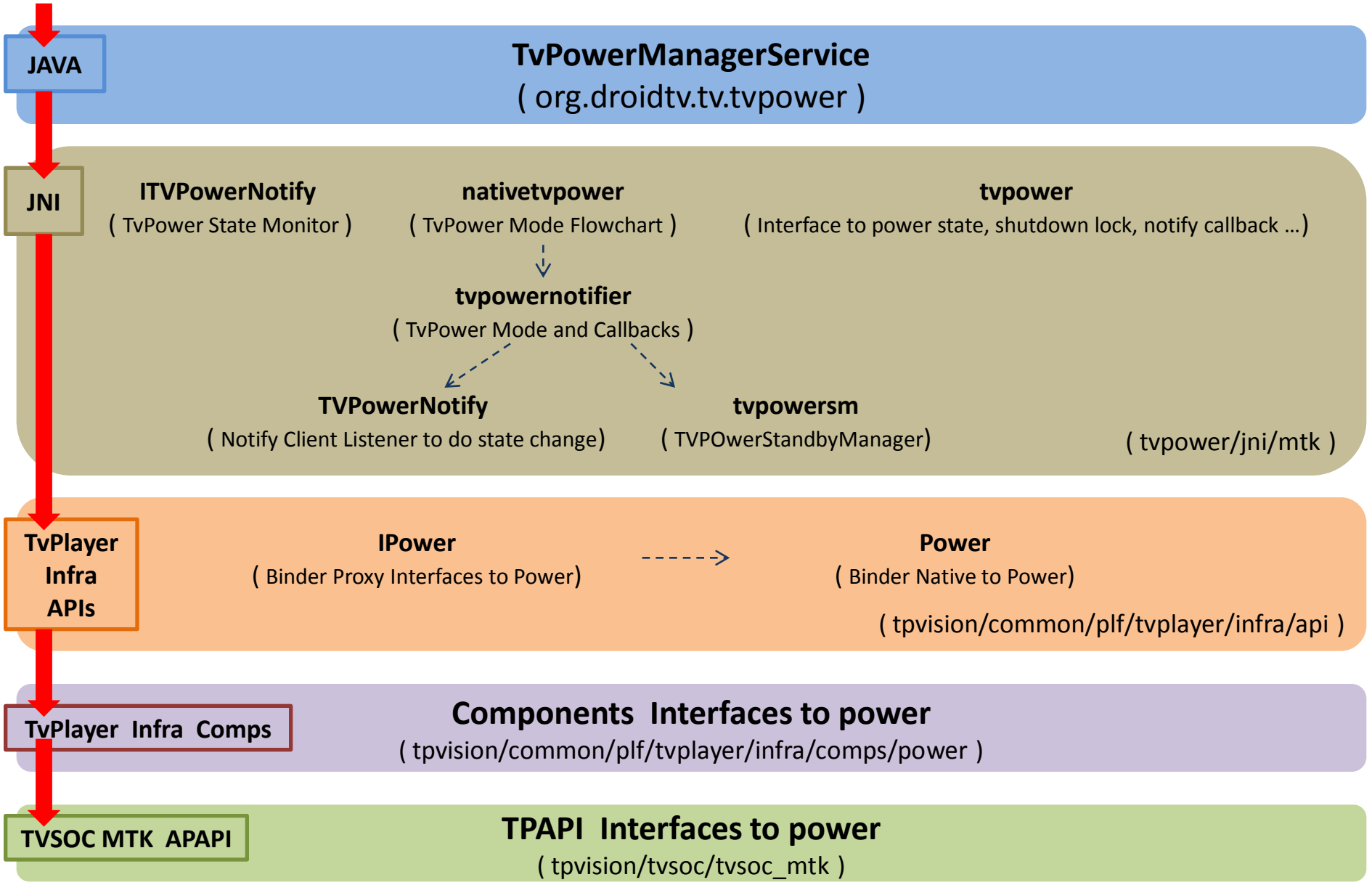
jielong.lin（林杰龙）

2015.10.26

Introduce Index

- 1. TPAPI Power APIs
- 2. When and How to Set LastPowerMode In Nvm
- 3. When and How to Use LastPowerMode In Nvm

Architect



TPAPI Power Functions Classification

TPAPI Power

Power Behavior

tpapi_pow_ColdReboot
tpapi_pow_SetPowerMode

```
/** @brief Power Mode = { ON,Standby,LowPower, DDR } */
typedef enum _tpapi_pow_mode
{
    /** @brief Power Mode to ON, added for completeness,
     *  assume that it will never be called from SoC to SM */
    TPAPI_POW_ModeOn              = 0x1,
    /** @brief Power Mode to Standby mode. Before calling
     *  this RC, LKB, GPIO and CEC wakeup reasons should
     *  be programmed. */
    TPAPI_POW_ModeStandby         = 0x2,
    /** @brief Low Power mode, only LKB Power Wakeup works */
    TPAPI_POW_ModeVirtualOff      = 0x3,
    /** @brief Power Mode to DDR Selfrefresh, in this mode
     *   Power to DDR will me ON */
    TPAPI_POW_ModeDDRStandby      = 0x4,
} tpapi_pow_mode;
```

Wakeup Reason/Sources

tpapi_pow_ProgramWakeupReasons
tpapi_pow_GetWakeupInfo
tpapi_pow_ProgramWakeupKeysRc
tpapi_pow_GetWakeupDetailsRc
tpapi_pow_ProgramWakeupLocalKeyboard
tpapi_pow_GetWakeupDetailsLocalKeyboard
tpapi_pow_ProgramWakeupCec
tpapi_pow_GetWakeupDetailsCec

```
/** @brief Power wakeup reasons */
#define TPAPI_POWER_WAKEUPREASON_ALARM                0x0001
#define TPAPI_POWER_WAKEUPREASON_RC                   0x0002
#define TPAPI_POWER_WAKEUPREASON_LKB                  0x0004
#define TPAPI_POWER_WAKEUPREASON_CEC                  0x0008
#define TPAPI_POWER_WAKEUPREASON_GPIO                 0x0010
#define TPAPI_POWER_WAKEUPREASON_BOOT                 0x0020
#define TPAPI_POWER_WAKEUPREASON_COLDBOOT             0x0040
#define TPAPI_POWER_WAKEUPREASON_FAST_COLDBOOT        0x0080
#define TPAPI_POWER_WAKEUPREASON_STARTUP_TIMEOUT      0x0100
#define TPAPI_POWER_WAKEUPREASON_ALIVE_TIMEOUT        0x0200
#define TPAPI_POWER_WAKEUPREASON_HW_WATCHDOG_TIMEOUT  0x0400
#define TPAPI_POWER_WAKEUPREASON_POWERDIP             0x0800
#define TPAPI_POWER_WAKEUPREASON_UART                 0x1000
#define TPAPI_POWER_WAKEUPREASON_WOWLAN               0x2000
// added by xmic james.liu for separating WoWLan and WoLan
#define TPAPI_POWER_WAKEUPREASON_WOLAN                0x4000
```

NVM Access

tpapi_pow_GetBootLoaderParam
tpapi_pow_SetBootLoaderParam

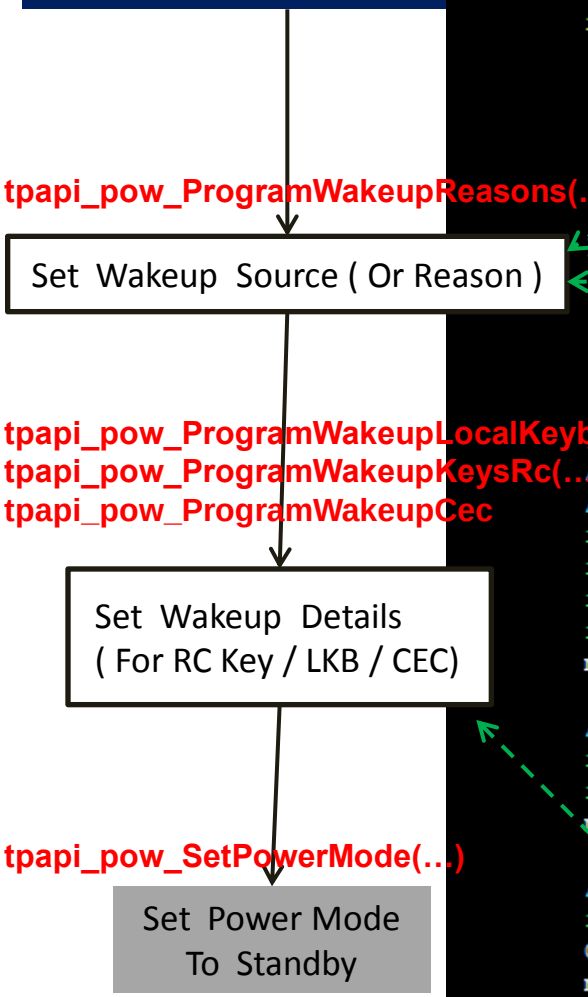
LastPowerMode is addressed in NVM:0x1000

Wakeup Source/Details


```
void TVPowerStandbyManager::SetPrograme WakeUpReasons(
    bool bIsVirtualSet,
    int iWOWLAN_Status
)
{
    if(bIsVirtualSet)
    {
        ;
        if(mIPower == NULL)
            init();
        mIPower->programWakeupReasons( POWER_WAKEUPREASON_LKB );

        /* 92 - STBY/OK
         * 91 - P+/Right
         * 90 - P-/Left
         * 89 - V-/Down
         * 88 - V+/Up
         */
        int iLKBKeys = 1;
        int iLKBCmd[] = {92};
        mIPower->programWakeupLocalKeyboard(iLKBCmd, iLKBKeys );
    }
    ...
}
```

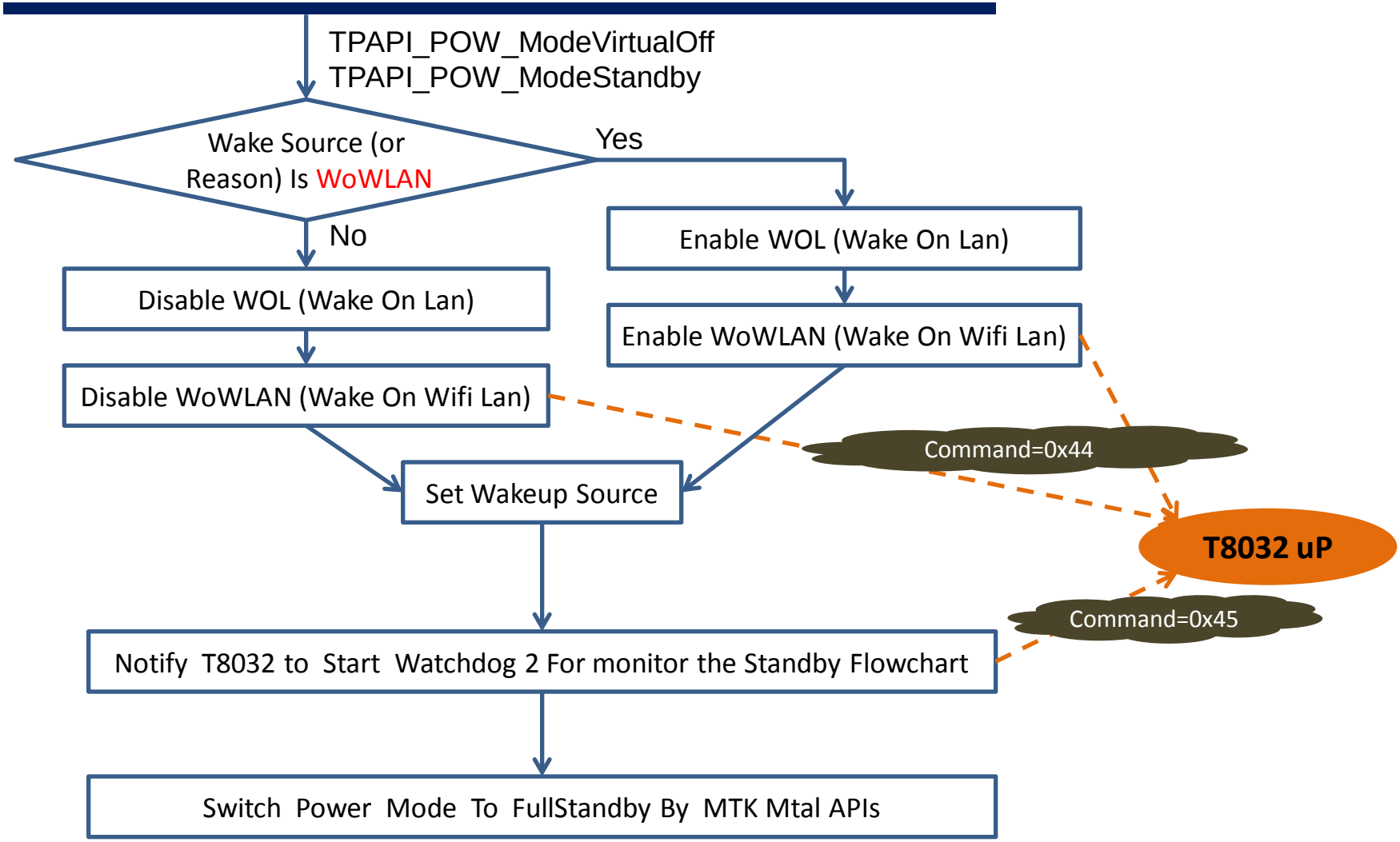
TPV
VISION INNOVATOR

Enter DdrStandby

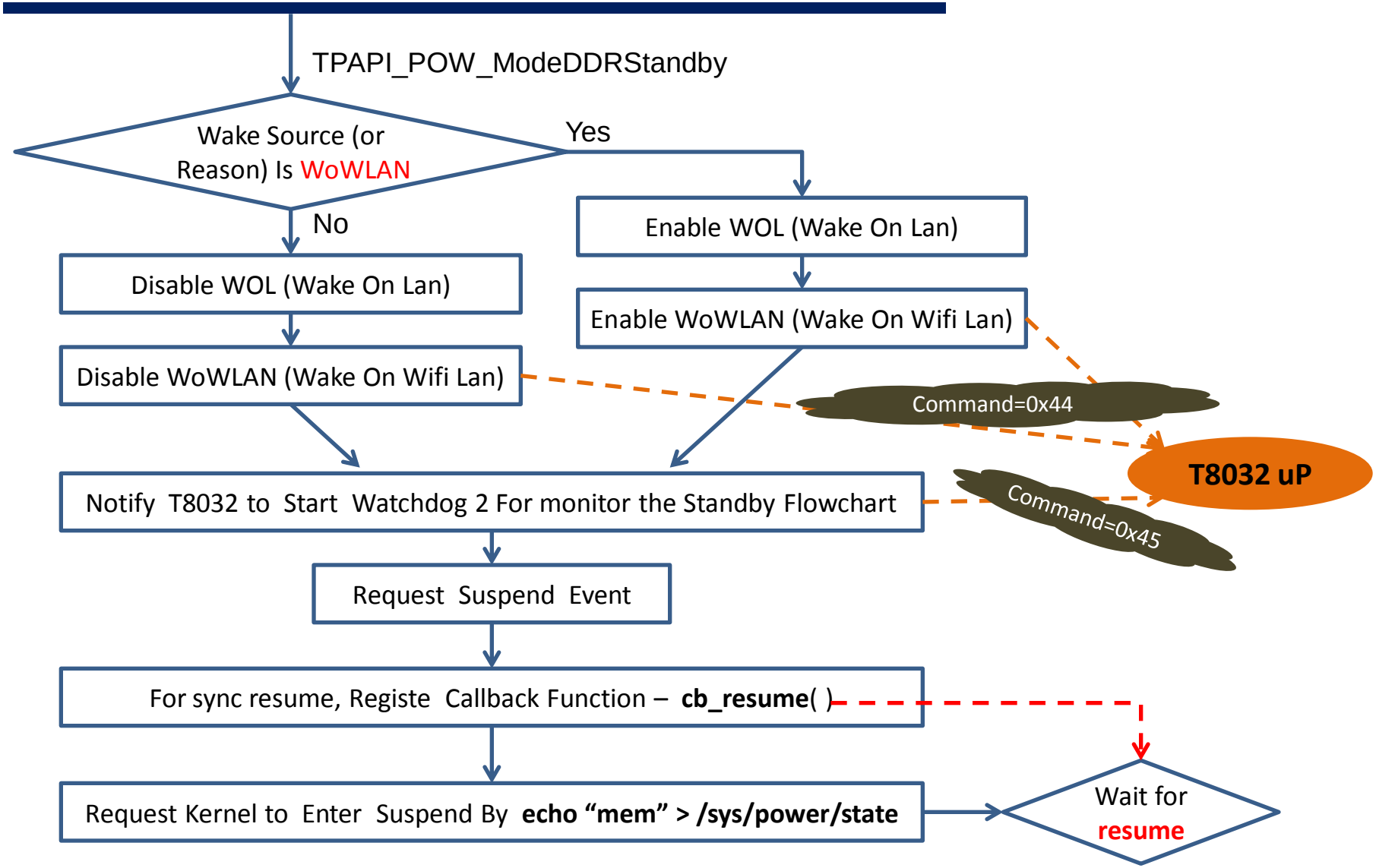



```
void TVPowerStandbyManager::SetProgrameWakeUpReasons(
    bool bIsVirtualSet, int iWOWLAN_Status
) {
    ...
    else {
        if(mIPower == NULL)
            init();
        if(iWOWLAN_Status) {
            mIPower->programWakeupReasons( POWER_WAKEUPREASON_ALARM
                                         | POWER_WAKEUPREASON_RC
                                         | POWER_WAKEUPREASON_LKB
                                         | POWER_WAKEUPREASON_CEC
                                         | POWER_WAKEUPREASON_WOWLAN
                                         );
        } else {
            mIPower->programWakeupReasons( POWER_WAKEUPREASON_ALARM
                                         | POWER_WAKEUPREASON_RC
                                         | POWER_WAKEUPREASON_LKB
                                         | POWER_WAKEUPREASON_CEC
                                         );
            //RC Keys: 84 - Home | 32/33 & 76/77 - Channel +/- | 12 - Power | 44 - Play(RC6)
            //         159 - TV | 0-9 - 0-9 | 143 - Ambilight | 118/112 - NetFlix
            int nbrKeys=21;
            int src[]   = {2,2,2,2,     2,2,2,     2,2,2,2,   2,2,2,2,  2,2,2,2, 2,2};
            int sys[]   = {0,0,0,0,     0,0,0,     0,0,0,0,   0,0,0,0,  0,0,0,0, 0,0};
            int cmd[]   = {84,32,33,76, 77,12,44, 159,0,1,2, 3,4,5,6,  7,8,9,143, 118,112};
            mIPower->programWakeupKeysRc(nbrKeys,src,sys,cmd);

            /* 92 - STBY/OK | 91 - P+/Right | 90 - P-/Left | 89 - V-/Down | 88 - V+/Up  */
            int iLKBKeys = 1;
            int iLKBCmd[] = {92};
            mIPower->programWakeupLocalKeyboard(iLKBCmd, iLKBKeys );

            //CEC: In sync with pi-782 | pi-786
            int nbrcecopcodes = 3;
            CecOpCode wk_code[] = { CEC_IMAGE_VIEW_ON, CEC_TEXT_VIEW_ON, CEC_ACTIVE_SOURCE};
            mIPower->programWakeupCec( nbrcecopcodes, wk_code );
        }
        return;
    }
```

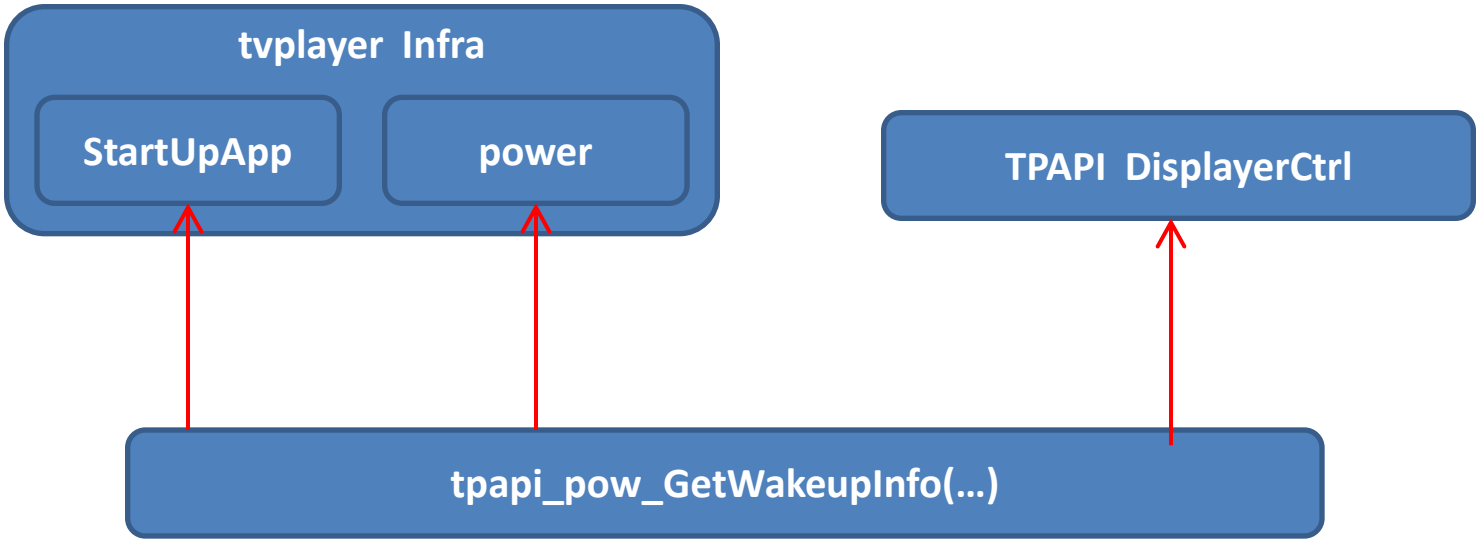
Set Power Mode(…) : Set Power To Enter FullStandby



Set Power Mode(…) : Set Power To Enter DdrStandby



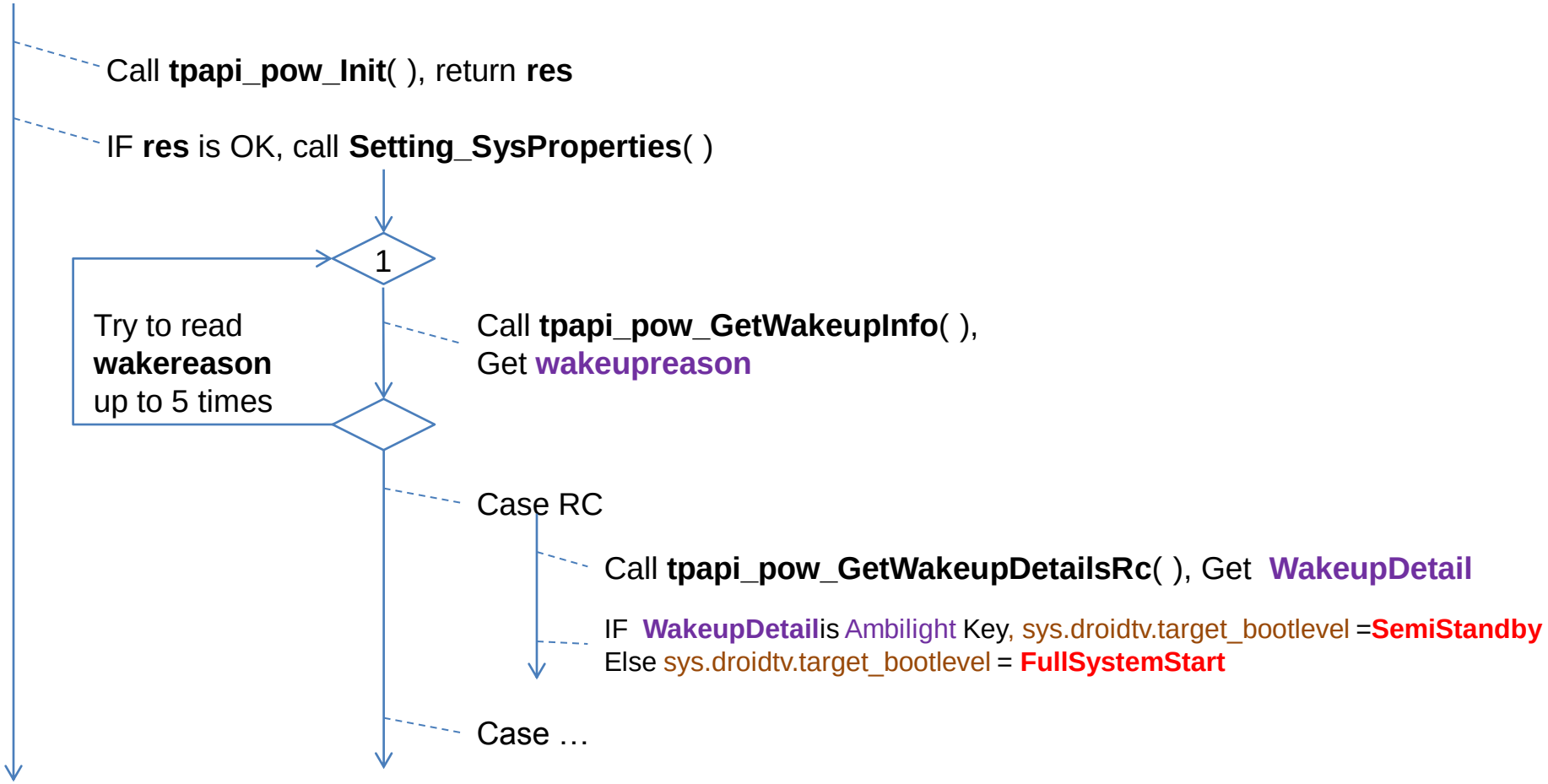
How To Use Wakeup Reason And Details



How To Use Wakeup Reason And Details

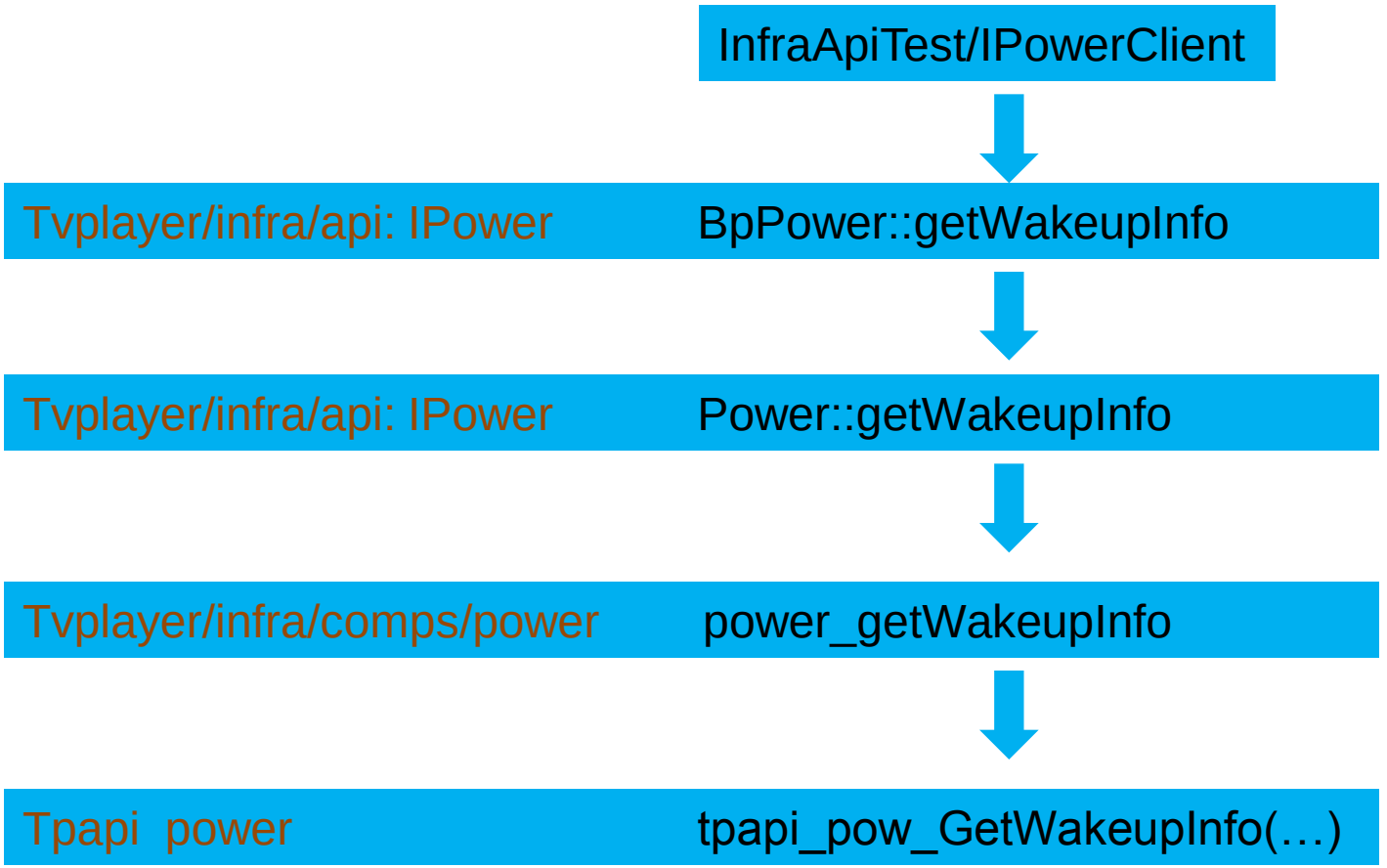
StartUpApp: Set the Property - Setting_SysProperties(…)

tvplayer/infra/comps/StartUpApp/StartUpApp.c: **main**( )



How To Use Wakeup Reason And Details

power: It is only used to test on InfraApiTest/IPowerClient



How To Use Wakeup Reason And Details

TPAPI DiaplayCtrl: it is only used to debug showing.

tpapi_displayctrl_requestDisplayState

```
int wakeupreason=0;
FResult eResult = TPAPI_OK;
eResult = tpapi_pow_GetWakeupInfo( NULL, &wakeupreason);
TPAPI_GEN_PRINT("++%s(Reason=%d) ret %d\n", __FUNCTION__, wakeupreason, eResult);
MTPMX_PANEL_PowerSequence((BOOL)TRUE); // turn on panel always regardless of wakeup reason
```

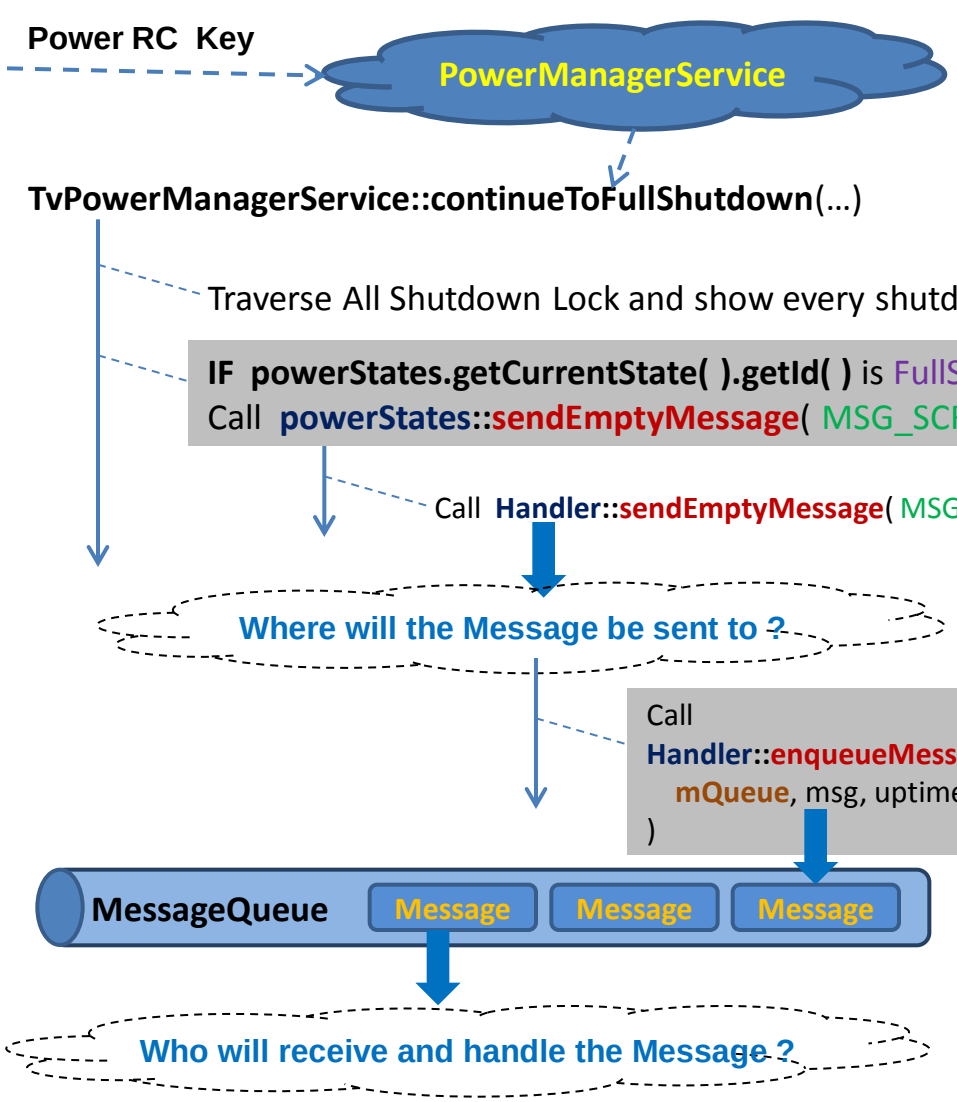
What is the **LastPowerMode** in NVM

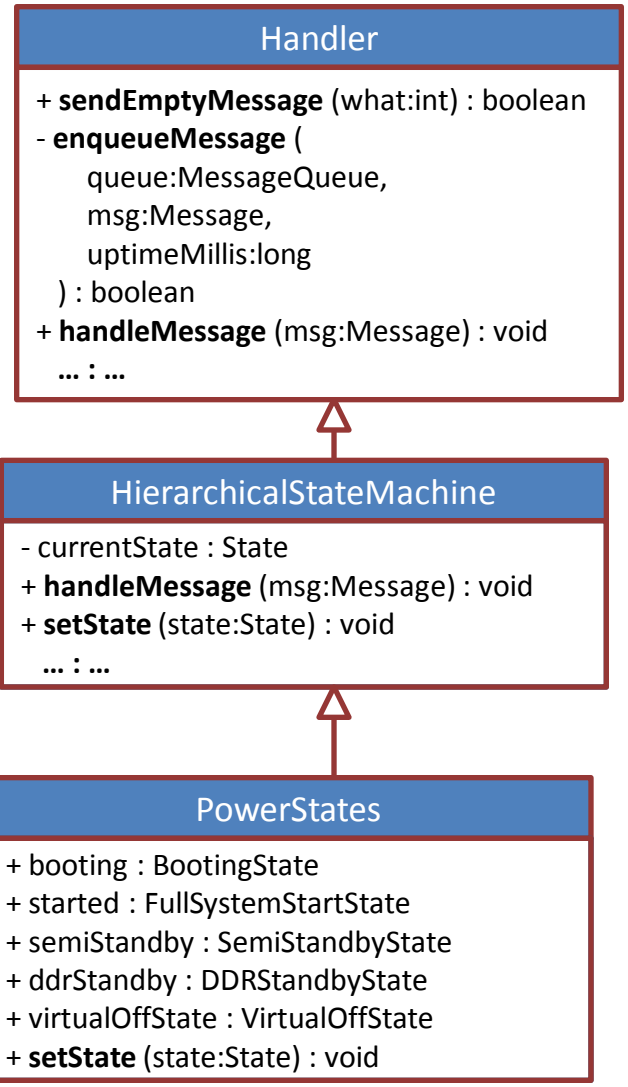
When System will enter standby mode included semi-standby, ddr-standby, full-standby and so on, the LastPowerMode is addressed in 0x1000 from the base address of the NVM and it will be writen to ‘0’ for representing the Last Mode Power is Standby. After System have already been in standby mode, turn off the AC power for a moment, and then turn on the AC power. Meanwhile System start to boot without any show, and it will enter the standby.

Why aren’t any shown? The Mtk Panel isn’t shown if LastPowerMode is set to ‘0’ in NVM and when System will enter standby, it has already set to ‘0’ before AC Power is off.

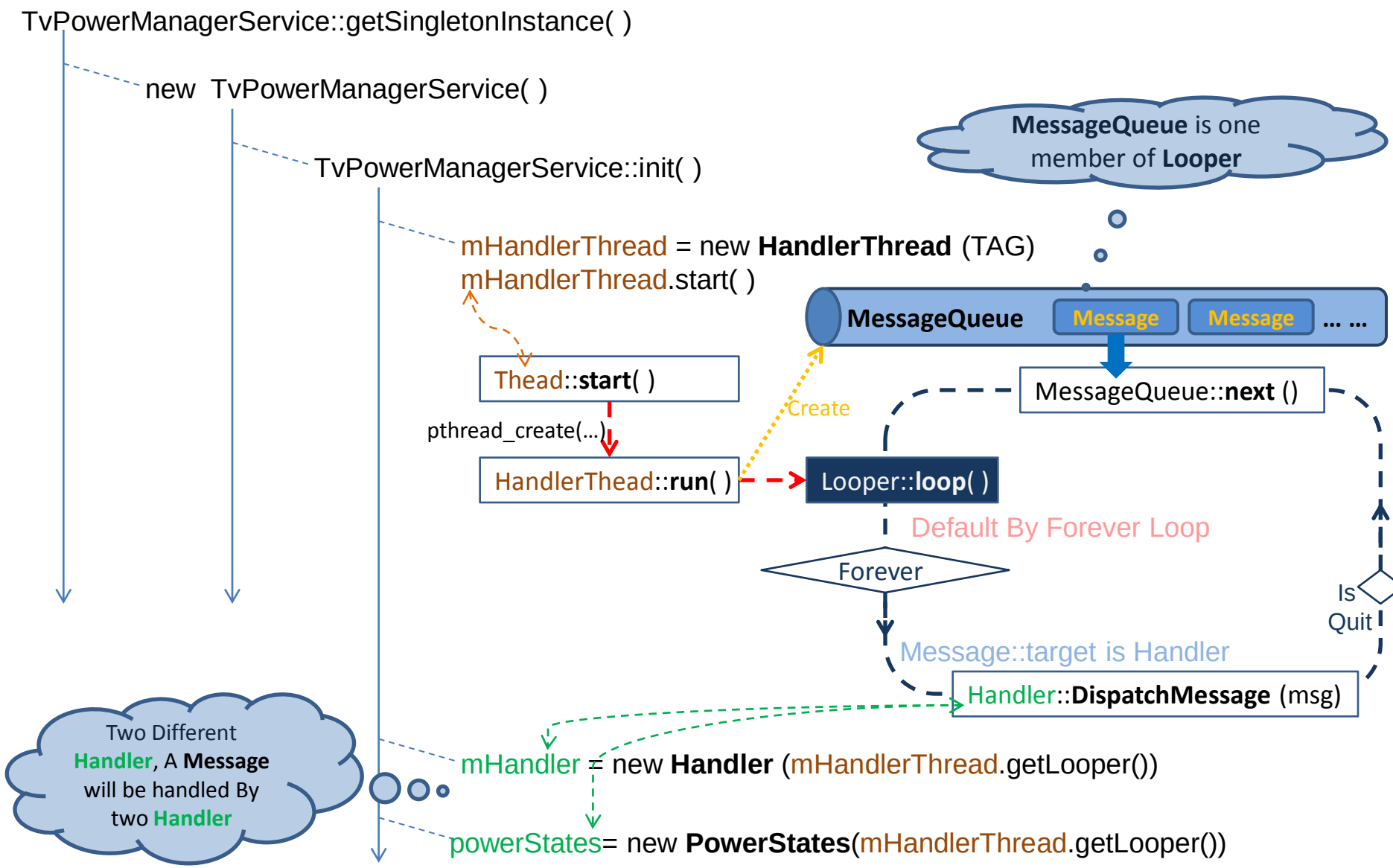
Hence, I am interested in two puzzles associated with how to set the LastPowerMode and when may TvPower implement it .

Message Dispatcher For TvPowerManagerService

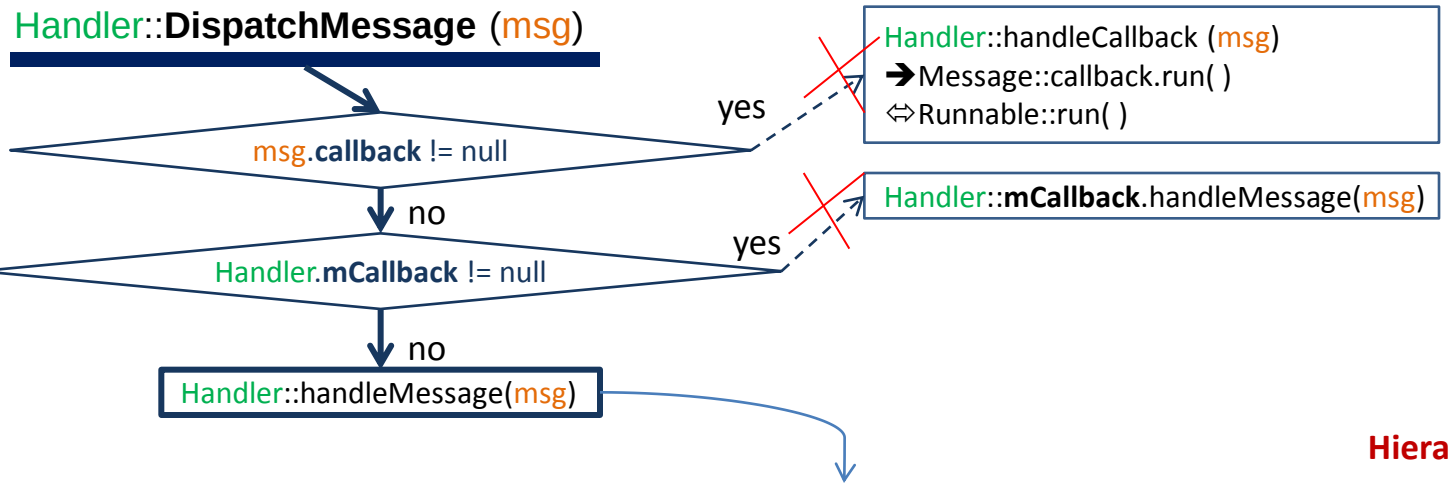


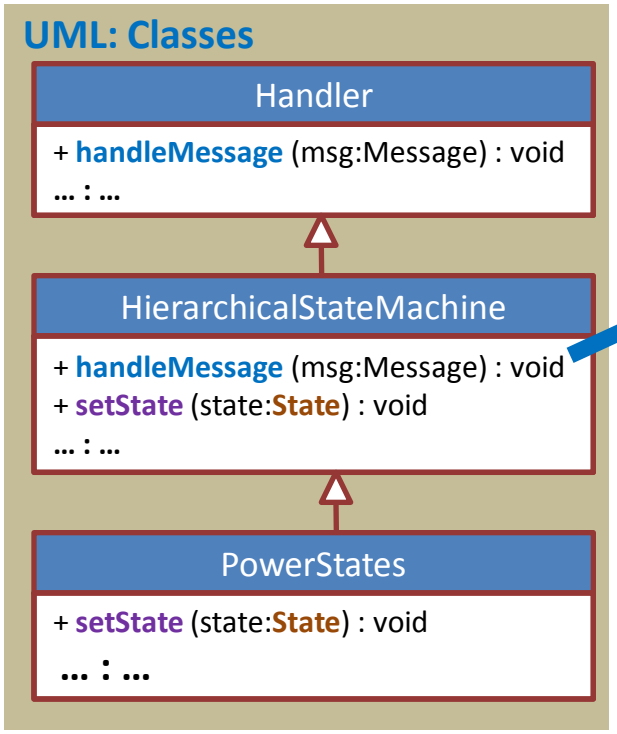


Message Dispatcher For TvPowerManagerService

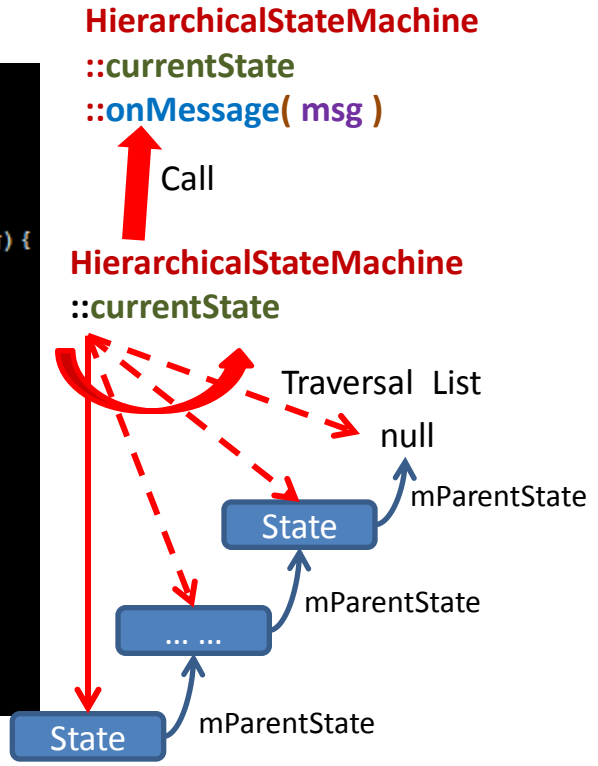


Message Dispatcher For TvPowerManagerService

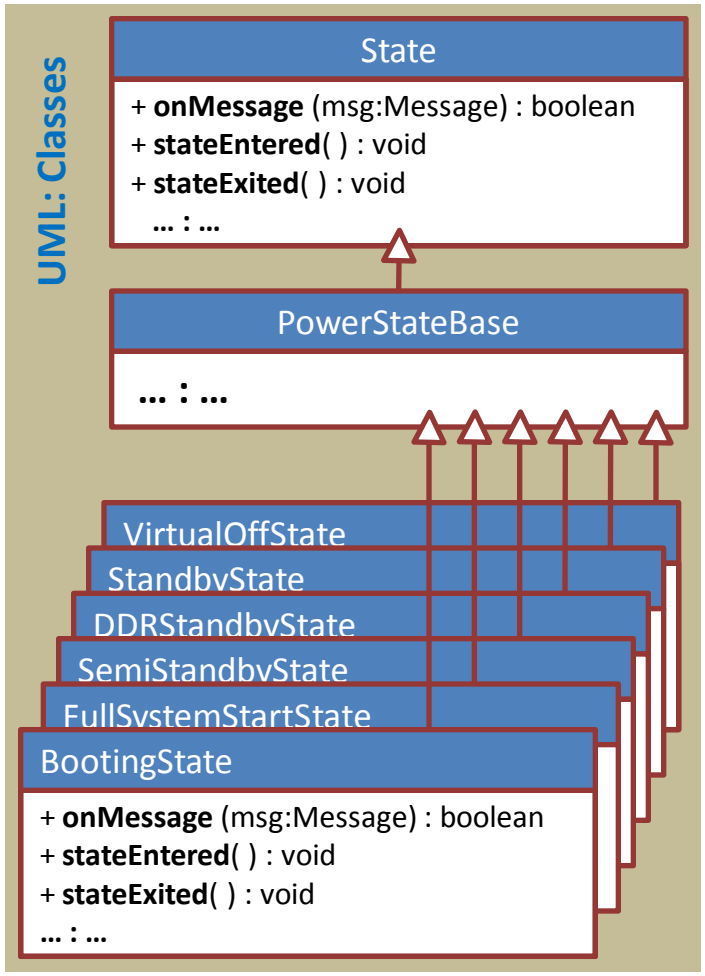





```
public class HierarchicalStateMachine
extends Handler
{
  ...
  @Override
  public void handleMessage(Message msg){
    State save = currentState;

    State cur = currentState;
    while (cur != null
           && !cur.onMessage(msg)) {
      ...
      cur = cur.getParentState();
    }
    if (cur != null) {
      return;
    }
  }
  ...
}
```



Message Dispatcher For TvPowerManagerService



HierarchicalStateMachine::currentState::onMessage(msg)

If the current state is Full System Start, the **HierarchicalStateMachine::currentState** will point to **FullSystemStartState** , and **FullSystemStartState**::**onMessage**(msg) will be run.

```
private class FullSystemStartState extends PowerStateBase {
    private static final String STATE = "FULL_SYSTEM_START";
    ...
    @Override
    public boolean onMessage(Message msg) {
        iPreviousPowerState = iPOWER_STATE_FULL_SYSTEM_START;
        int what = msg.what;
        switch (what) {
        case MSG_SCREEN_OFF: {
            TvPowerManagerService.this.sendPowerStateChangeBegin(
                iPOWER_STATE_FULL_SYSTEM_START,
                iPOWER_STATE_SEMI_STANDBY
            );
            stateMachine.setState(stateMachine.semiStandby);
            return true;
        }
        ...
        default:
            return false;
        } // end switch
    }
    ...
}
```

How To Set LastPowerMode in NVM

TvPowerManagerService::**sendPowerStateChangeBegin**(…)

JNI: **CommenceNativeNotifying**(…)

⇔ **Java_org_droidtv_tv_tvpower_TvPowerManagerService_CommenceNativeNotifying**(…)

android::**CommenceNotifying**(…)

IF iTargetPowerStates is **iPOWER_STATE_STANDBY**(=6)
iTargetPowerStates is **iPOWER_STATE_DDR_STANDBY**(=5)
iTargetPowerStates is **iPOWER_STATE_SEMI_STANDBY**(=4)

Call TVPowerStandbyManager::**SetFTSParam(true)**

BpPower::**setFtsParam(**"LastPowerMode", "Standby"**)**

Binder Communication

BnPower::**onTransact(…)**

Power::**setFtsParam**("LastPowerMode","Standby")

power_setFtsParam(null, "LastPowerMode","Standby")

tpapi_pow_SetBootLoaderParam(…)

ELSE

iTargetPowerStates is **iPOWER_STATE_FULL_SYSTEM_START**(=3)

Call TVPowerStandbyManager::**SetFTSParam(false)**

How To Set LastPowerMode in NVM

```
/* FTS Zone Defined In EEPROM With BootLoader */
#define FTS_ADDR                0x1000
#define FTS_SIZE                64
...
FResult tpapi_pow_SetBootLoaderParam( void *handler, unsigned char *key, unsigned char *value )
{
    int           i4Key;
    int           i4Value;
    ...
    i4Key = fts_key_GetIndex((const char *)key);
    ...
    i4Key += FTS_ADDR;

    i4Value = fts_value_toInt((const char *)key, (const char *)value);
    ...
    errno = 0;
    if (MTEEPROM_Write((UINT32)i4Key, (UINT8 *)&i4Value, 1) != MTR_OK) {
        TPAPI_INFRA_PRINT("[%d:%s] Failed to call MTEEPROM_Write(\"%s\", ...), error=%s\n",
            __LINE__, __FUNCTION__, key, strerror(errno));
        return TPAPI_ERR_SYSTEM_FAILED;
    }
    ...
    return TPAPI_OK;
}
```

Summarize

LastPowerMode=0,namely Standby, Before the State of TvPower will be changed to Semi-Standby, Full-Standby or Ddr-Standby and so on.

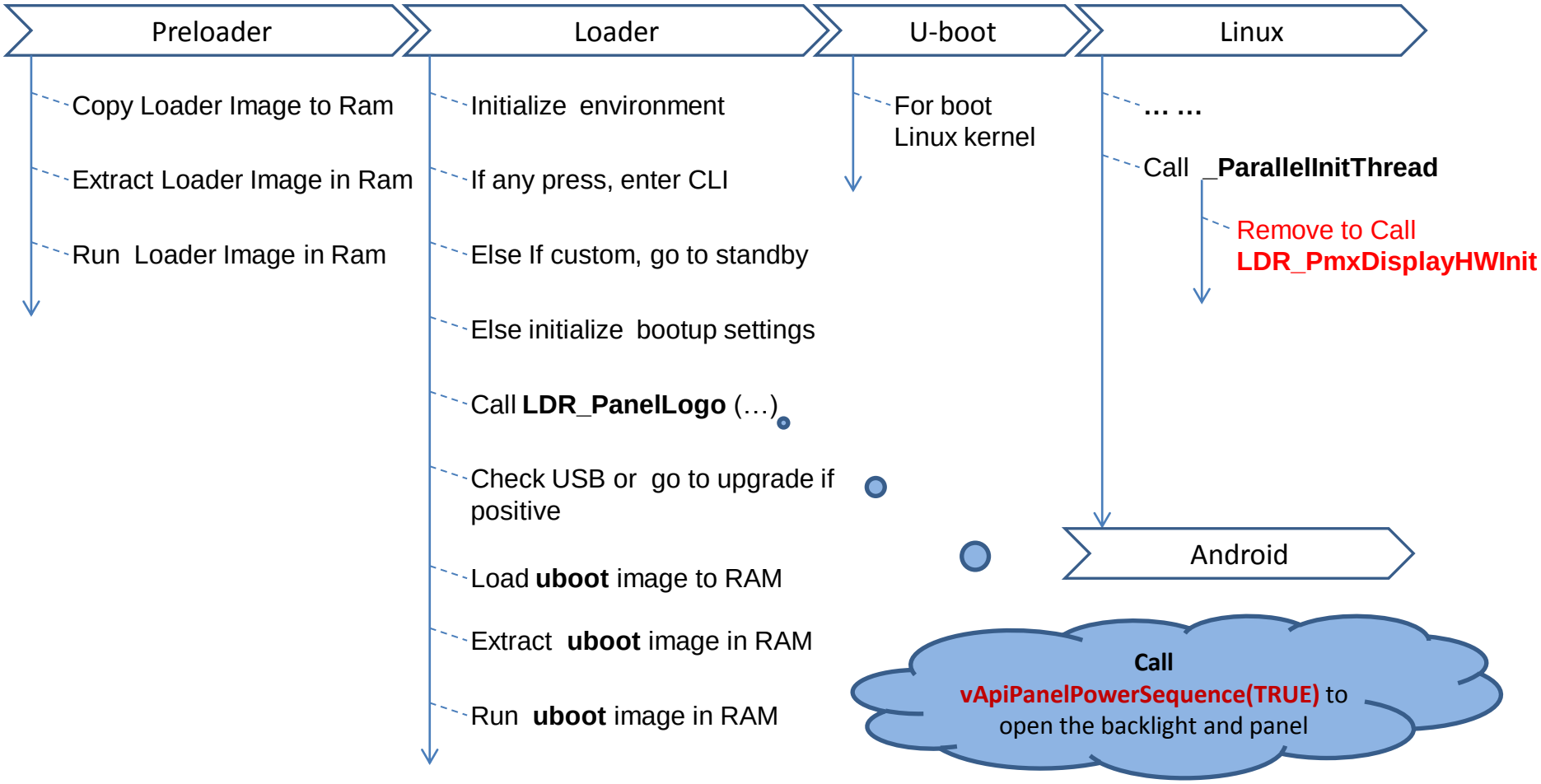
LastPowerMode=1,namely Null or Not Standby, Before the State of TvPower will be changed to Full-System-Start.

How To Use **LastPowerMode** in NVM

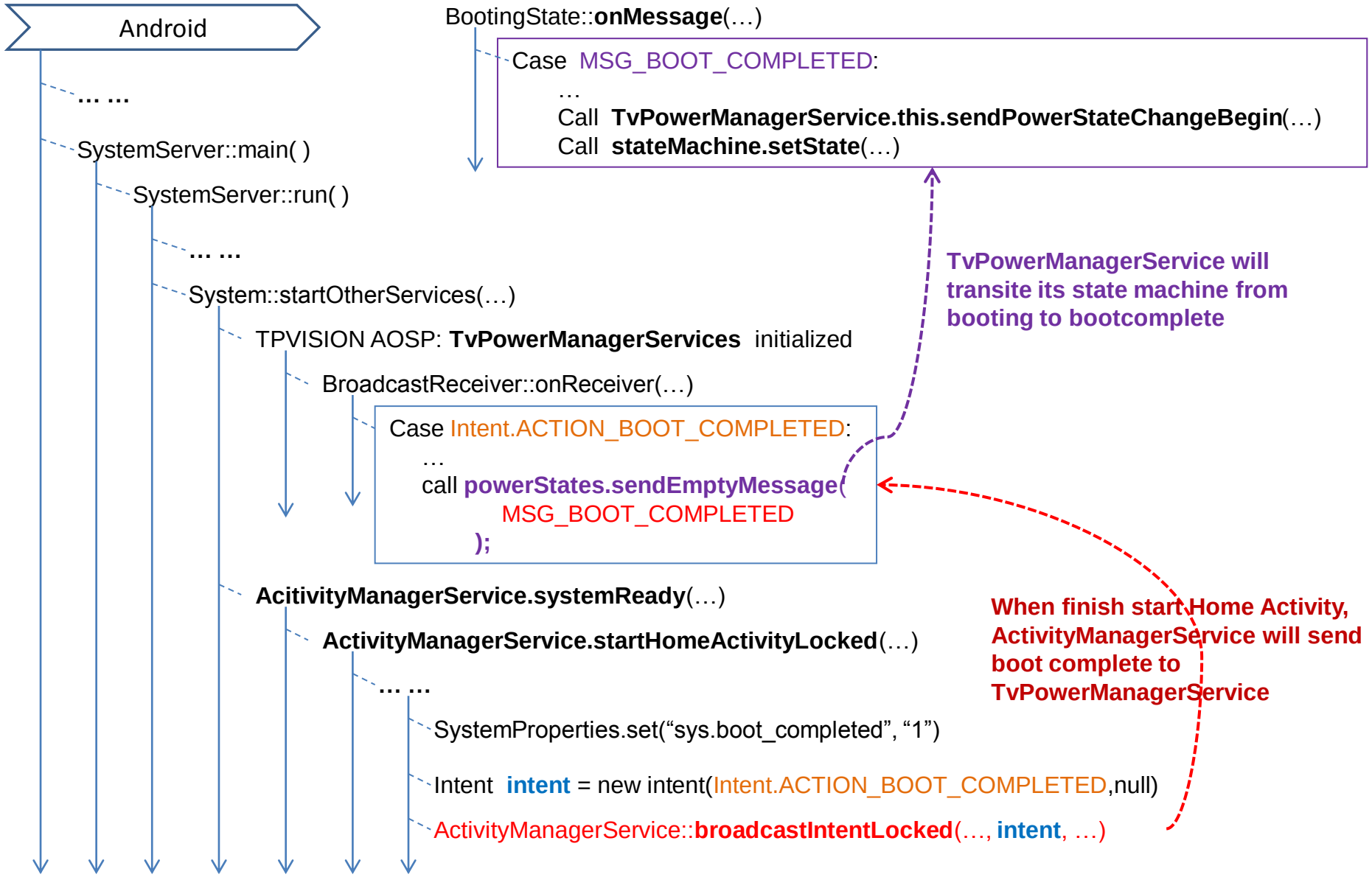
LastPowerMode is used in **vApiPanelPowerSequence(true)** in order to turn on the **backlight** and **panel**.

And **vPanelPowerSequence(true)** is called on startup stage and on resume stage

Startup Stage



How To Use **LastPowerMode** in NVM



How To Use **LastPowerMode** in NVM

TvPowerManagerService.this.sendPowerStateChangeBegin(iSps=Booting,iTps=FullSystemStart,…)

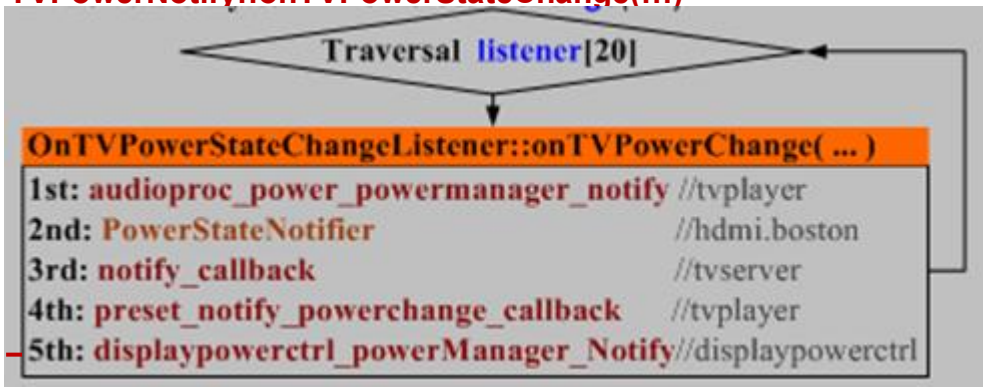
… …

CommenceNativeNotifying(0,iSps,iTps,…)
⇔Java_org_droidtv_tv_tvpower_TvPowerManagerService_CommenceNativeNotifying(…)

android::CommenceNotifying(0,iSps,iTps,…)

If **iTps** is **FullSystemStart**(=3):
call **TvPowerStandbyManager::SetFTSParam(**false**)**
⇔**LastPowerMode will be modifed to 1 (not standby)**

TVPowerNotify::onTVPowerStateChange(…)



DisplayCtrl is as the **client app** of the **TvPowerManagerService**, it will registe callback to get the power state transition by calling
TvPowerNotify:: RegisterTVPowerObserver(displaypowerctrl_powerManager_Notify);

TvInfraLooper_sendMessage(
m_displaypowercontrol_looper,
displaypowerctrl_changeDisplayState_OnPowerChanged, 0, &msg1, sizeof (msg1)
);

How To Use **LastPowerMode** in NVM

displaypowerctrl_changeDisplayState_OnPowerChanged(…)

… …

tpapi_displayctrl_getCurrentDisplayState(&state)

IF state is OFF:
call **displaypowerctrl_turnOnDisplay ( )**

Call **tpapi_displayctrl_requestDisplayState(TPAPI_DISPLAYCTRL_DISPLAYSTATE_ON)**

Call MTOSD_BASE_DisableLoaderLogo()

Turn Off Philips Logo

Call MTOSD_PLA_Enable(MTOSD_PLANE_2, TRUE);//enable android osd

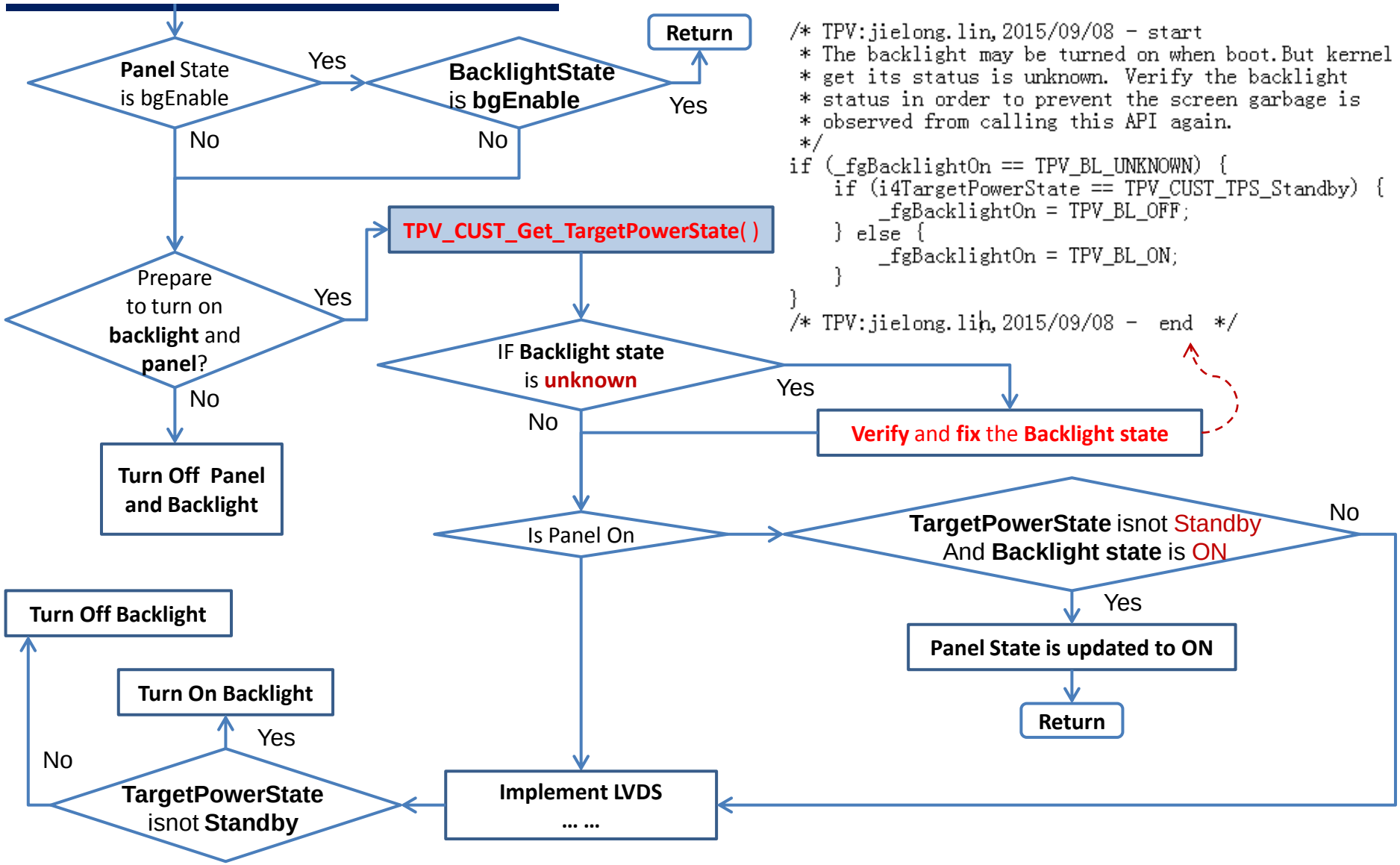
Call **MTPMX_PANEL_PowerSequence**((BOOL)TRUE)

… Mtal Call Flowchart …

Re-open the backlight and panel

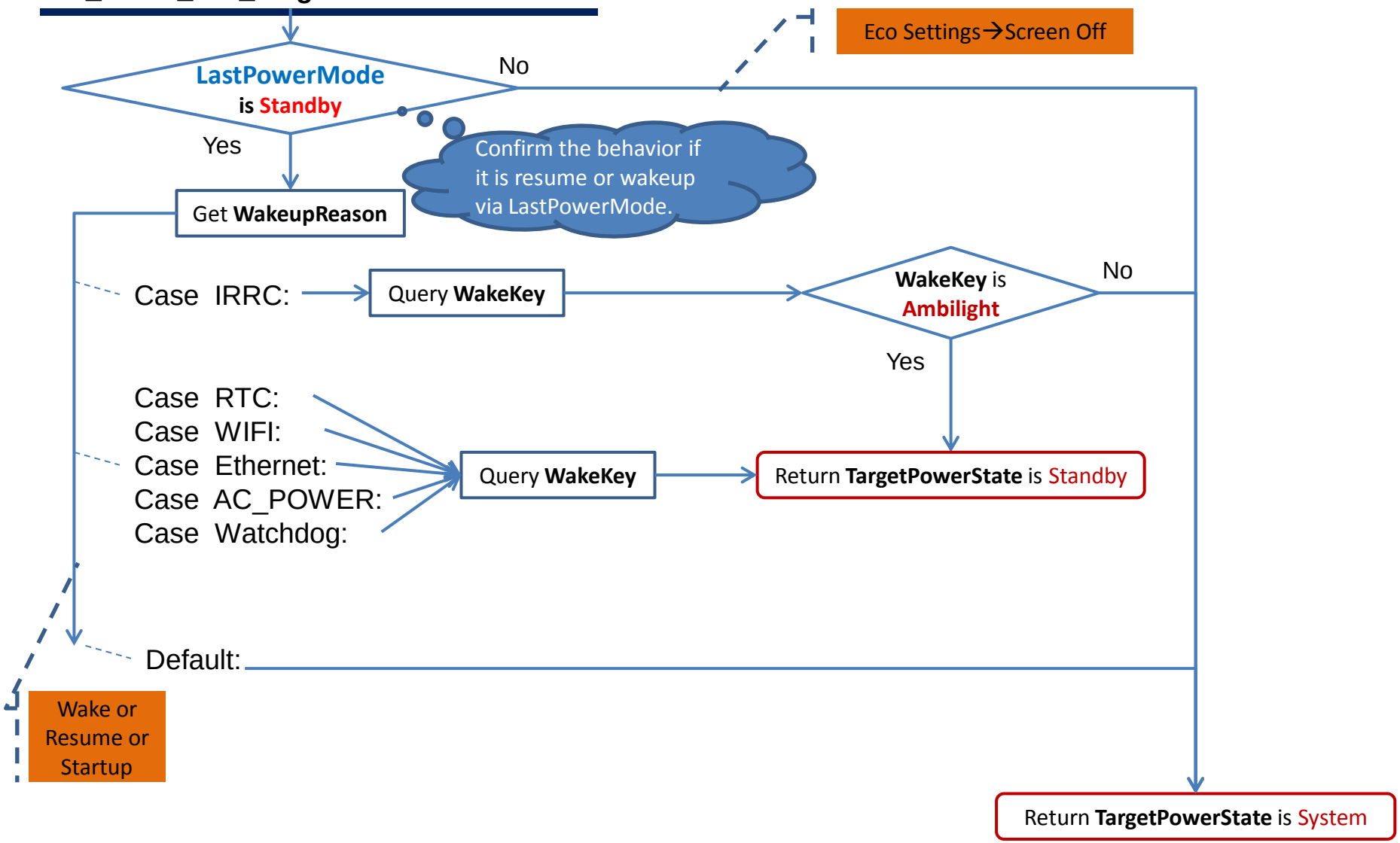
Call **vApiPanelPowerSequence(TRUE)**

How to implement Panel and Backlight



How To Use **LastPowerMode** in NVM

TPV_CUST_Get_TargetPowerState



TPV
VISION INNOVATOR

Thank you