Motorola Mobility

An Overview of STB Power Modes in Industry Standards

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Agenda

- ❑ Power Modes in Industry Standards
- ❑ Power Modes Mapping
- ❑ Power Modes Transitions
- ❑ Summary

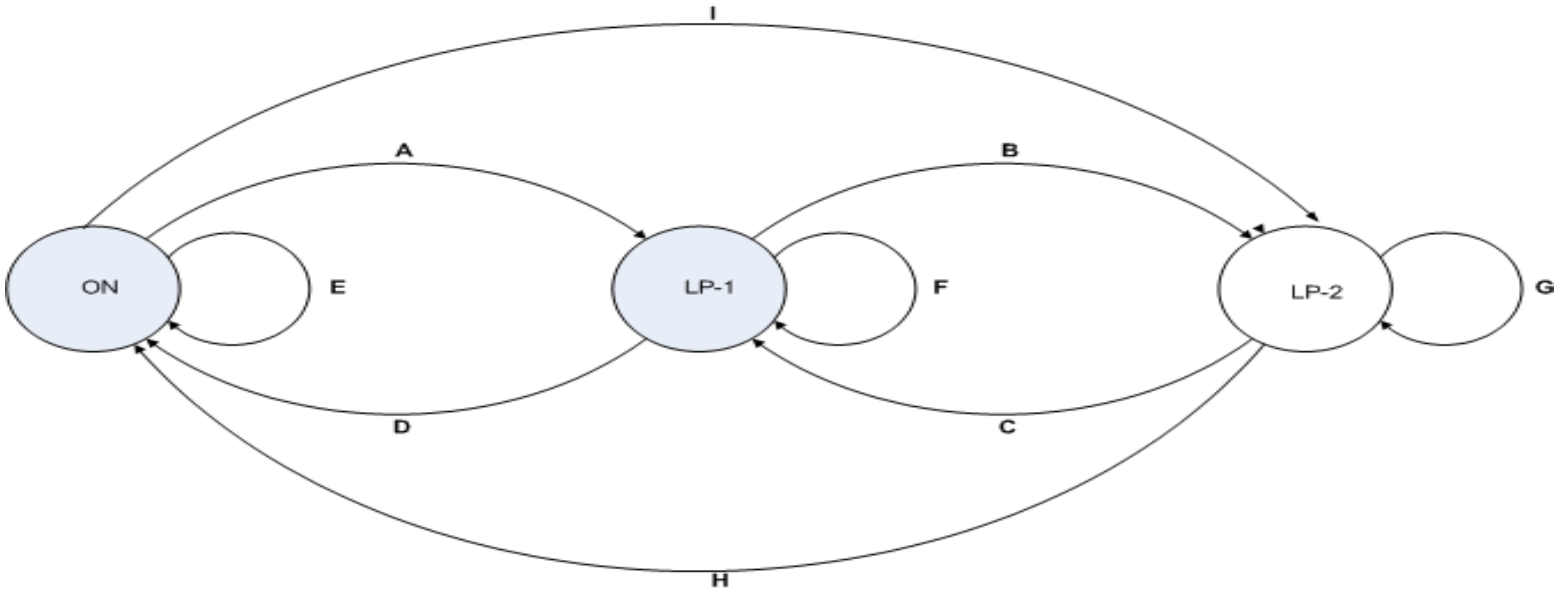
STB Power Modes defined in Main Industry Standards

- US EPA Energy Star STB Program Requirements
  - Active Modes: On (live, playback, record)
  - Low Power Modes: Sleep, Deep Sleep
- IEC 62087 and Canada CSA C380-11
  - Active Modes: On (average, play, record, multi-function)
  - Low Power Modes: Standby Active High, Standby Active Low, Standby Passive, OFF
  - Focus on test procedure and power measurement
- EU STB Voluntary Industry Agreement
  - Active Modes: On
  - Low Power Modes: Standby
- EU Code of Conduct (CoC)
  - Active Modes: On
  - Low Power Modes: Network Standby, Standby Passive

North America Low Power Modes Mapping

IEC 62087/ C380-11	STB Behavior	Energy Star	STB Behavior
Standby - Active High	1) Not providing A/V outputs 2) Can transition to another mode by internal or external signals 3) Can exchange data with external sources	Sleep	1) Not providing a primary function 2) Can transition to other modes by remote switch (external signal), internal sensor, timer (internal signal) 3) Support continuous functions such as information display and sensor-based functions Primary Function: ▪ Support live or recorded A/V contents to thin client/remote STB or local/remote recording devices ▪ Support live or recorded A/V content to a consumer display
Standby - Active Low	1) Not providing A/V outputs 2) Can transition to another mode by internal or external signals 3) Cannot exchange data with external sources		
Standby Passive	1) Performing no useful function 2) Only monitoring for a command (e.g. remote control command) to transition to anther mode	Deep Sleep	1) Monitoring command from remote control or physical STB user interface (e.g. buttons on the front panel) 2) If no user interface supported, monitoring command from internal (e.g. timer) or external (e.g. network message) signals
OFF	1) Connected to a power source, no function is provided. 2) Cannot transition to any other mode by a remote control, internal or external signals	N/A	

Two Stages Low Power Modes (LP-1, LP-2) Transitions



LP-1 (Low Power Mode Stage 1): STB mode with lower power consumption
LP-2 (Low Power Mode Stage 2): STB mode with lowest power consumption

State Transition	User Cases (Note)	State Transition	Use Cases (Note)
A	1) User presses the power button 2) Auto Power Down 3) Apps/SW initiates	**F**	1) No apps/SW request to enter On or (LP-2) mode 2) No power button pressed
B	1) User presses the (LP-2) mode button 2) Apps/SW initiates	**G**	1) No apps/SW request to exit (LP-2) mode 2) No power button pressed
C	Apps/SW initiates	**H**	User presses the power button
D	1) User presses the power button 2) Apps/SW initiates	**I**	User presses the (LP-2) mode button
E	User activities within APD timer limit (e.g. 4 hours)		

Note: Use cases presented in the above table do not cover all scenarios

Summary

- Power modes have been defined in multiple industry standards with various terminologies and definitions
- Power modes mapping is essential to align the various power modes for comparison and evaluation of STB energy consumption
- Autonomous power modes transitions would be managed by software application (e.g. APD)
- Power modes transitions shall be designed to optimize the power saving and user experience