

Device Automation Bus on RDK-V

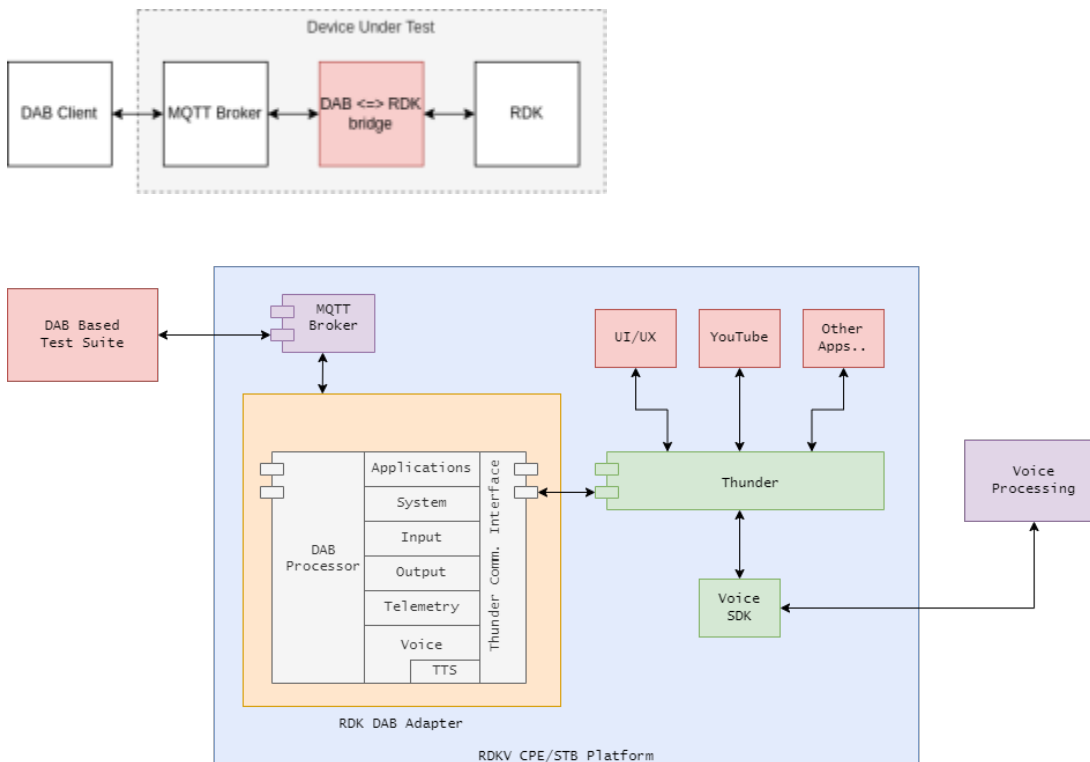
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Architecture & Set-up

The [dab-adapter-rs](#) the "DAB <=> RDK adapter" can be executed both on the RDK device or using an external PC.

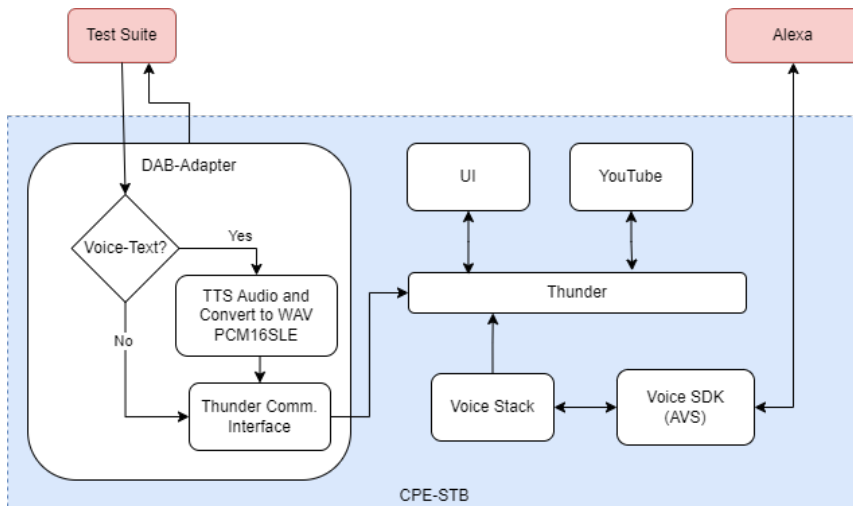
Note: current implementation is for STB devices.

Preferred mode of operation : "On Device" implementation



Reference: [blocked URL](#)

Alexa based implementation flow



Device run-times

Compatible Navigator UI version 4.1.3 or later. (Why is it? - UI need to listen and manage external app lifecycle related events and send app state report to Alexa.)

All the below commands can be executed from device console (SSH prompt or serial terminal).

Related RFC

Device.DeviceInfo.X_RDKCENTRAL-COM_RFC.Feature.DAB.Enable

How to check current RFC configuration:

```
tr181 -g Device.DeviceInfo.X_RDKCENTRAL-COM_RFC.Feature.DAB.Enable
```

How to set the RFC:

```
tr181 -s -t boolean -v true Device.DeviceInfo.X_RDKCENTRAL-COM_RFC.Feature.DAB.Enable
```

How to clear the RFC:

```
tr181 -s -t boolean -v false Device.DeviceInfo.X_RDKCENTRAL-COM_RFC.Feature.DAB.Enable
```

DAB Operations - API Map

Below table enlists the API mapping details of current DAB adapter implementation of RDK for STB devices. RDK APIs are listed under '*Thunder Implementation*'.

API details are as per dab-adapter version : <https://github.com/device-automation-bus/dab-adapter-rs/commit/f6318d0080ab8282f758bb2bf19a0097f58f34a6> (6.0 f6318d)

DAB Request	DAB Category	Thunder Implementation for the Request
operations/list	Supported Operations	No RDK specific implementation required except platform specific key map configuration.
applications/list	Applications	https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getavailabletypes Use the response to match the AppID as per DAB-2.0 spec. [Note: should have YouTube, Amazon & Netflix as types in the API response.]

applications/launch		https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getstate https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=launch https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=movetofront https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=setfocus https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getvisibility https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=setvisibility
		<p>Note: Implementation supports only YouTube common port. If previous state is suspended; then moveToFront & setFocus rdkshell APIs are called with AppID matching callsign.</p> <p>If parameter is present; App specific deeplink API is invoked.</p> <p>For YouTube: https://code.rdkcentral.com/r/plugins/gitiles/rdk/components/generic/cobalt/+refs/heads/24.Its.dev/plugin/doc/CobaltPlugin.md#deeplink-method</p> <p>Please see Provideplatformspecificapplifecycledelays/timeouts for adding platform specific tuning.</p>
applications/launch-with-content		https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getstate https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=launch https://code.rdkcentral.com/r/plugins/gitiles/rdk/components/generic/cobalt/+refs/heads/24.Its.dev/plugin/doc/CobaltPlugin.md#method.deeplink https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=movetofront https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=setfocus https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getvisibility https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=setvisibility
applications/get-state		<p>Note: Implementation supports only YouTube common port. If previous state is suspended; then moveToFront & setFocus rdkshell APIs are called with AppID matching callsign.</p> <p>Please see Provideplatformspecificapplifecycledelays/timeouts for adding platform specific tuning.</p>
applications/exit		https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getstate https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=destroy https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=suspend
		<p>Please see Provideplatformspecificapplifecycledelays/timeouts for adding platform specific tuning.</p>
device/info	System	https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getconnectedvideodisplays https://rdkcentral.github.io/rdkservices/#/api/SystemPlugin?id=getdeviceinfo [estb_mac is used as DAB Device ID] https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=getscreenresolution https://rdkcentral.github.io/rdkservices/#/api/NetworkPlugin?id=getinterfaces https://rdkcentral.github.io/rdkservices/#/api/DeviceInfoPlugin?id=systeminfo [uptime is extracted from this] https://rdkcentral.github.io/rdkservices/#/api/DeviceIdentificationPlugin?id=deviceidentification https://rdkcentral.github.io/rdkservices/#/api/NetworkPlugin?id=getipsettings https://rdkcentral.github.io/rdkservices/#/api/DeviceInfoPlugin?id=make https://rdkcentral.github.io/rdkservices/#/api/DeviceInfoPlugin?id=modelid https://rdkcentral.github.io/rdkservices/#/api/DeviceInfoPlugin?id=serialnumber https://rdkcentral.github.io/rdkservices/#/api/DeviceInfoPlugin?id=firmwareversion https://rdkcentral.github.io/rdkservices/#/api/DeviceIdentificationPlugin?id=deviceidentification [chipset is extracted from this]
system/restart		https://rdkcentral.github.io/rdkservices/#/api/SystemPlugin?id=reboot
system/settings/list		https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsupportedresolutions https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsupportedaudioports https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsupportedaudiomodes https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsettophdrsupport https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=gettvhdrsupport https://rdkcentral.github.io/rdkservices/#/api/TextToSpeechPlugin?id=isttsenabled CEC: checks availability of https://rdkcentral.github.io/rdkservices/#/api/HdmiCec_2Plugin MEMC: false LowLatencyMode: true as its being enabled by the pipeline property. No plugin exposed APIs available. VideoInputSource : Home (STB's playback source is its app itself.) PictureMode: None (not an STB feature)

system/settings/get		https://rdkcentral.github.io/rdkservices/#/api/DisplayInfoPlugin?id=width https://rdkcentral.github.io/rdkservices/#/api/DisplayInfoPlugin?id=height https://rdkcentral.github.io/rdkservices/#/api/DisplayInfoPlugin?id=framerate <p>Note: expecting response as "Framerate60" instead of "FRAMERATE_60" as per component owner review. Documentation needs update.</p> https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsupportedresolutions https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsupportedaudioports https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsupportedaudiomodes https://rdkcentral.github.io/rdkservices/#/api/HdmiCec_2Plugin?id=getenabled https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsoundmode https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getmuted https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getconnectedvideodisplays https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getsettophdrsupport https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=gettvhdrsupport https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getconnectedaudioports https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getvolumelevel https://rdkcentral.github.io/rdkservices/#/api/TextToSpeechPlugin?id=isttsenabled https://rdkcentral.github.io/rdkservices/#/api/UserPreferencesPlugin?id=getuilanguage
system/settings/set		https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getconnectedvideodisplays https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=setcurrentresolution https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=getconnectedaudioports https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=setvolumelevel https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=setmuted https://rdkcentral.github.io/rdkservices/#/api/HdmiCec_2Plugin?id=setEnabled https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=setenableaudioport https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=setforcehdrmode https://rdkcentral.github.io/rdkservices/#/api/DisplaySettingsPlugin?id=setsoundmode https://rdkcentral.github.io/rdkservices/#/api/TextToSpeechPlugin?id=enabletts https://rdkcentral.github.io/rdkservices/#/api/UserPreferencesPlugin?id=setuilanguage <p>PictureMode: not implemented (not an STB feature)</p> <p>VideoInputSource : not implemented due to lack of device capability.</p>
input/key/list	Input	Platform configurable key map /opt/dab_platform_keymap.json.
input/key-press		<p>Please see Provideplatformkeymapconfiguration</p> https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=injectkey
input/long-key-press		<p>[Note: injectKey will not be overridden by the rdkshell_keymapping.json so put the final KEYCODE in /opt/dab_platform_keymap.json]</p> https://rdkcentral.github.io/rdkservices/#/api/RDKShellPlugin?id=injectkey <p>[Note: injectKey will not be overridden by the rdkshell_keymapping.json so put the final KEYCODE in /opt/dab_platform_keymap.json]</p>
output/image	Output	https://rdkcentral.github.io/rdkservices/#/api/ScreenCapturePlugin?id=uploadscreencapture
device-telemetry/start	Device & Application Telemetry	As per DAB-2.0 specification; it is an optional requirement. TBD: Funtionality not tested.
device-telemetry/stop		As per DAB-2.0 specifiction; it is an optional requirement. TBD: Funtionality not tested.
device-telemetry/metrics		As per DAB-2.0 specifiction; it is an optional requirement. https://rdkcentral.github.io/rdkservices/#/api/DeviceInfoPlugin?id=systeminfo [totalram, freeram & cpuload is used]
app-telemetry/start		As per DAB-2.0 specifiction; it is an optional requirement. TBD: Funtionality not tested.
app-telemetry/stop		As per DAB-2.0 specifiction; it is an optional requirement. TBD: Funtionality not tested.
app-telemetry/metrics		As per DAB-2.0 specification; it is an optional requirement. Funtionality not implemented.
health-check/get	Health Check	No RDK specific implementation required.
messages	Operational General Notifications	As per DAB-2.0 specifiction; it is an optional requirement. No RDK specific implementation required.
voice/list	Voice	https://rdkcentral.github.io/rdkservices/#/api/VoiceControlPlugin?id=voicestatus

voice/set		https://rdkcentral.github.io/rdkservices/#/api/VoiceControlPlugin?id=configurevoice with following parameter in the current implementation. <pre> { "enable": false, "ptt": { "enable": false } } </pre>
voice/send-audio		https://rdkcentral.github.io/rdkservices/#/api/VoiceControlPlugin?id=voicesessionrequest <pre> { "audio_file": "/tmp/tts.wav", "type": "ptt_audio_file" } </pre>
voice/send-text		To convert the audio to platform compatible format; <i>gst-launch-1.0</i> binary is required. https://rdkcentral.github.io/rdkservices/#/api/VoiceControlPlugin?id=voicesessionrequest <pre> { "audio_file": "/tmp/tts.wav", "type": "ptt_audio_file" } </pre>
version	Version	No RDK specific implementation required.
For generating DAB Device ID	Generic	https://rdkcentral.github.io/rdkservices/#/api/SystemPlugin?id=getdeviceinfo with param estb_mac
For feature/service availability	Generic	https://github.com/rdkcentral/Thunder/blob/master/Source/WPEFramework/doc/ControllerPlugin.md#method.activate https://github.com/rdkcentral/Thunder/blob/master/Source/WPEFramework/doc/ControllerPlugin.md#method.deactivate https://github.com/rdkcentral/Thunder/blob/master/Source/WPEFramework/doc/ControllerPlugin.md#property.services [Used as 'status@callsign']

DAB Integration & Debug Helpers

How to fine tune dab-adapter to platform

Provide platform keymap configuration

RDK dab-adapter by default is configured to align DAB keymap with RDKShell keycodes <https://github.com/rdkcentral/RDKShell/blob/master/linuxkeys.h>. There is another provision to override or add more keys by introducing a platform specific keymap configuration file to dab-adapter runtime.

Create */opt/dab_platform_keymap.json* with following format: key value pair of "DAB_KEY": PLATFORM_KEYCODE.

```

{
  "KEY_GREEN": 406,
  "KEY_YELLOW": 403,
  "KEY_BLUE": 404,
  "KEY_HOME": 173
}
```

Provide platform specific app lifecycle delays/timeout

The time required to launch and exit an app runtime would be greatly dependent on the platform. DAB-2.0 specification mandates that the DAB app lifecycle APIs shall only return the DAB response after the app lifecycle is completed.

Create */opt/dab_platform_app_lifecycle.json* and add app specific parameters as per following template.

Template

```

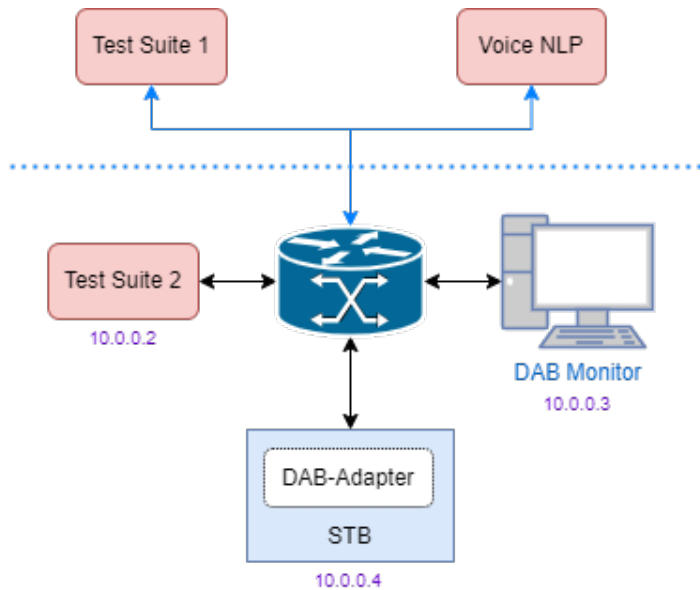
{
  "dab-app-id-lowercase": {
    "cold_launch_timeout_ms": 6000,
    "resume_launch_timeout_ms": 3000,
    "exit_to_destroy_timeout_ms": 2500,
    "exit_to_background_timeout_ms": 2000
  }
}
```

Example

```
{
  "youtube": {
    "cold_launch_timeout_ms": 6000,
    "resume_launch_timeout_ms": 3000,
    "exit_to_destroy_timeout_ms": 2500,
    "exit_to_background_timeout_ms": 2000
  },
  "primevideo": {
    "cold_launch_timeout_ms": 8000,
    "resume_launch_timeout_ms": 4000,
    "exit_to_destroy_timeout_ms": 5000,
    "exit_to_background_timeout_ms": 2300
  }
}
```

DAB Message Sniffer for analysis

This section details about how to setup a tool to see DAB messages being exchanged over the test network using a Linux PC(DAB Monitor).



Install required tools on the DAB Monitor Linux machine

```
sudo apt-add-repository ppa:mosquitto-dev/mosquitto-ppa
sudo apt-get update
sudo apt-get install mosquitto-clients moreutils
```

Listen to the MQTT messages from the broker(dab-adapter)

```
user@DABMonitor:~$ mosquitto_sub -h 10.0.0.4 -v -t '#' | ts '[%Y%b%d %H:%M:%S]'
```

How to run DAB adapter binary in debug mode

If at any time during DAB adapter development or integration phase wanted to see what is the Thunder API request payload and its platform response that dab-adapter sends/receives, you could run the dab-adapter binary with verbose mode enabled as below.

```
user@STB:~$ dab-adapter --debug true
```

Common pit-falls

- How to get Device ID: Device ID which need to be supplied to the [dab-compliance-suite](#) to connect with [dab-adapter](#) instance running on the device can be obtained from [dab-adapter](#) start-up log.

journalctl -fu dab-adapter

```
root@AmlogicFirebolt:~# journalctl -fu dab-adapter
-- Logs begin at Mon 2023-09-11 16:32:00 UTC. --
Sep 11 16:35:05 AmlogicFirebolt systemd[1]: Started DAB <=> RDK adapter.
Sep 11 16:35:05 AmlogicFirebolt dab-adapter[22887]: Monitoring changes of /run/dab-enable
Sep 11 16:35:06 AmlogicFirebolt dab-adapter[22887]: DAB Device ID: AC64CF339B28
Sep 11 16:35:06 AmlogicFirebolt dab-adapter[22887]: Ready to process DAB requests
Sep 11 16:35:33 AmlogicFirebolt dab-adapter[22887]: OK: operations/list
```

References

- <https://getdab.org/>
- <https://github.com/device-automation-bus/dab-compliance-suite>
- <https://github.com/device-automation-bus/dab-adapter-rs>
- [RDK Voice Integration on Accelerators](#)