Linux Plumbers 2018
Genpd news/next
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Agenda

● Multiple PM domains per device (done)
● Performance states in genpd (initial support)
● Genpd + opp == DVFS (evolving)

Callers of pm_genpd_init():

v4.14: 24
v4.20-rc1: 28
BTW: Fixup PM domain attach

ret = dev_pm_domain_attach(dev, true);

v4.17:
if (ret != -EPROBE_DEFER)
    ret = drv->probe(dev);

v4.18:
if (ret)
    return ret;
ret = drv->probe(dev);

From v4.18 we can deal with error codes, yeah! :-}
QCOM APQ8096 - Cam.subsystem

VIDEO FRONTEND H
(high resolution)

VIDEO FRONTEND L
(low resolution)

CAM
Implementation

Constraints
● Consumer control PM domains independently.
● Device PM (runtime/system) work seamlessly.
● Legacy for single PM domain.

Solution
● Attach one virtual device per PM domain.
● Consumer use device links to control PM.
QCOM APQ8096 - Cam.subsystem

VFH PM Domain
virt1_dev_cam

VFL PM Domain
virt0_dev_cam

Device link

CAM
DT - Multiple PM domains

vfpd: power-controller@12340000 {
    compatible = "vfpd,power-controller";
    reg = <0x12340000 0x1000>;
    #power-domain-cells = <1>;
}

};

cam-device@12351000 {
    compatible = "foo,cam";
    reg = <0x12351000 0x1000>;
    power-domains = <&vfpd 0>, <&vfpd 1> ;
    power-domain-names = "low", "high";
}

};
1: Attach and probe

**Attach**

dev_vf_low = dev_pm_domain_attach_by_name(dev, “low”);
dev_vf_high = dev_pm_domain_attach_by_name(dev, “high”);

**Note:** No power on for “multi attach”!

**Probe**

link_vf_low = device_link_add(dev, dev_vf_low,
DL_FLAG_STATELESS | DL_FLAG_PM_RUNTIME | DL_FLAG_RPM_ACTIVE);

<- You may skip this flag.
2: Adopt to the use case

**Low resolution**

```c
link_vf_low = device_link_add(dev, dev_vf_low,
    DL_FLAG_STATELESS | DL_FLAG_PM_RUNTIME | DL_FLAG_RPM_ACTIVE);
```

**High resolution**

```c
link_vf_high = device_link_add(dev, dev_vf_high,
    DL_FLAG_STATELESS | DL_FLAG_PM_RUNTIME | DL_FLAG_RPM_ACTIVE);
```

**High -> Low**

```c
device_link_del(link_vf_high);
```
Examples

- drivers/media/platform/qcom/camss/camss-csid.c (v4.19)
- drivers/usb/host/xhci-tegra.c (v4.20-rc1)
Genpd performance states

Generic PM Domain
(performance state == 7)

DEVICE 0

DEVICE 0

DEVICE 0

2 5 7
Provider/consumer interface

**Genpd provider:**
->set_performance_state(genpd, state)

**Ongoing:** Propagate performance state to masters

**Consumer:**
dev_pm_genpd_set_performance_state(dev, state)

**What performance state?**
1: Genpd + opp == DVFS

**Genpd provider:**
->opp_to_performance_state(genpd, opp)

**Genpd:**
devel_pm_opp_of_add_table(dev)
devel_pm_opp_of_add_table_indexed(dev, idx)
2: Genpd + opp == DVFS

**OPP core:**
of_genpd_opp_to_performance_state(dev, np) (removed)
pm_genpd_opp_to_performance_state(genpd, opp) (next)
dev_pm_genpd_set_performance_state(dev, state)

**Consumers drivers:**
dev_pm_opp_set_rate(dev, rate)
dev_pm_opp_set_virt_dev(dev, virt_dev, idx) (next)