



JETPACK 6

SUHAS SHESHADRI

DEC 2023

Topics

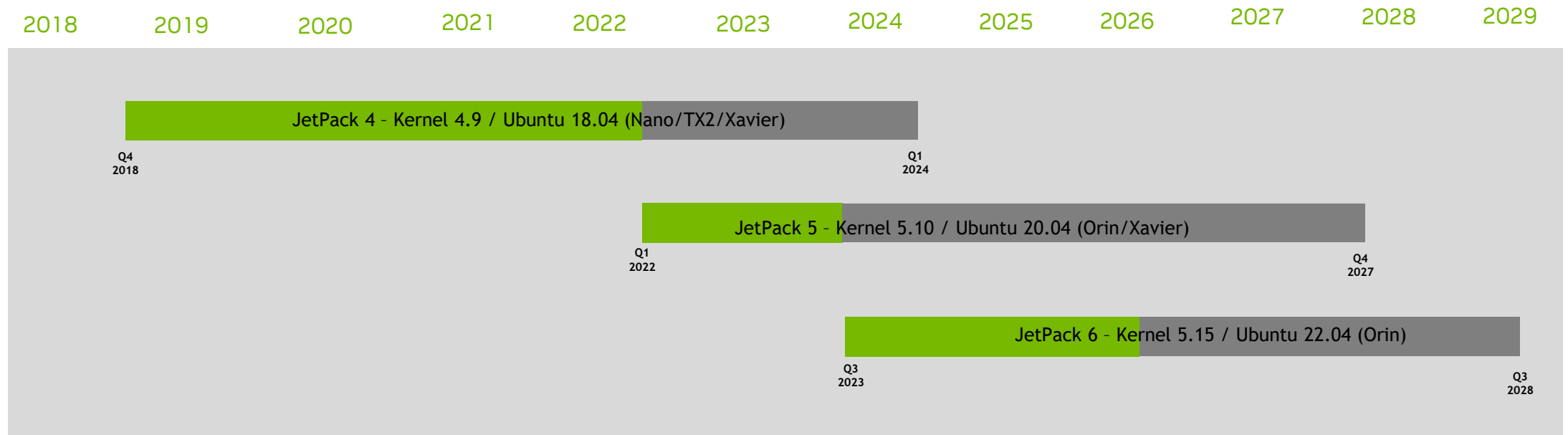
- Recap of Announcements
- JetPack Branch Roadmap
- JetPack 6 Highlights
- Bring Your Own Kernel
- Expanded Choices of Distros
- Upgradable Compute Stack
- ROS 2 Humble
- JetPack 5 to 6 transition
- Demos





ANNOUNCEMENTS

JetPack Branch Roadmap



Active Branch with new features and CUDA-X stack



Sustaining branch with regular security fixes (no new features and CUDA-X stack)

* Timelines are subjected to change

JETPACK 4 EOL - ANNOUNCED

Announced in forum on Sep 25th

📌 JetPack 4 Reaches End of Life ✎

Home > ■ Autonomous Machines ■ Jetson & Embedded Systems ■ Announcements



suhash  Moderator

1  Sep 25

For the past five years, JetPack 4 has been the driving force behind the success of numerous NVIDIA Jetson based products. Earlier this year, Kernel 4.9 and Ubuntu 18.04 which Jetpack 4 is based on, reached their End of Life. But we continued to roll out regular JetPack 4 updates with security patches and critical bug fixes.

As we look ahead, we are targeting final release of Jetpack 4 in Q1 2024, marking its End of Life. For continued Kernel maintenance on JetPack 4 beyond EOL, we encourage you to leverage the expertise of our ecosystem partners and reach out to [TimeSys](#) ¹⁹ and [Codethink](#) ¹⁹. For products based on Jetson Xavier NX and Jetson AGX Xavier modules, we recommend transitioning to JetPack 5, ensuring seamless continuity of support.

In line with our earlier [announcement](#) ³⁶ this year, we've been channeling our efforts into integrating Jetson changes into the upstream Linux Kernel. JetPack 6, slated Nov-end 2023, will be based on an upstream kernel 5.15 and will be complemented by a small set of out-of-tree patches. This will empower Jetson developers with the freedom to choose their preferred Kernel version (any version beyond Kernel 5.15) and foster collaborations with diverse Linux distributions, broadening the spectrum of distro choices for the Jetson community.

4       Reply



JETPACK 6

JETPACK 6 -KERNEL AND UBUNTU

New Kernel and Ubuntu



Kernel 5.15



Ubuntu 22.04

JETPACK 6 - NEW CAPABILITIES

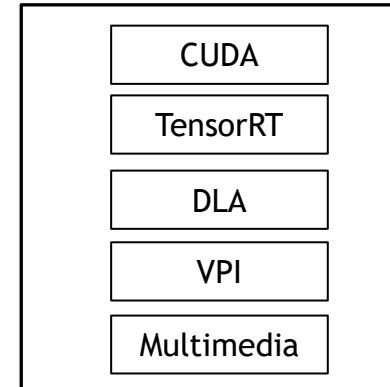
Largest Upgrade Ever



Greater flexibility with selection of Linux kernels (Kernel 5.15 and up)



Greater choice of Linux based distributions from distro partners like Canonical



Latest CUDA-X compute stack and flexibility to upgrade CUDA-X compute stack without upgrading JetPack

JETPACK SOFTWARE ROADMAP

■ Released ■ In Development ■ In Planning

Upcoming

JetPack 6

Kernel 5.15
Ubuntu 22.04

JetPack 6.0
Developer Preview

- + Kernel 5.15
- + Ubuntu 22.04 based RFS
- + CUDA 12.2
- + TensorRT 8.6

JetPack 6.0
Production Release

- + Production Quality
- + New Features
- + Updated Compute Stack

JetPack 6.1
Production Release

- + New Features
- + Updated Compute Stack

JetPack 5

Kernel 5.10
Ubuntu 20.04

JetPack 5.1.2
Production Release

- + Last Feature Release

JetPack 5.1.3
Production Release

- + Security Fixes

JetPack 5.1.4
Production Release

- + Security fixes

JetPack 5.1.5
Production Release

- + Security fixes

Jul 2023

Dec 2023

Jan 2024

Mar 2024

Apr 2024

Q3 2024

Q4 2024

Products in development and planning are subject to change.

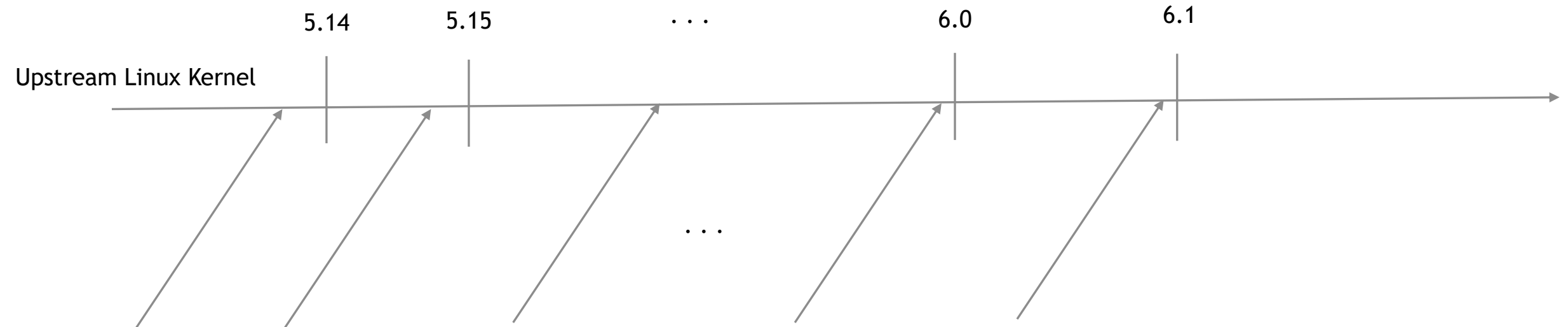




JETPACK 6 - BRING YOUR OWN KERNEL

BRING YOUR OWN KERNEL

Upstreaming Jetson Changes

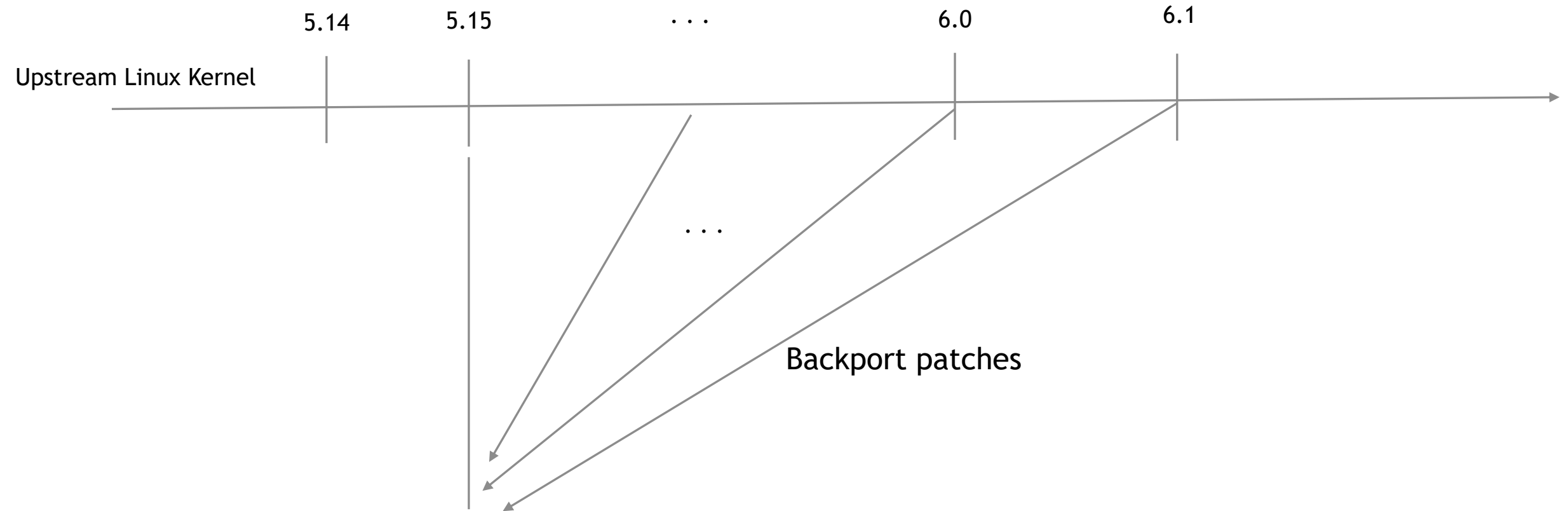


Jetson Changes are now:

- Upstreamed patches, OR
- Out-of-tree patches

BRING YOUR OWN KERNEL

Recipe at a high level



Recipe for building Kernel:

Upstream Kernel + Backport of patches + OOT patches as LKM

UPSTREAM PATCHES

We provide a list

<https://docs.nvidia.com/jetson/archives/r36.2/DeveloperGuide/SD/Kernel/BringYourOwnKernel.html>

Commit ID	Subject	Linux Version	Component
92a511a568e4	fbdev/simplefb: Add support for generic power-domains	next	SIMPLEFB
8ddfc01ace51	fbdev/simplefb: Support memory-region property	next	SIMPLEFB
c12f0d0ffade	cpufreq: tegra194: remove redundant AND with cpu_online_mask	v6.7	CPUFREQ
a60a55678875	cpufreq: tegra194: use refclk delta based loop instead of udelay	v6.7	CPUFREQ
6b121b4cf7e1	cpufreq: tegra194: save CPU data to avoid repeated SMP calls	v6.7	CPUFREQ
bae8222a6c29	cpufreq: tegra194: fix warning due to missing opp_put	v6.7	CPUFREQ
7b64906c98fe	hwmon: (ina3221) Add support for channel summation disable	v6.7	HWMON
f344675a3438	memory: tegra: Set BPMP msg flags to reset IPC channels	v6.7	BPMP
ea608a01d4ee	firmware: tegra: Add suspend hook and reset BPMP IPC early on resume	v6.7	BPMP
9def28f3b863	memory: tegra: Add Tegra234 clients for RCE and VI	v6.7	memory
d1cd5b51bc91	pinctrl: tegra: Add support to display pin function	v6.6	pinctrl
27ec43c77b5d	i2c: tegra: Fix i2c-tegra DMA config option processing	v6.6	I2C
ebfde1584d9f	Revert "PCI: tegra194: Enable support for 256 Byte payload"	v6.6	PCIe
27ec43c77b5d	i2c: tegra: Fix i2c-tegra DMA config option processing	v6.5	I2C
b3497ef404dc	i2c: tegra: Fix failure during probe deferral cleanup	v6.5	I2C
d18b2a0f1a78	pinctrl: tegra: avoid duplicate field initializers	v6.5	pinctrl

BRING YOUR OWN KERNEL

Recipe

<https://docs.nvidia.com/jetson/archives/r36.2/DeveloperGuide/SD/Kernel/BringYourOwnKernel.html>

Here are the high-level steps to bring your own kernel:

1. Identify the initial list of patches. Patches that are integrated in kernel versions that are later than the targeted kernel version will need to be integrated.
2. Build and install a set of out-of-tree modules for drivers that cannot be upstreamed or that have not yet been upstreamed.
3. Review the kernel in the official NVIDIA release to see whether there are additional patches that have not yet upstream and that are needed.



JETPACK 6 - LINUX DISTROS ON JETSON

CHOICES OF DISTROS

Extended Choice of Distros with JetPack 6

Jetson Linux
(L4T)



WINDRVR



CHOICES OF DISTROS

Extended Choice of Distros with JetPack 6

<https://developer.nvidia.com/embedded/jetpack-sdk-60dp>

Linux Distros

JetPack includes Jetson Linux out of the box, but Jetson ecosystem partners offers various Linux based Distros on Jetson. They include:

on Jetson

Canonical Ubuntu: Ubuntu 22.04 offered by Canonical.

Red Hat: Red Hat Enterprise Linux 9.3 offered by Red Hat

Windriver: Commercial embedded Linux OS from Windriver.

RedHawk: Real Time Linux OS from Concurrent Real-Time for mission critical hard real time applications.

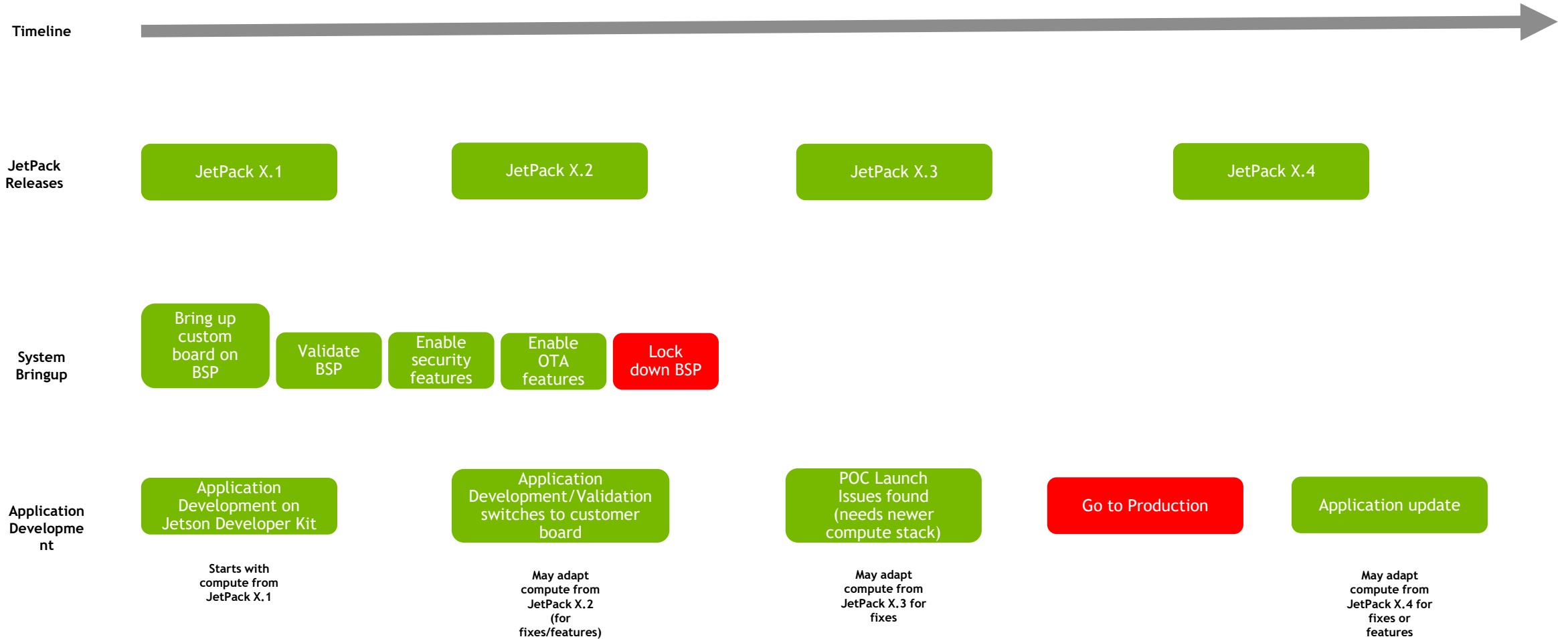
Yocto based distros: Various Yocto based distros and services leveraging meta-tegra are offered by ecosystem partners like Balena, Foundaries.io & TimeSys.



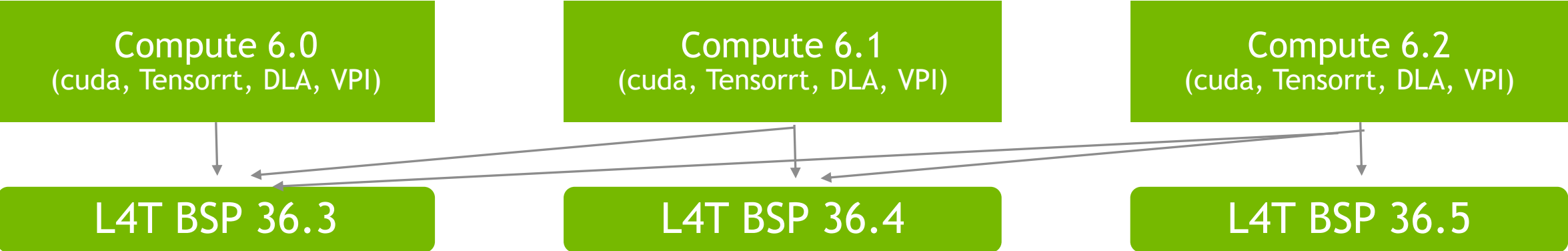
JETPACK 6 - UPGRADABLE COMPUTE STACK

Why Upgradable Compute?

Typical Journey to Production



UPGRADABLE COMPUTE



Upgradable compute will support running compute from JetPack on 2 prior JetPack major dot releases



JETPACK 6 - ROS2 HUMBLE

ROS 2 HUMBLE SUPPORT

JetPack 6 brings Tier-1 Humble support



Humble Hawksbill is primarily supported on the following platforms:

Tier 1 platforms:

- Ubuntu 22.04 (Jammy): `amd64` and `arm64`
- Windows 10 (Visual Studio 2019): `amd64`

Tier 2 platforms:

- RHEL 8: `amd64`

Tier 3 platforms:

- Ubuntu 20.04 (Focal): `amd64`
- macOS: `amd64`
- Debian Bullseye: `amd64`



MIGRATION FROM JETPACK 5

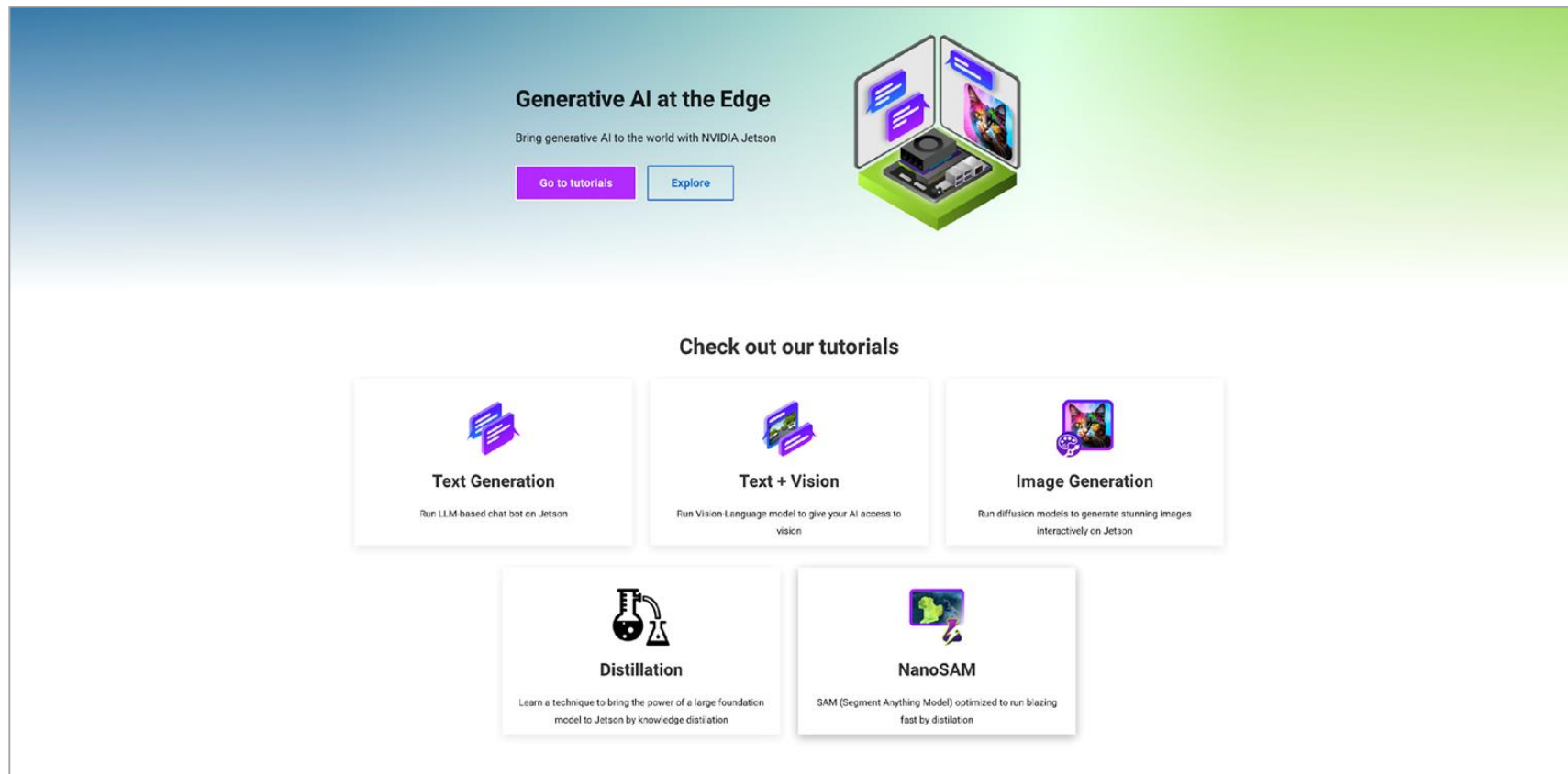
MIGRATING FROM JETPACK 5 TO 6

Item	Changes
Kernel	5.10 to 5.15
Ubuntu	20.04 to 22.04
Bootloaders	No change
Trusted OS	No change
Compute	Upgradable compute stack
Camera	Camera drivers are packaged as out of tree drivers
Multimedia	No major changes
Graphics	No major changes
Security	New features: FTPM and Measured Boot Trusted OS remains same
Power, performance and clocks	No change
OTA	Same: APT based for developer kits Image based OTA for production usecase



GENERATIVE AI PLAYGROUND

CHECK OUT NVIDIA JETSON GENERATIVE AI LAB



Generative AI at the Edge
Bring generative AI to the world with NVIDIA Jetson

[Go to tutorials](#) [Explore](#)

Check out our tutorials

- Text Generation**
Run LLM-based chat bot on Jetson
- Text + Vision**
Run Vision-Language model to give your AI access to vision
- Image Generation**
Run diffusion models to generate stunning images interactively on Jetson
- Distillation**
Learn a technique to bring the power of a large foundation model to Jetson by knowledge distillation
- NanoSAM**
SAM (Segment Anything Model) optimized to run blazing fast by distillation

www.jetson-ai-lab.com



Q&A