

Status of DTS Validation in the Linux Kernel

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Introduction

- Krzysztof Kozlowski
- I work for Qualcomm
- I am a co-maintainer of a few subsystems in the Linux kernel
 - SoC subsystem (formerly arm-soc)
 - Devicetree bindings
 - Memory controller drivers
 - Samsung Exynos SoC ARM/ARM64 architecture

Agenda

- dt-check-style
- Status of the validation per architectures
- Status of the validation per SoC Platforms

dt-check-style

- Long-awaited linting tool for DTS

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 - Default 'relaxed' mode: ARM, ARM64, PowerPC are clean, with a few exceptions
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 - --mode strict: many false positives, work in progress
- New DTS should not introduce new 'relaxed' warnings

dt-check-style

- Long-awaited linting tool for DTS
- scripts/dtc/dt-check-style
 - Default 'relaxed' mode: ARM, ARM64, PowerPC are clean, with a few exceptions
 - --mode strict: many false positives, work in progress
- New DTS should not introduce new 'relaxed' warnings
 - And should not introduce new 'strict' warnings when issue would be flagged also by review
 - Similarly example DTS in the bindings

Status of Architectures



Kernel Versions

- All further slides show results as of Linux kernel:
- next-20260925 (called v7.4 on slides)
 - Only on some of the slides
 - Validated with dtschema v2026.10.dev4+g568711590
- v7.3-rc5, (almost) latest RC release
 - Validated with dtschema v2026.10.dev4+g568711590
- v7.1, released June 2026
 - Validated with dtschema v2026.06
- v6.18, released end of November 2025
 - Validated with dtschema v2025.08

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- v7.1, released June 2026
 - Validated with dtschema v2026.06
- v6.18, released end of November 2025
 - Validated with dtschema v2025.08
- Trying to show change happening during last year
 - Comparing with earlier Linux kernel releases is tricky, because dtschema is stricter now
 - Therefore trying to use dtschema package from that era

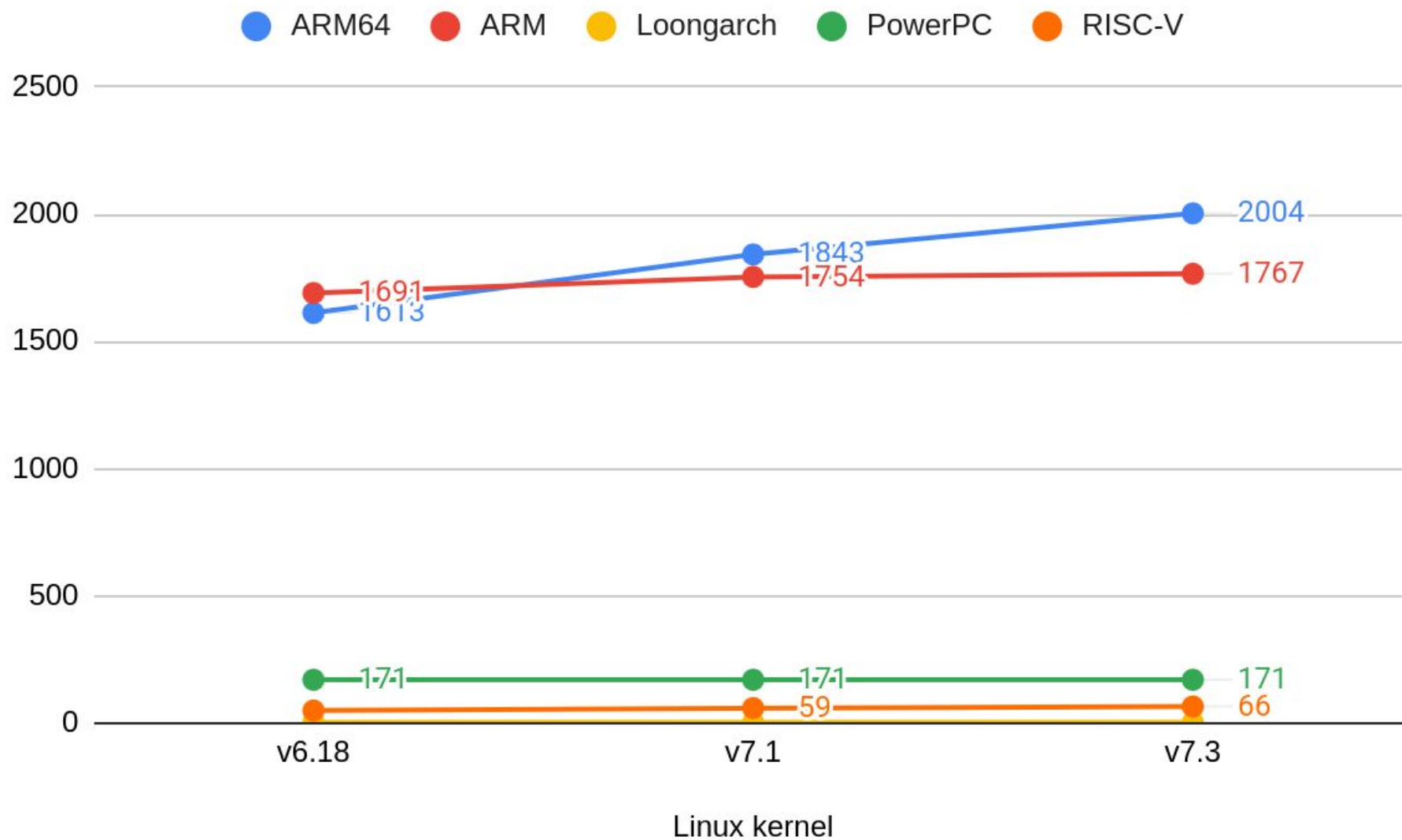
Architectures Tested Here

- ARM
 - ``ls arch/arm/boot/dts/``
 - Everything which could build, so includes ARMv7, ARMv6 and ancient ARMv4T (ARM9 like TI Nspire calculator)
- ARM64
 - ``ls arch/arm64/boot/dts/``
- RISC-V
- Loongarch
- PowerPC

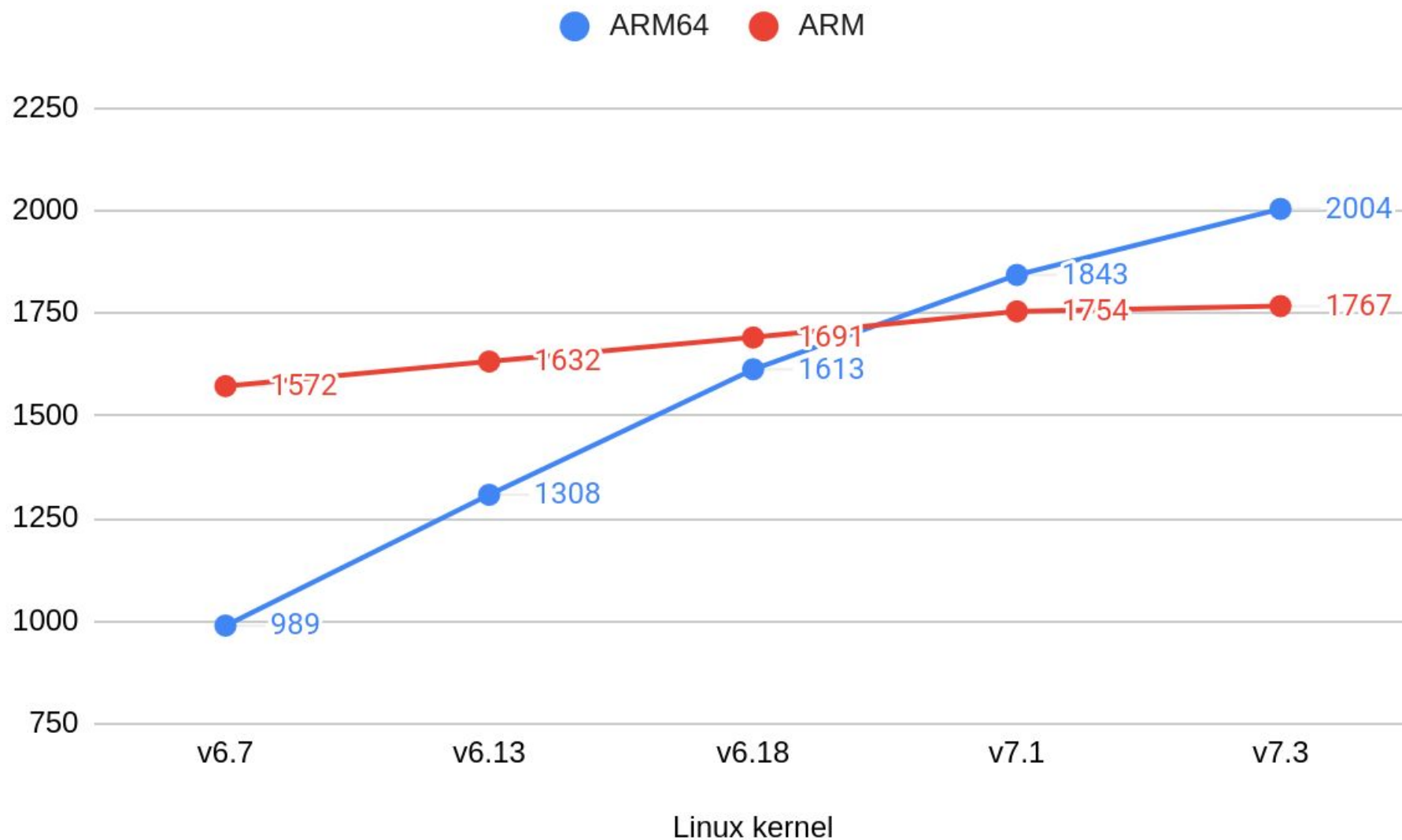
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- RISC-V
- Loongarch
- PowerPC
- Not included in my talk
 - MIPS

Targets per Architecture



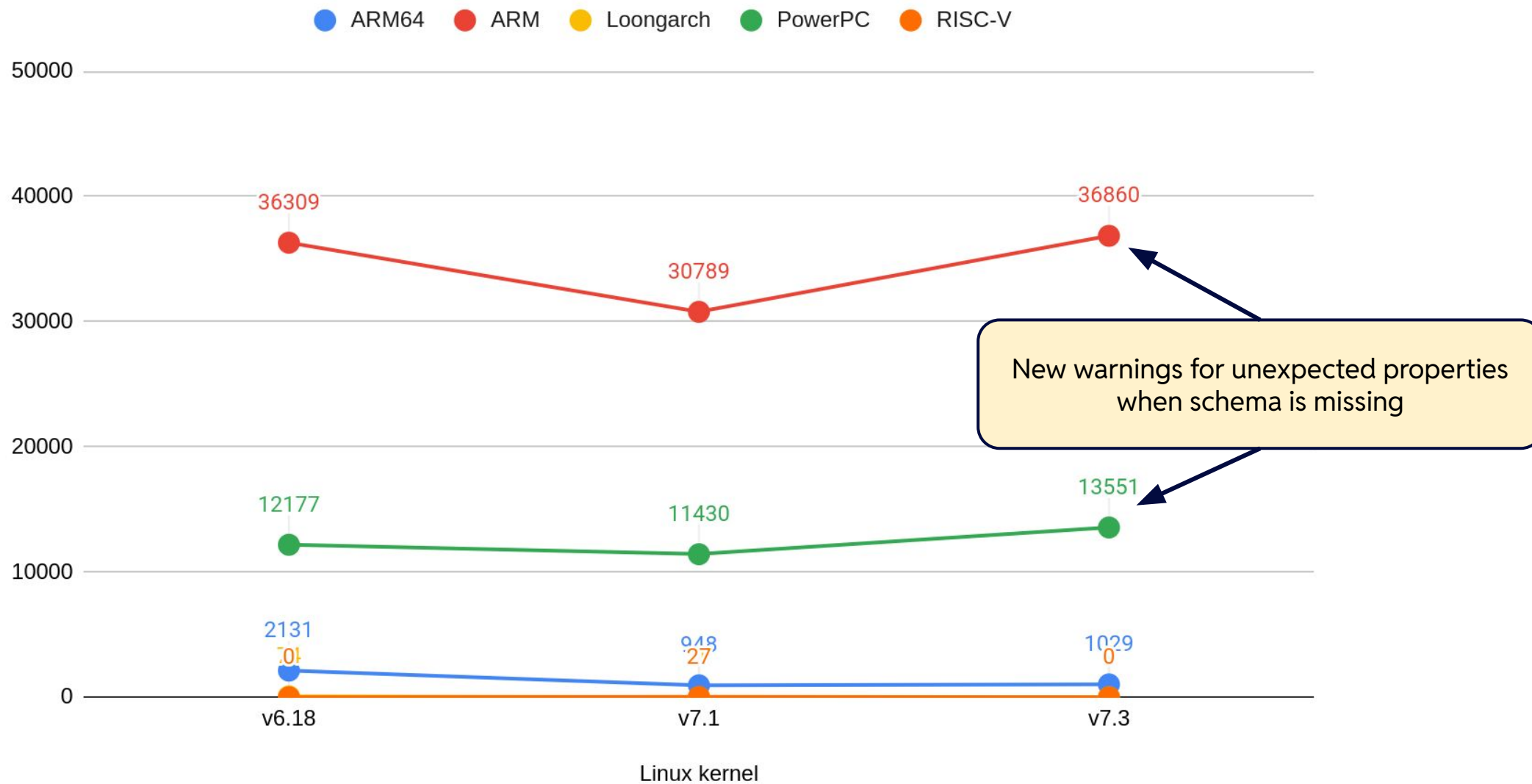
Targets per Architecture (Two Years Retrospective)



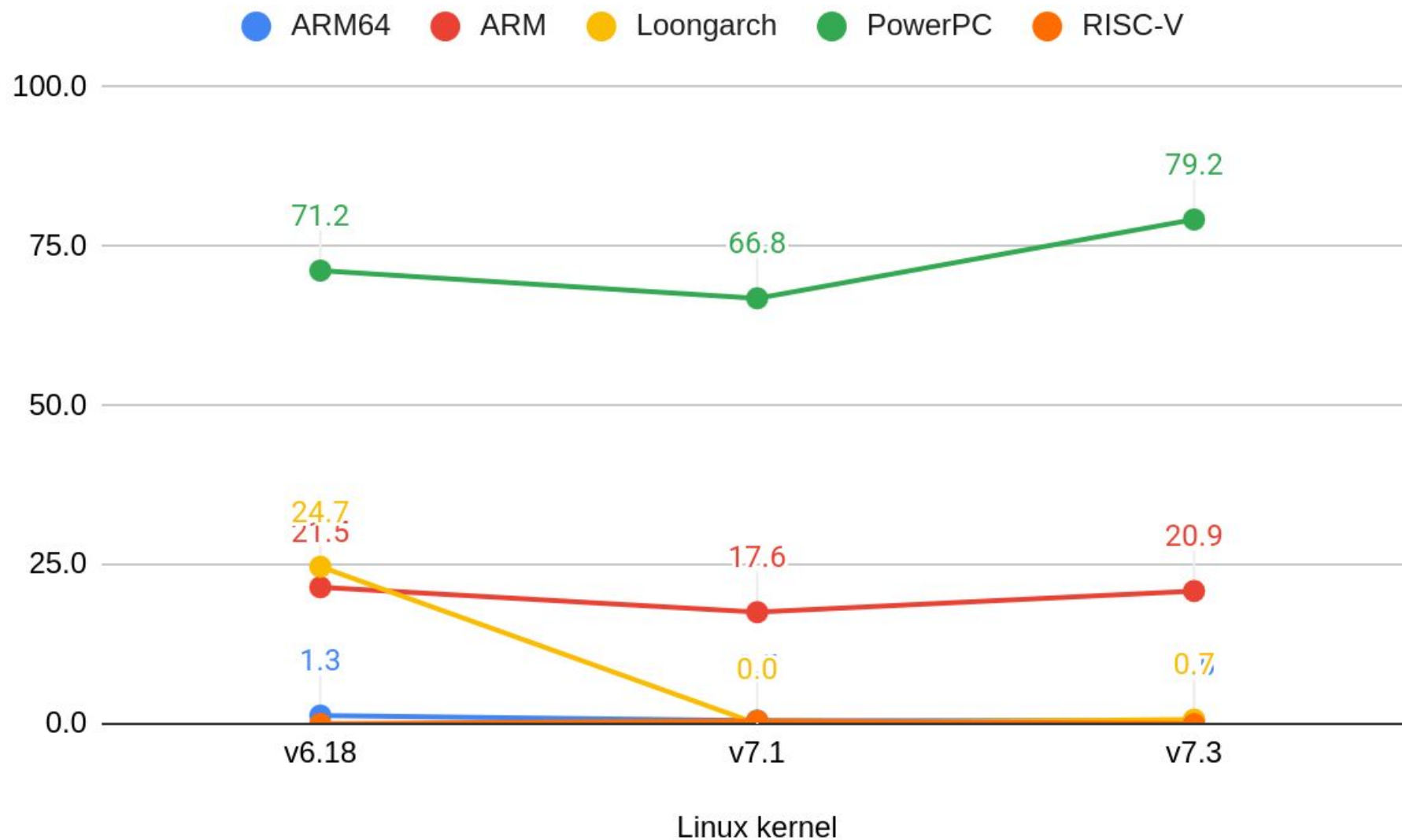
Total DTBs Check Warnings (Lower Better)



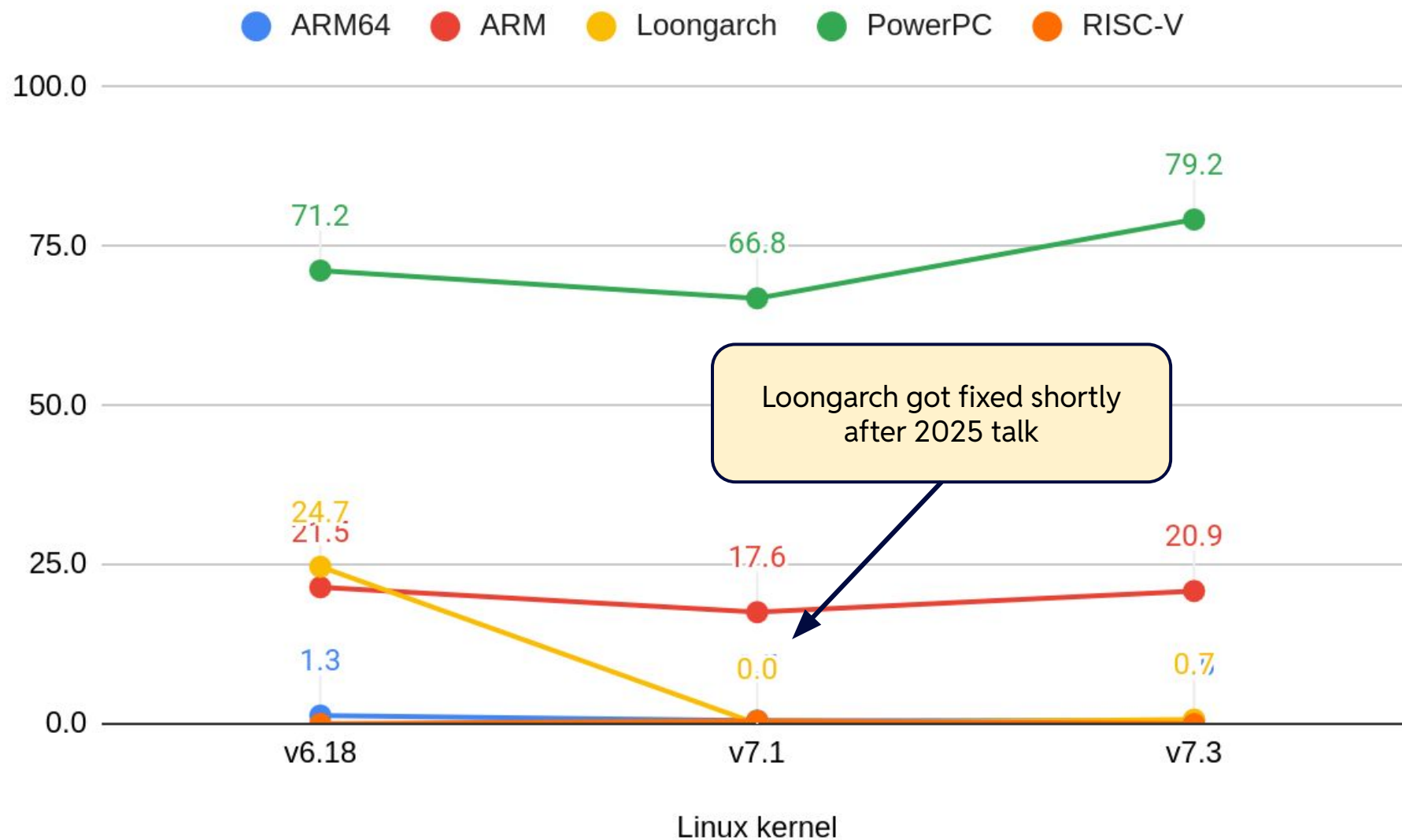
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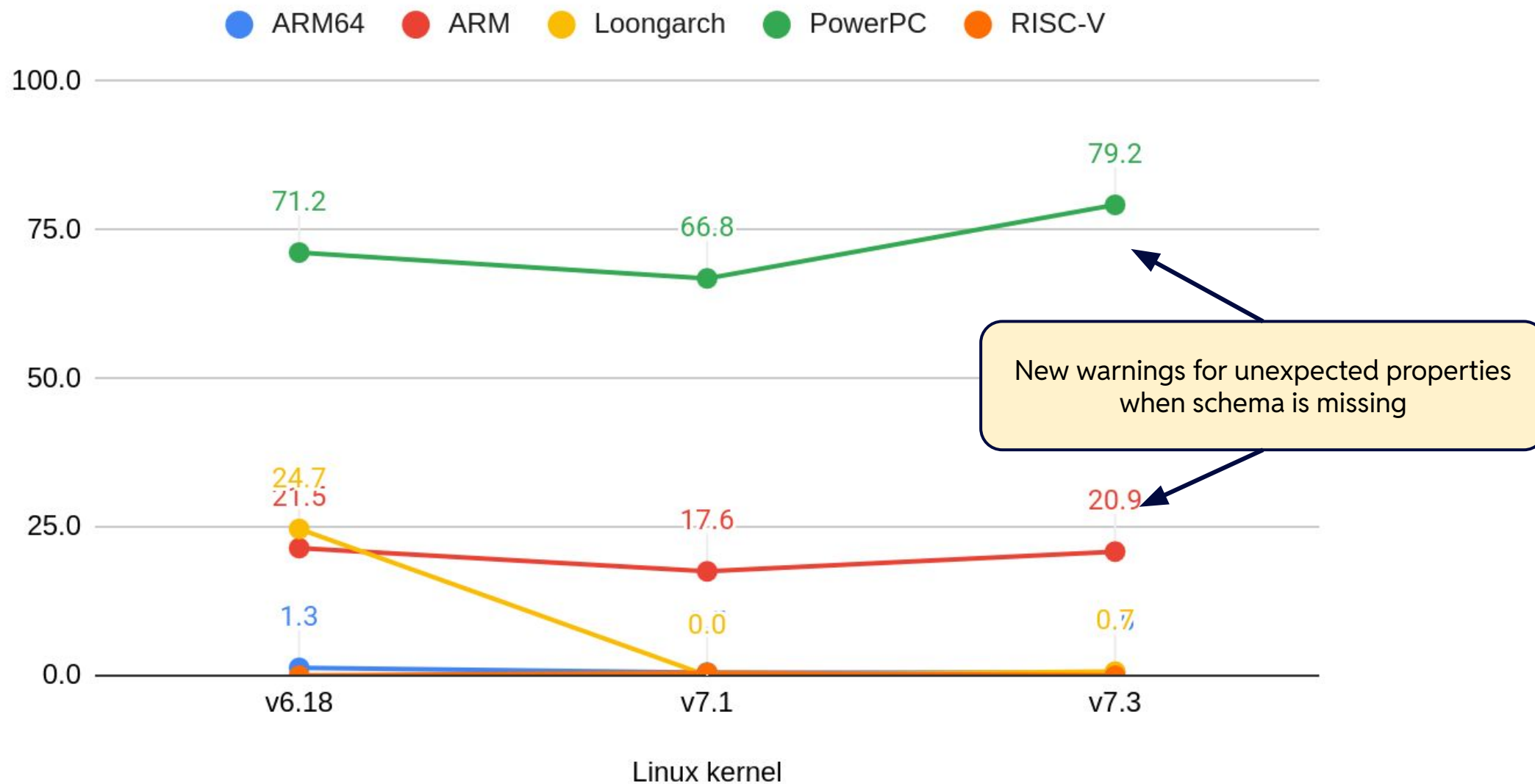
DTBs Check Warnings / Target (Lower Better)



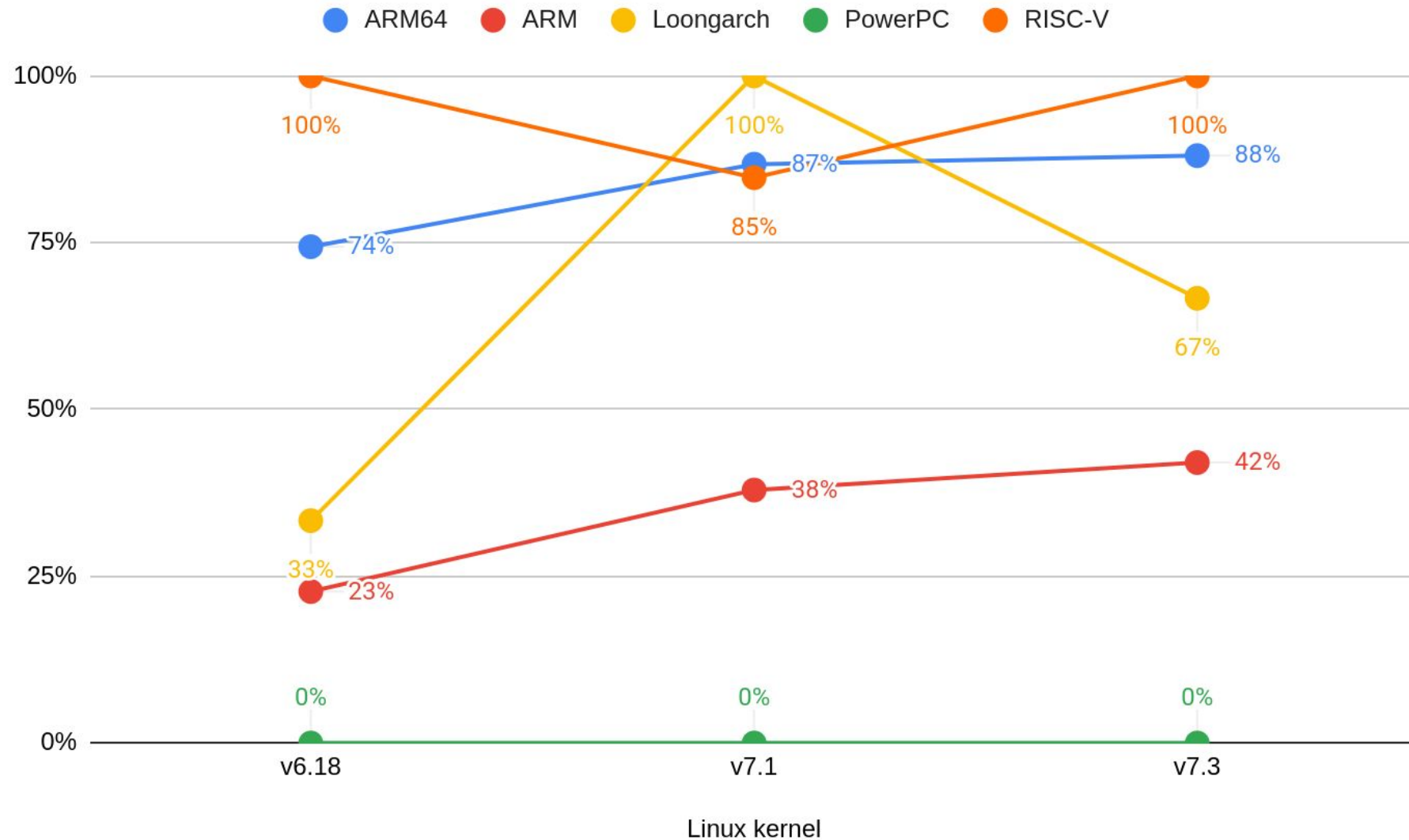
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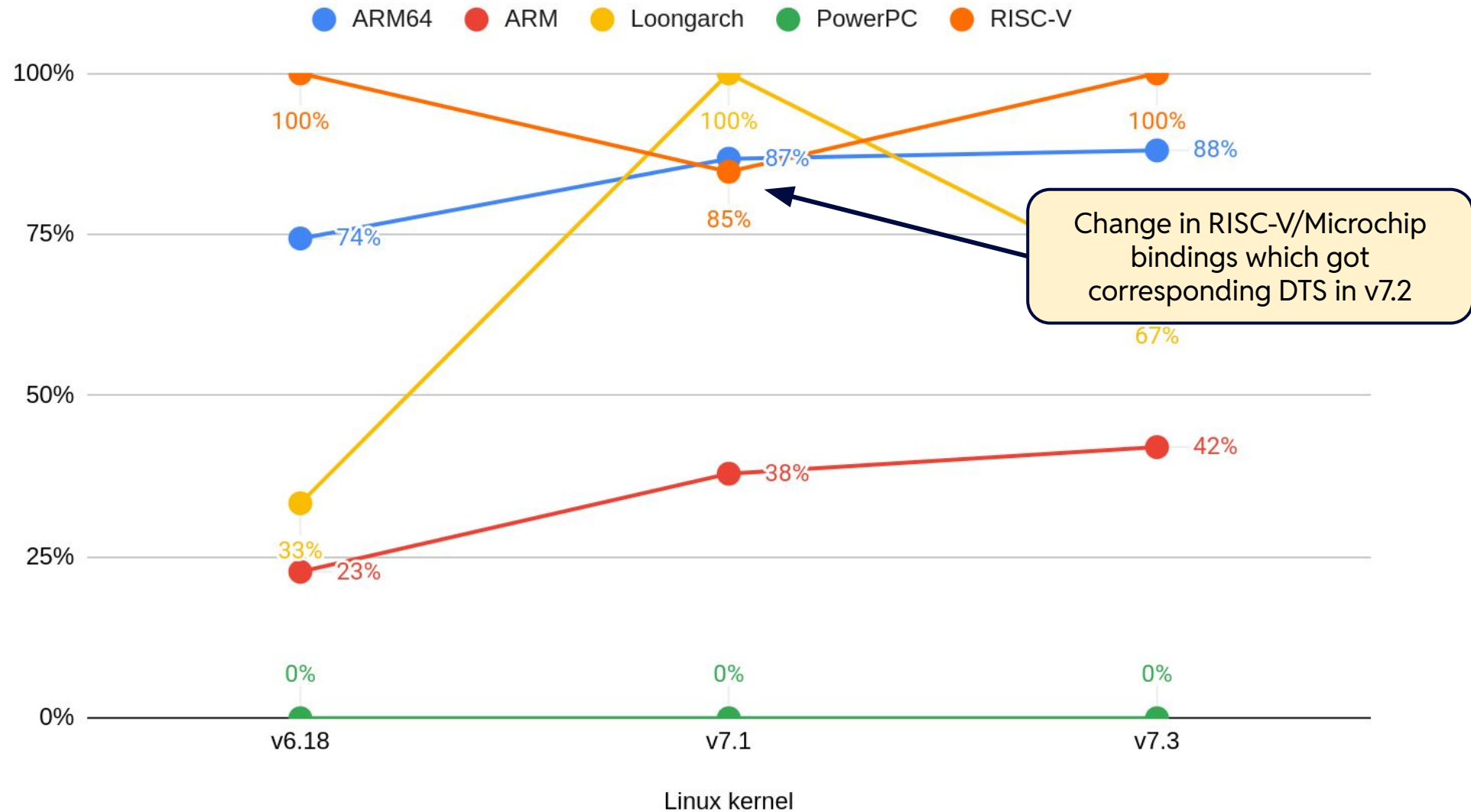
DTBs Check Warnings / Target (Lower Better)



Percentage of Warning-free Targets (Higher Better)



Percentage of Warning-free Targets (Higher Better)



Status of (SoCs) Platforms



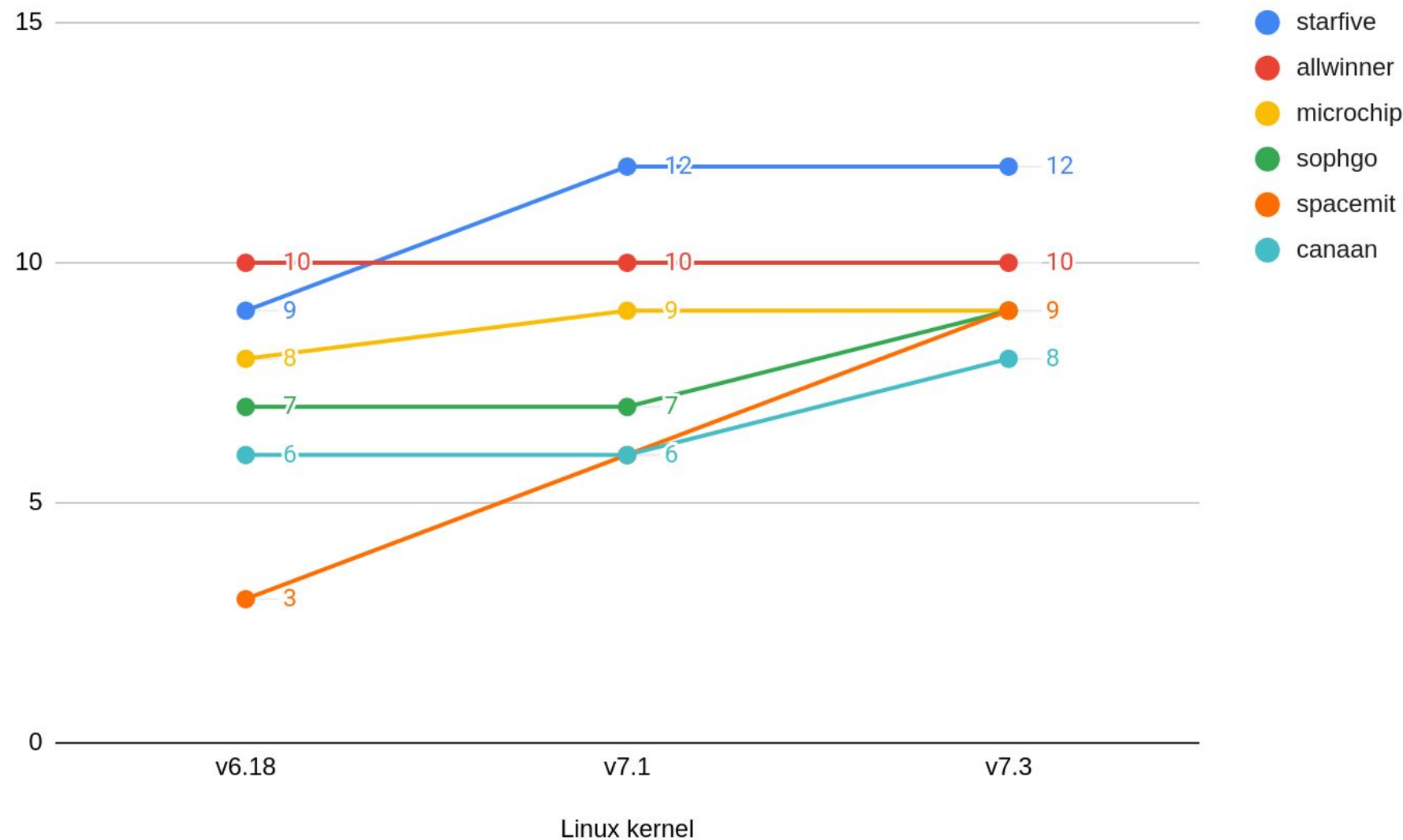
Status of RISC-V Platforms



SoC Platforms - RISC-V

- RISC-V has 100% DTBs check compliance so no need to compare SoCs
- I can show number of targets...

Number of Targets - RISC-V



Status of ARM (32-bit) Platforms



SoC Platforms - ARM

- There are ~40 subdirectories in arch/arm/boot/dts - ~40 SoC vendors

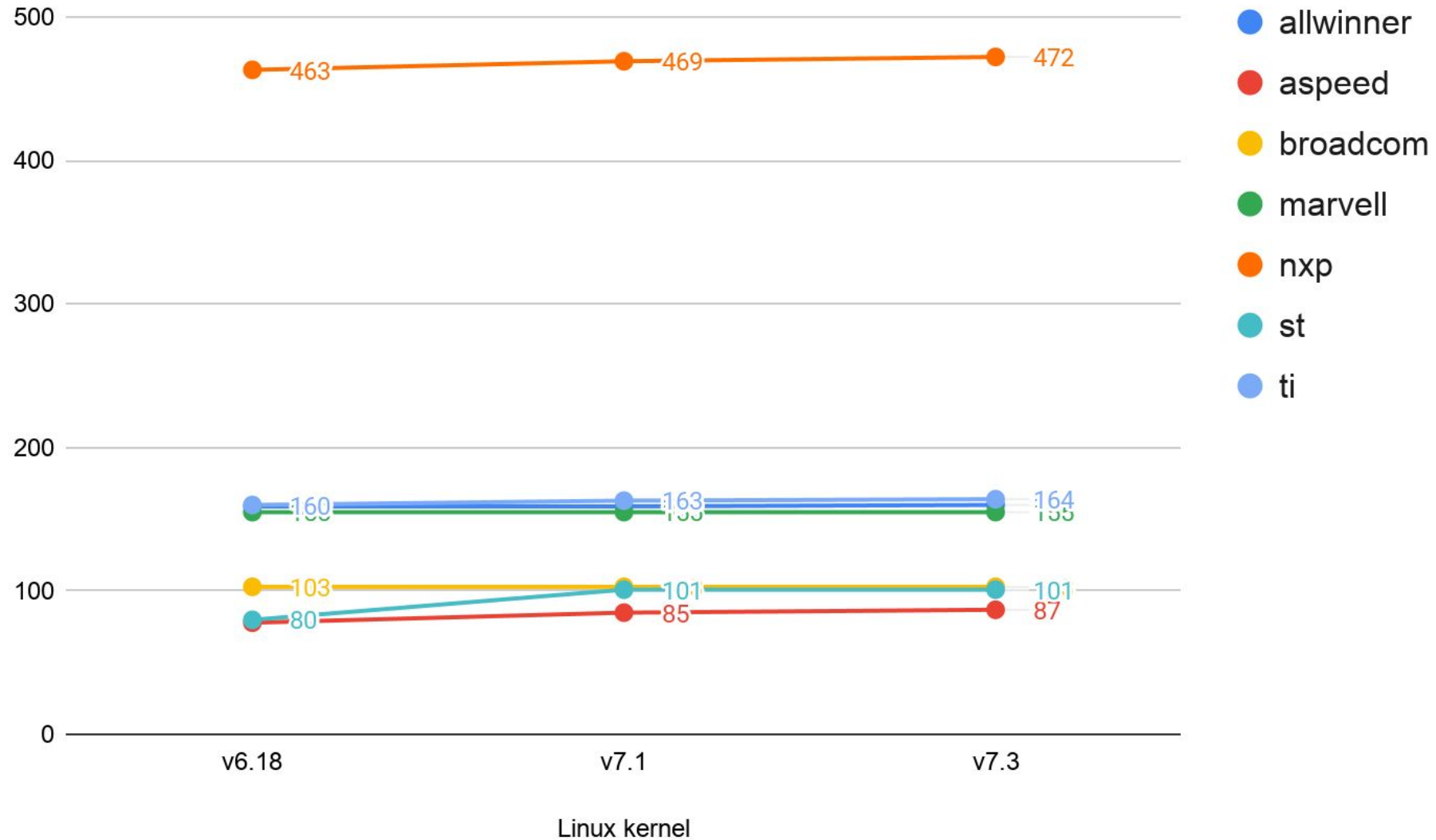
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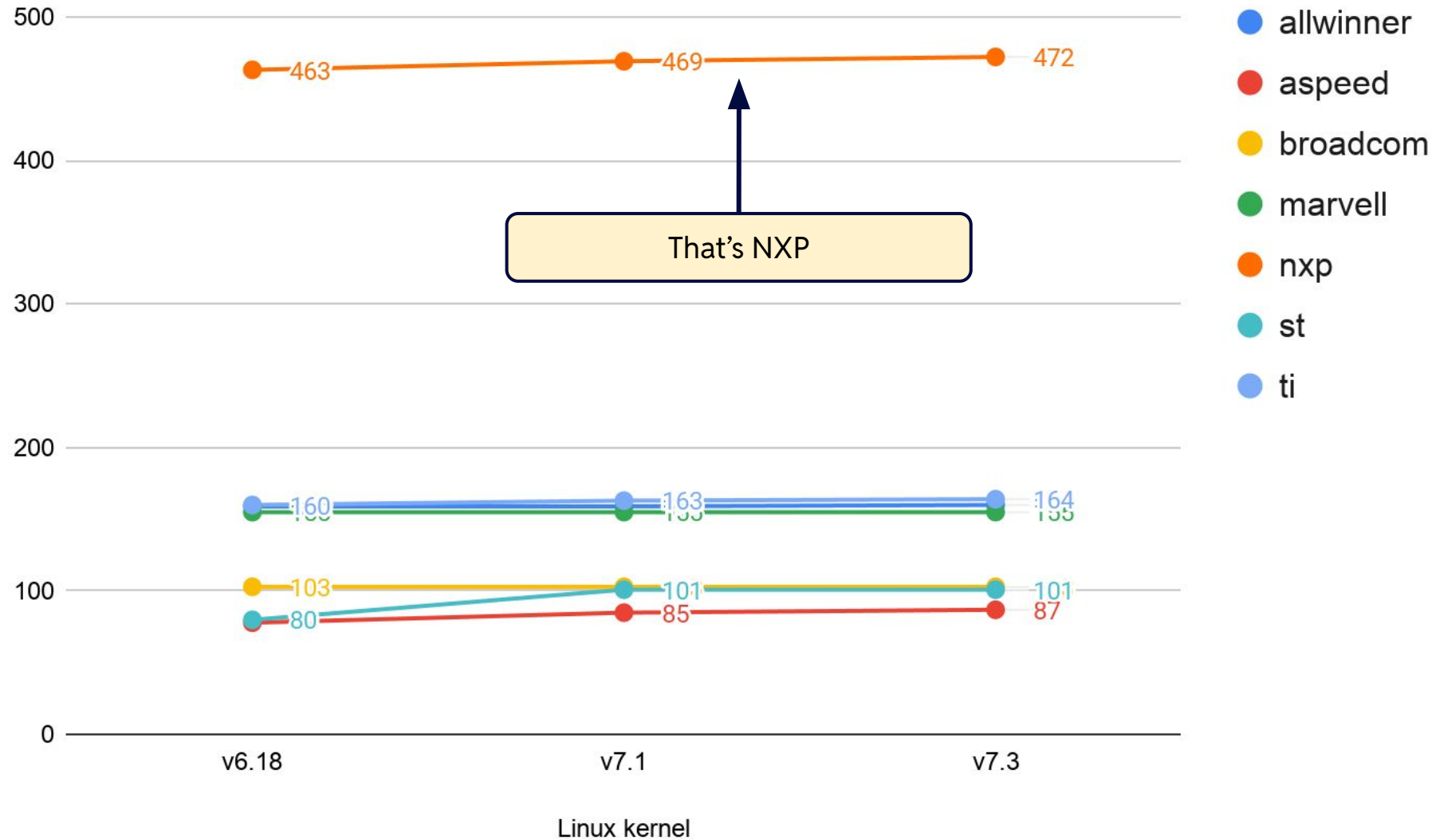
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- Following slides show subset of architectures, e.g. most active in Linux kernel

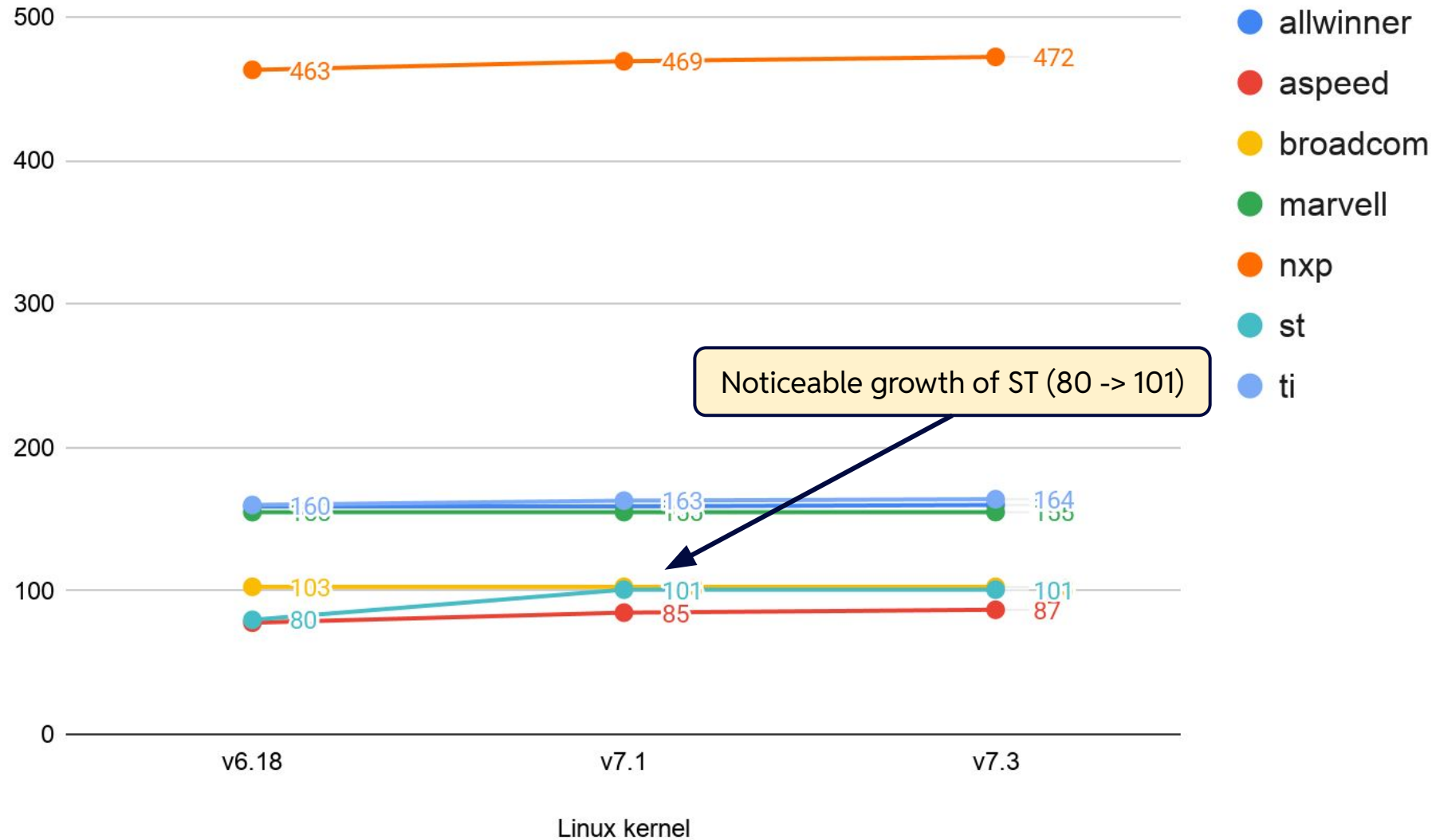
Number of Targets - ARM (Excerpt)



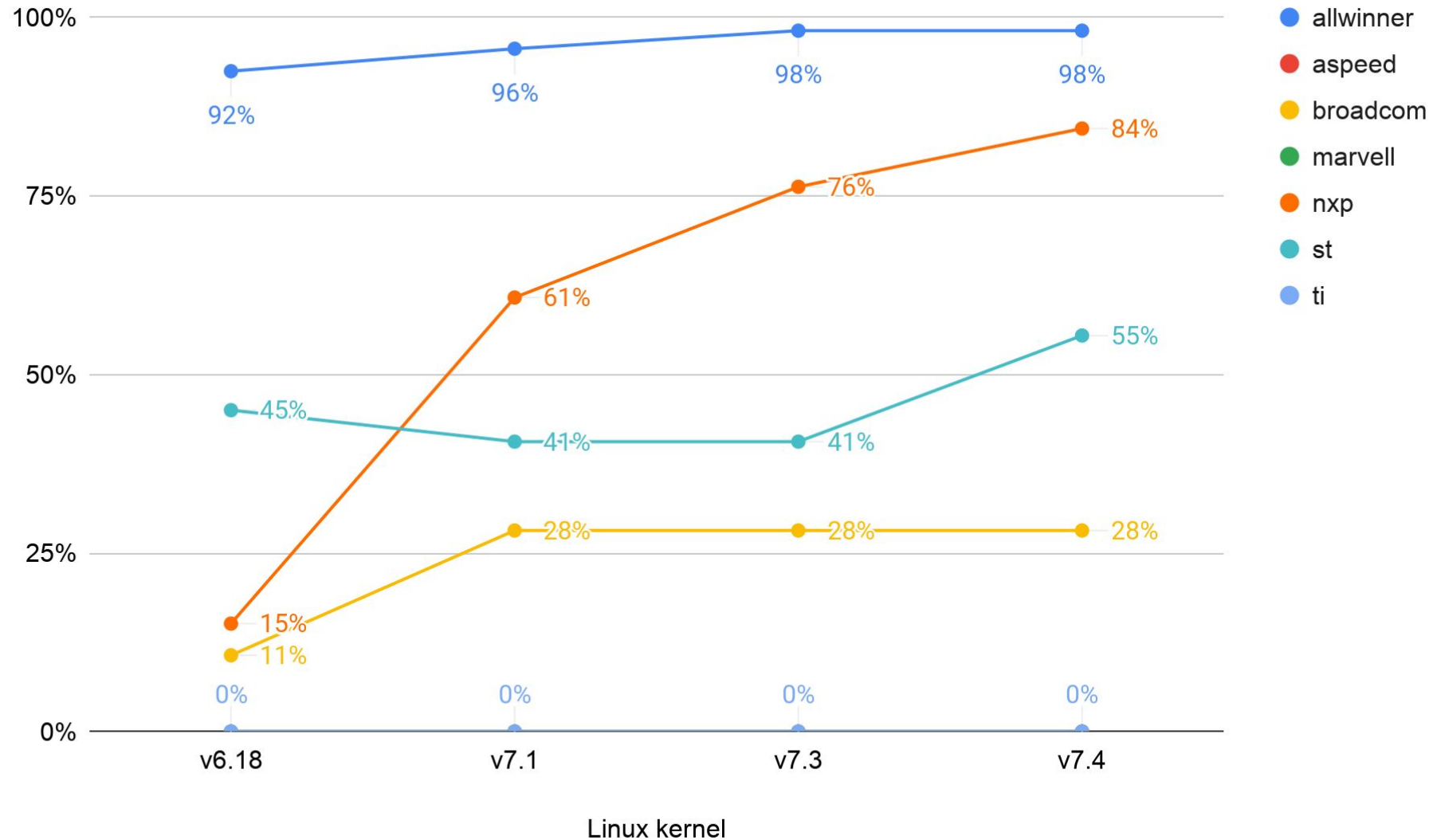
Number of Targets - ARM (Excerpt)



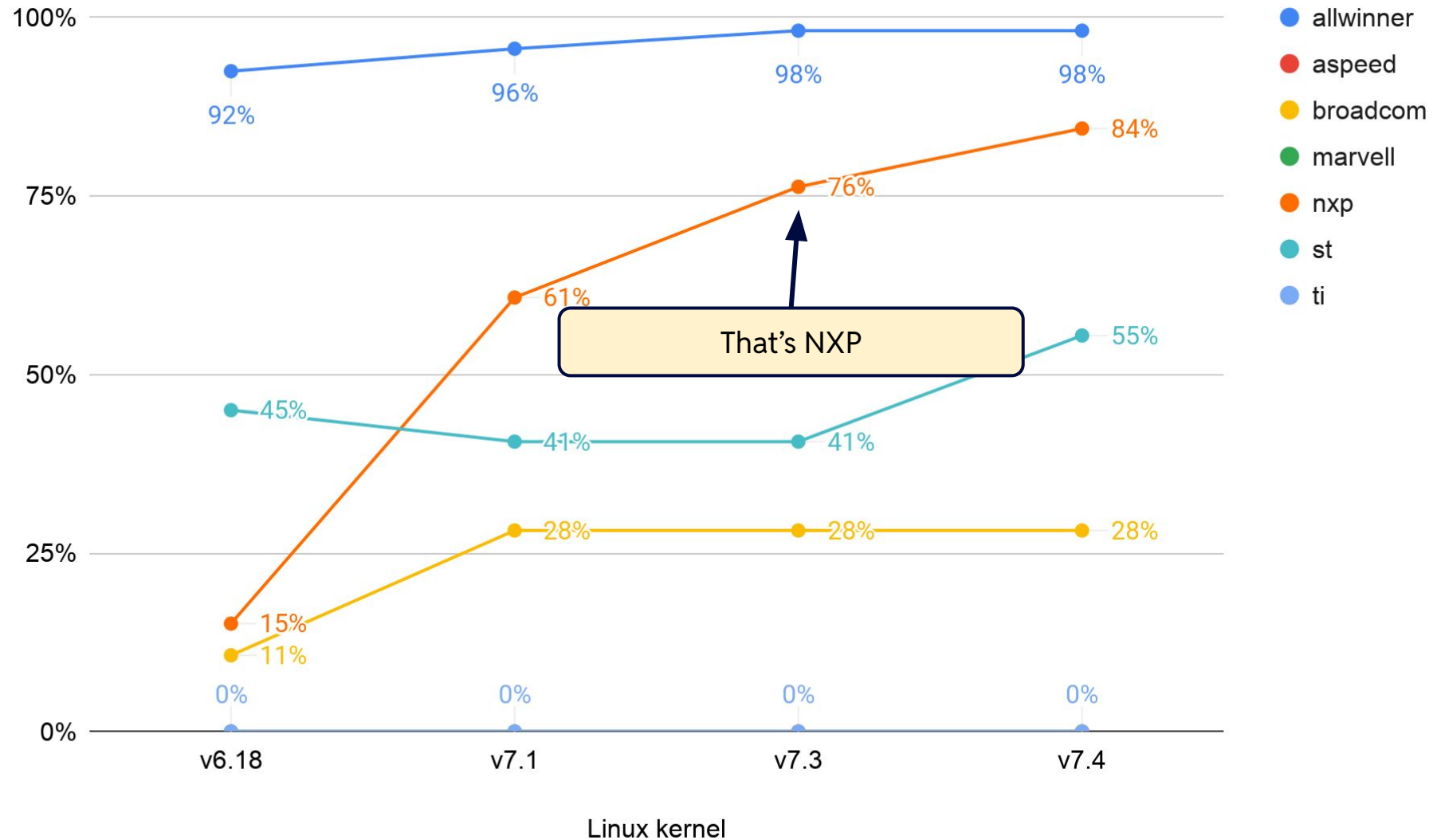
Number of Targets - ARM (Excerpt)



Percentage of Warning-free Targets (Higher Better) - ARM (Excerpt)



Percentage of Warning-free Targets (Higher Better) - ARM (Excerpt)



Warning-free Platforms (Higher Better) - ARM, v7.4 (next)

SoC Platform	Percentage of Warning-free Targets	No. Targets
Actions	100%	5
Airoha	100%	1
Amlogic	100%	6
HPE	100%	1
ZTE	100%	1
Allwinner	98%	160
Socionext	91%	11

Status of ARM64Platforms



SoC Platforms - ARM64

- There are ~42 subdirectories in arch/arm64/boot/dts - ~40 SoC vendors
 - Tesla and Exynos are both Samsung
 - Freescale = NXP (old naming used here)
 - Altera and Intel almost the same but not counted together (sorry, too much work...)

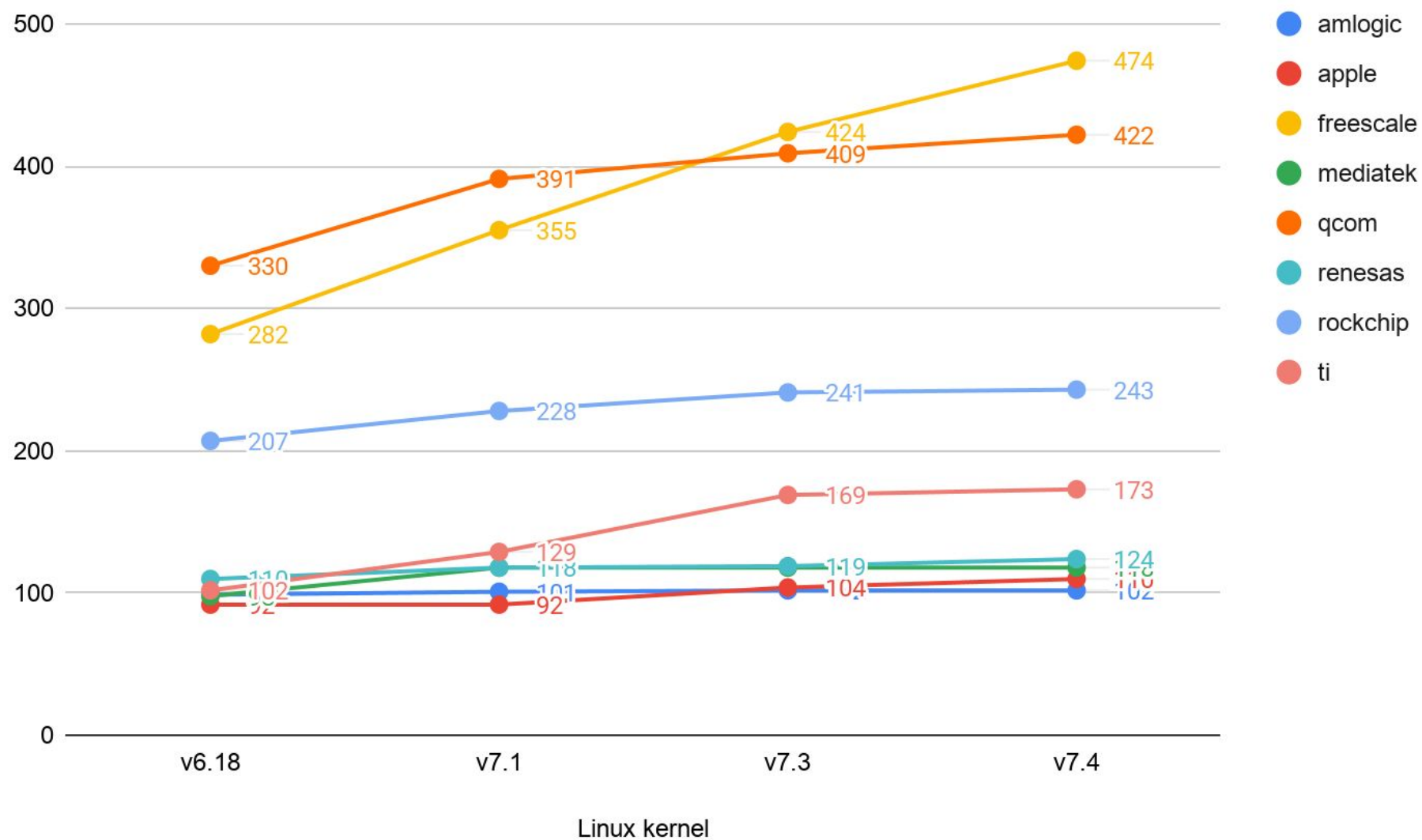
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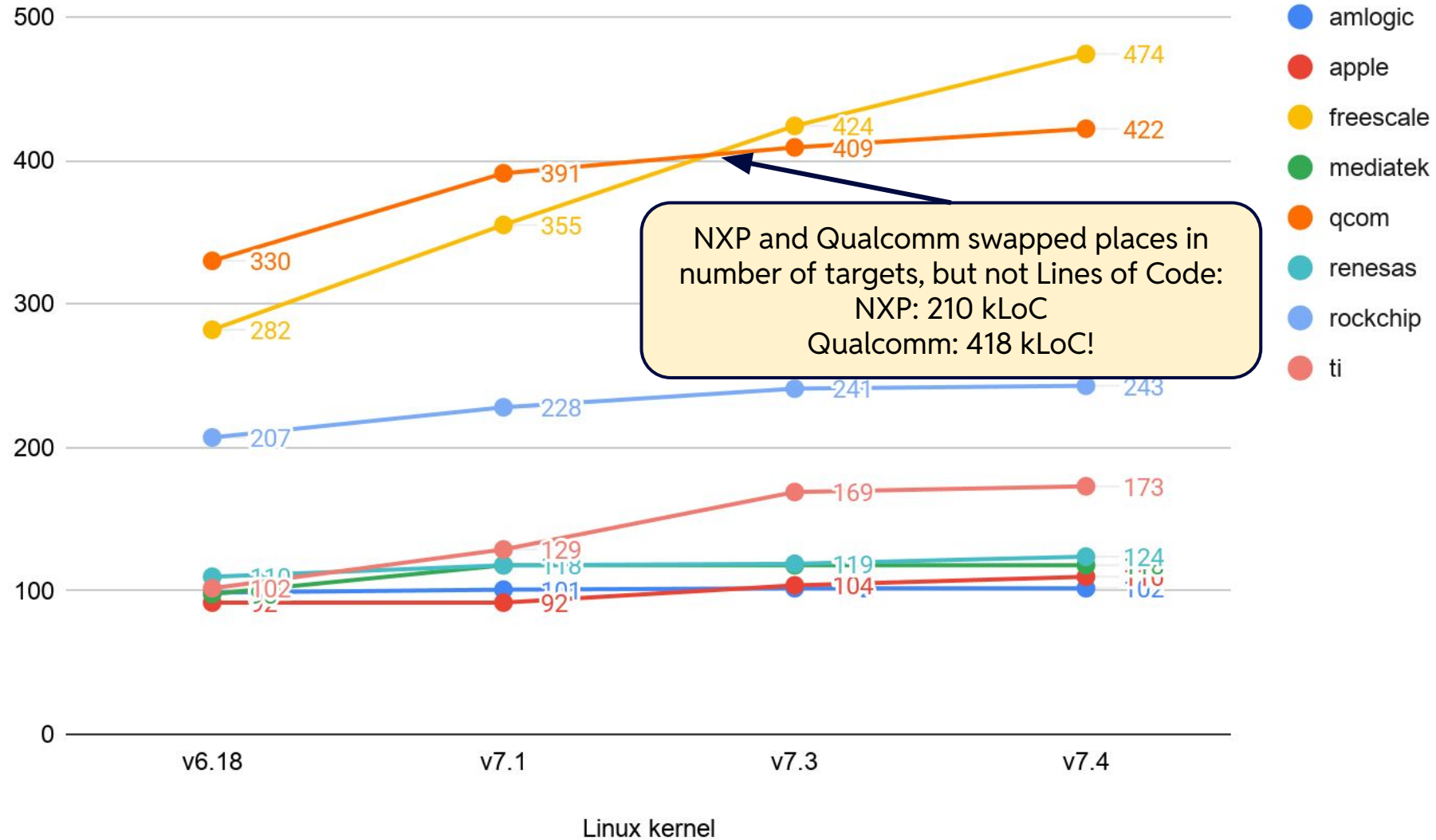
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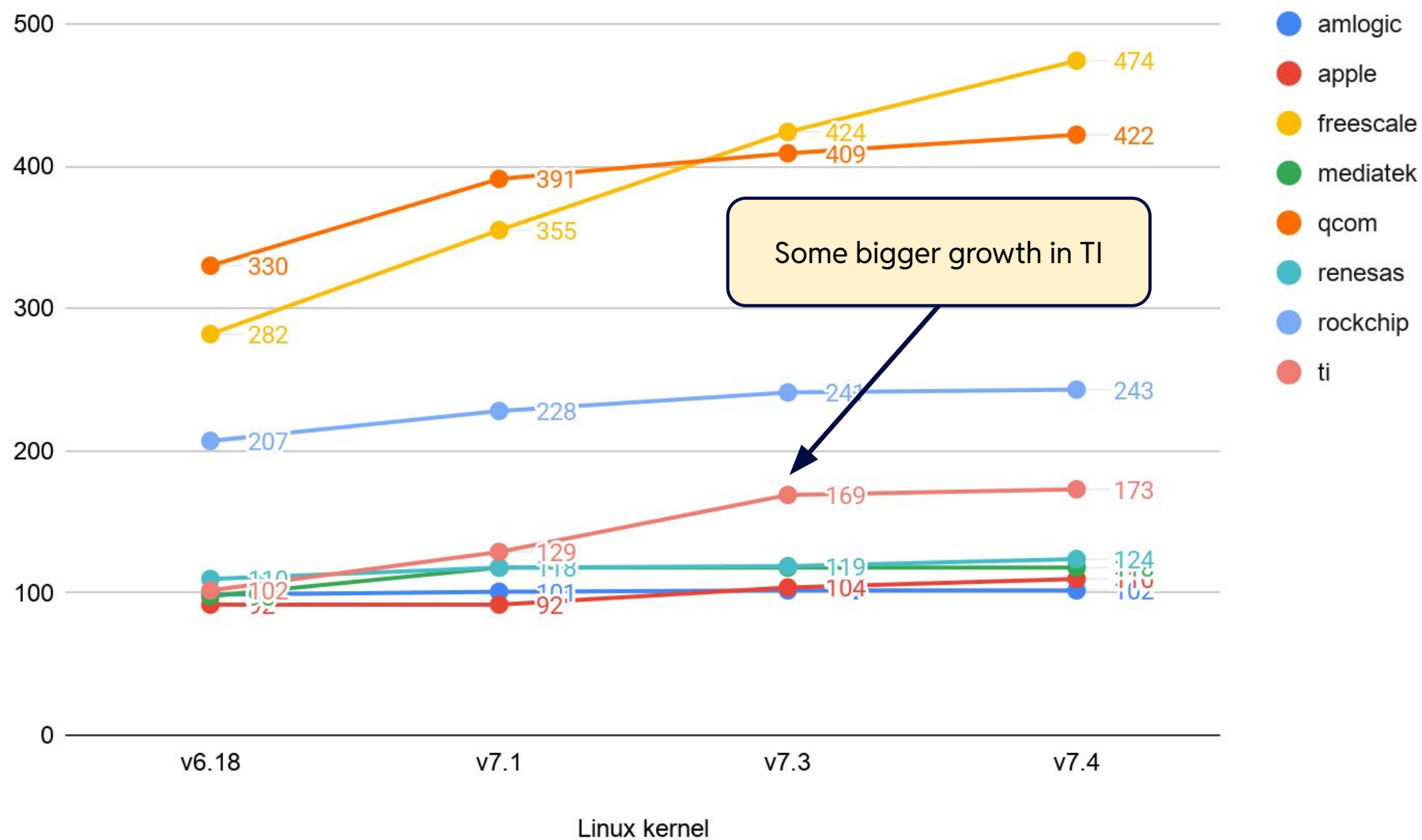
Number of Targets - ARM64 (Excerpt)



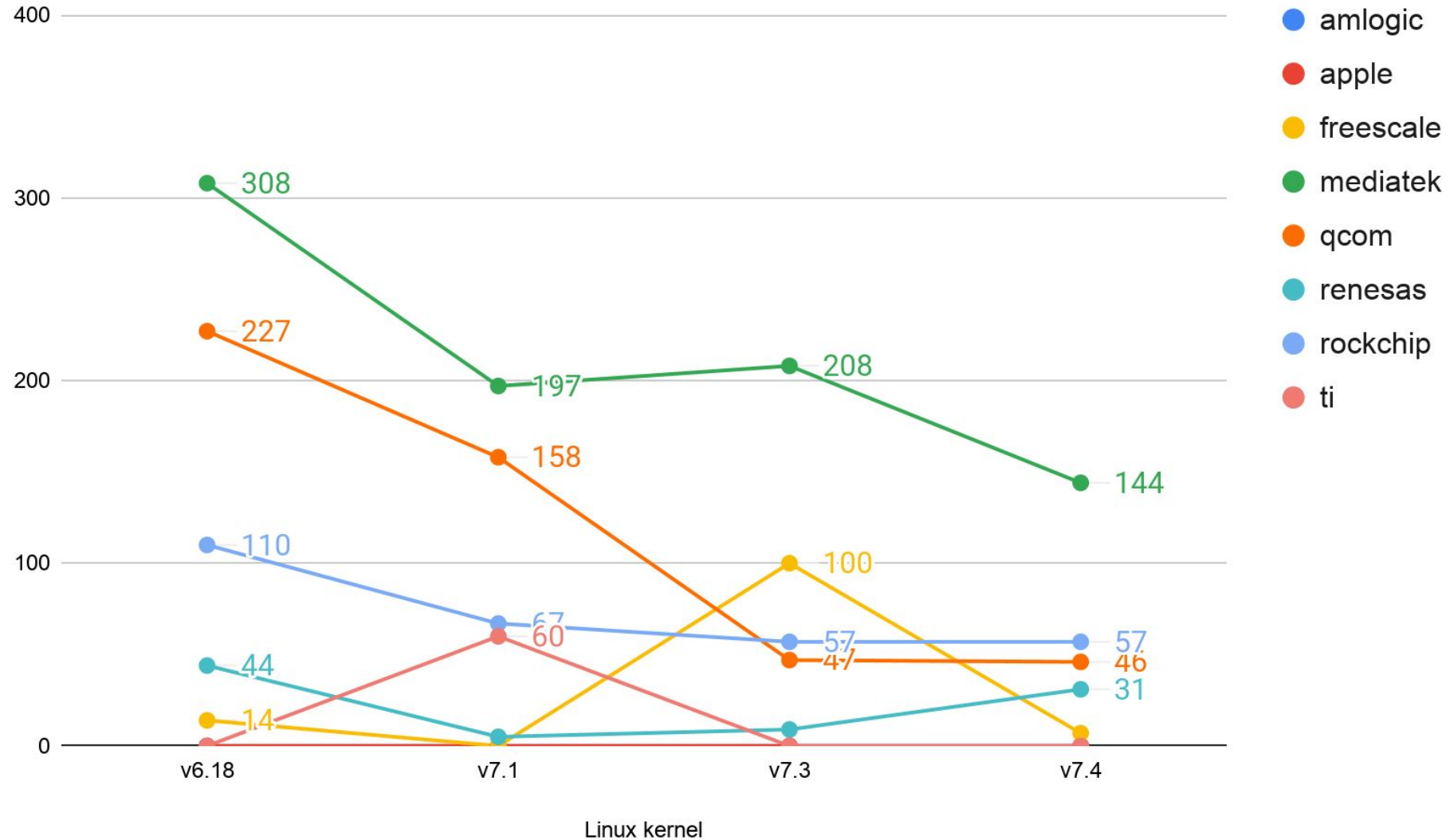
Number of Targets - ARM64 (Excerpt)



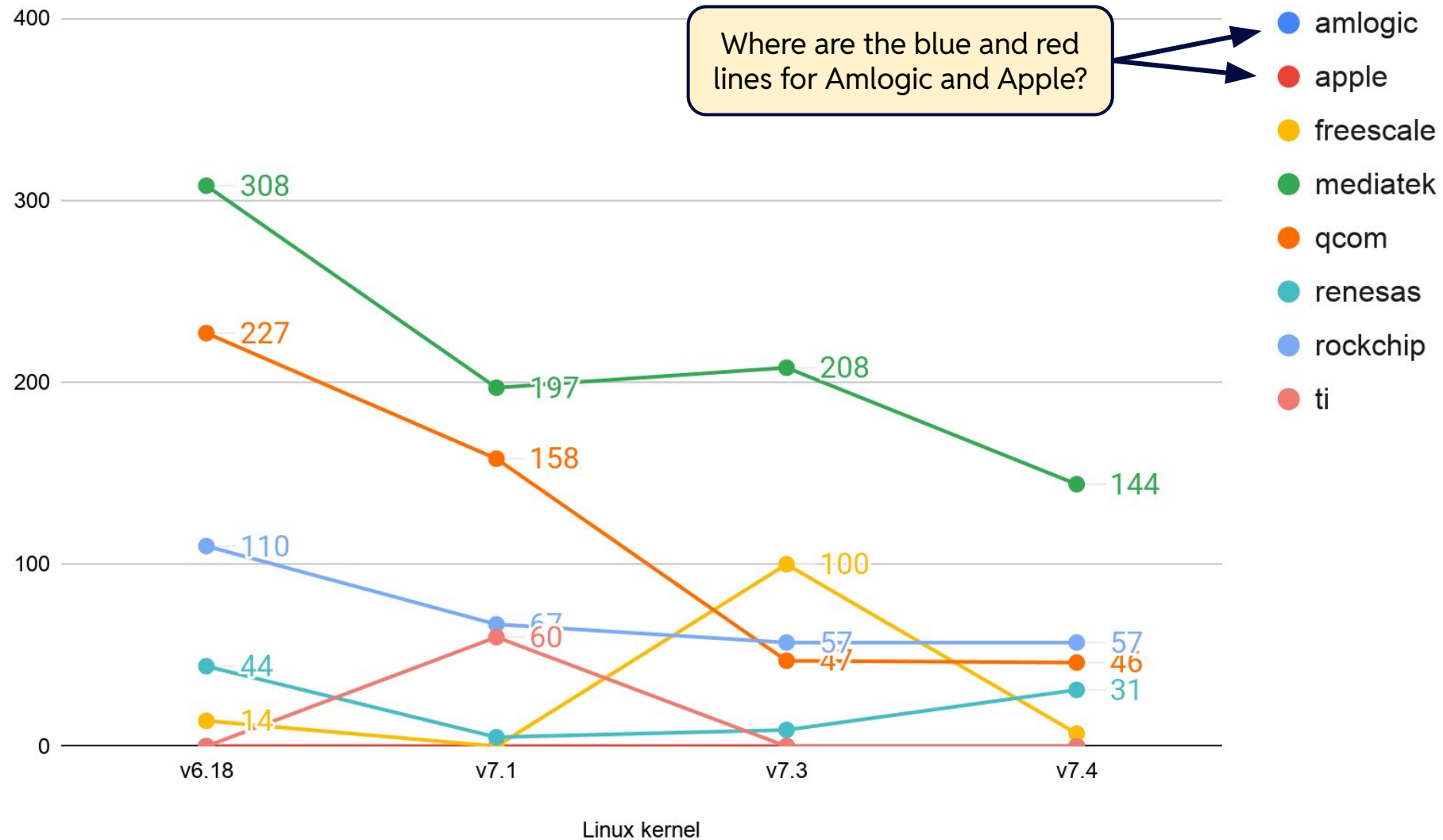
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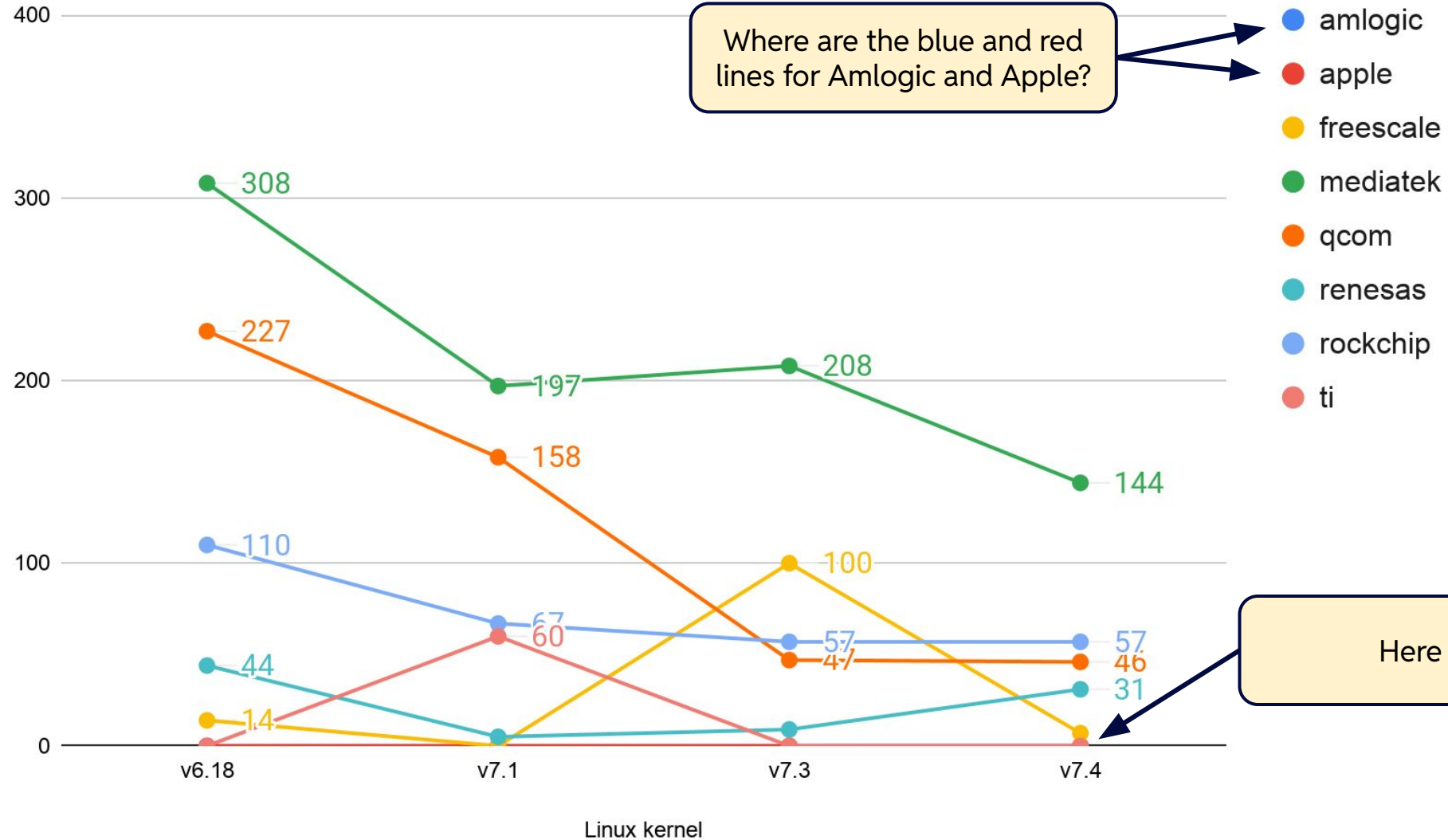
Total DTBs Check Warnings (Lower Better) - ARM64 (Excerpt)



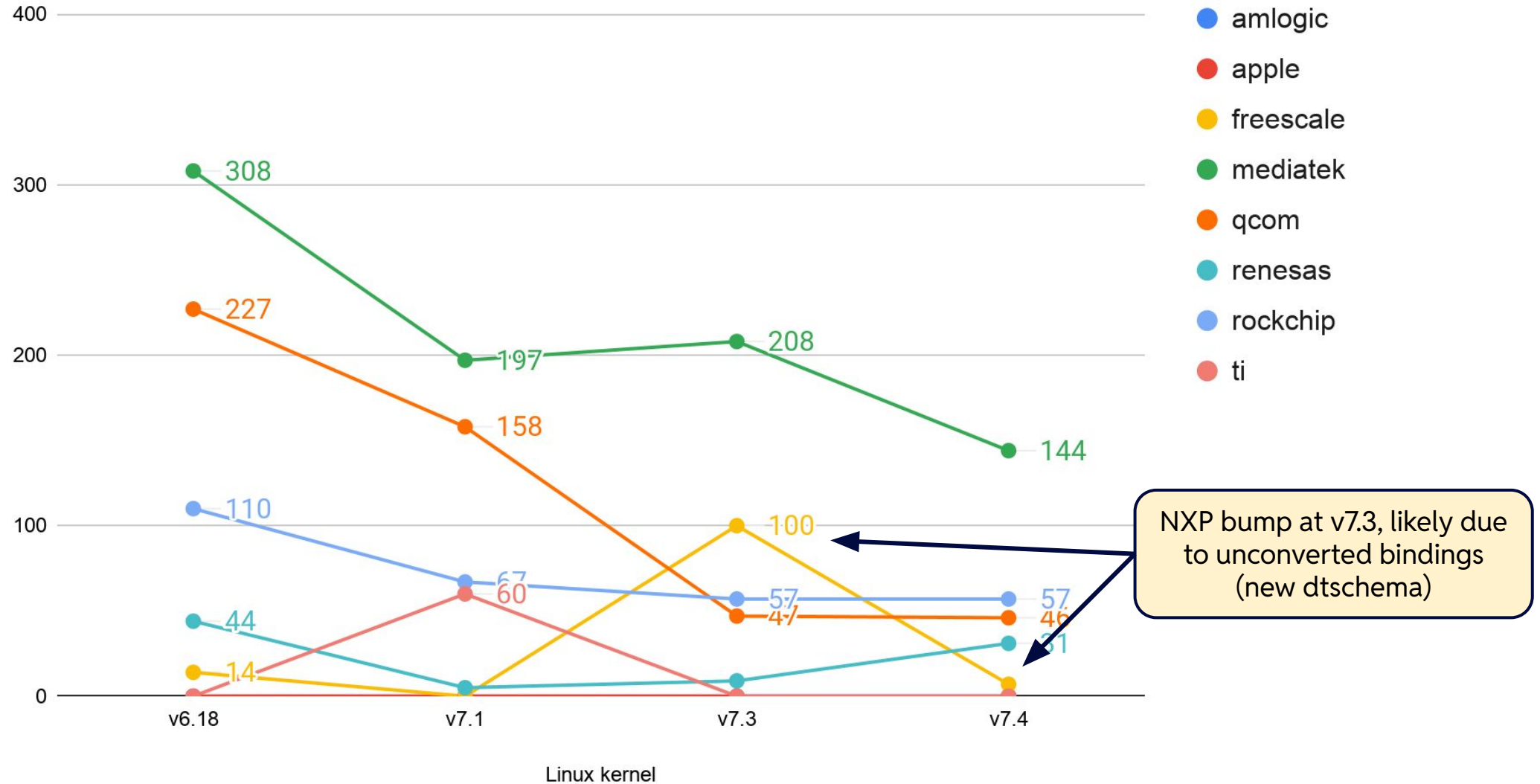
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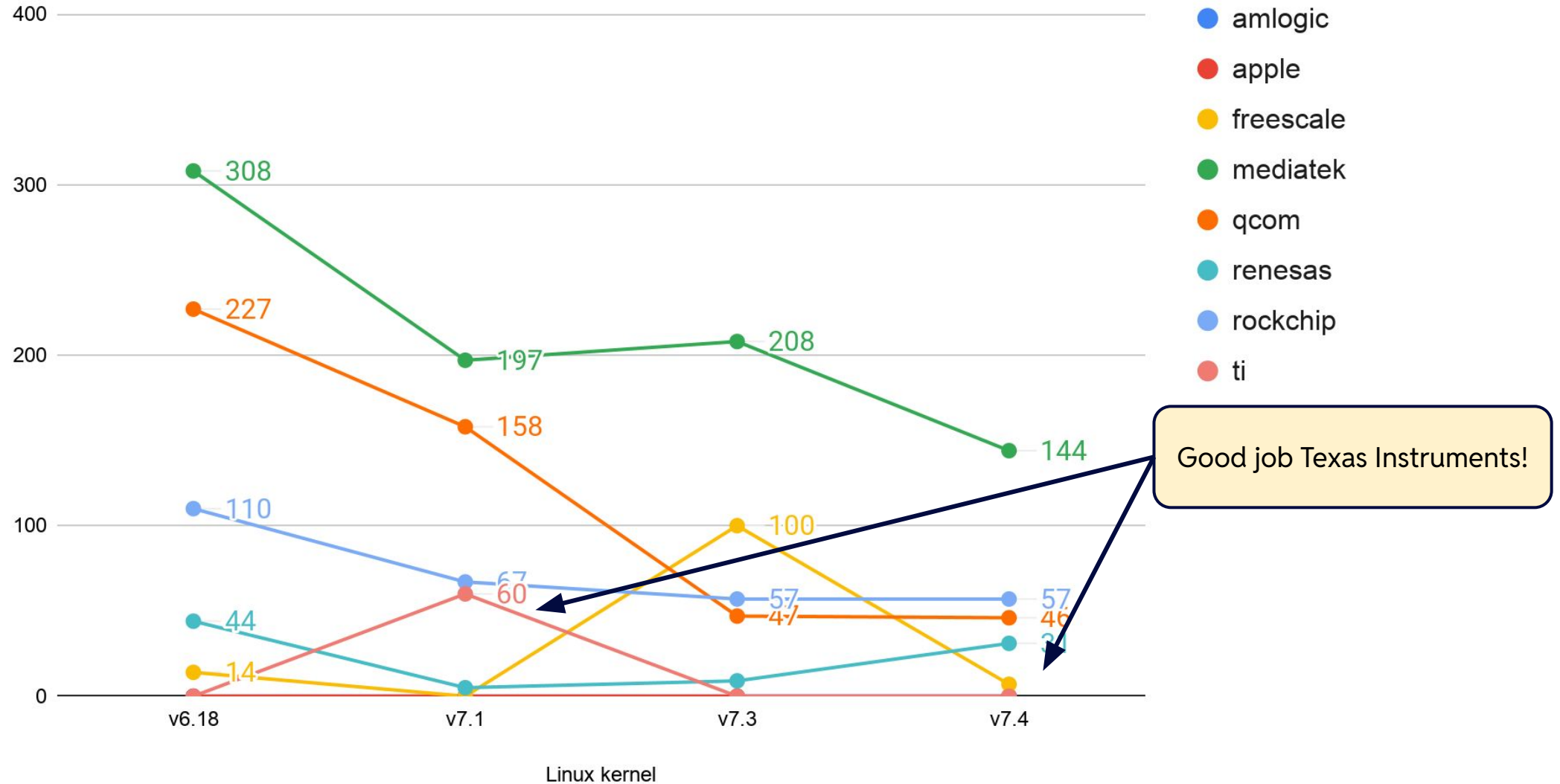
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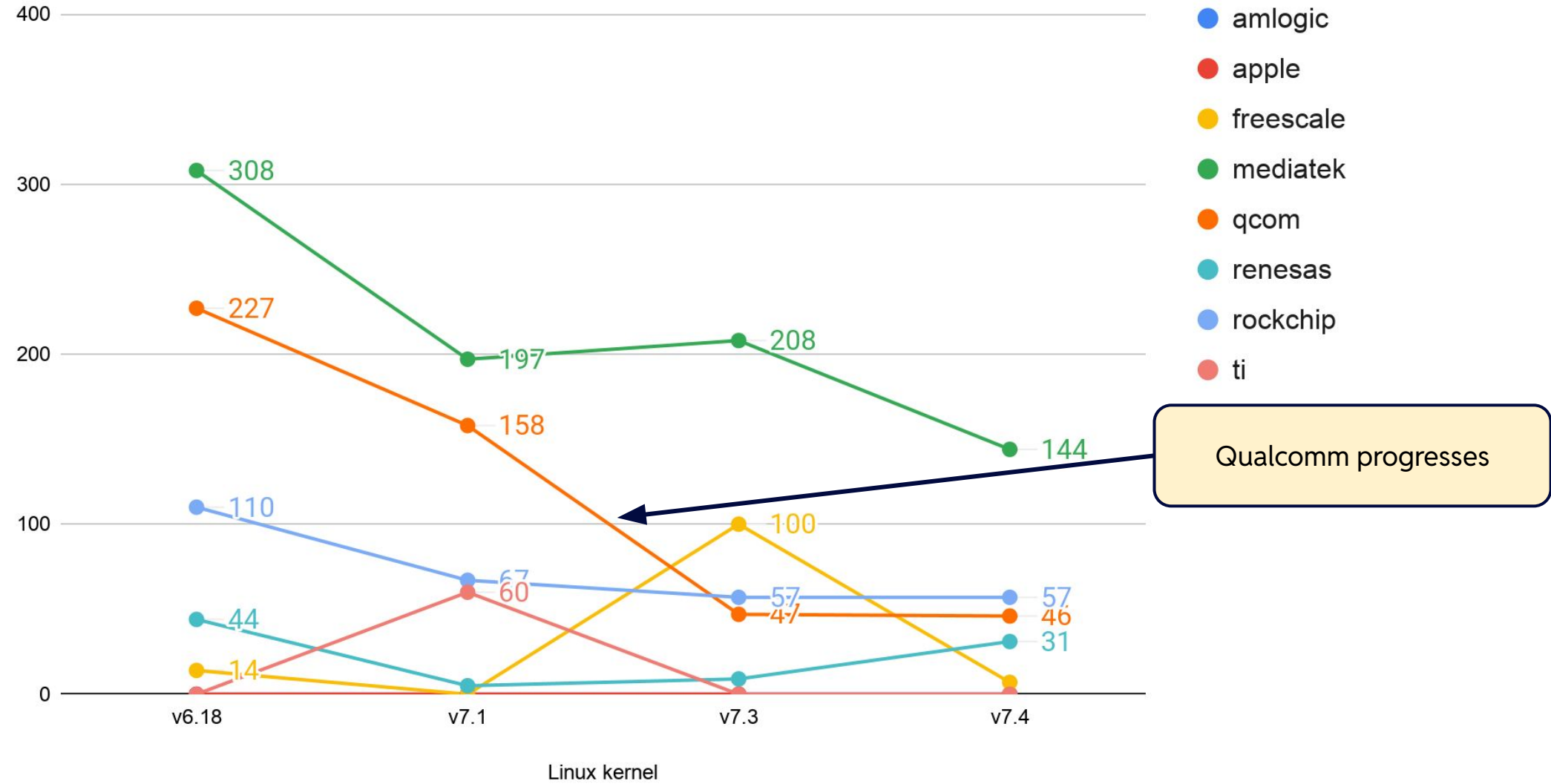
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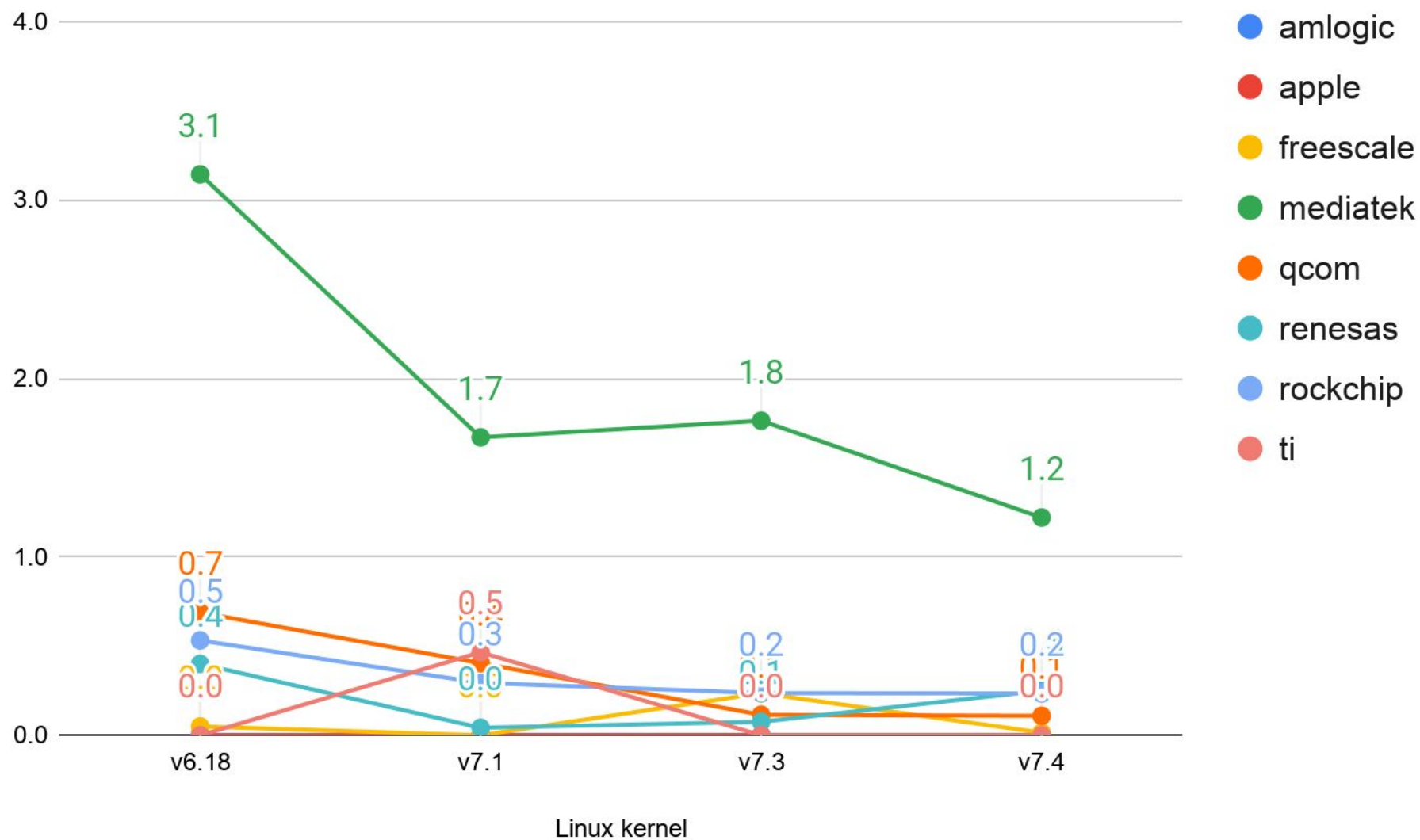
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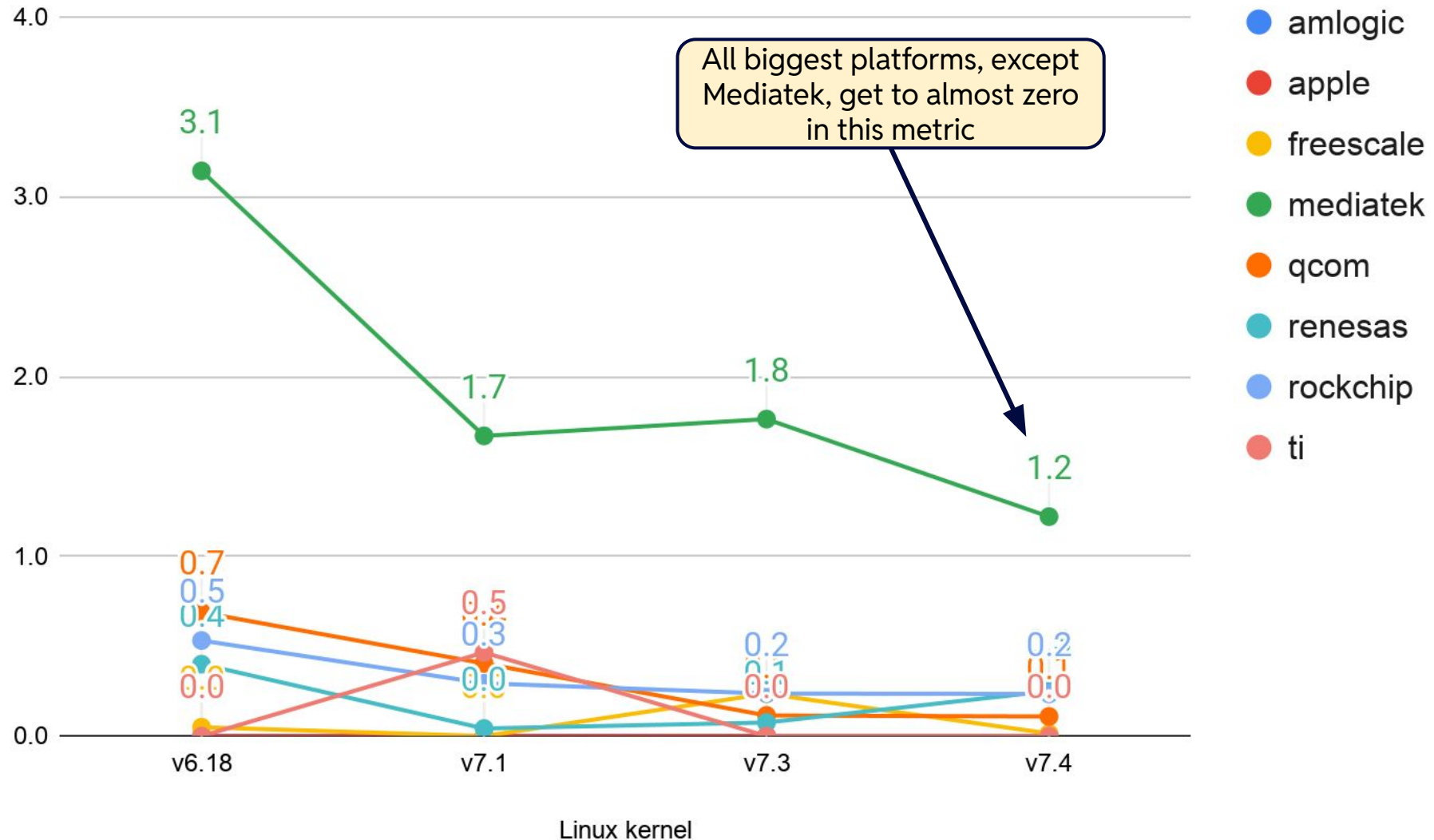
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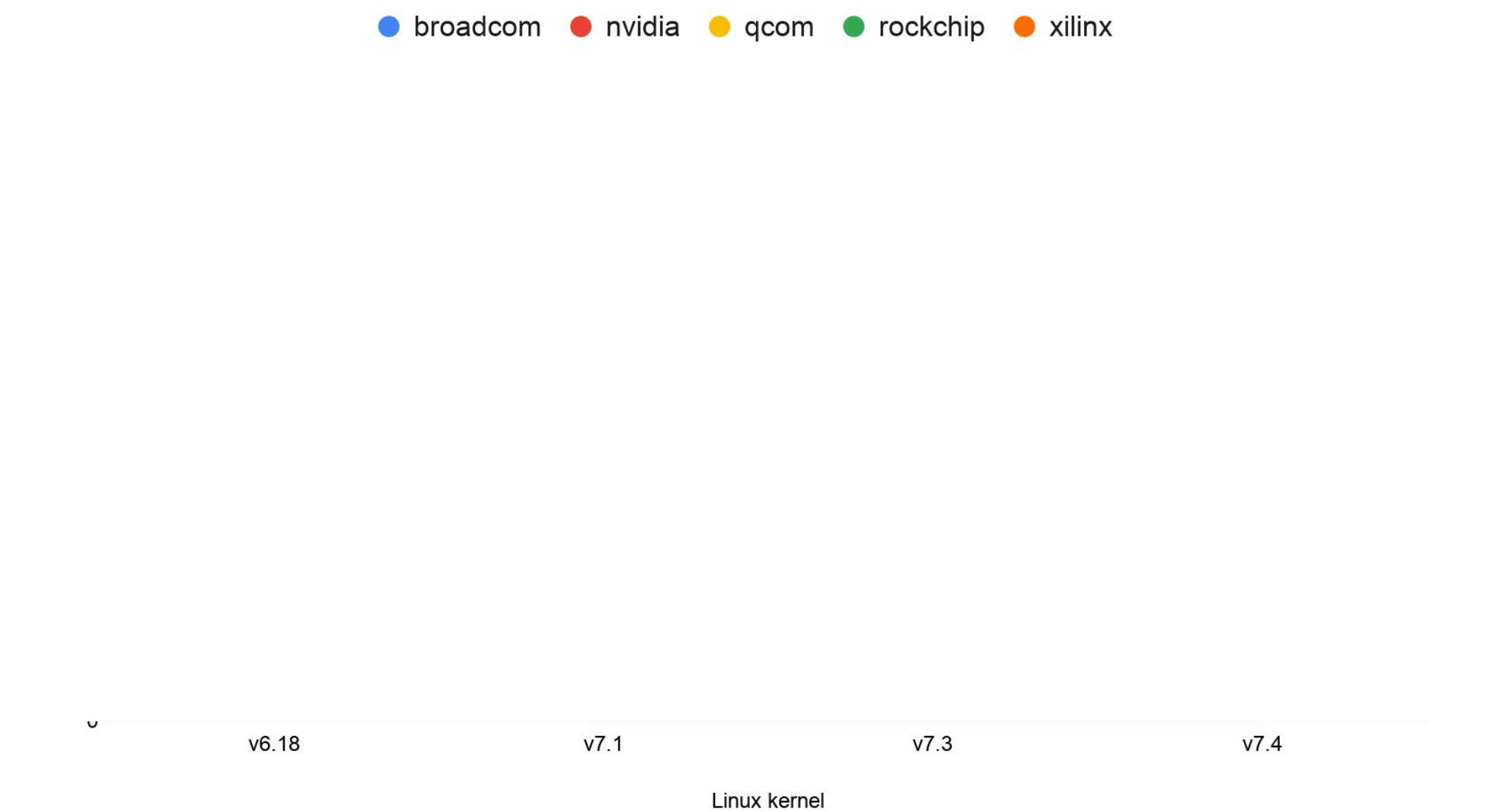
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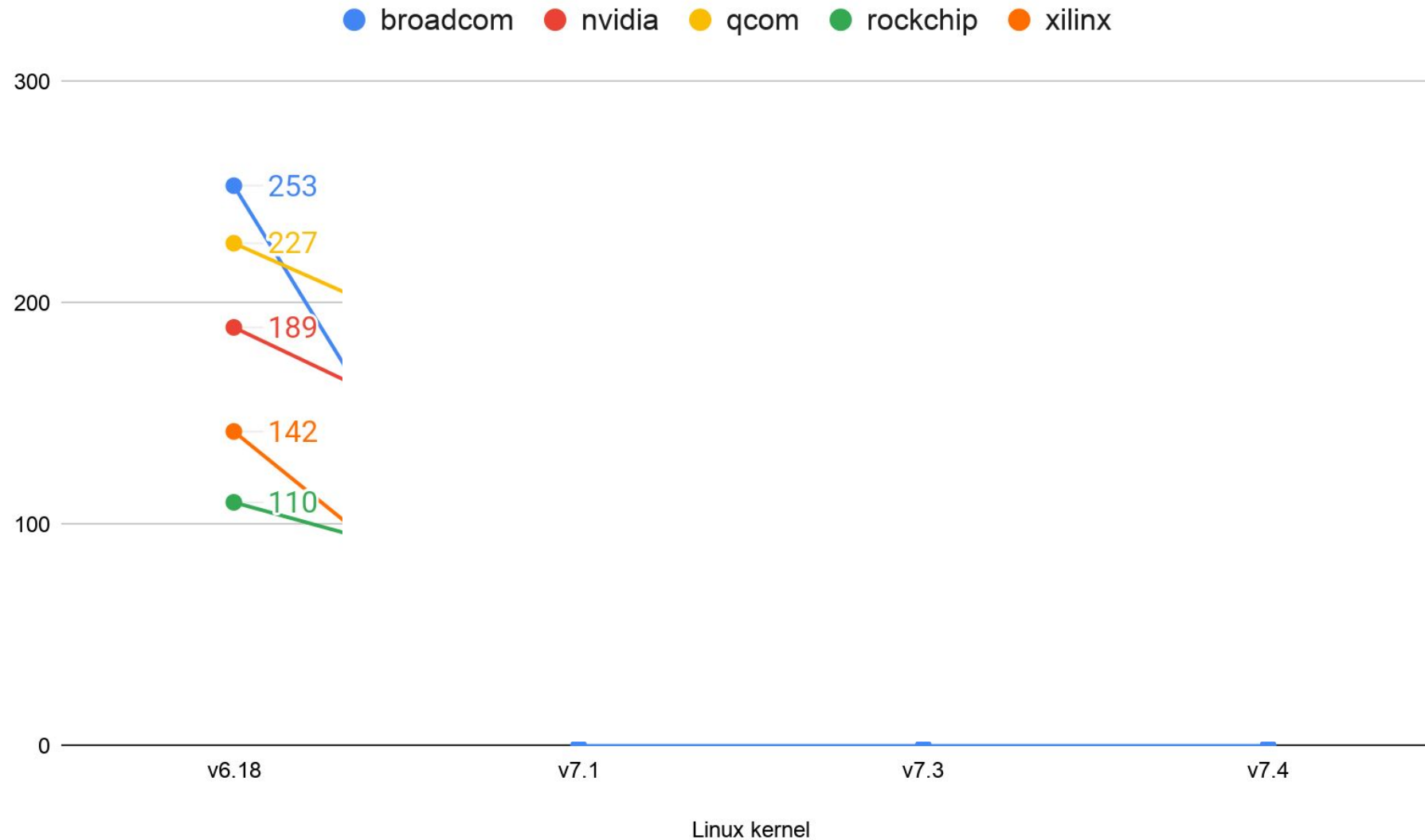
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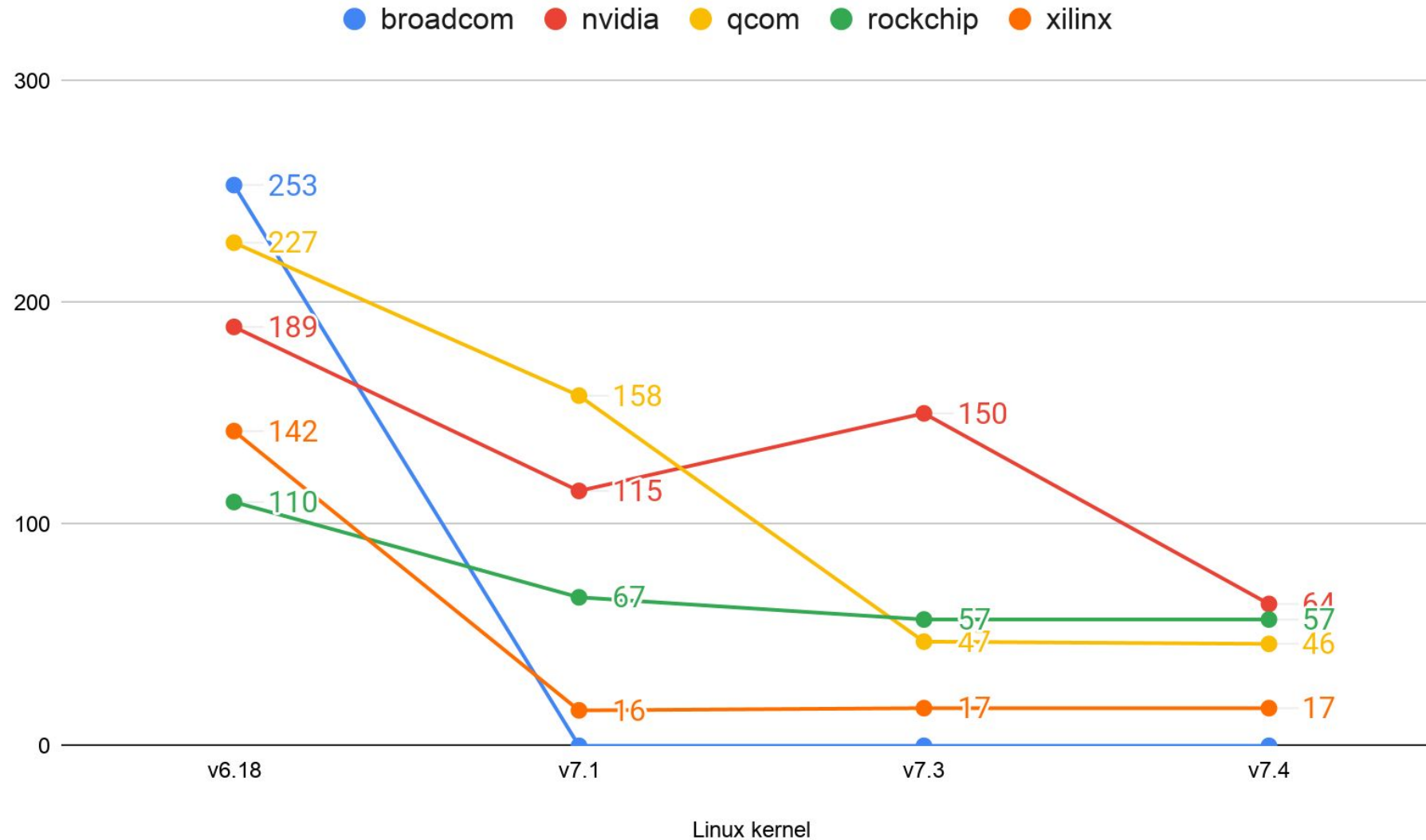
Total DTBs Check Warnings (Lower Better) - ARM64 (Big Moves)



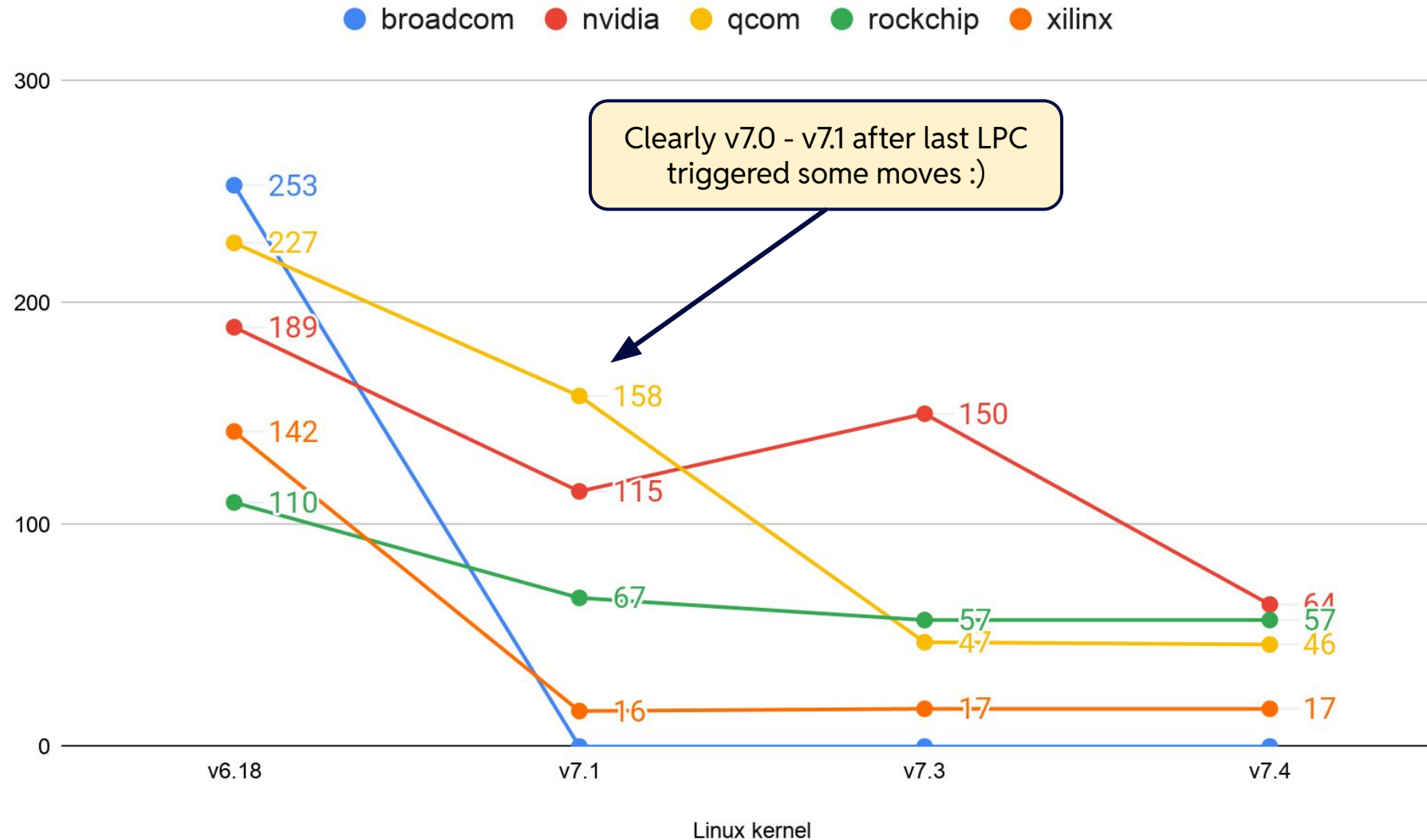
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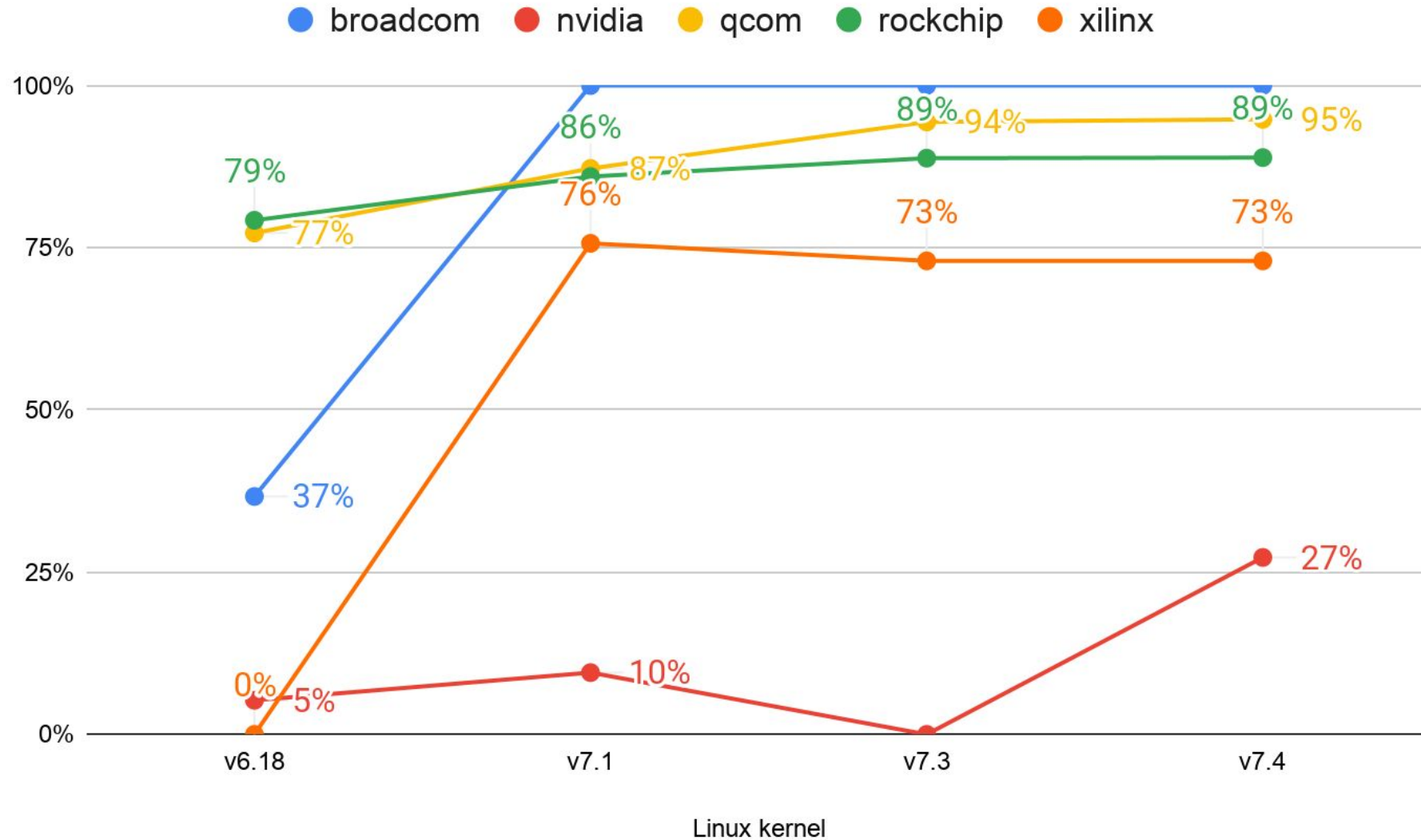
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Percentage of Warning-free Targets (Higher Better) - ARM64



Warning-free Platforms (Higher Better) - ARM64, v7.4 (next)

SoC Platform	Percentage of Warning-free Targets	No. Targets
allwinner	100%	61
amlogic	100%	102
apple	100%	110
broadcom	100%	29
intel	100%	14
samsung	100%	26
socionext	100%	8
ti	100%	173

SoC Platform	Percentage of Warning-free Targets	No. Targets
freescale/NXP	99%	474
arm	95%	19
qcom	95%	422
renesas	94%	124

Warning-free Platforms (Higher Better) - ARM64, v7.4 (next)

- Warning-free are also several smaller platforms with one or two boards
 - actions
 - airoha
 - altera
 - amazon
 - amd
 - aspeed
 - axiado
 - bitmain
 - blaise
 - bst
 - cavium
 - cix
 - lg
 - sophgo
 - synaptics
 - toshiba

Thank you

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Thank you

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