LTSI Project update

Long Term Support Initiative

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Automotive Linux Summit

Ariake, Tokyo Japan

Who am I

- Tsugikazu SHIBATA, NEC
- Founder and project lead of LTSI
- LTS/LTSI Advocate

- Board member of Linux Foundation
- Involved with Linux community since 2.4

Open Source is being dominant

- All the innovative new projects are started with Open Source activities

- Well established Open and Collaborative method

- Great human resource ; Experienced and Trained come across other communities

- Existing Legal model , Open Source license and its framework

Linux Open Source project

- Linux is one of the most successful Open Source project

- Continue growing in 26 years ; expanding adoption for new area;
  - IT enterprise, Cloud, SNS, Network, Smart Phone, Robotics, Embedded, IoT and many others

- Developing and delivering under GPLv2

Developed by the community

- Participating ~1700 developer, ~230 companies every release

- Growing yearly 1.5Mlines of code, 4000 files increased

- 26 Years of history

- Maintainers have great skill to manage the subsystem and professional knowledge of its area of technologies

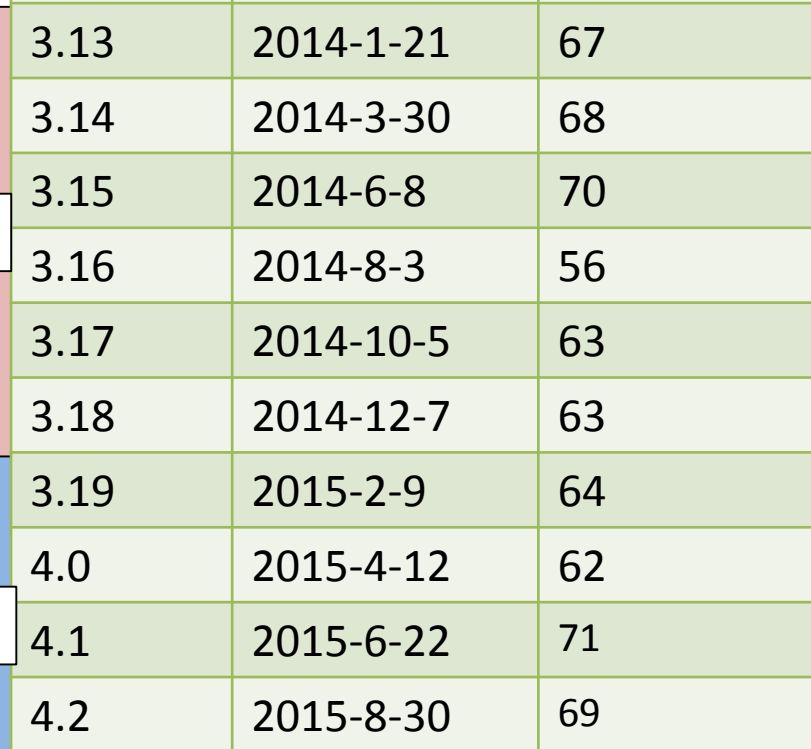# **Status of Latest Linux Kernel**

- Latest released Kernel : 4.11
  - Released: May 1st , 2017
  - Lines of code : 23,137,402   (+297,743)
  - Files : 57,964 (+792)
  - Developed period: 70 days
- Current Stable Kernel: 4.11.3
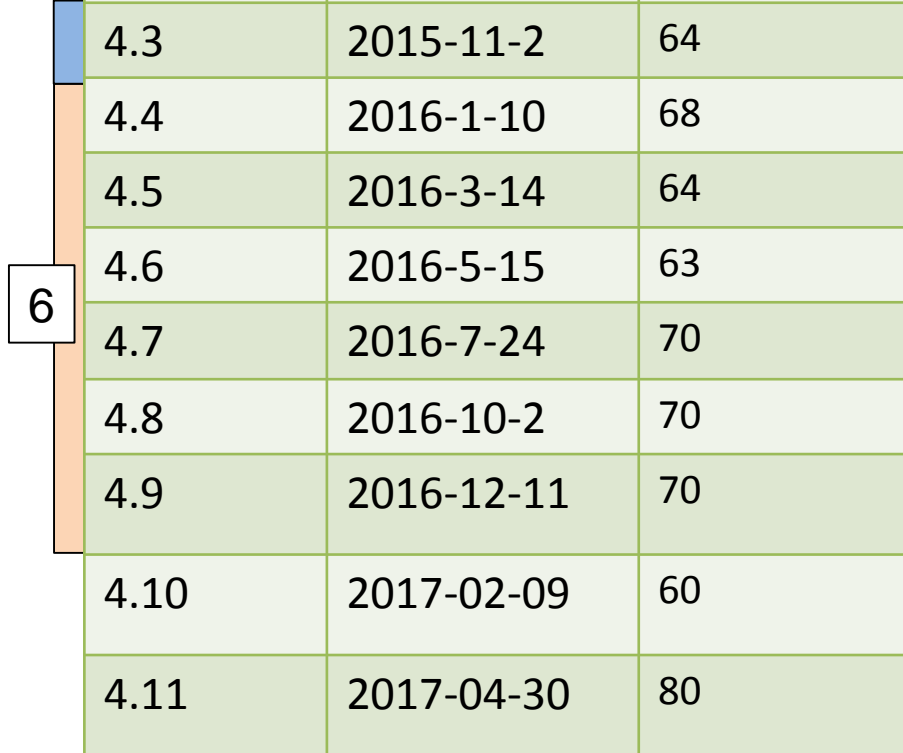- Current development kernel: 4.11-rc2

Kernel release cycle

- Release cycle: 65 ~ 70 days, 5~6 releases/year

Version	Release	Rel. span
3.13	2014-1-21	67
3.14	2014-3-30	68
3.15	2014-6-8	70
3.16	2014-8-3	56
3.17	2014-10-5	63
3.18	2014-12-7	63
3.19	2015-2-9	64
4.0	2015-4-12	62
4.1	2015-6-22	71
4.2	2015-8-30	69

Version	Release	Rel. span
4.3	2015-11-2	64
4.4	2016-1-10	68
4.5	2016-3-14	64
4.6	2016-5-15	63
4.7	2016-7-24	70
4.8	2016-10-2	70
4.9	2016-12-11	70
4.10	2017-02-09	60
4.11	2017-04-30	80

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Linux development policy

- Upstream is only the place to accept the patches
  - Reviewed by skilled maintainer
  - Tested with other proposals to confirm no conflicts
 - Well coordinated development process for over thousands of developers

Upstream

New Features

Fixes
(Bug/Security)

Linux Development process

- Just after the release of 4.n, two weeks of merge window will be opened for proposal of new features

- After 2 weeks of merge window, -rc1 will be released and the stabilization will be started

- 4.n+1 will be released when it becomes reasonably stable by some of -rcX released

Merge Window (2weeks) — Stabilization

4.n   -rc1   -rc2   -rc3   -rc4   -rcX   4.n+1
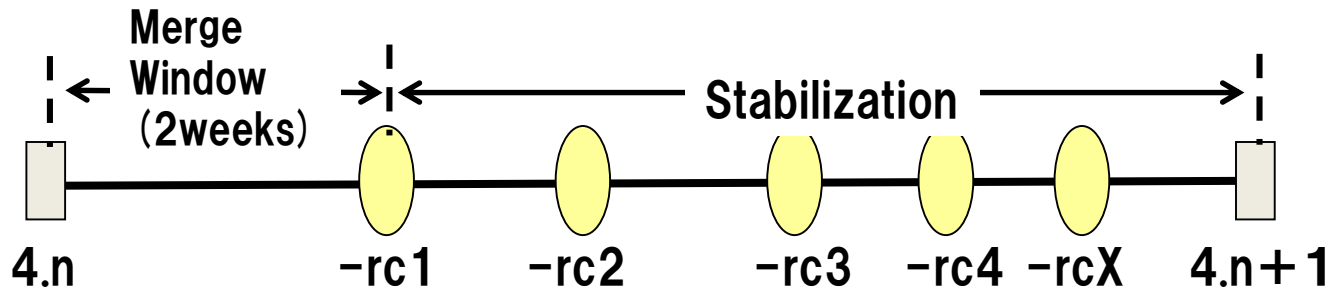
Linux Source Code Growth

- Increasing 0.3ML/Version, 1.5ML/year
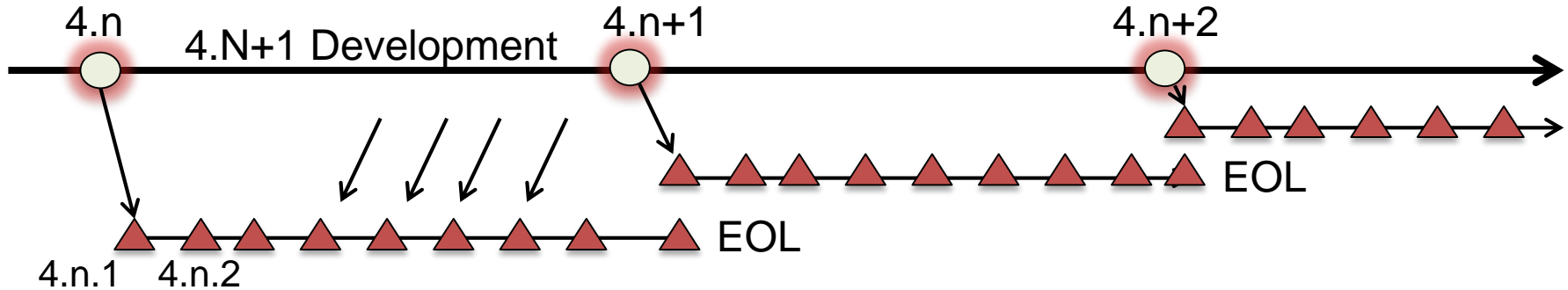
Linux source code growth
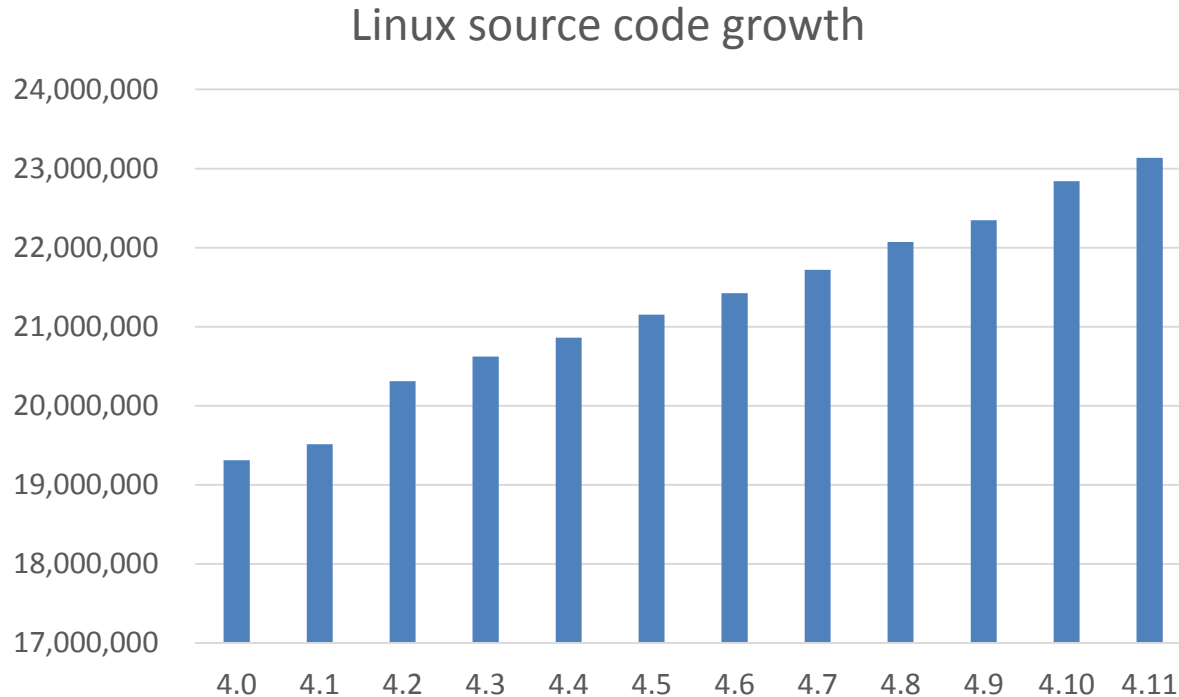
Rapid Release cycle of Linux

- Yearly more than 5 times of chance to marge the code into upstream. Other project maybe 6 month release cycle that is 2 times/year
- So many choice for own products and need deeper knowledge to pick right version.

Stable kernel release

- Recommended branch for users who want the most recent stable kernel
- 3 part version like 4.n.m
- Contain small and critical fixes for security problems or significant regressions discovered in a latest development version
- Becomes End Of Life when next stable kernel were released

Status of Latest Linux Kernel Again

- Latest released Kernel : 4.11

- Current Stable Kernel : 4.11.3

- Current development kernel : 4.12-rc3
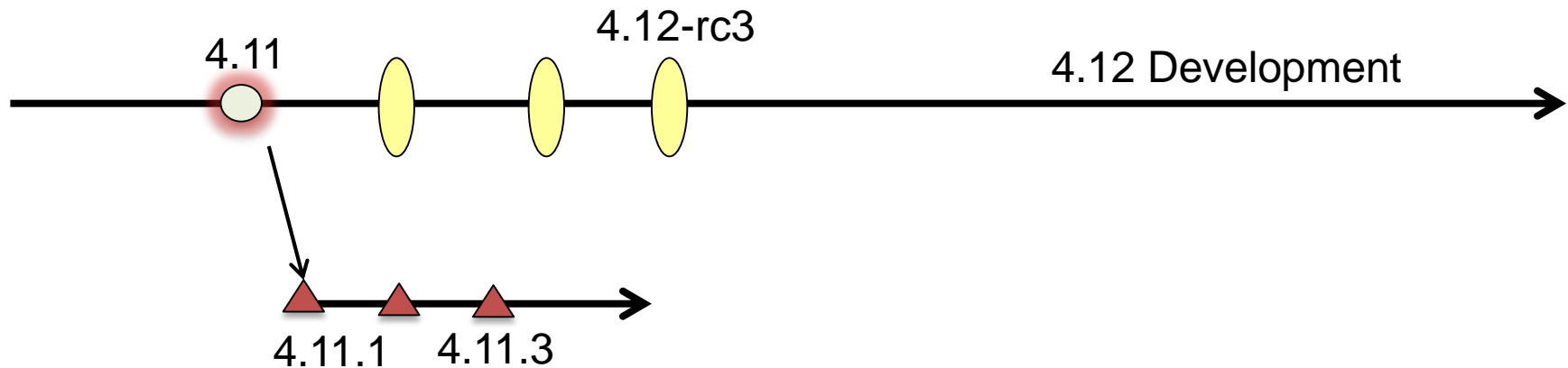
LTS: Long Term Stable Kernel

- Extended maintenance period for stable kernel

- Kernel tree continue to back port bug and Security fixes for more long term

- Pick one version per year and maintain 2 years
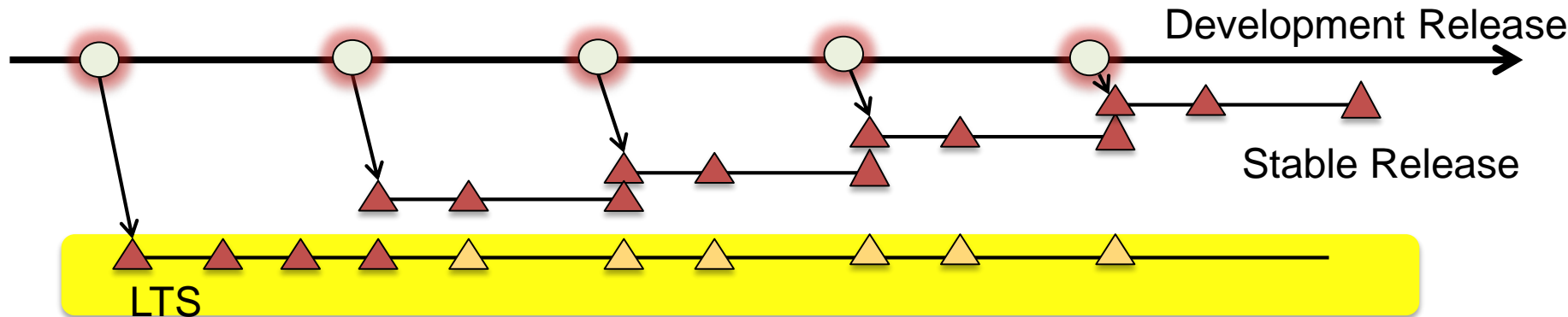
Why LTS?

- Only the tree get fixes from the community
- In the real use case, tested/confirmed kernel is important, less important for new features
- Fixes will be released # of times and should be applied frequently, Security/Bug fixes are being more important
- Bugs found in LTS should be reported and fixed in upstream

Current LTS versions

Version	Maintainer	Released	Projected EOL
4.9	Greg Kroah-Hartman	2016-12-11	Jan, 2019
4.4	Greg Kroah-Hartman	2016-01-10	Feb, 2018
4.1	Sasha Levin	2015-06-21	Sep, 2017
3.16	Ben Hutchings	2014-08-03	Apr, 2020
3.10	Willy Tarreau	2013-06-30	Oct, 2017
3.4	Li Zefan	2012-05-20	Apr, 2017
3.2	Ben Hutchings	2012-01-04	May, 2018

https://www.kernel.org/category/releases.html

LTS includes large number of fixes

- 600 – 700 fixes included in a Stable release
- LTS include several thousands of fixes

As of 2017/5/27

Version		# of commits
From	To	
3.2	**3.2.88**	**7658**
3.3	3.3.8	698 (EOL)
3.4	**3.4.113**	**5929**
3.5	3.5.7	816 (EOL)
3.6	3.6.11	757 (EOL)
3.7	3.7.10	718 (EOL)
3.8	3.8.13	996 (EOL)
3.9	3.9.11	746 (EOL)
3.10	**3.10.105**	**6042**
3.11	3.11.10	677 (EOL)

Version		# of commits
From	To	
3.12	**3.12.70**	**7342(EOL)**
3.13	3.13.11	903 (EOL)
3.14	**3.14.79**	**4977(EOL)**
3.15	3.15.10	703 (EOL)
3.16	**3.16.43**	**6317**
3.17	3.17.8	884 (EOL)
3.18	**3.18.47**	**4083(EOL)**
3.19	3.19.8	873(EOL)
4.0	4.0.9	757(EOL)
4.1	**4.1.39**	**3648**

Version		# of commits
From	To	
4.2	4.2.8	903(EOL)
4.3	4.3.6	618(EOL)
4.4	**4.4.70**	**4533**
4.5	4.5.7	973(EOL)
4.6	4.6.7	705(EOL)
4.7	4.7.10	912(EOL)
4.8	4.8.17	1102(EOL)
4.9	**4.9.30**	**2285**
4.10	4.10.17	1136(EOL)
4.11	4.11.3	341

of Fixes in LTS

Version	Maintainer	Released	Years maintained	Total fixes	Fixes/year
4.9	Greg Kroah-Hartman	2016-12-11	0.5	841	841
4.4	Greg Kroah-Hartman	2016-01-10	1.4	3649	2647.9
4.1	Sasha Levin	2015-06-21	1.9	3510	1814.7
3.16	Ben Hutchings	2014-08-03	2.8	6317	2242.9
3.10	Willy Tarreau	2013-06-30	3.9	6042	1545.4
3.4	Li Zefan	2012-05-20	4.0	5929	1180.6
3.2	Ben Hutchings	2012-01-04	5.4	7320	1356.2

LTSI Status

What is LTSI

- Open Source community to create and maintain LTSI kernel tree for long term
  - Based on LTS
  - Add another chance to include further patches on top of LTS
  - Same lifetime with LTS (yearly release and 2 years life time)
- Industry party to share best practice and help companies to use Linux for long term

LTSI includes LTS

LTSI

- ☐ Add vendor required features
- ☐ Share status, info, problem among industry people
- ☐ Huge testing by contributors
- ☐ Auto test frame-work
- ☐ Provide help developer for upstream

LTS

- ☐ Release 1 version / year, Maintain 2 years
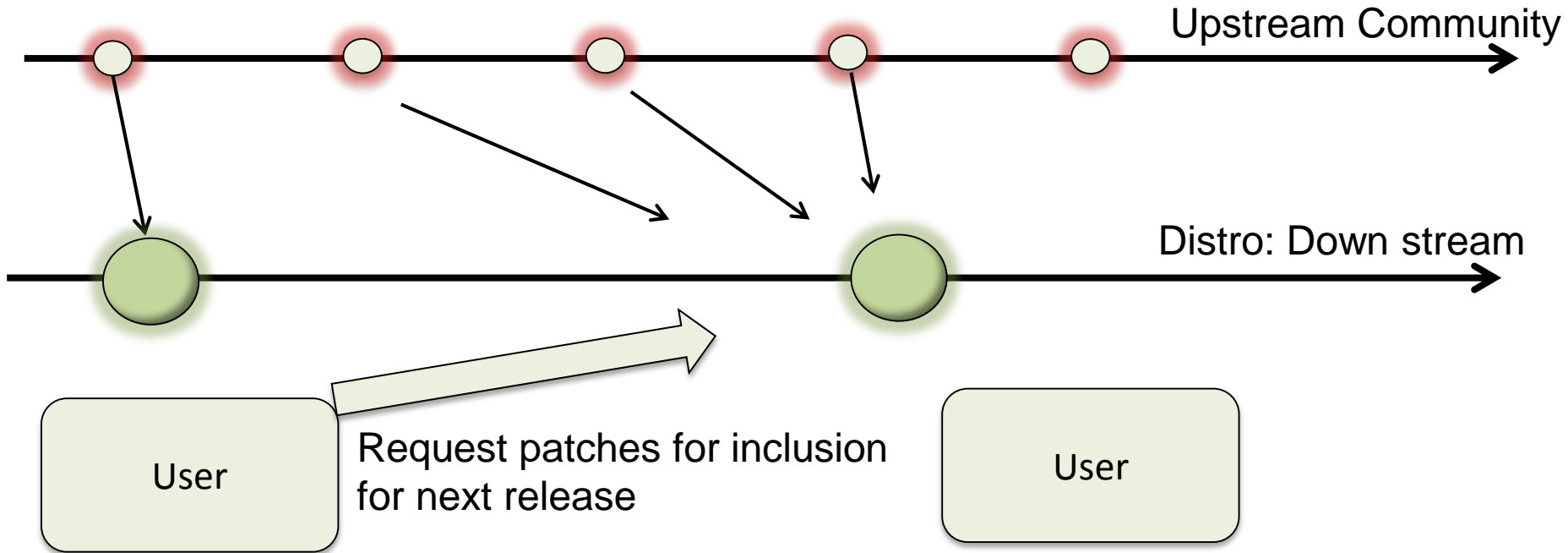- ☐ Frequently and large number of bug /security fixes

History of LTSI

- Established 2011 – 6 yeas now
  - Started for stable Kernel for Android
- Integrated by Yocto Project (2012, May)
- Have had a workshop/session to share information and discuss issue among industry people
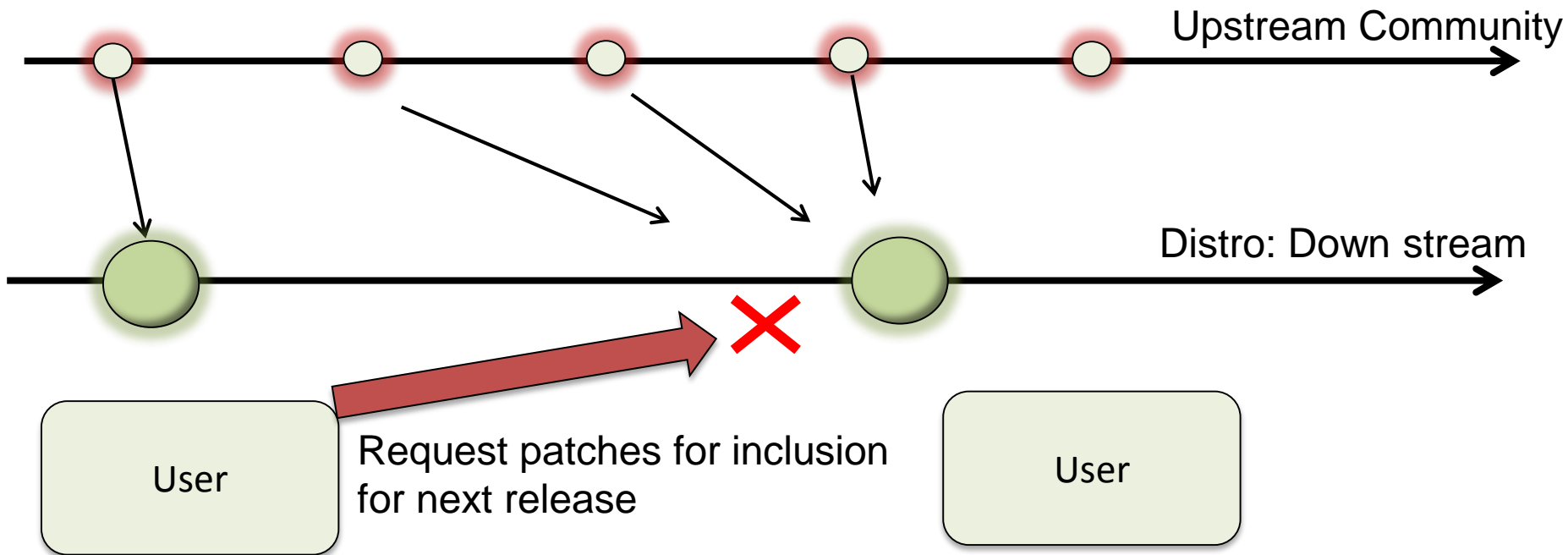- Released yearly basis; 3.0, 3.4, 3.10, 3.14, 4.1

Shape of LTSI Project

- Small staff to coordinate workshop , session at LF conference
- Maintainer: Greg Kroah-Hartman , Fellow of Linux Foundation
- Working with upstream Linux Community
- Keeping neutral position to be able to use for variety of use case

Upstream first: OLD DAYS of Distro

Upstream Community

Distro: Down stream

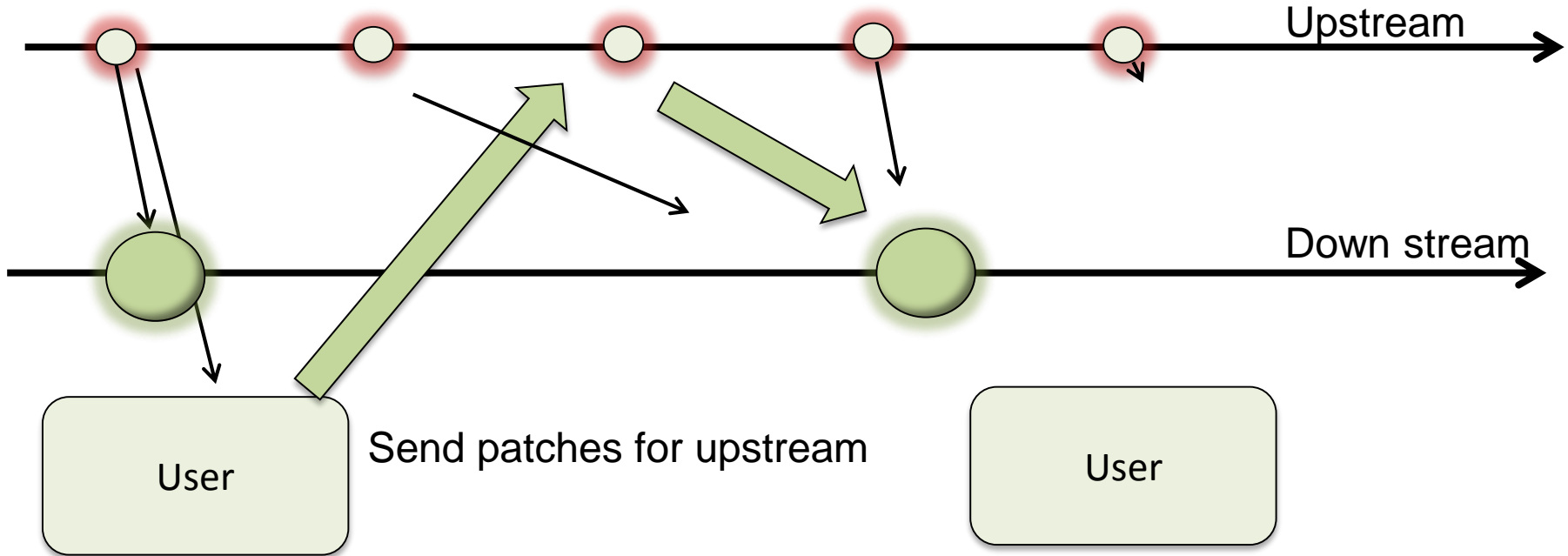Request patches for inclusion for next release

User

User

Upstream first: OLD DAYS of Distro

Upstream first Development model

Develop add on features based on a Kernel version
It will take some(one or more) version period to merge it

Upstream

Down stream

Send patches for upstream

User

User

LTSI kernel

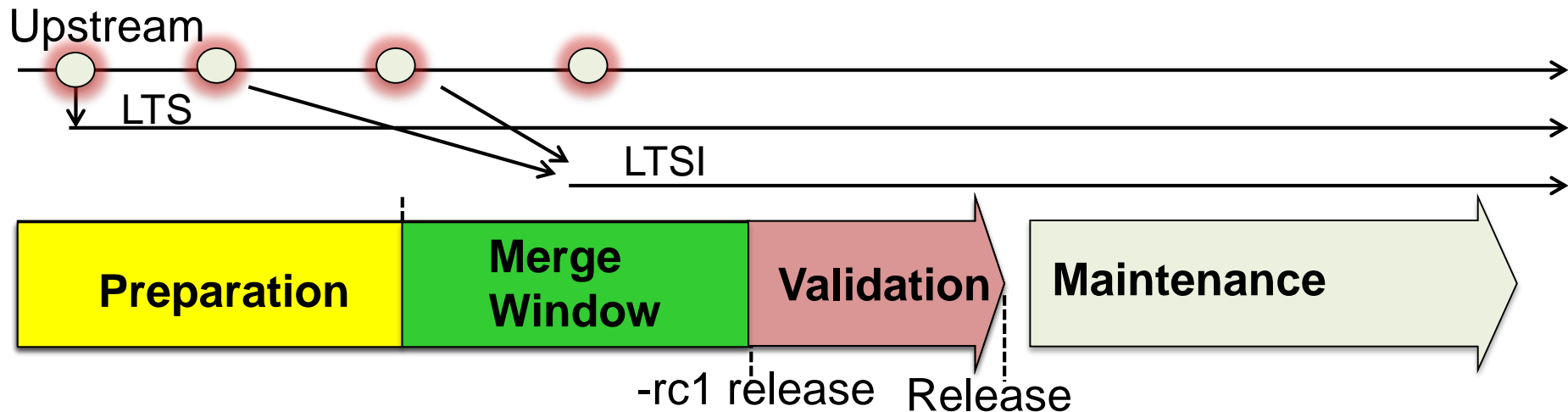Additional chance to merge required patch on top of LTS

LTS Continuous fixes

Own Changes for Vanilla kernel (already in later upstream)
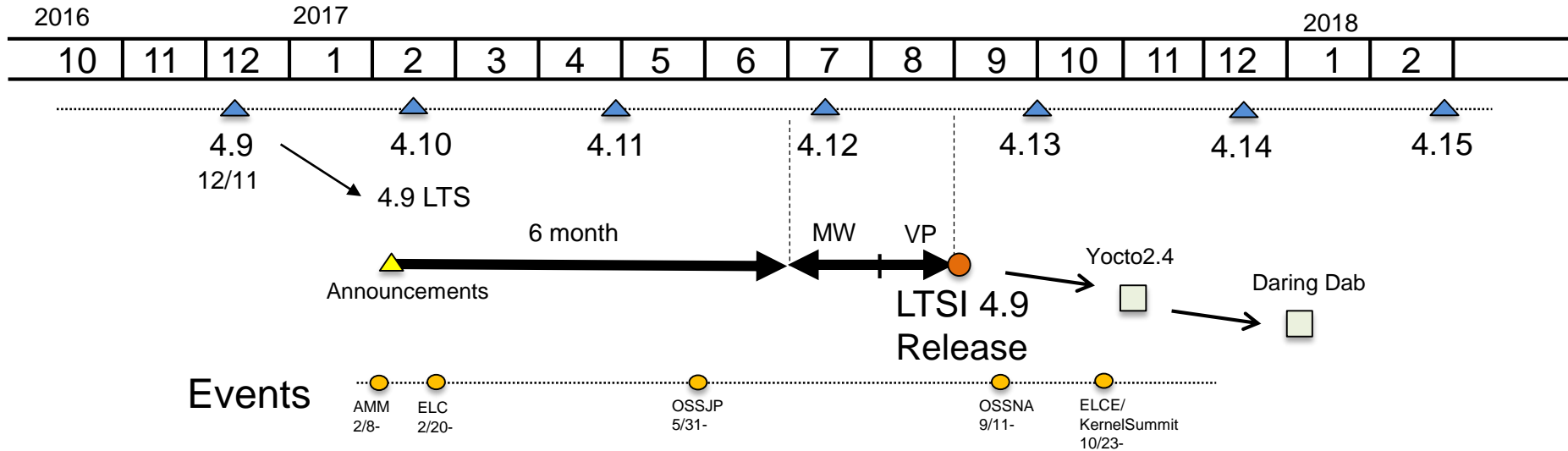
Company's own changes,
SoC's Add-on Patches

Vanilla Kernel Features (LTS version)
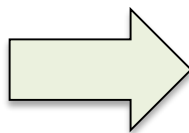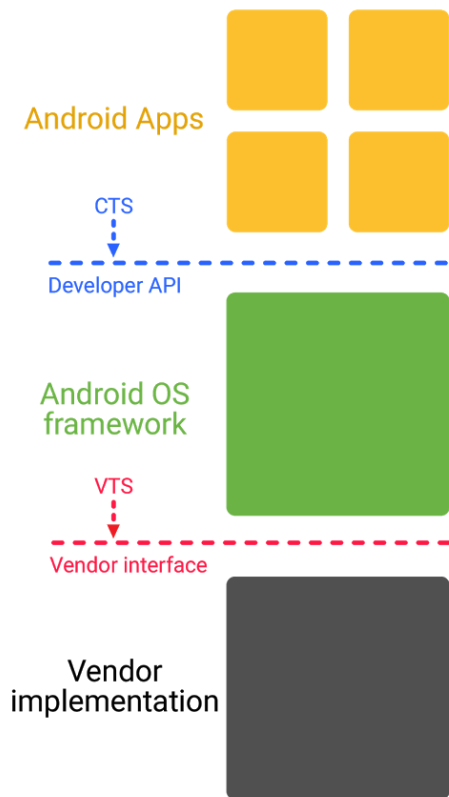
LTSI development process

- Preparation: 4-6 month (~2 of upstream release)

- Merge window: 1~2 month to propose additional patches. Self contained or upstream features accepted

- Validation: a month or more. All the contributor must validate and report back
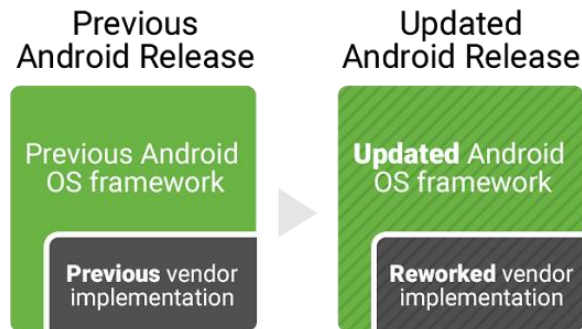
LTSI 2017 Development plan

Announce	Merge Window Open	Merge window Close	Release
2/8 or 20	End of June	End of July	End of August

Here comes the Treble project

Android Apps

CTS
Developer API

Android OS framework

VTS
Vendor interface

Vendor implementation

Before Treble

Previous Android Release

Previous Android OS framework

Previous vendor implementation

Updated Android Release

Updated Android OS framework

Reworked vendor implementation

With Treble

Previous Android OS framework

Updated Android OS framework

Vendor interface

Original vendor implementation

https://android-developers.googleblog.com/2017/05/here-comes-treble-modular-base-for.html

You can participate LTSI

- Follow on Twitter account:

    @LinuxLTSI

- Web:

    http://ltsi.linuxfoundation.org

- Mailing list:

    https://lists.linuxfoundation.org/mailman/listinfo/ltsi-dev

- Git tree :

    http://git.linuxfoundation.org/?p=ltsi-
    ernel.git;a=summary

LinuxLTSI
@LinuxLTSI
*LTSI stands for Long-Term Support Initiative. A group of CE
Working Group of the Linux Foundation to provide Long-Term
and stable Linux for Industry*

Conclusion

- LTSI was started to fill the gap between community and industry but still there is the gap
  - We will continue our activity to discuss both side to better align each other
- Upstream first policy is important for Open Source
- Why don't you join LTSI?
  - By joining LTSI, you will be able to share best practice
  - Be able to get information for stable kernel

THANK YOU