



Finding Long-Term usable Linux Kernel for Embedded Products

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Chinzan-so @Tokyo

Agenda

- LTSI patch status
- LTSI release process
- What's next

Key activities of LTSI

- ✓ Provide industry managed kernel and maintain two years
- ✓ Provide a common place for embedded industry to share information
- ✓ Support upstream activity



LTSI: Industry managed kernel

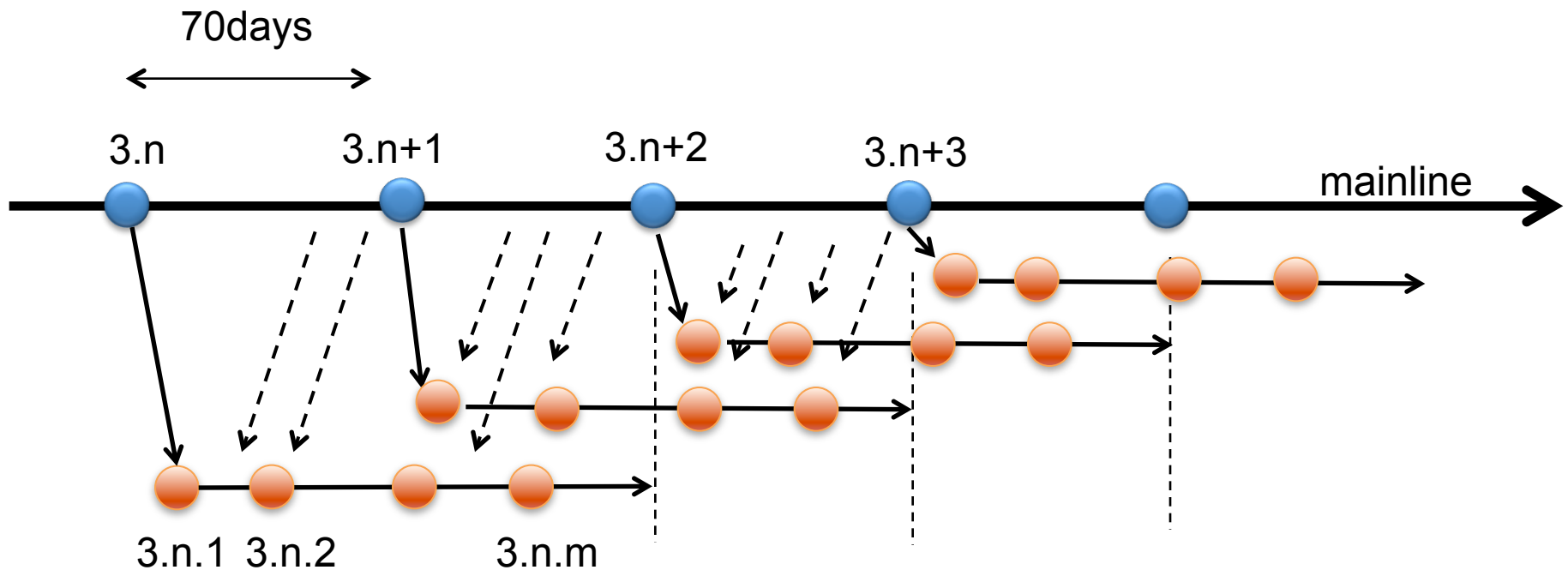


- LTSI defines a common kernel every year and maintains for 2 years
- LTSI adopts community Long term stable kernel as a base. Bug/security fixes from upstream are applied to LTSI.
- LTSI kernel = long term + additional patches
- After 2 years term finished, possible to take over maintenance for longer term

Stable kernel release

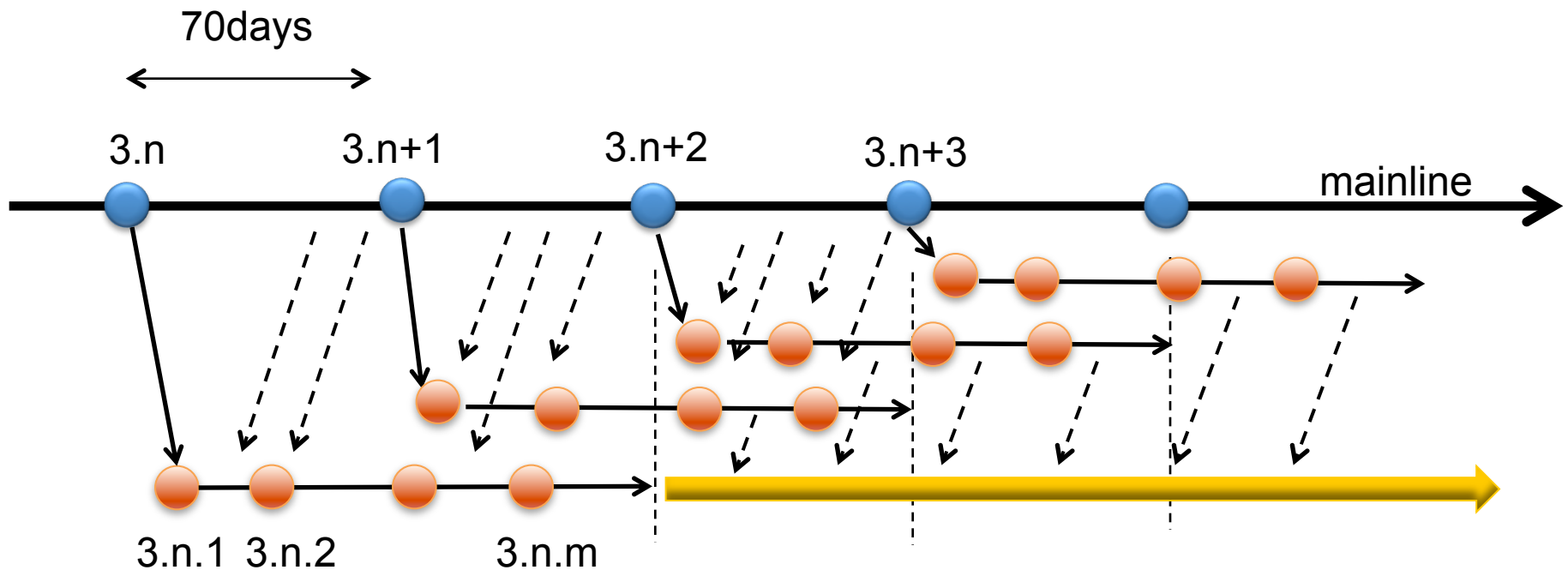


- After release of a kernel, stable release branch will start to maintain until $n+2$ version released
- Stable release will be included bug/security fixes found in latest version and back ported



Maintaining Long term stable kernel

- Take over maintenance of “stable release” and continue back porting to specific log term kernel version
- Maintainer of “Long Term Stable” kernel should have trusted relationship among kernel development community



Community's long term kernels and Its consumers

- 2.6.27: SUSE11
- 2.6.32: SUSE11 SP1/RHEL 6/Ubuntu10.04 LTS
- 2.6.34: Wind River Linux
- 2.6.35: Embedded usage, Android (Ginger Bread)
- 3.0: **LTSI**, Android (Ice Cream Sandwich), SUSE11 SP2
- 3.2: Debian7, Ubuntu 12.04 LTS
- 3.4: **LTSI**, Android (Jelly bean)

Patches included in LTSI

- LTSI have two types of patches
 - Community's Long Term Stable (LTS) patches
 - Patches posted in LTSI mailing list

	LTS	LTSI	Total	
3.0	2238	875	3113	3.0 .. 3.0.79
3.4	2750	721	3471	3.4 .. 3.4.46

Cost estimation of LTSI patches

- If a company do all the back port by themselves, how much cost does they spend?
- Condition:
 - 3000 patches back ported into a kernel
 - 15K\$/Month/Kernel Engineer
- EST A) 1 hour for back port a patch
 - $3000 \times 1\text{MH} = 375\text{MDay} = 18.75\text{MMonth}$
 - $18.75\text{MM} \times 15\text{K\$} = 281.25\text{K\$} = 2812.5 \text{ 万円}$
- EST B) Half day(4 Hour) for a back port
 - $1.125\text{M\$} = 1.125 \text{ 億円}$

LTSI is providing 3.0 and 3.4.
Value of LTSI is over 2M\$

Linux Kernel release cycle

Dates

100

90

80

70

60

50

40

30

20

10

0

3.1

3.2

3.3

3.4

3.5

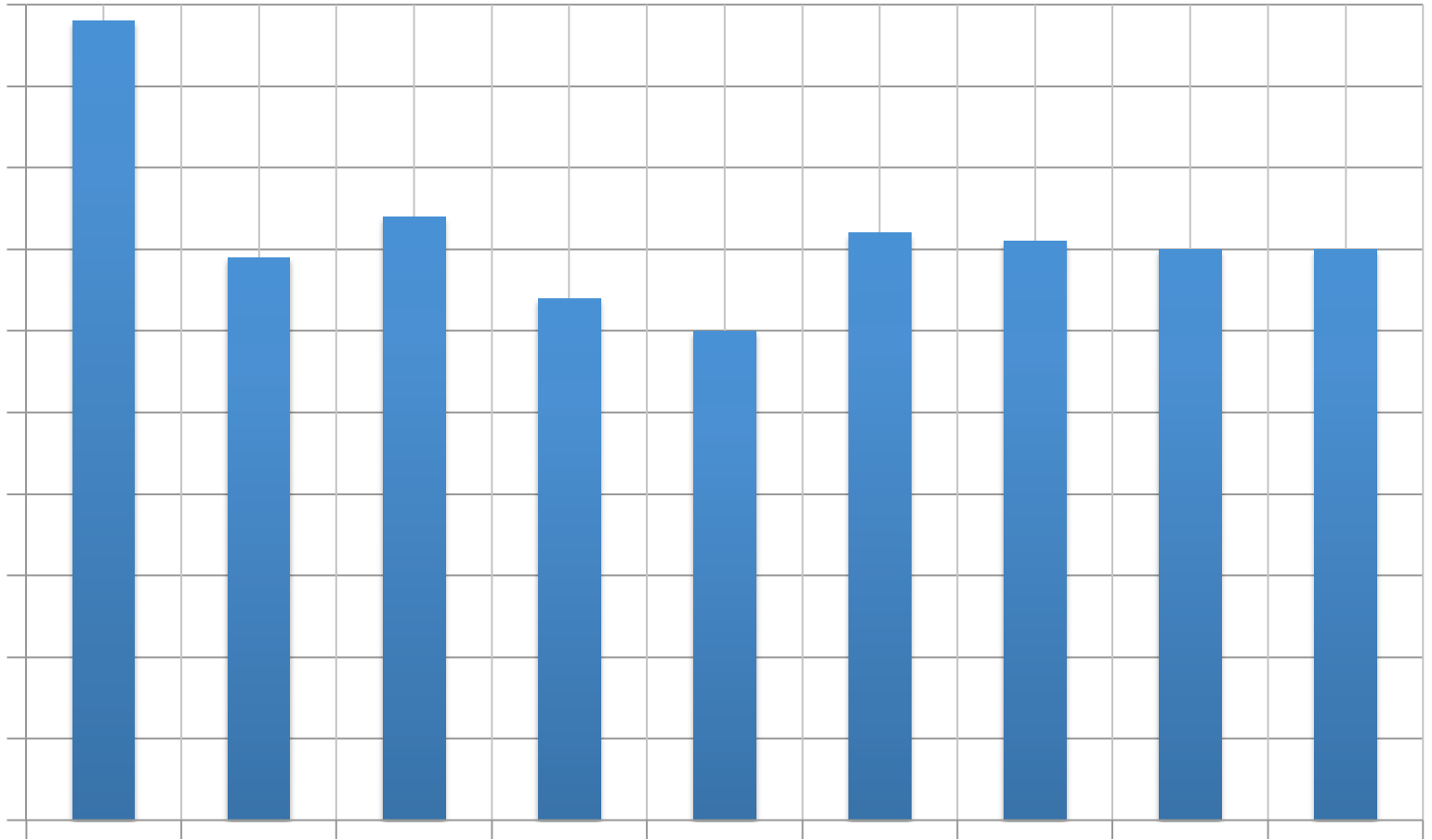
3.6

3.7

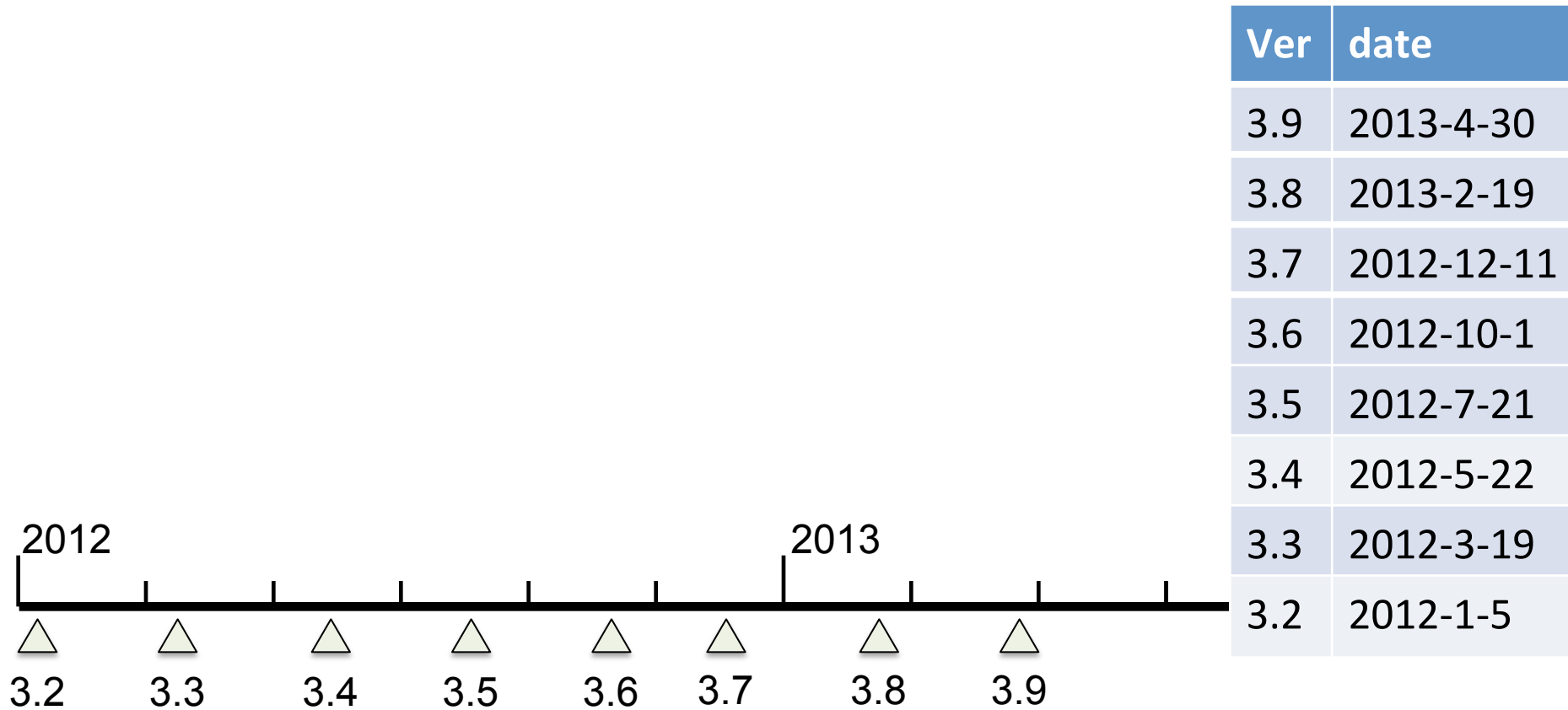
3.8

3.9

Kernel version



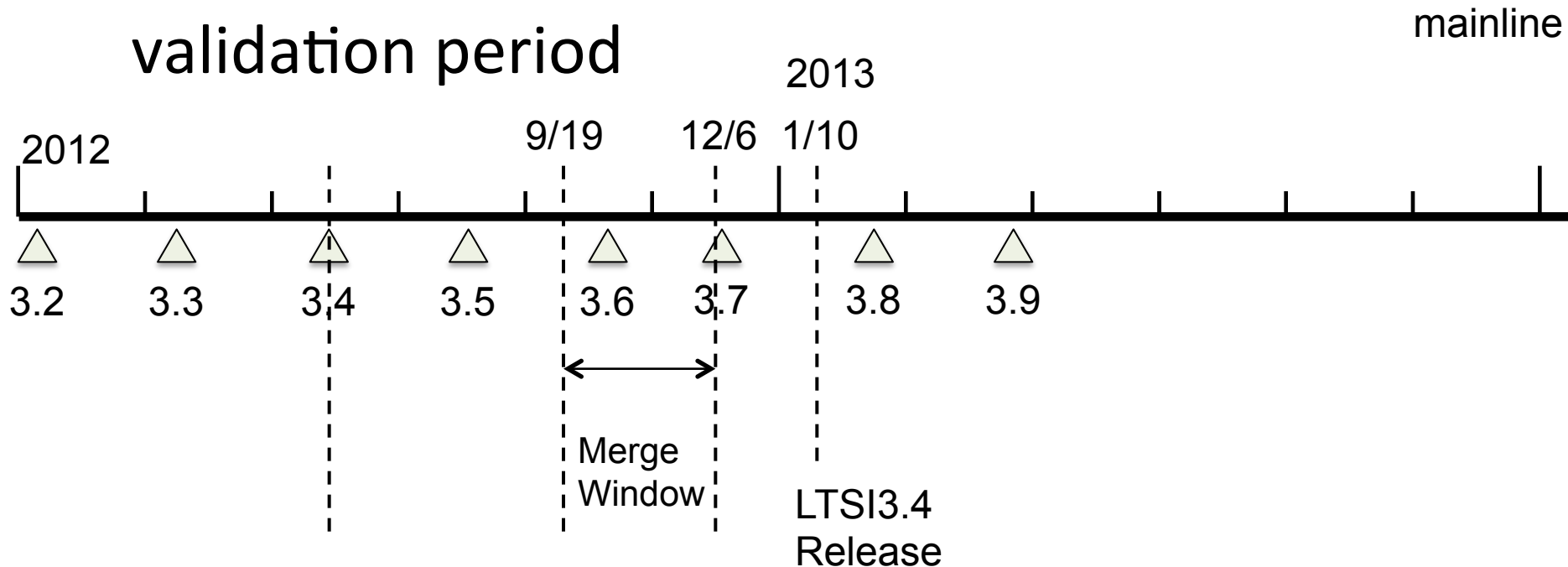
Current Linux kernel release line



LTSI 3.4 release process

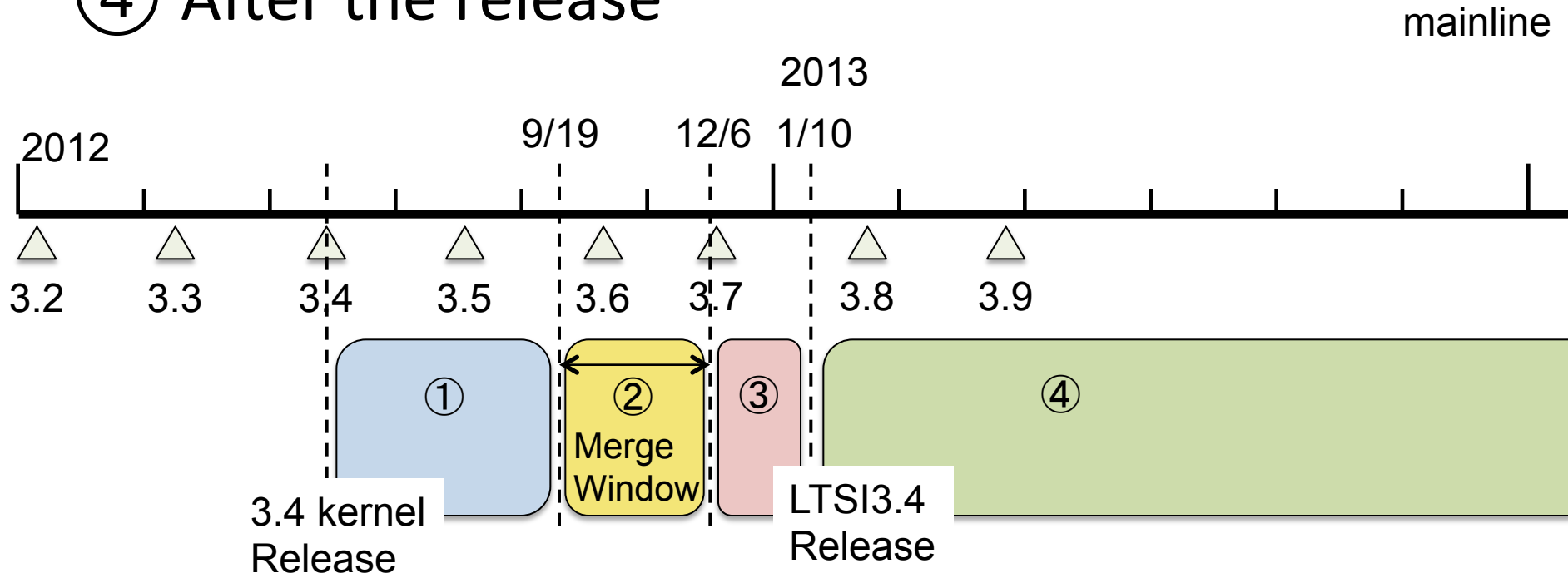


- LTSI merge window will be opened when LTS released. It will be after two release of kernel version
- LTSI will be released after reasonable validation period



LTSI development phase

- ① Preparation for Merge window
- ② Merge window to propose patches to LTSI
- ③ Validation period
- ④ After the release



Patchwork is now ready



- Patchwork is tool to cherry pick a patch available on LTSI mailing list
- By using patchwork we can share patches even after the release of LTSI

<https://patchwork.kernel.org/project/ltsi-dev/list/>

Patchwork LTSI Project development

[login](#) [register](#) [mail settings](#)

Project: ltsi-dev : [patches](#) : [project info](#) : [other projects](#) [about](#)

Incoming patches

« Previous **1** [2](#) [3](#) [4](#) [5](#) Next »

Filters: State = Action Required Archived = No				
Patch	Date	Submitter	Delegate	State
[12/12] ARM: shmobile: armadillo800eva: set clock rates before timer init	2013-05-22	Do Quang Thang		New
[11/12] ARM: shmobile: use FSI driver's audio clock on armadillo800eva	2013-05-22	Do Quang Thang		New
[10/12] ASoC: fsi: tidyup sh_fsi_platform_info pointer	2013-05-22	Do Quang Thang		New

LTSI can be selected in Yocto

- Yocto is project to build your own distribution
- From 1.4 release of Yocto, you can choose LTSI3.4 as kernel for Yocto
- Release cycle of LTSI is one release per year and Yocto is every six month, we will continue to sync with Yocto



Summary



- LTSI released two of kernel version 3.0, 3.4
- If your company do the back port like LTSI, the cost become over 2M\$
- LTSI now provide patchwork and integrated with Yocto project
- Using LTSI is really cost effective approach for your embedded products

How you can participate LTSI

- Follow on Twitter account:

@LinuxLTSI



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

- 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>

Open Workshop



- Date/Time: May 30, 2013 4:00pm - 5:00pm
- Place: Orchid 1&2, 4th floor
- Agenda
 - Technical detailed update
 - Industry based discussion
 - Demonstration of Use Case Program
 - Others

We will do another Use Case Program soon, Stay tuned!

THANK YOU



Linux kernel: release date, # of files and lines

Version	Release date	# of Files	# of Lines	
3.9	2013-4-30	42,423	16,686,972	(+1.6%)
3.8	2013-2-19	41,520	16,416,967	(+1.4%)
3.7	2012-12-11	40,905	16,191,784	(+1.4%)
3.6	2012-10-1	39,733	15,868,122	(+1.7%)
3.5	2012-7-21	39,096	15,596,464	(+1.4%)
3.4	2012-5-22	38,566	15,383,946	(+1.4%)
3.3	2012-3-19	38,082	15,166,160	(+1.1%)
3.2	2012-1-5	37,617	14,998,737	(+1.5%)
3.1	2011-10-28	37,085	14,770,555	

Released 60-70 days

500 Files, 200K Lines of code added for a version