The advantages of a Kernel Sub-Maintainer

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Abstract

Last year, approximately 9,500 patches were submitted to the Linux kernel networking sub-system. Of these 9.500 patches, roughly 8% of those patch submissions were against the in-kernel Intel® wired LAN drivers. In addition, over the last 2 years, the number of in-kernel Intel® wired LAN drivers went from 3 drivers (e100, e1000 & ixgb) to 8 drivers (e100, e1000, e1000e, igb, igbvf, ixgb, ixgbe & ixgbevf). With the increase in Intel® wired LAN kernel drivers and the large number of kernel patches, support and maintaining of the in-kernel drivers faced several challenges.

To address the issues in maintaining and supporting the Intel® wired LAN in-kernel drivers, we needed a sub-maintainer to deal with all of these challenges. I will go on to explain the obstacles we overcame and the advantages we found by having a sub-maintainer and the processes we use to assist us in our daily routine.

1 Introduction

When submitting patches toward the kernel for our Intel® wired LAN drivers, ran into issues that caused a number of problems. Either the patches did not apply cleanly, because there were changes made to the in-kernel driver that developers were not aware of, or patches were not submitted at the proper time to make a particular kernel version.

Having over 8 developers, who are all trying to keep up-to-date with what the latest networking kernel tree to use and/or the proper order and format the patches needed to be submitted in was a nightmare. Individual developers had to keep up with what was going on in the community while still maintaining their internal work load, and for some that was too much.

From the community standpoint, seeing patches and responses from several different developers at Intel® caused confusion as to who they needed to contact or deal with when problems arose with the Intel® wired LAN kernel drivers. With these problems, we needed to find a resolution which could both service the needs of the community and our internal needs. That is where I come in as the kernel sub-maintainer for Intel® wired LAN drivers...

2 Reasoning

Increased Drivers

Over the last 3 years, Intel® has gone from supporting 3 drivers (e100, e1000 and ixgb) to supporting 8 drivers (e100, e1000, e1000e, igb, igbvf, ixgb, ixgbe, and ixgbevf) with a 40 GbE driver on the way as well. The increasing number of drivers to support means an increase in the amount of work to be done as well as community support.

Increased patches

With the additional in-kernel drivers, comes additional internal and external patches submitted against our drivers. The Linux kernel networking maintainer (David Miller) already has a large number of patches to review and test personally, so any offload of the work would greatly assist Mr. Miller.

3 Advantages

3.1 Consistency

In the past, multiple developers were submitting patches using different techniques and/or tools. The kernel maintainers felt like they had to inform developers of their preferences and tendencies every time a patch was submitted. In addition, developers would submit patches once or twice a year which made it difficult to remember the preferred methods and procedures

for submitting patches. By having a single, local sub-maintainer, the patch submittal process followed a more regulated schedule and the patches were consistent in their format to ensure that they followed the kernel coding style. I am also able to keep in constant communication with David Miller to make sure that we are aware of Mr. Miller's current preferences and tendencies.

One of the by products of having consistently formatted patches is that the kernel maintainers and community can focus on reviewing the changes being made rather than focusing on patch formatting. An additional advantage is that patches tend to be smaller and easier to review because patches are being sent out at a consistent and regular pace, rather than "bulk" patches sent every three months.

3.2 Single Point of Contact

With having a dedicated maintainer for the Intel® wired LAN drivers, both the community and kernel maintainers have a single point of contact for questions and/or support for any of our drivers. This reduces the amount of confusion as to who to contact when questions or problems arise and I am able to ensure that the appropriate developers are made aware of any issues.

3.3 Reduced Patch Problems

Patches submitted by the community can often times conflict with patches submitted by Intel® which would either cause the driver to break or have issues passing traffic. In having a single sub-maintainer, David Miller can have confidence that patches I send to him have been tested and will apply cleanly to his networking git trees.

3.4 Increased Patch Testing

Every patch submitted against our drivers, either from the community or internally, goes through our BAT (Basic Acceptance Testing) to ensure that the patch does not cause any issues. The testing includes compile testing, module load/unload, and passing of traffic. In addition to these basic tests, additional targeted testing is done to ensure that the patch does what it is intended to do.

4 Processes (Internal/External)

4.1 Internal Mailing List & Netdev

Community patches come through the kernel networking (Netdev) mailing list and sometimes through the kernel mailing list (LKML). I import these patches and mail them out through our internal kernel patch mailing list. This ensures that Intel® developers and testers who have not seen the patch on the community mailing lists, have a chance to review the community patches.

4.2 Patchworks

In addition to David Miller's Netdev patchwork project, we have an internal patchworks server to keep the status of the patches (internal and community) that have been submitted against our drivers. We have modified the patch status field to include a more granular status of the patch. Here are the additional states that a patch could be in:

Status: New

This is the same status used in the community, new patches which have been submitted that need to be assigned a tester and placed under review for others to see and comment.

Status: Under LAD Review

Patches are under review internally (driver owners specifically) and have been assigned a tester and placed under review for others to see and comment.

Status: Under LAD Review - Critical

This status is reserved for internal and community patches which need immediate attention for review and testing.

Status: Under LAD Testing

The validation team is currently working on validating the patch. Validation of a patch usually takes 24 hours to complete the Basic Acceptance Testing (BAT).

Status: Passed LAD Testing

The testing has passed the Basic Acceptance Testing (BAT) and can be sent to Netdev for inclusion.

Status: Failed LAD Testing

Testing has failed the testing and changes are required. The patch is assigned back to me, along with feedback on why the patch has failed.

Status: Mailed to Kernel/Netdev ML

The patch has passed testing and has been submitted to the appropriate kernel maintainer and kernel mailing list. In some cases, this is a re-submittal (for community patches) to the kernel maintainer and kernel mailing list.

5 Problems

Public Git Tree

Currently we do not have a public git tree for the community to pull from. This can be an issue when I import patches submitted from the community into our internal git tree because there may be several internal patches currently applied to the tree which are under testing. I have been able to minimize this by maintaining several branches in my git trees which keeps the patch count in each branch lower.

Patch Status

Community patch submitters do not have a way to view the status of their patch while the patch goes through our internal patch process. David Miller sets the status of the patch, originally submitted to the community, to "Awaiting Upstream" in the Netdev project of patchworks. This is not a direct reflection of the current status of the patch in our internal git tree.

6 Conclusion

The addition of a sub-maintainer for Intel® wired LAN drivers has helped David Miller in the processing and review of patches. Since the adding of a sub-maintainer, the patch acceptance rate went from 45%, over three years ago, to 97% acceptance rate in 2009. This paper shows some of the benefits of having a sub-maintainer and some of the processes that can be used.

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