

# Paper review <sup>[1]</sup>

Yu SU 55323707

## 1. The Problem

With the develop of cloud computing, there are more and more requirements for the virtual network. However, the existing research on it is often focusing on a point problem such as the high-speed dataplanes, virtualized routing infrastructure or NFV middleboxes. And the paper tried to bring a system containing of all the characters, so the paper proposed Andromeda, which is a network virtualization environment for Google Cloud Platform.

## 2. Challenge

There are many requirement and challenges for Andromeda. First, isolation performance of each customer is needed and they should enable communicate with each other with same throughput and latency. What's more, it should evolve many network features without VM disruption. Third, the virtual networks should be highly available and good scalability without degradation of performance.

## 3. Key Insight

There are three main contributions in the paper.

First is the control plane in the Andromeda, which is designed around a global hierarchy coupled with the overall cloud cluster management layer, which maintains the information about each single VM, high level product and some infrastructure state. There are three layer in the control plane, cluster management layer, fabric management layer and switch layer, which make sure the scalability, isolation, agility and the availability of the Andromeda.

Second is the dataplane, which is composed of a flexible set of flow processing paths. There are two primary paths, fast path and coprocessor path. The fast path could guarantee the high performance and low latency and the coprocessor path could decouple feature growth form fast path performance, providing isolation, ease of programming and scalability.

And for the packets do not match the flow rule, Andromeda sends it to the hoverboards, which process the long tail of mostly idle flows. As a result, there is no need for install full forwarding information on every host, which could improve the memory utilization and CPU scalability.

Besides these, the paper also remained at the cutting edge, making Andromeda support transparent VM live migration and non-disruptive dataplane upgrades.

## 4. Limitation

Although Andromeda tried to improve the isolation to split the fast path ingress engine into two parts, only the back half get the good isolation. The noisy neighbor issues still arise if the less CPU intensive front half is overloaded.

## 5. Future Work

In the future, the researchers should try to move the substantial portions of the fast path to the hardware, which could improve the scalability of Andromeda a lot, because with a flexible and lightweight virtual network endpoints, the whole virtual network could be more dynamic and scalable.

[1] D. Michael, S. David, A. Jacob, A. Ahsan, G. Anshuman (2018). Andromeda: Performance, Isolation, and Velocity as Scale in Cloud Network Virtualization. *Proceedings of the 15<sup>th</sup> USENIX Symposium on Networked Systems Design and Implementation*.