TOWARDS RESILIENCE ENHANCEMENT OF SDNs

ALI MALIK, BENJAMIN AZIZ AND MO ADDA

PROBLEM

Failures (e.g. link failures) take place in everyday operation with varying in living-time and causes. Reconfiguring the flow entries of a forwarding element’s flow table usually arises for various reasons, such as link/node failure, security policy management and traffic engineering. This problem is considered as a manifold due to following aspects.

1. Network update is not a trivial task.
2. Negative impact on the network’s QoS.
3. Flow table space limitation (TCAM).

CONTRIBUTION

Our contribution can be summarised as:

- Framework: We define a new framework for tackling the issue of link failures, which is modelled based on the principle of the undirected graph and set theories. We use this framework to find a path that comprises from a set of edges with low failure rate, which can be determined based on the Mean Time Between Failure (MTBF).
- Algorithms: We will develop a new novel algorithms to implement the newly proposed framework of SDN network stability and availability. A new cost function will be designed, which incorporates some metrics (e.g. Bandwidth, MTBF, utilisation, etc.).
- Simulations: The proposed framework will be evaluated and validated through well-known simulation tools such as Mininet, FNSS and BRITE.

SDN ARCHITECTURE

THE PROPOSED FRAMEWORK

1. Network update is not a trivial task.
2. Negative impact on the network’s QoS.
3. Flow table space limitation (TCAM).

WHY THIS SOLUTION FITS SDN?

Our proposed framework is suitable for centrally controlled networks like SDNs due to the following facts:

- Global view: Unlike the traditional IP networks, SDN architecture consisting of three layers. The Control plane, or sometimes called the controller, represents the network brain that exerts a granular control by relying on the global view over the network topology, which is a crucial feature that has been missed in the past.
- Adaptability: Being centrally controlled means network-wide or individual device adjustments can be made quickly without remoting into the network device manually. Therefore, paths (from end-to-end) can be assessed on the basis of different requirements like reliability, security, shortest, etc.

CONCLUSIONS AND FUTURE WORK

We presented a new framework for SDN to tackle the problem of finding the most reliable primary/alternative path. Links MTBF will be employed as an availability indicator, which can be viewed as a network operator requirement.

For future, we will implement the framework to act as a real SDN component in order to investigate the trade off between the shortest and reliability in terms of different QoS metrics.

REFERENCES


CONTACT DETAILS

For further information and details, please do not hesitate to contact us: Email: [ali.al-bdairi; benjamin.aziz; mo.adda] @port.ac.uk

LINK FAILURE ANALYSIS

The above figures show the analysis of link’s failure (i.e. frequency and characterisation) that will be utilised in our simulation towards more accurate link’s failure probability generation.