

# Where is ECN Stripped On The Network?: Status report

Myles Lamb

2325727L

## Proposal

### Motivation

ECN, or Explicit Congestion Notification, is a feature partially implemented in the IP header. Which utilises the two least significant bits of the DSCP or traffic class field. To this day, devices on the network modify these fields or drop packets setting them. In this project we investigate the modification pathologies of ECN fields to identify incorrectly configured network devices, and to motivate design decisions to facilitate ECN deployment.

### Aims

The project seeks to determine, where ECN is stripped on the network by network devices, and how often this happens. Furthermore we examine.

- The current state of ECN adoption.
- Whether the modification pathologies for ECT(0) and ECT(1) are the same, ie. are the code points treated the same by network devices
- Whether the network substrate (IPv4/IPv6) influences the frequency of modifications to ECN fields.
- Whether the transport substrate (TCP/UDP) influences the frequency at which modifications to the ECN fields occur.

## Progress

To date the project exists as:

- an almost complete network analysis tool. With respect to the project goals. However, minor changes are required to ensure robustness.
- Some progress has also been made in regard to the analysis of the outputs of the network analysis tool (a collection of pcap files). Allowing us to compute a variety of metrics, such as, is a given host reachable, and whether ECT code points have been stripped via examining ICMP responses from traceroutes.
- An experiment with ethics approval involving ~8 participants, ~10 virtual private servers acting as additional network vantage points, has been organised to begin at the start of semester 2.

## Problems and risks

### Problems

Problems that have arisen to date:

- Sourcing a suitable cloud provider that would cover the cost of the research experiment in January.
- Sourcing suitable participants in regards to geographic distribution. Of which has largely been resolved.
- Implementation of a variant of the program `traceroute` that targets the quic protocol.

### Risks

- Potential deployment/installing issues with the network analysis tool to participants computing equipment.
  - Many participants own Raspberry Pis, hence supplying a ‘pre-installed’ `.img` file should simplify this process.
  - Otherwise a pre written installer for Amazon Machine Images could be adapted to install the software on a participants machine assuming it runs a variant of Ubuntu.
- Run time issues with the network analysis tool.
  - Smaller ‘pre-flights’ of the network tool have been run and will continue to be run over the Christmas period in order to identify concurrency issues (the most common variant of issues given the design of the tool).
  - Additionally the experiment information sheet includes provisions asking for participants to facilitate at most daily check ins to verify that the tool has not crashed.

### Plan

- *Xmas period* Produce `*.img` files for Raspberry Pis, finish up with data analysis code, and network analysis tool.
- *Weeks 1-2* Conducting experiment with participants and data centre provider. Finishing up with data analysis code.
- *Weeks 3* Evaluating the results of the experiment, Producing output visualizations of results.
- *Weeks 4-6* Produce a first draft of dissertation / Table of contents for evaluation.
- *Weeks 7-onwards* Work on final draft of dissertation in preparation for submission.