Hello everyone

After an intensive Summer packed with activities, we owe you an update. We have continued working on SCIONLab, our infrastructure to make SCION easy to try and use. SCIONLab now supports connections to multiple attachment points and our automated image builder enables you to easily fetch a fully customized image for Raspberry Pi and Odroid devices to run your SCION AS.
In this newsletter, we focus on SCIONLab research opportunities, give insight into an exciting project that has been conducted on SCIONLab, report on a DDoS solution for servers that we have implemented, and provide an update from Anapaya Systems.

Research opportunities for SCIONLab

As SCIONLab continues to mature, many exciting research opportunities become possible. To illustrate this point, we present a few possibilities.
SCIONLab offers next-generation Internet architecture research based on SCION. By joining SCIONLab, users obtain real ASes with all cryptographic credentials to participate in the global SCIONLab routing infrastructure. Through the control-plane PKI, each AS obtains its own certificate. ASes can use their own computing resources and attach to different points in the SCIONLab network. This enables a user to use SCIONLab as a path-aware networking testbed with path-selection support, perform inter-domain routing scalability research, or investigate network availability and performance across the globe.

In the near future, we plan to extend SCIONLab with the following mechanisms enabling additional exciting research opportunities:

- Hidden paths for secure IoT operation
- Inter-domain bandwidth resource allocation system
- Multi-path QUIC socket for multi-path research
- DDoS defense research using in-network defense mechanisms.

MS thesis project report: Network performance evaluation on SCION

In a MS thesis project by François Wirz, we conducted a performance evaluation of SCION on a distributed set of hosts operated by Open Systems. We conducted measurements of the end-to-end connectivity between hosts over the regular Internet and over SCION using various metrics, such as latency and topological path properties (e.g., path stretch). By

inspecting the topological properties of the SCION paths, we evaluated how path selection can improve availability and path performance in a path aware networking context. Our results show that for more than 90% of possible AS pairs, SCION was able to deliver high path disjointness and simultaneous availability for both eastbound and westbound paths. More results of this collaboration with Open Systems can be found in François' thesis report.

DoS Defense for Server Systems

With SCION's global QoS system, end domains have an effective mechanism to defend against volumetric DDoS attacks (which congest network links). However, non-volumetric attacks that exhaust resources on the end host are still possible. The main problem lies in the asymmetry between the attacker and the defender: while the attacker can trivially forge arbitrary requests, the defender has to process all incoming requests. Thus, we designed and implemented an efficient packet filtering service that is able to filter a traffic stream with 60+ Gbps bandwidth on a commodity server while introducing negligible latency overhead. During an attack, the service checks the authenticity of each packet, removes duplicate packets, and enforces per-AS resource allocation. This work arose from a collaboration of Florian Jacky and Pascal Sprenger under the supervision of Benjamin Rothenberger. The paper describing this work is currently under review, if you would like to get access please contact benjamin.rothenberger@inf.ethz.ch.

Anapaya Systems Update

On the commercial side, Anapaya systems is continuing the ISP and customer deployment of SCION. The growing BGP-free commercial SCION network now encompasses Swisscom, Deutsche Telekom, SWITCH, and Init7. Several corporations have obtained SCION network connections through these ISPs to the corporate SCION network. The Anapaya team is steadily growing at a recent pace of one person per month, with currently 9 developers. With the increasing maturity of the product, Anapaya is now starting to build up a management, operation, and sales team.

With the continuing increase of interest and deployment, we are experiencing profuse excitement.

Thanks for your interest and stay tuned for further updates!

The SCION team