SCION in 2026

SWINOG #41

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Agenda

- SCION Recap
- Adoption
- What's new
- Upcoming Events

SCION: Secure Path-Aware Inter-Domain Routing

TRUST SOVEREIGNTY

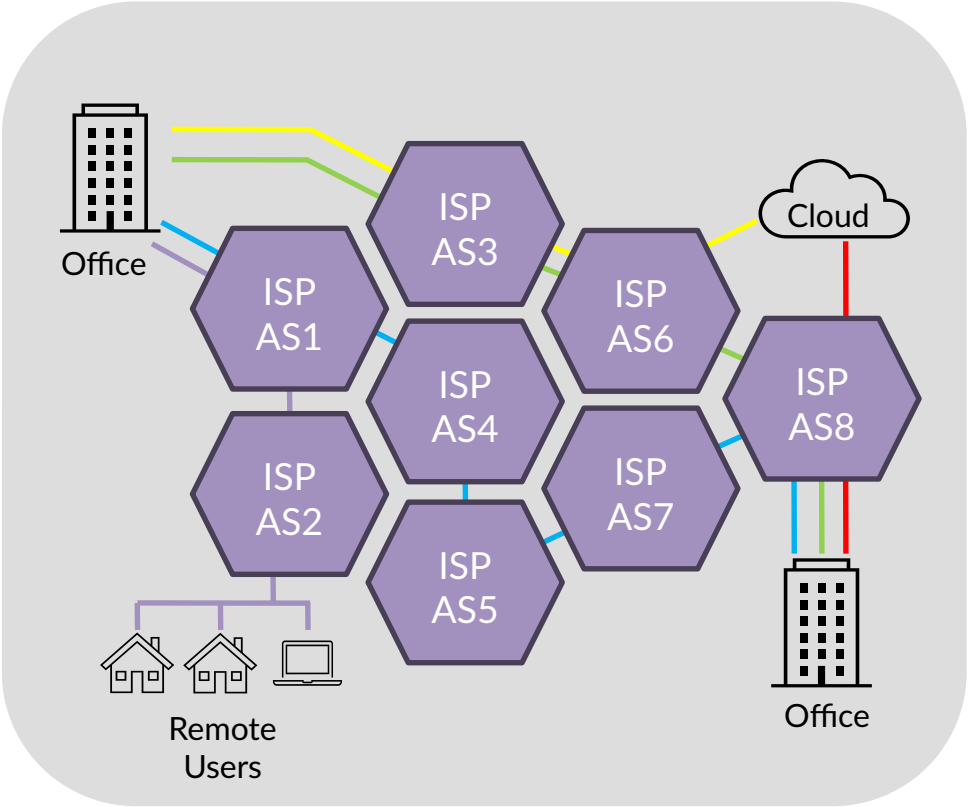
- Self-governed trust domain without 3rd party CAs
- ASes are authenticated with X.509 certificates

PATH CONTROL

- Endpoints select paths across ASes
- Path selection based on latency, bw, geolocation, …
- Geofencing & Route Hijacking prevention

MULTI-PATH DISCOVERY & FAILOVER

- Fast failover in ~RTT
- Use multiple paths concurrently



SCION in a Nutshell

ISOLATION DOMAIN (ISD)

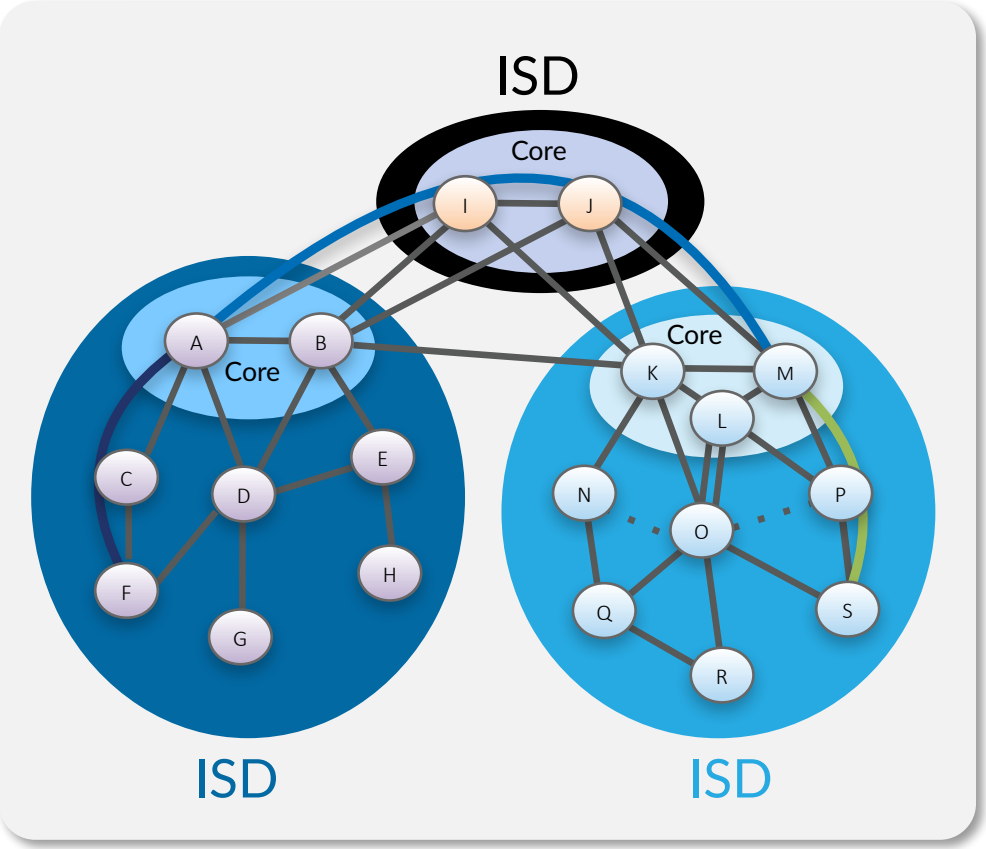
- **Grouping** of Autonomous Systems (AS)
- Each ISD has its own **trust root**
- **Public** vs **private** ISDs

CONTROL PLANE – PATH DISCOVERY

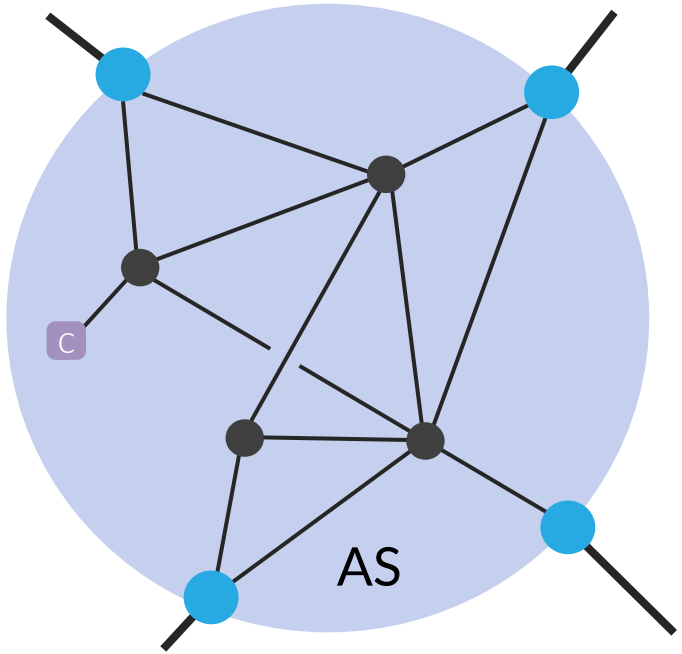
- Paths are based on **AS / border routers**
- **Beacons** travel the network to build paths
- **Path server** stores paths segments
- PKI **authenticates** path segments

DATA PLANE – PACKET FORWARDING

- Clients **build end-to-end path** from segments
- SCION **packets contain end-to-end path**
- Border routers **forward packets** based on path



Deployment Model



C Control Services

Border router

Internal router

AS DEPLOYMENT

- No change to internal network infrastructure needed
- **Border routers** peer with other SCION-enabled ASes
- Control services
  - **Beacon service** – sends and receives beacons
  - **Path service** – store path discovered from beaconing
  - **Certificate service** – caches certificates and manages keys for inter-AS comms
- **Endpoints** run SCION enabled apps
- **Legacy endpoints** can use SCION gateways

Real-World Deployment:
Secure Swiss Finance Network: SSFN

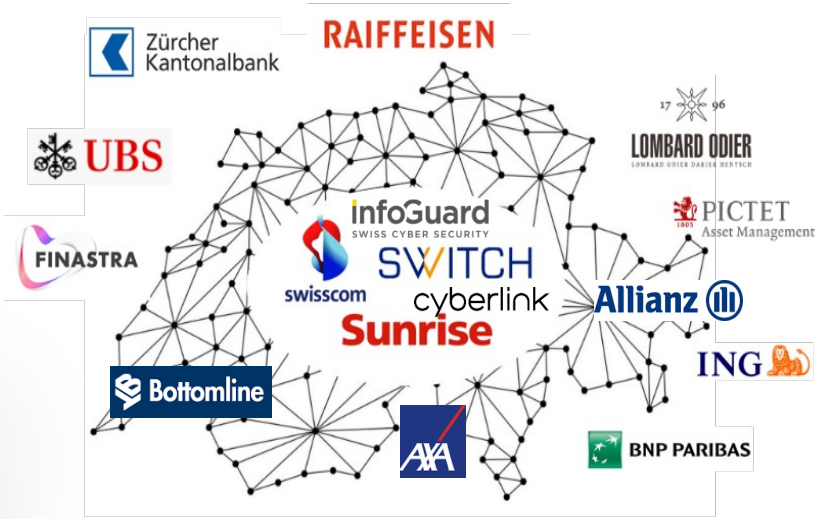
- Swiss inter-banking network
- ~300 finance institutions
- Critical real-time financial services
- Governed by the Swiss National Bank and SIX

Enforceable governance with SCION's trust concept

Multi-ISP

Geofencing

Performance-based routing & fast failover



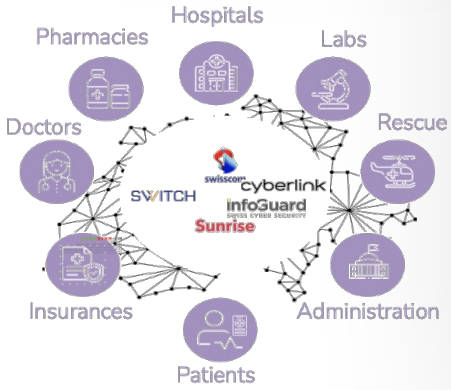
Finance, Healthcare, Power & Education

PAYMENTS

The Secure EFTPOS Network (**SEPN**) uses SCION for cashless payments.

HEALTHCARE

HIN uses SCION to interconnect Swiss hospitals and doctors.



POWER

Secure Swiss Utility Network (**SSUN**) is a concept by the VSE (Association of Swiss Electricity Companies).

VSE plans to have all market partners join SSUN by 2030.

EDUCATION

The SCION Education, Research & Academic Network (**SCIERA**) connects campuses and research institutions with SCION.

Deployment: Public Network

Registered ASes	*Reachable (public) ASes*
242	98

Traceroute from ETH Zurich to **98 ASes**

	Median	*Maximum*
Paths per destination	204	5828
Fastest path: Hops	4	7
Fastest path: RTT [ms]	4.1	363.69

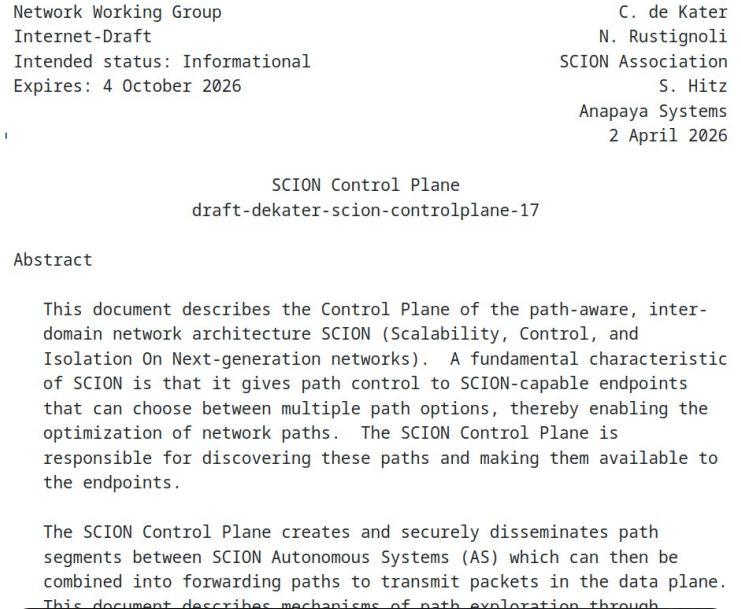
News

IETF/IRTF

- IETF independent submission stream
- Data plane & control plan drafts are with the RFC editor
- Only editorial changes expected

Specification Internet Drafts:

SCION PKI	draft-dekater-scion-pki
SCION Control Plane	draft-dekater-scion-controlplane
SCION Data Plane	draft-dekater-scion-dataplane



Network Working Group
Internet-Draft
Intended status: Informational
Expires: 4 October 2026

C. de Kater
N. Rustignoli
SCION Association
S. Hitz
Anapaya Systems
2 April 2026

SCION Control Plane
draft-dekater-scion-controlplane-17

Abstract

This document describes the Control Plane of the path-aware, inter-domain network architecture SCION (Scalability, Control, and Isolation On Next-generation networks). A fundamental characteristic of SCION is that it gives path control to SCION-capable endpoints that can choose between multiple path options, thereby enabling the optimization of network paths. The SCION Control Plane is responsible for discovering these paths and making them available to the endpoints.

The SCION Control Plane creates and securely disseminates path segments between SCION Autonomous Systems (AS) which can then be combined into forwarding paths to transmit packets in the data plane. This document describes mechanisms of path exploration through

More News

CLIENT LIBRARIES & APPS

- Go, Rust, C, Java (& Python)
- Chromium browser plugin
- Stand-alone applications: no SCION installation needed
- Increasingly native SCION endhost apps

NATIVE SCION TRAFFIC

- Several companies plan release of SCION native software later this year
- This should result in 100'000+ native SCION users by end of the year

REFERENCE IMPLEMENTATION

- Latest release **v0.15.0 "Schimberig"**
- Support for NAT

Events

SCION Day – Benelux Edition

Amsterdam

May 19, 2026

SCION Hackathon 2026

Zurich

June 24, 2026

SCION Day – Swiss Edition

Zurich

October 27, 2026

Thank you!

LinkedIn

More information:

- SCION Association: https://www.scion.org
- Providers: https://www.scion.org/business/#providers
- Reference & Developer Docs: https://docs.scion.org/
- Vendor: https://www.anapaya.net/resources
- Latest Release: https://github.com/scionproto/scion/releases/
- IETF/IRTF spec drafts:
  - https://datatracker.ietf.org/doc/draft-dekater-scion-controlplane/
  - https://datatracker.ietf.org/doc/draft-dekater-scion-dataplane/

FAQ for Online Viewers

FAQ

How does SCION know when a specific route is vulnerable or unsafe?

- SCION routes traffic in 'trust domains' (ISDs) formed from groups of trusted ISPs (e.g. SSFN).
- Paths can cryptographically ensure that traffic never leaves trusted domain.

Does SCION work with the existing internet (ASes, ...)?

- SCION works with the existing Internet,
- AS internal routing remains unchanged
- non-SCION aware host/networks can use SIGs.

How does the dynamic routing work? Are multiple paths continuously assessed for integrity / performance?

- SCION endpoints can use multiple paths across multiple ISPs
- Endhosts have multiple path available for immediate use.
- Endpoints can continuously assess and switch path.

What is the response time in the case of a network router failure, etc?

- Failover can be as fast as the round-trip time
- Link failures can be signaled by the network (SCMP).

FAQ

Will SCION help against a DDoS attack?

- If an Internet path is unavailable due to a DoS attack, SCION can quickly switch to alternative paths.
- Some SCION networks can be isolated from the Internet, reducing attack surface.

Is it compatible with Pv4 and IPv6? Does it put constraints on protocol stacks and application services?

- SCION works with both IPv4 and IPv6
- SCION endhosts can use SCION directly (SCION over IP)
- SCION Gateways may be deployed at the edge of SCION networks to translate from IP to SCION and vice-versa.

Is SCION compatible with VPNs?

- IP-based applications or VPNs run over a SCION network.
- SCION offers the advantage of supporting a multi-ISP and inter-domain environment, with end-to-end capabilities.

The End

SCION Ecosystem

Benefits of SCION


Sovereignty: Self-governed trust, vendor independence, multi-ISP


Security: Authenticated control plane


Stability: Native multi-pathing with rapid path failover


Control: ISP preselect paths, user apps choose paths, e.g., for geofencing


Protection: Apps select (hidden) paths to evade DDoS attacks


Performance: Apps select paths based on latency, bandwidth, ...