SCiON, Quo Vadis?

Prof. Adrian Perrig
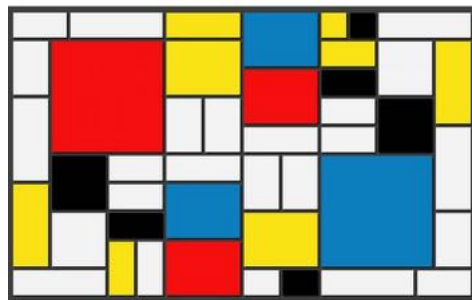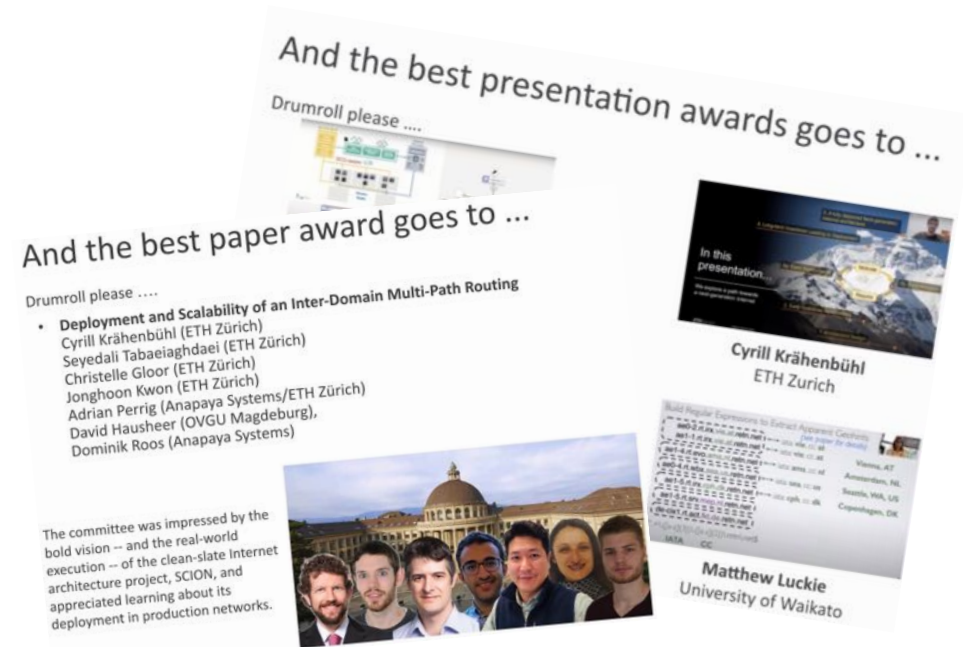**Network Security Group, ETH Zürich**

2021 Highlights: Research

Global secure
time sync

First globally scalable
bandwidth guarantees
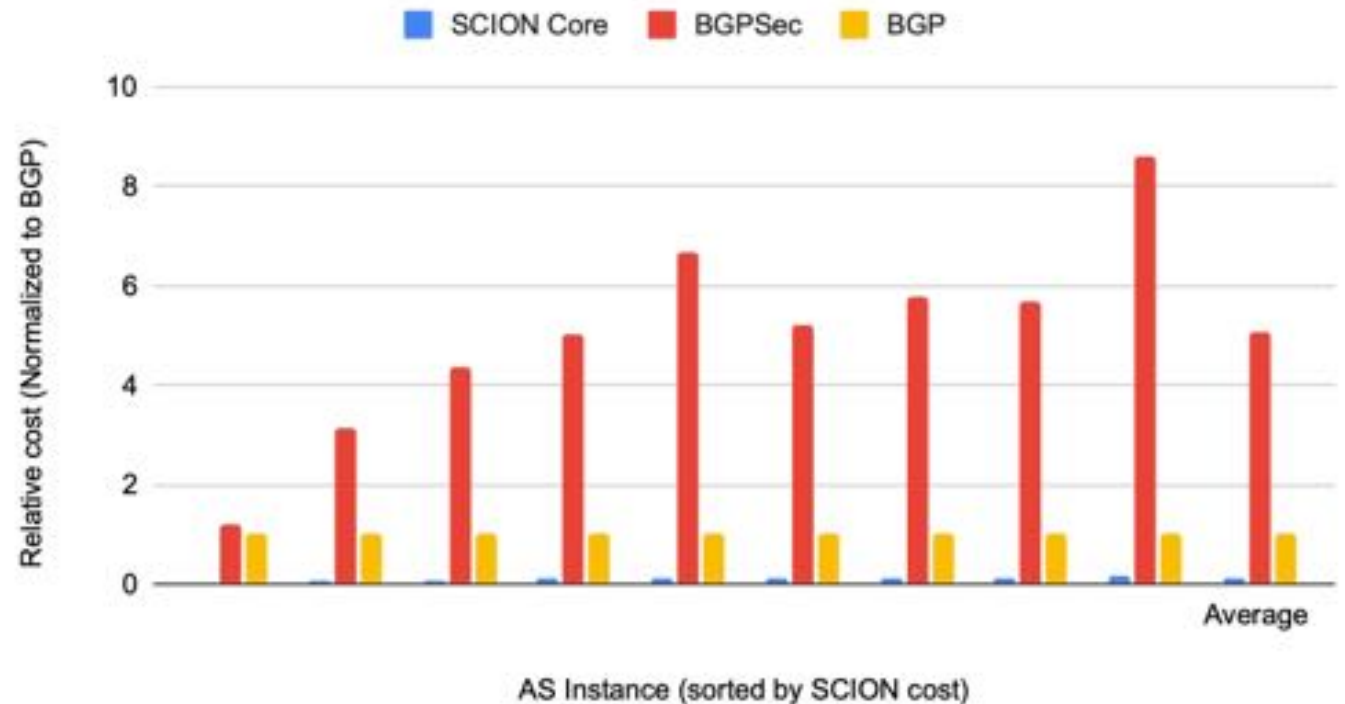(COLIBRI)

Mondrian zoning
system

Green
Routing

Awards at top
conference
(CoNEXT'21)

And the best presentation awards goes to …

Drumroll please ….

And the best paper award goes to …

Drumroll please ….

- **Deployment and Scalability of an Inter-Domain Multi-Path Routing**
  Cyrill Krähenbühl (ETH Zürich)
  Seyedali Tabaeiaghdaei (ETH Zürich)
  Christelle Gloor (ETH Zürich)
  Jonghoon Kwon (ETH Zürich)
  Adrian Perrig (Anapaya Systems/ETH Zürich)
  David Hausheer (OVGU Magdeburg),
  Dominik Roos (Anapaya Systems)

The committee was impressed by the
bold vision -- and the real-world
execution -- of the clean-slate Internet
architecture project, SCION, and
appreciated learning about its
deployment in production networks.

Cyrill Krähenbühl
ETH Zurich

Matthew Luckie
University of Waikato

ETH zürich

SCION

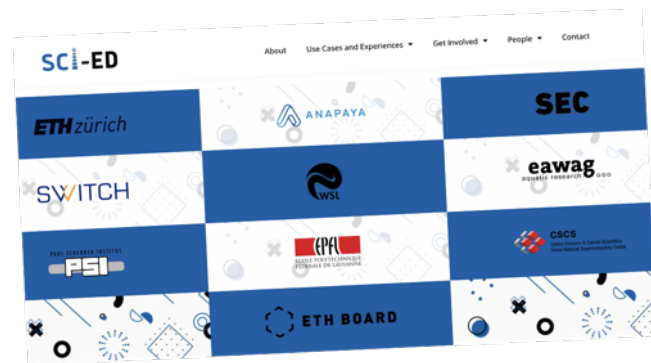# 2021 Highlights: Scalability Demonstration

Scalability analysis: on a per-path basis, SCiON expends 200 times less effort than BGP, and 1000 times less effort than BGPsec!

SCION Core, BGPSec and BGP

Legend: SCION Core, BGPSec, BGP

Y-axis: Relative cost (Normalized to BGP)
X-axis: AS Instance (sorted by SCION cost), Average

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2021 Highlights: Development and Deployment

New ISPs, SCI-ED, SBAS, DRKey & COLIBRI in SCIONLab

P4 router, Video app, LINC, Lightning Filter, Hercules, …

SSFN Launch

Call with SCION

Call without SCION

Deployment

New implementations

New SCiON Book

ETH zürich

SCiON

Multipath Communication: Exciting SCiON Opportunity

- Thanks to multiple path choices, SCiON can offer best path for different requirements
  - Low latency, jitter
  - High bandwidth
  - Privacy, anonymity
  - Low CO_2 footprint
  - Jurisdiction
- Application can make use of multiple paths simultaneously and optimize paths for performance
- New world, offering exciting opportunities!

SCiON

Premium Web Browsing

- Today's Internet has only single path, no choice

- Low-latency and low-bandwidth path exists can be used for small packets

- With SCiON we can use both low-latency and high-bandwidth paths

- Using an additional low-latency path speeds up web page download by over 10% for servers with latency > 30ms

  - 12% median improvement

  - 10-20% improvement over range

- Larger improvements expected with more available paths and more sophisticated path scheduling

SCiON

Technologies to Drive Deployment

Scenario		Backbone ISP		End host ISP		End Application	
		SRC	DST	SRC	DST	SRC	DST
Locally deployed SCION IP Gateway (SIG)	SCION	🔧	🔧	🔧	🔧	✅	✅
SCION built into application (Used if present in end-host ISP)		🔧	🔧	🔧	🔧	🔧	🔧
"Happy Eyeballs" standard with SCION support	👀	🔧	🔧	🔧	🔧	✅	🔧
Secure Home Office (Carrier-Grade SIG deployed at ISP)	SCION	🔧	🔧	✅	🔧	✅	✅
Secure Backbone AS (SBAS)	SCION BGP IP	🔧	✅	✅	✅	✅	✅

🔧 Change required   ✅ No change required

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SCION Backbone: SBAS

SBAS optimizes regular Internet traffic, using the SCiON backbone

- Optimizing latency, CO_2, security
- Transparent to Internet hosts
- Promising system to get traffic onto the SCiON network

Key point: no upgrade to source or destination!

SCiON

SBAS

Internet

client   Regular server

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SCION Backbone: SBAS

SCiON

SBAS

Internet

client

server
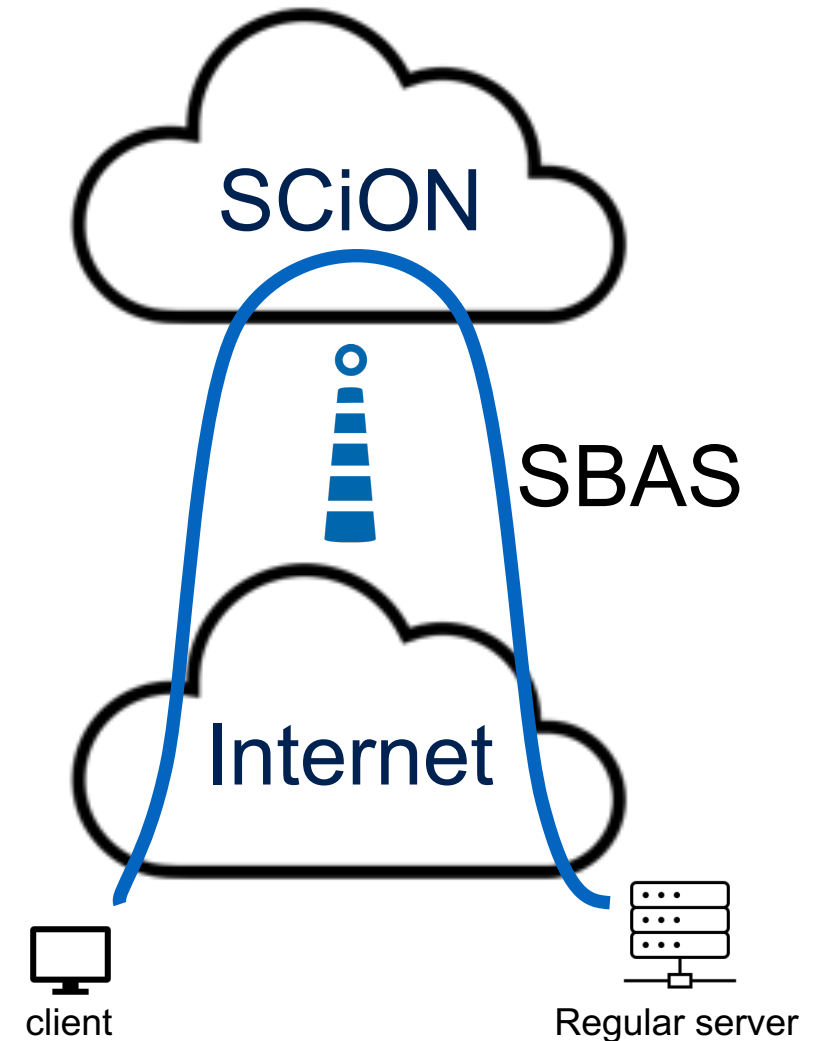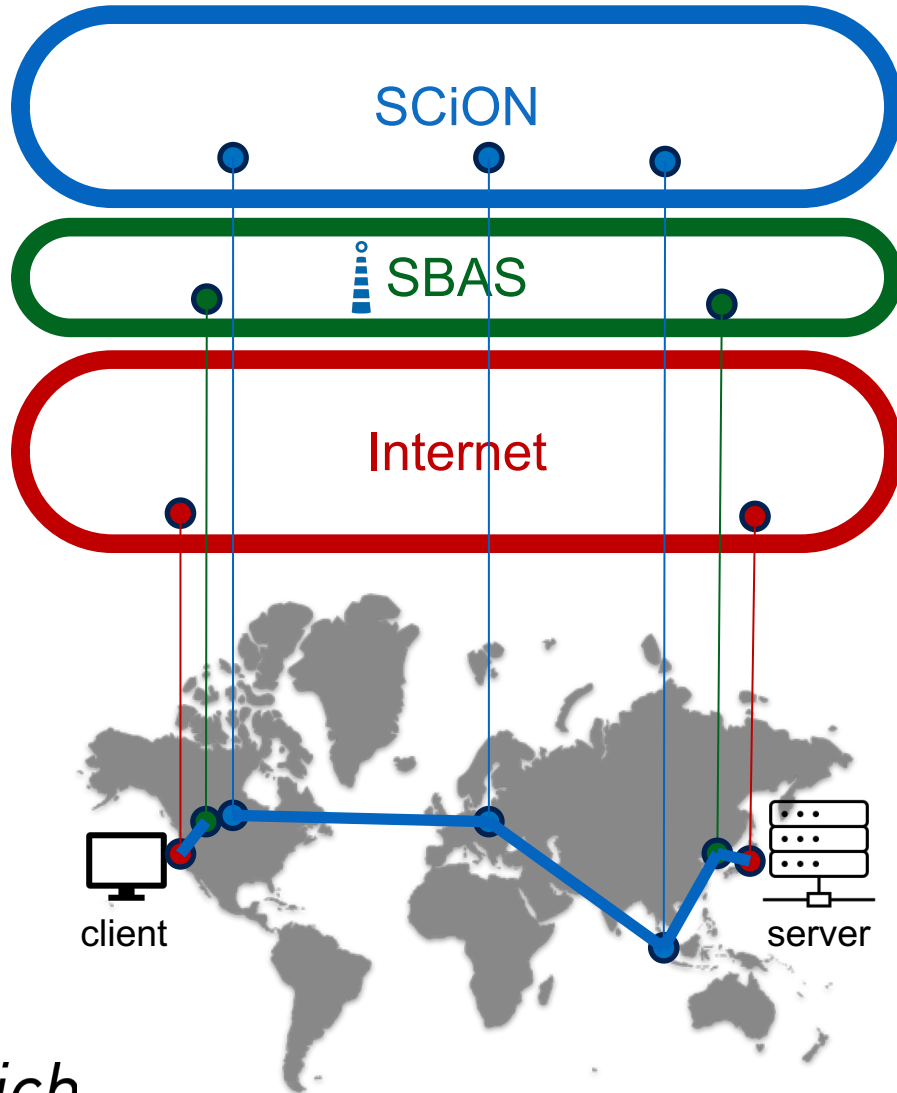
Hijack-resilient enterprise network
For security-conscious enterprise customers

Green Internet
Improved carbon efficiency for private customers
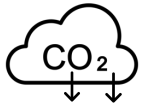
Gaming Internet
A latency-optimized home connection for private customers

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2022 Outlook: Toward Daily SCiON Use

Home office

Cloud connectivity

Build SCiON into applications

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2022 Outlook: Expanding Ecosystem

New players

SCiON Foundation

Standardization

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SCiON Journey

- For 12+ years, we have been on our SCiON journey

- We now have an internet architecture that is faster, greener, and secure

- Thank you for joining us on our expedition to establish the new internet!

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