



Innovating the European Internet space

my journey and SCION's partnership with GÉANT

Klaas Wierenga

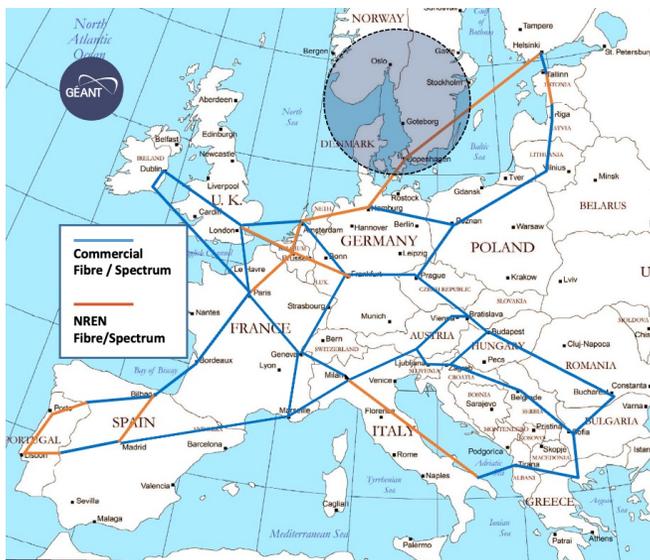
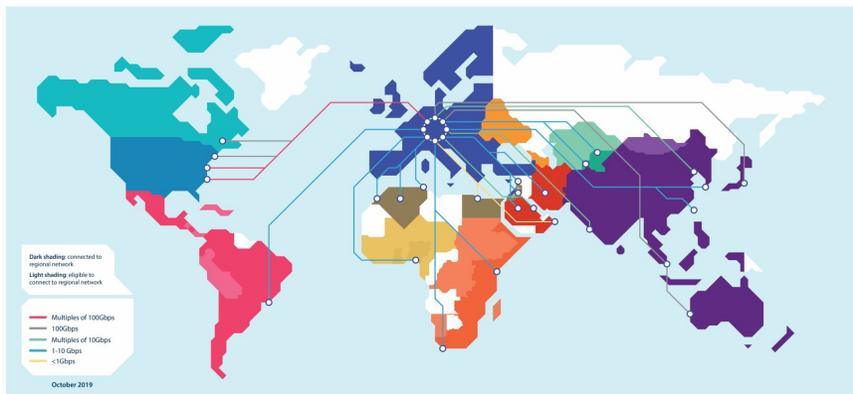
Chief Information & Technology Officer

SCION Day

18 October 2023

Public / ~~Confidential~~ / Restricted

AT THE HEART OF GLOBAL RESEARCH AND EDUCATION NETWORKING



Collaborate



I am here

Identify



Connect



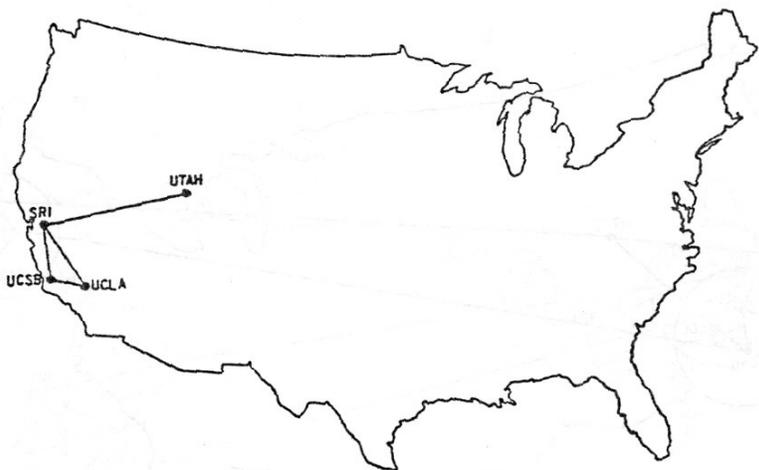
Outline



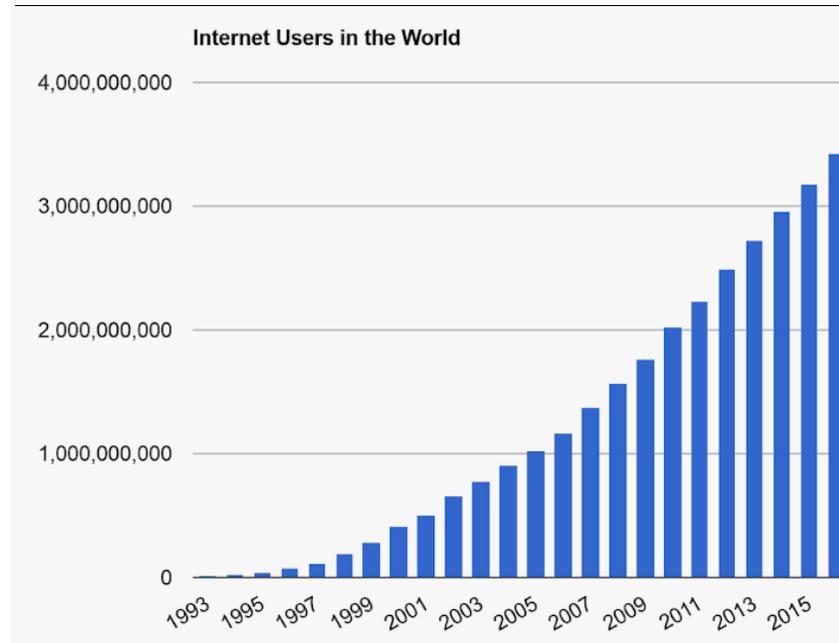
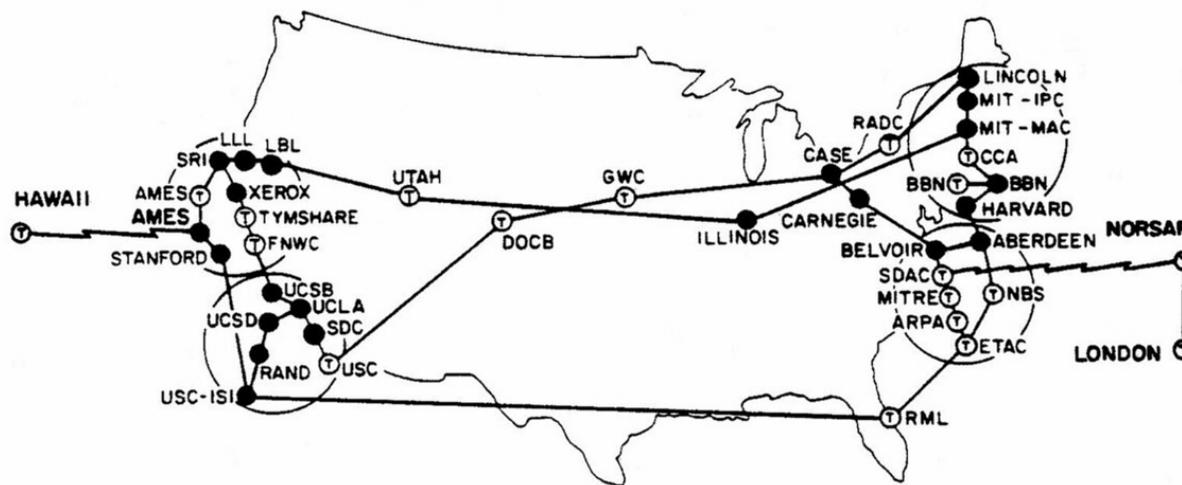
- eduroam
 - history
 - lessons learned
- ~~GEANT Partnership with SCION~~
- Observations on SCION



The Internet



The ARPANET in December 1969



Courtesy: Steve Huter



Courtesy: Doug Humphrey



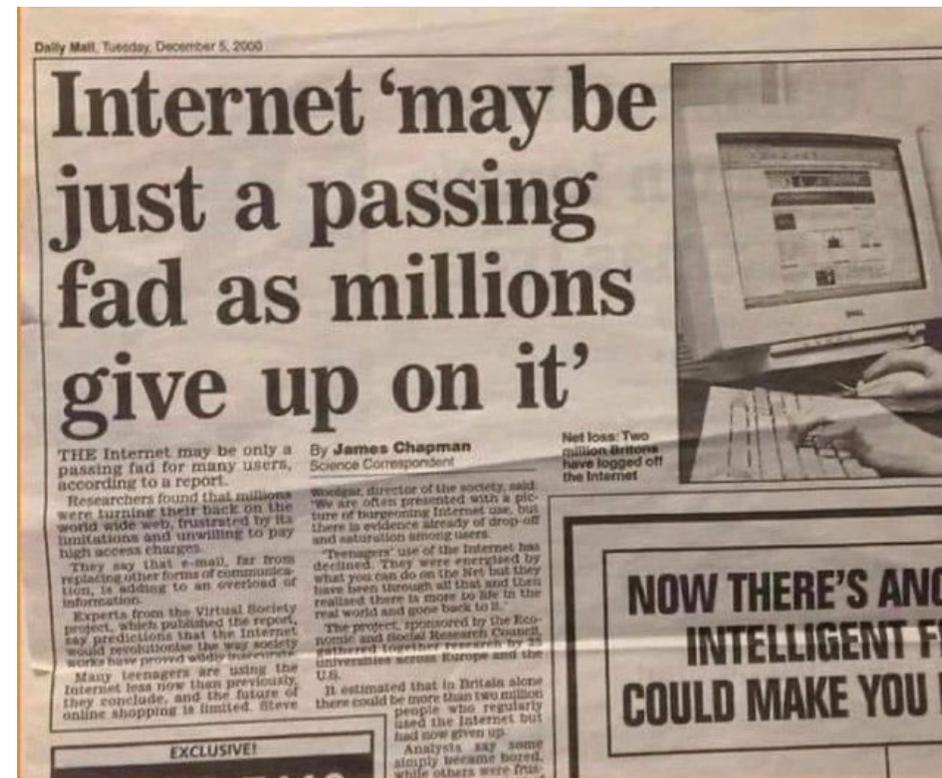
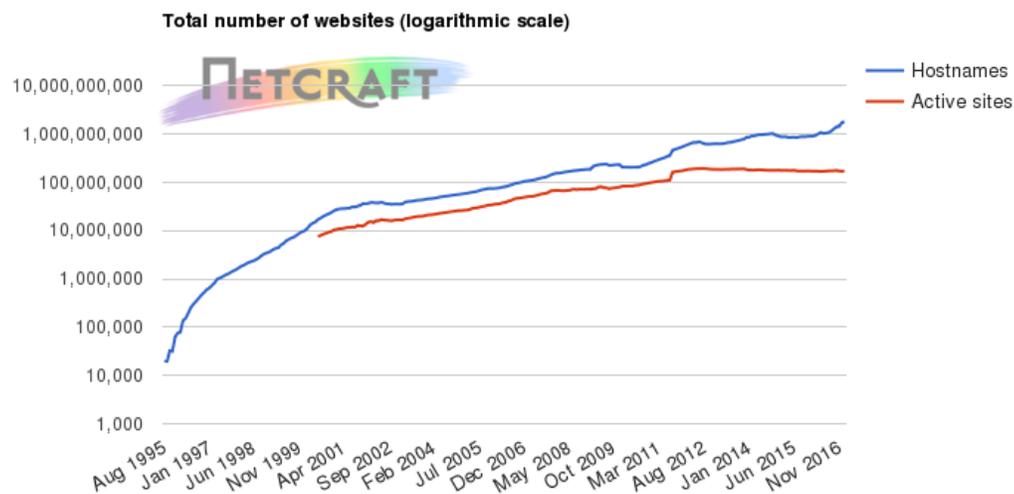
Courtesy: Jeff Osborn



The Web



Copyright: CERN

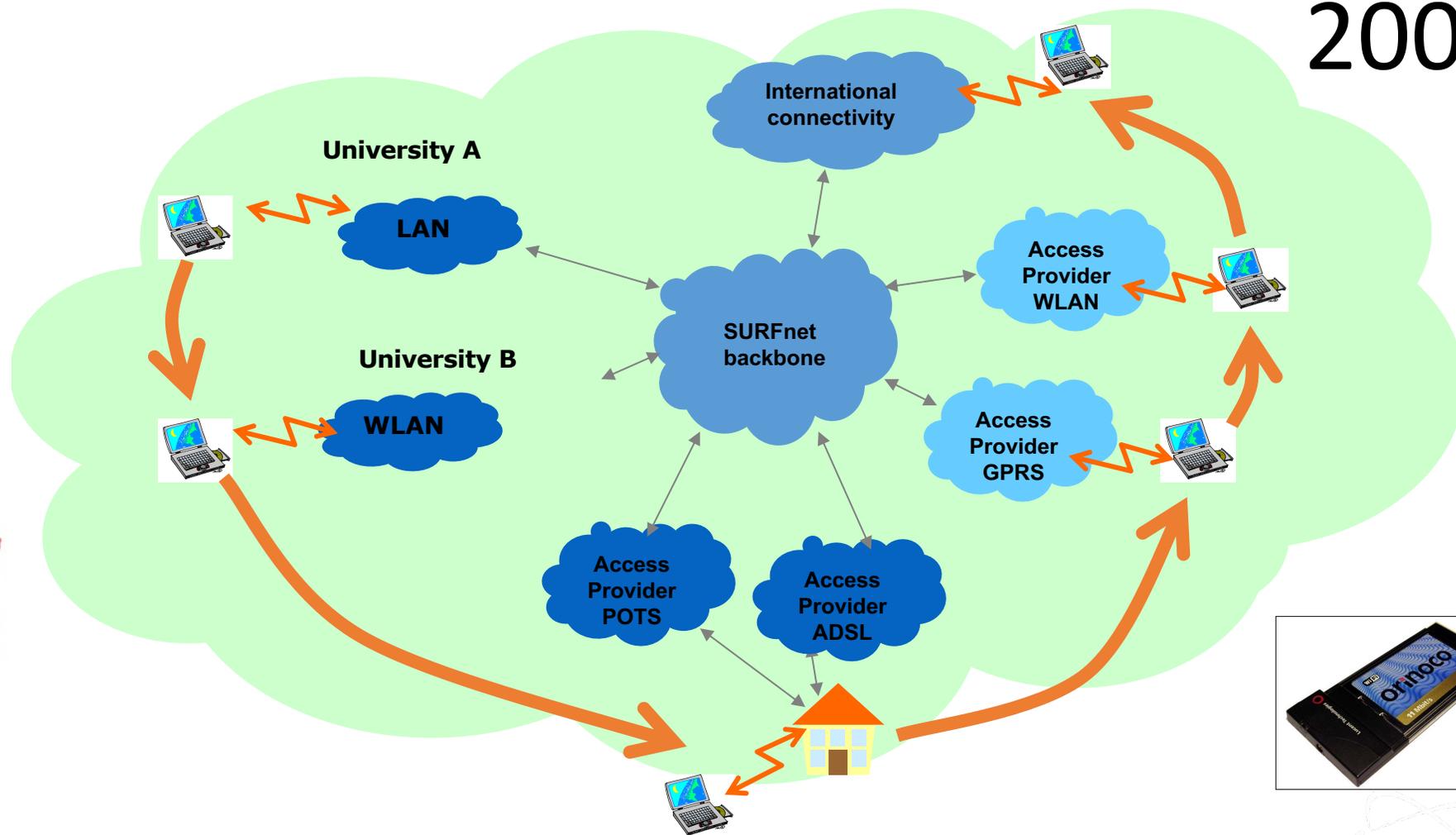


“A complex system that works is invariably found to have evolved from a simple system that worked. The inverse proposition also appears to be true: A complex system designed from scratch never works and cannot be made to work. You have to start over, beginning with a working simple system.”

Source: “John Gall’s law” from “Systematics: How Systems Really Work and How They Fail” - 1975

Motivation

2003



It all started with ...

Subject: [mobility] proposal for inter NREN roaming
From: Klaas Wierenga <Klaas.Wierenga@surfnet.nl>
Date: Thu, 30 May 2002 12:46:43 +0200
To: mobility@terena.nl

Dear all,

As promised at the mobility workshop a proposal for an inter-NREN wireless LAN roaming test. Based on some investigation we have done in the Netherlands we propose to experiment with the 802.1x standard as that seems the most likely candidate for inter-NREN roaming since it gets a lot of industry attention and scales relatively easy.

I'm looking forward to hear your comments or better ideas.

Cheers,

Klaas

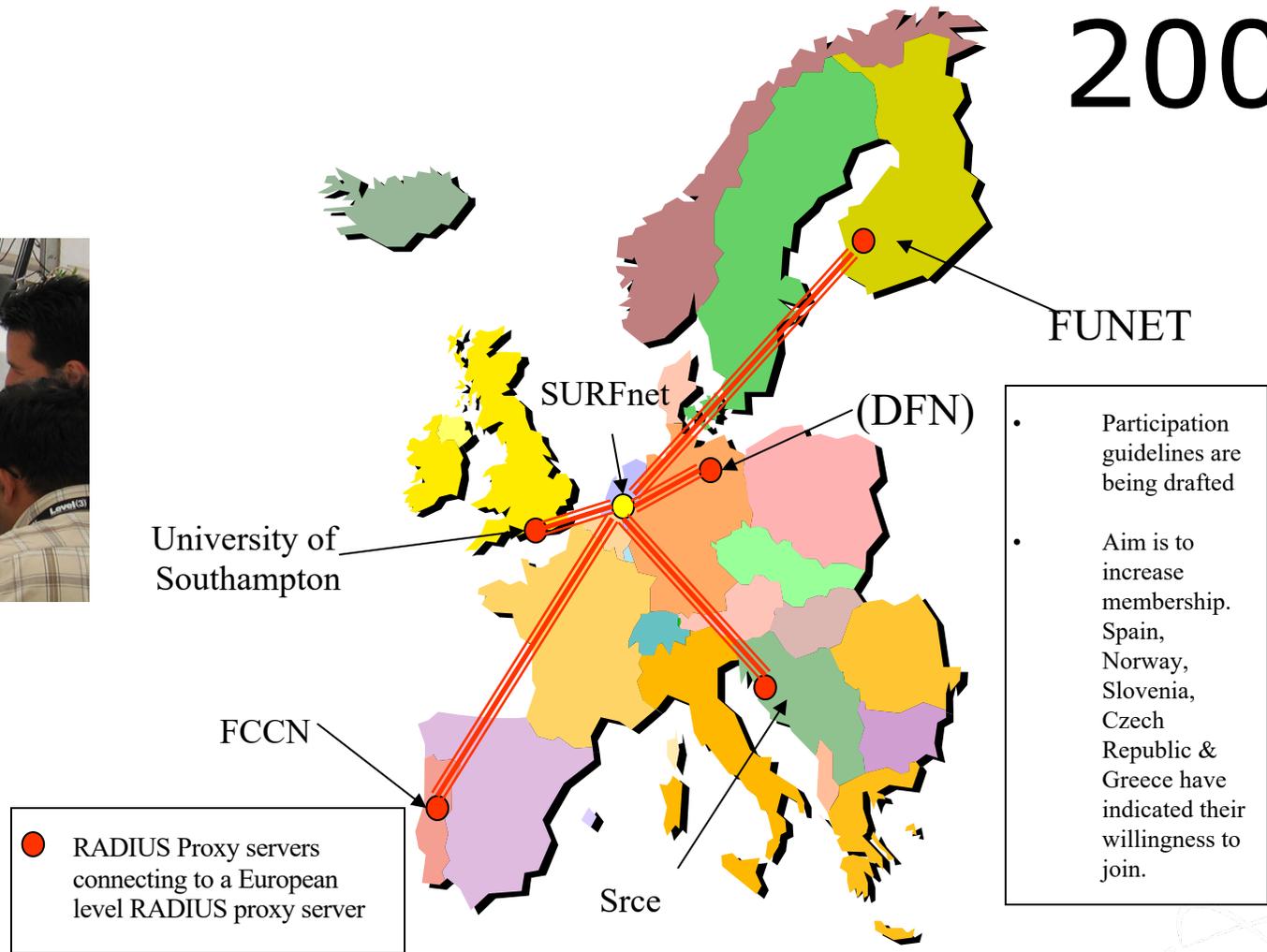
<http://www.terena.org/activities/tf-mobility/start-of-eduroam.pdf>



The European NREN Community



2004



- Participation guidelines are being drafted
- Aim is to increase membership. Spain, Norway, Slovenia, Czech Republic & Greece have indicated their willingness to join.

The global nren community



2012





eduroam-r-us



“Without trust we don’t truly collaborate; we merely coordinate or, at best, cooperate. It is trust that transforms a group of people into a team.”

Stephen Covey

2012

The screenshot shows the website tnc2012.terena.org with a navigation bar containing 'SEDE', 'New Project · GitLab', 'Not Found', 'maslov wireless carto...', 'Facebook', and 'Απόφο 58 - Τροντοίν...'. Below the navigation bar are four main sections: 'SCHEDULE', 'VENUE', 'MEDIA', and 'PARTICIPATE'. A secondary navigation bar includes 'Announcements', 'Live Video', 'Archived Video', 'Daily Impressions', 'News', 'Social', and 'Recording Contest'. A news banner reads 'Announcements | TERENA thanks Miroslav Milinović for 6 years as Vice-President for Conferences'. The 'Latest News' section features several articles:

- eduroam® celebrates a decade of providing secure roaming Internet access for users** (24/05/2012): Accompanied by a photo of a man in a t-shirt that says 'I shared my idea with the TERENA community and all I got was this lousy t-shirt and...'. The article text states: 'eduroam®, the ground-breaking secure roaming connectivity service has passed a major milestone: since its inception 10 years ago eduroam has now spread to over 50 countries globally, with more than 5,000 locations in Europe alone where researchers, students and teachers with eduroam credentials can securely access the Internet while away from their home institution. A celebration of eduroam's ten-year anniversary took place during the 2012 TERENA Networking Conference (TNC2012), with special recognition for the role of Klaas Wierenga who had the original idea for eduroam while employed at SURFnet, the Dutch National Research and Education Network (NREN) organisation. The anniversary is 30 May 2012. Secure roaming access'.
- TNC2012 closes with a coded invitation to TNC2013 in Maastricht.
- Jorge Somavilla wins the TNC2012 student poster competition.
- Postgraduate student posters are highlighted at TNC2012.
- Video reports from TNC2012.

- Global eduroam Governance committee (GeGC)
 - eduroam Compliance Statement, October 2011
- 50+ countries
 - European confederation (43 countries)
 - Australia, Canada, Japan, USA, ...
 - Asia & Pacific, Latin America, Africa, ...
- 5000+ service locations only in Europe
- cumulative stats from 20+ European countries
 - total of over 250 million successful authN (~ 6% is international)
- ETRLS servers (March 2012):
 - 3.000.000+ successful authN
 - ≈ 400.000 CSI/days (device/days)
- eduroam is ranked as 27th most widely used SSID (no. 9 in 2023)

eduroam RFC

Independent Submission
Request for Comments: 7593
Category: Informational
ISSN: 2070-1721

K. Wierenga
Cisco Systems
S. Winter
RESTENA
T. Wolniewicz
Nicolaus Copernicus University
September 2015



The eduroam Architecture for Network Roaming

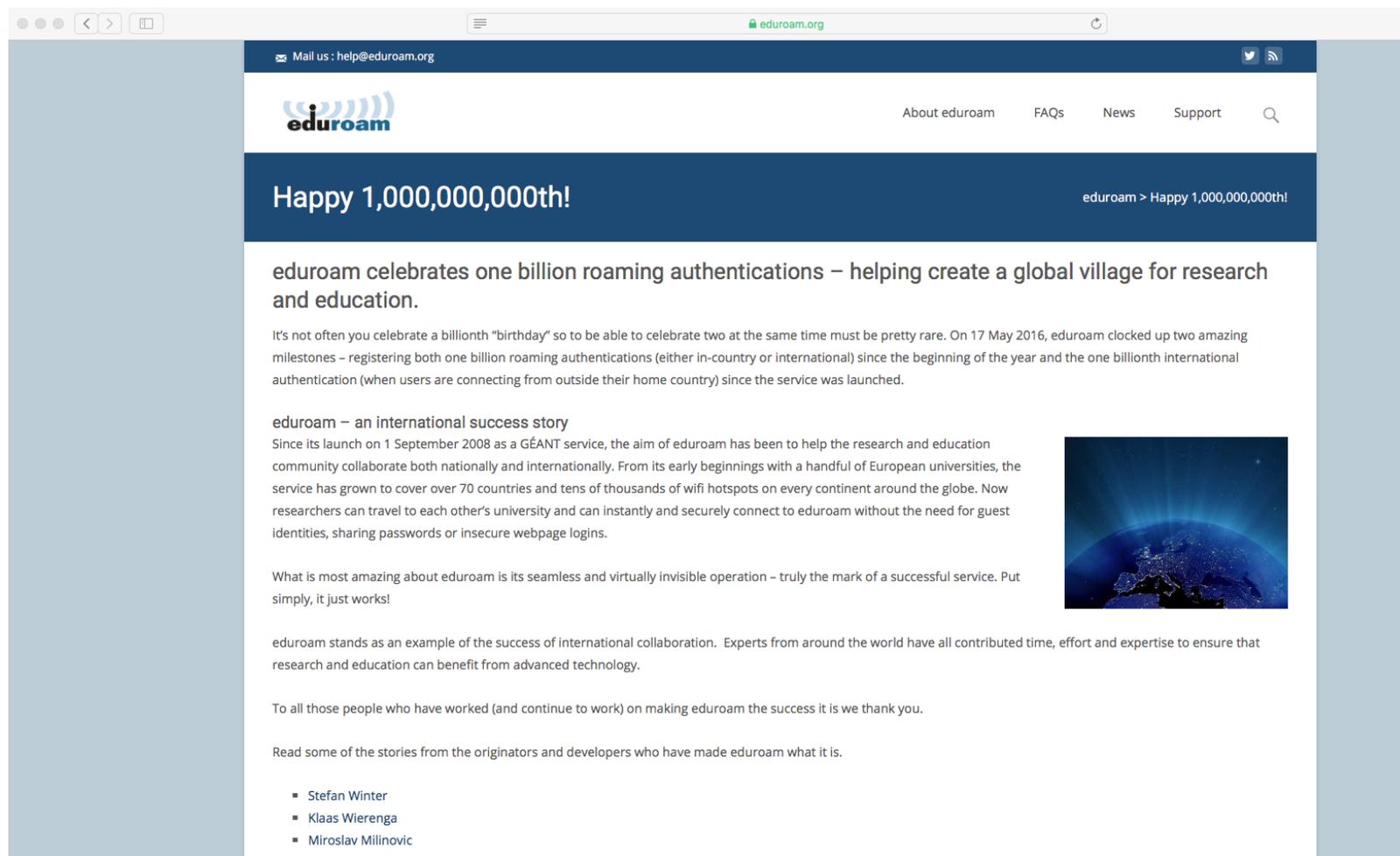
Abstract

This document describes the architecture of the eduroam service for federated (wireless) network access in academia. The combination of IEEE 802.1X, the Extensible Authentication Protocol (EAP), and RADIUS that is used in eduroam provides a secure, scalable, and deployable service for roaming network access. The successful deployment of eduroam over the last decade in the educational sector may serve as an example for other sectors, hence this document. In particular, the initial architectural choices and selection of standards are



1 Billion

2016



The screenshot shows a web browser displaying the eduroam website. The browser's address bar shows "eduroam.org". The website has a dark blue header with the eduroam logo on the left and navigation links for "About eduroam", "FAQs", "News", and "Support" on the right. Below the header, a dark blue banner reads "Happy 1,000,000,000th!" with a breadcrumb "eduroam > Happy 1,000,000,000th!". The main content area has a white background and features the following text:

eduroam celebrates one billion roaming authentications – helping create a global village for research and education.

It's not often you celebrate a billionth "birthday" so to be able to celebrate two at the same time must be pretty rare. On 17 May 2016, eduroam clocked up two amazing milestones – registering both one billion roaming authentications (either in-country or international) since the beginning of the year and the one billionth international authentication (when users are connecting from outside their home country) since the service was launched.

eduroam – an international success story

Since its launch on 1 September 2008 as a GÉANT service, the aim of eduroam has been to help the research and education community collaborate both nationally and internationally. From its early beginnings with a handful of European universities, the service has grown to cover over 70 countries and tens of thousands of wifi hotspots on every continent around the globe. Now researchers can travel to each other's university and can instantly and securely connect to eduroam without the need for guest identities, sharing passwords or insecure webpage logins.

What is most amazing about eduroam is its seamless and virtually invisible operation – truly the mark of a successful service. Put simply, it just works!

eduroam stands as an example of the success of international collaboration. Experts from around the world have all contributed time, effort and expertise to ensure that research and education can benefit from advanced technology.

To all those people who have worked (and continue to work) on making eduroam the success it is we thank you.

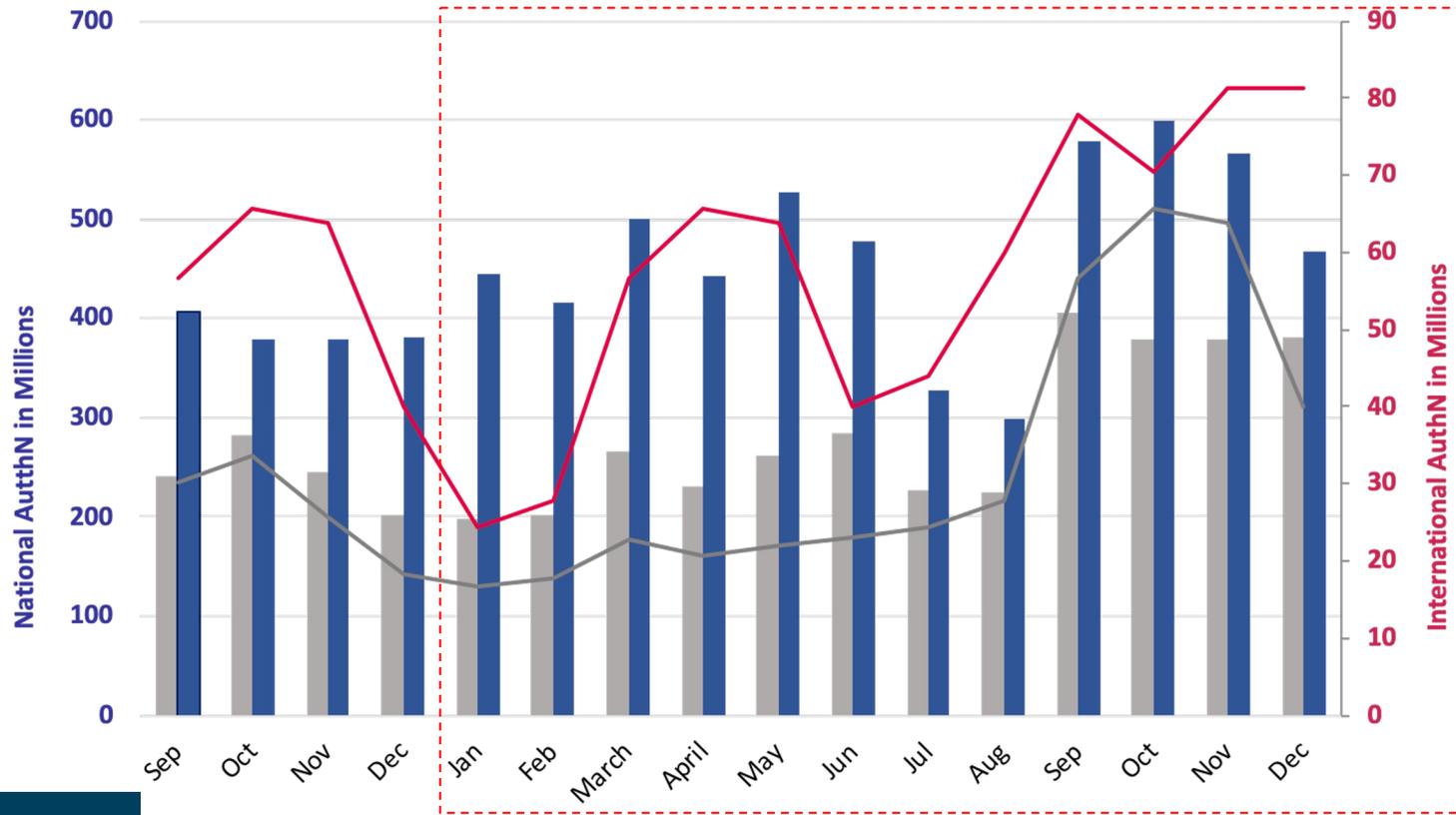
Read some of the stories from the originators and developers who have made eduroam what it is.

- Stefan Winter
- Klaas Wierenga
- Miroslav Milinovic





KPI	Baseline	Target	Measured
Number of International Authentications per year	760 M (for 2018)	10% annual increase	401 M (Jan-Dec 2021) 1,019 M (Jan-Dec 2022)



Period 3: Sep 2021-Dec 2022

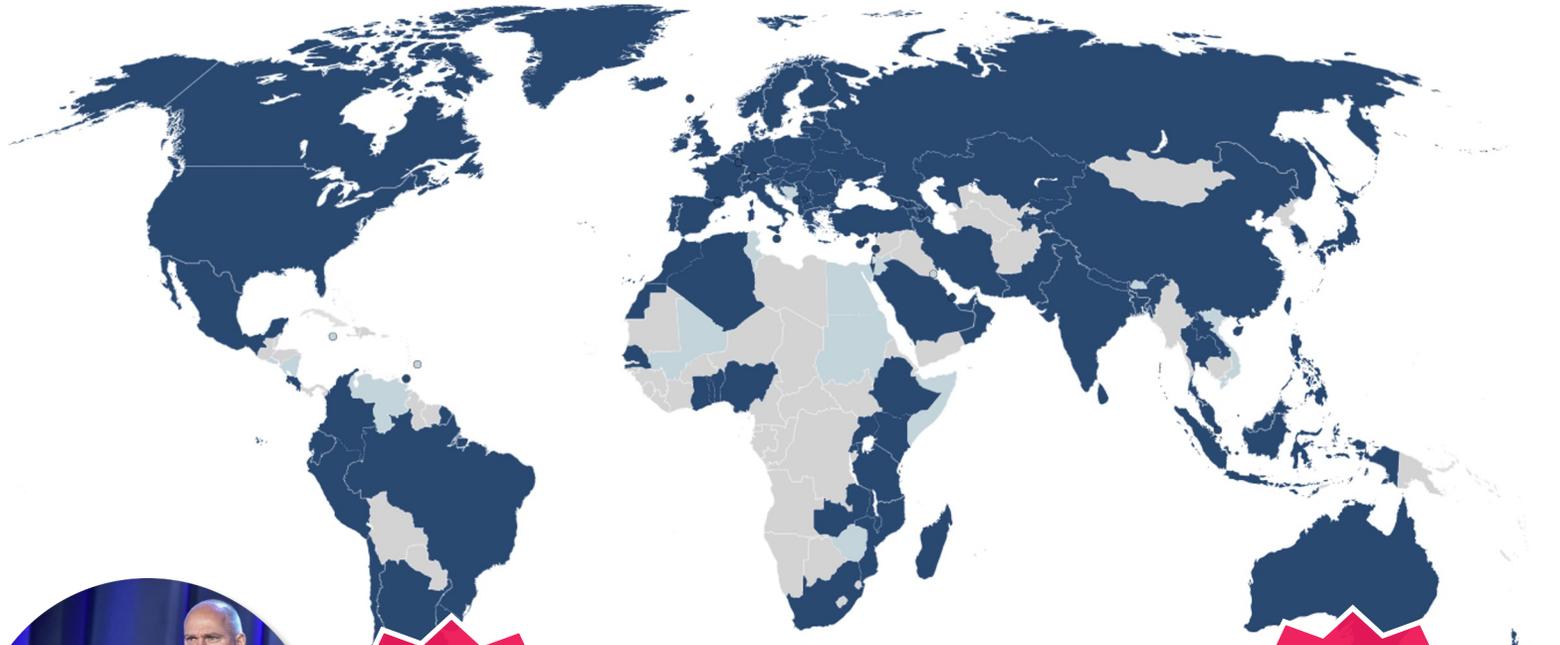
■ National AuthN 2020-2021 ■ National AuthN 2021-2022
— International Auth 2020-2021 — International Auth 2021-2022

Figures 2022



eduroam

Linking students to the global community



Internet Hall
of Fame 2019
Klaas Wierenga

>1 billion
international
authN in 2019

106
Countries

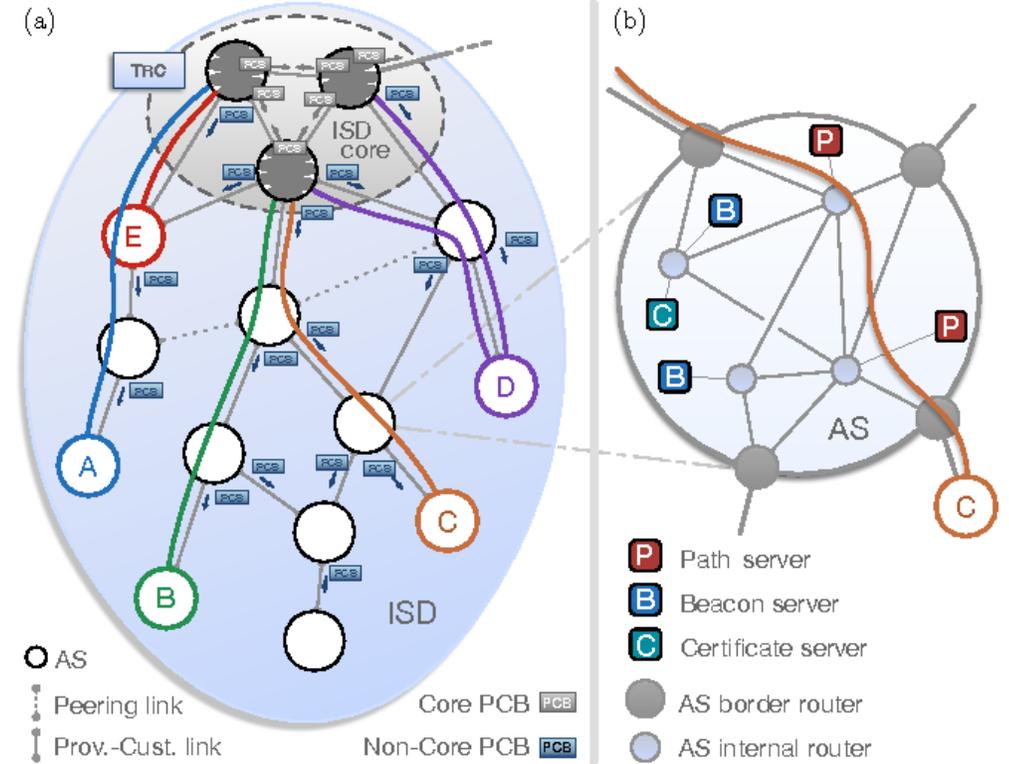
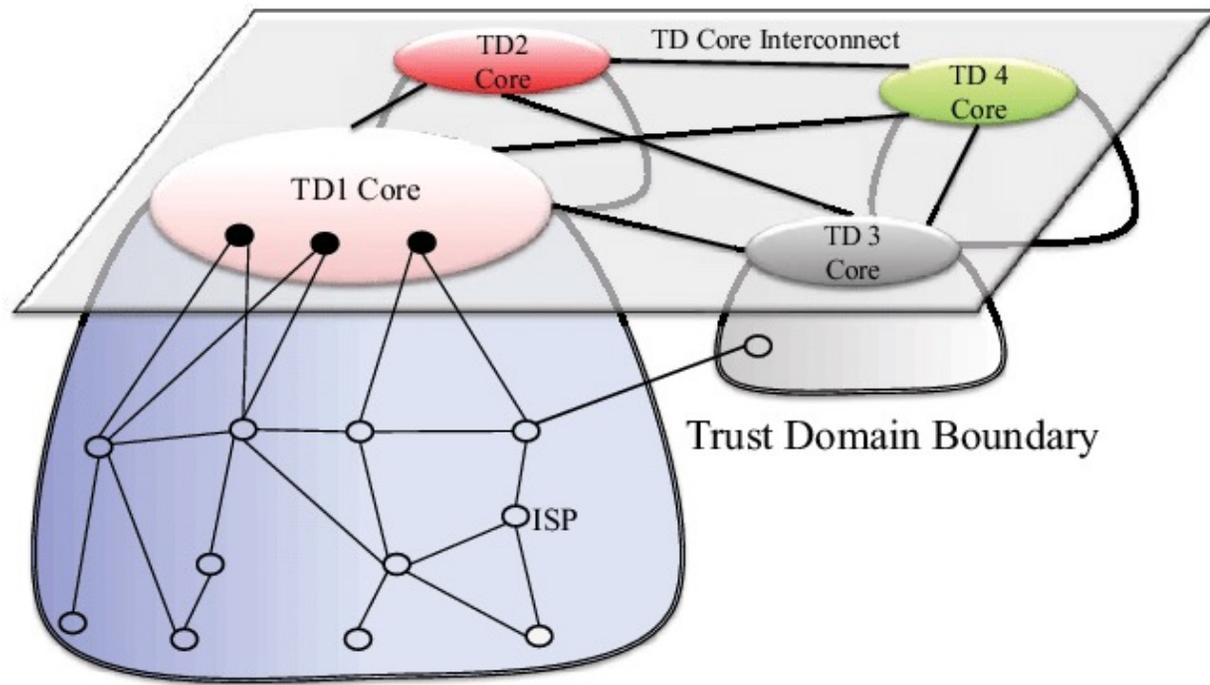
9500+
Institutions

36,000+
Service
Locations

Lessons learned

- Start simple, complicate only when necessary
- Do 1 thing, and do that well!
- Build a community of trust
- Standardise
- Get lucky!

Start simple



Do 1 thing well



Build a (global!) community



Standardise

draft-dekater-panrg-scion-overview-04

PANRG
Internet-Draft
Intended status: Informational
Expires: 10 March 2024

C. de Kater
N. Rustignoli
SCION Association
A. Perrig
ETH Zuerich
7 September 2023

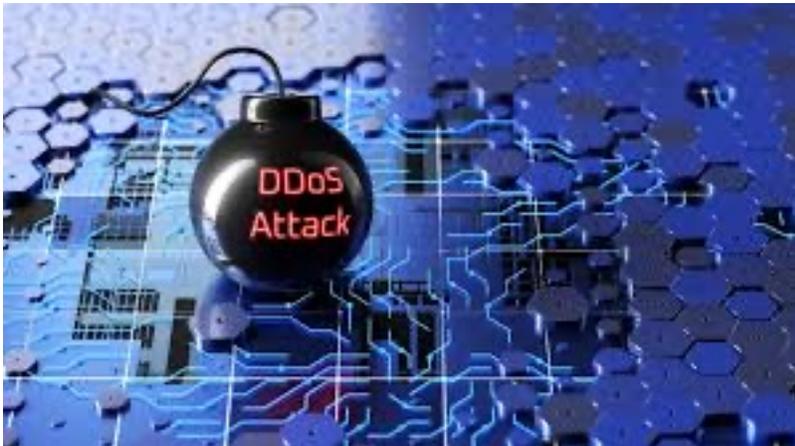
SCION Overview
draft-dekater-panrg-scion-overview-04

Abstract

The Internet has been successful beyond even the most optimistic expectations and is intertwined with many aspects of our society. But although the world-wide communication system guarantees global reachability, the Internet has not primarily been built with security and high availability in mind. The next-generation inter-network architecture SCION (Scalability, Control, and Isolation On Next-generation networks) aims to address these issues. SCION was explicitly designed from the outset to offer security and availability by default. The architecture provides route control, failure isolation, and trust information for end-to-end communication. It also enables multi-path routing between hosts.

This document discusses the motivations behind the SCION architecture and gives a high-level overview of its fundamental components, including its authentication model and the setup of the control- and data plane. A more detailed analysis of relationships and dependencies between components is available in

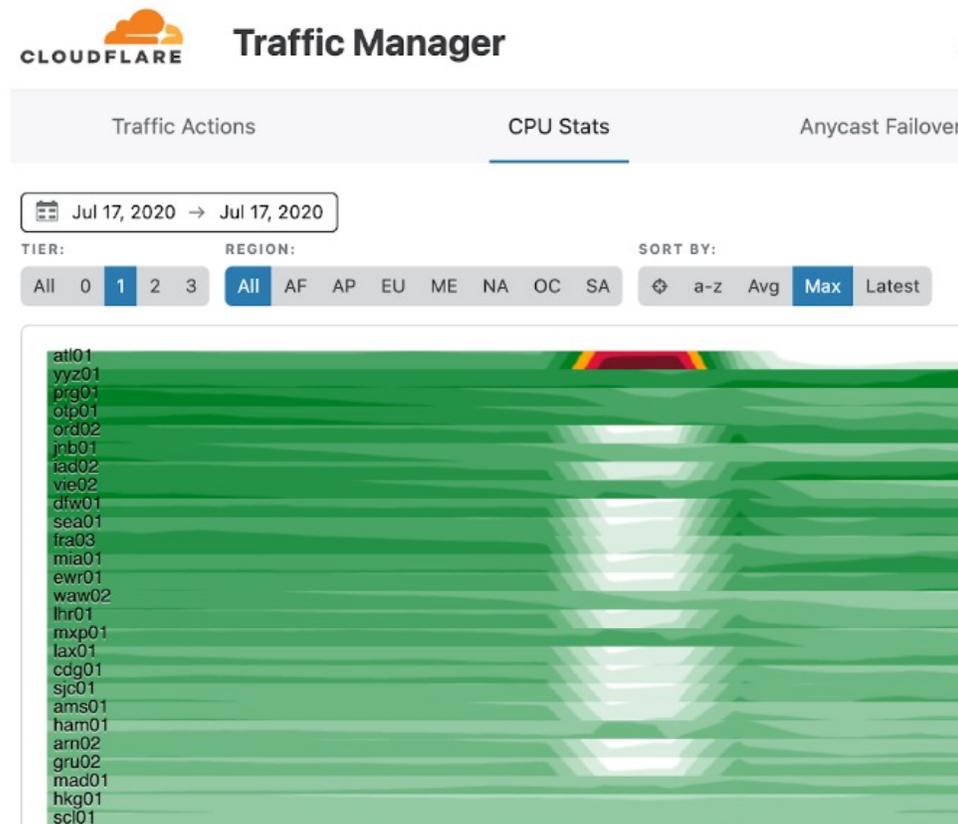
Get “lucky”



cryptocurrency services.

BGP routing security incidents in the wild

BGP routing incidents can be problematic for a range of reasons. In some cases, they simply disrupt the flow of legitimate internet traffic while in others, they can result in the misdirection of communications, posing a security risk from interception or manipulation. Routing incidents occur



Correlation \neq causation





Thank you!

May tanong?

Questions?

Вопросы?

¿Preguntas?

سوالات

კითხვები?

प्रश्न

Ebibuuzo?

Vragen?

Questões?

Maswali?

Frågor?

有問題嗎？

Domande?

Ερωτήσεις?

Fragen?

www.geant.org



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