

2STiC

Hoe ziet het Internet van de toekomst eruit?

Caspar Schutijser (SIDN Labs)
2stic.nl

SIDN TechTalk, Arnhem
15 juni 2022

SIDN is the operator of the .nl TLD

- Objective: increase society's confidence in the Internet
- Provide secure and fault-tolerant registry services for .nl
 - Anycasted DNS services with DNSSEC support
 - Registration and domain protection services
- Increase the value of the Internet in the Netherlands and elsewhere
 - Enable safe and novel uses (SIDN Fonds, IRMA)
 - Increase infrastructure security and trustworthiness (SIDN Labs)
- Not-for-profit private organization with a public role based in Arnhem



.nl = the Netherlands
17M inhabitants
6.2M domain names
3.4M DNSSEC-signed
2.5B DNS queries/day
8.6B NTP queries/day

SIDN Labs team



SIDN Labs
Maarten Wullink
Research engineer



SIDN Labs
Thymen Wabeke
Research engineer



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Moritz Müller
Research engineer



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Caspar Schutijser
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SIDN Labs
Cristian Hesselman
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SIDN Labs
Giovane Moura
Data Scientist



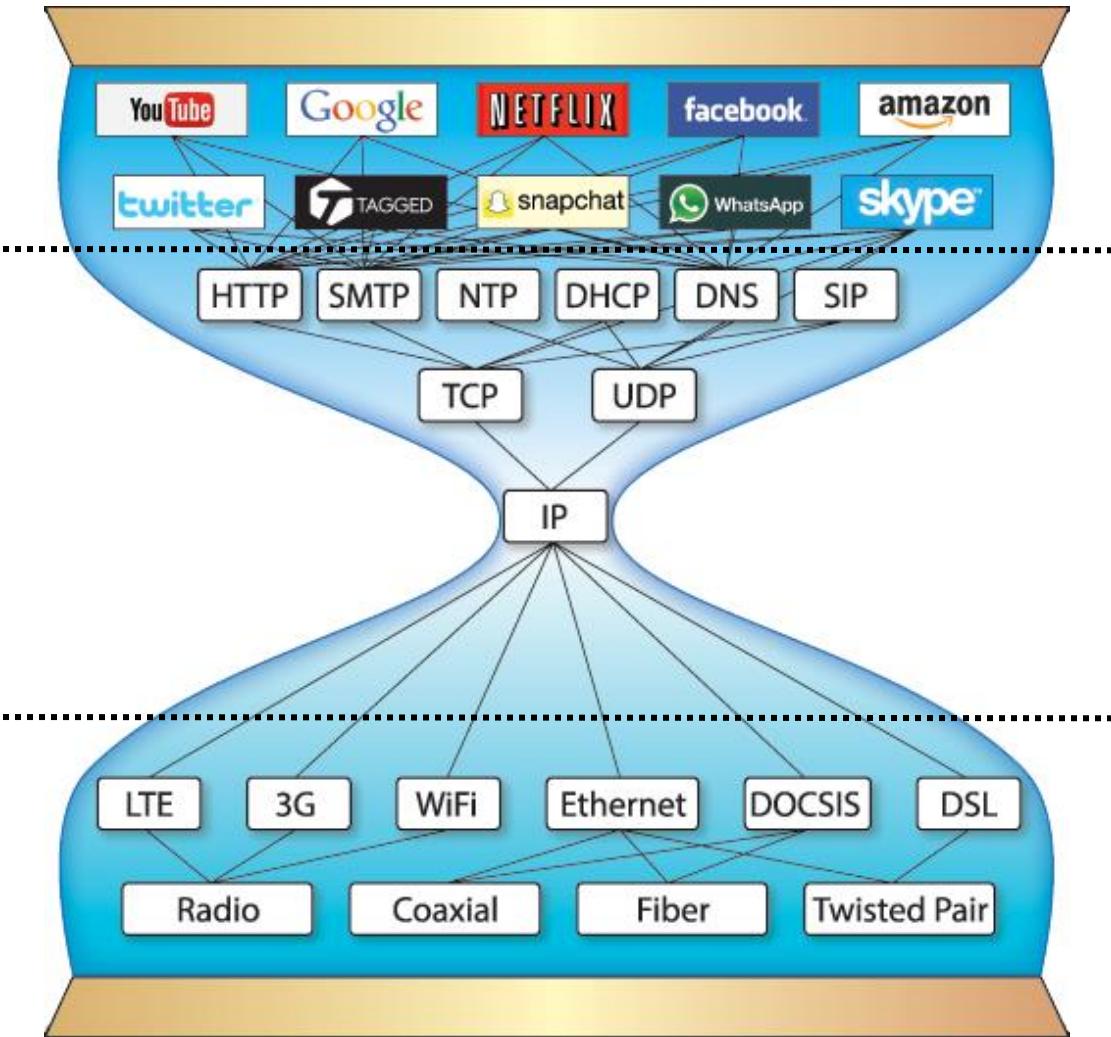
SIDN Labs
Marco Davids
Research engineer

- Technical experts, diverse in seniority and nationality
- Help SIDN teams, write open-source software, analyze large amounts of data, conduct experiments, write articles, collaborate with universities
- M.Sc students help us advance specific areas

Wat bedoelen we met "het Internet"?

Meeste
mensen

Wij



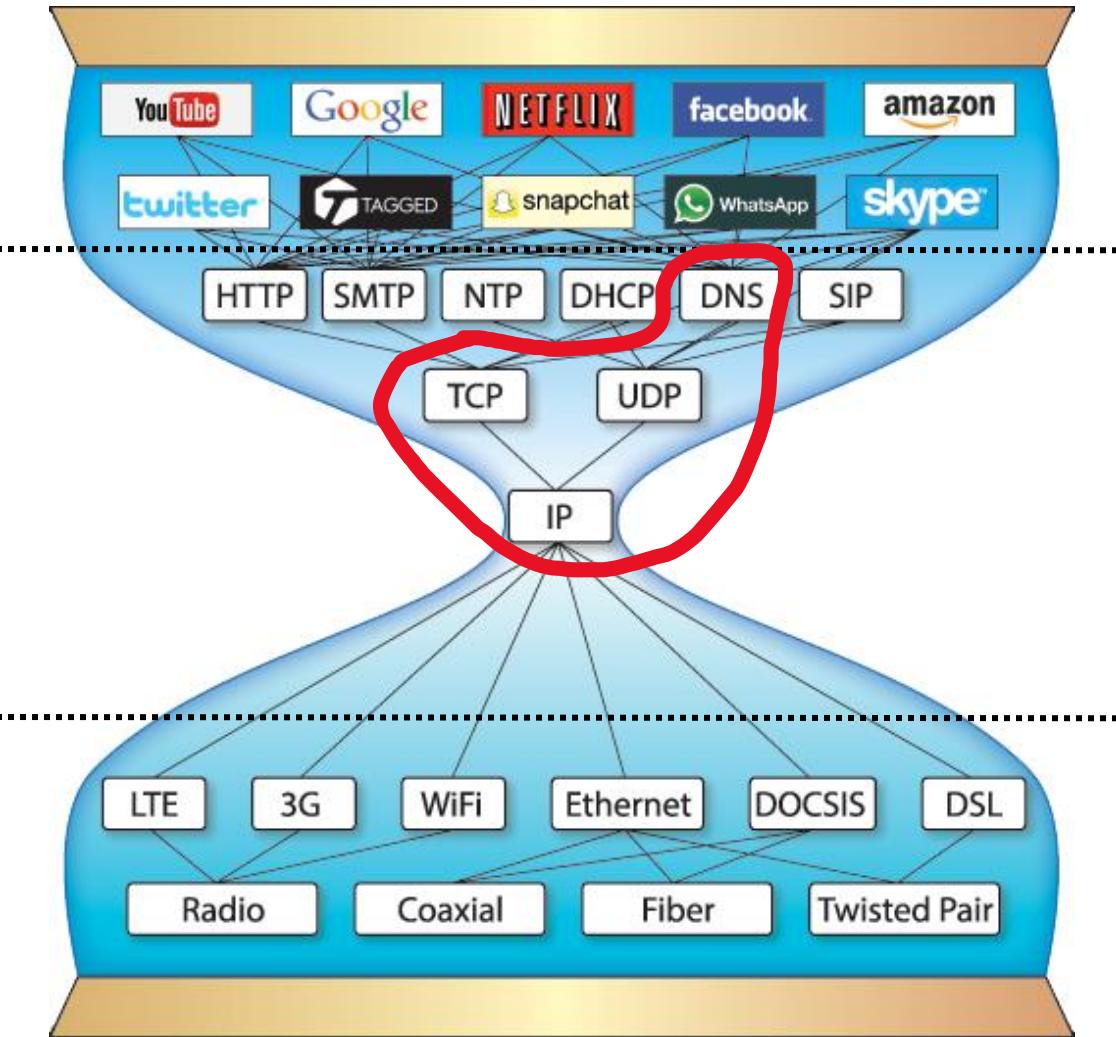
Services

Internet-
protocollen

Transmissie

Meeste
mensen

Wij



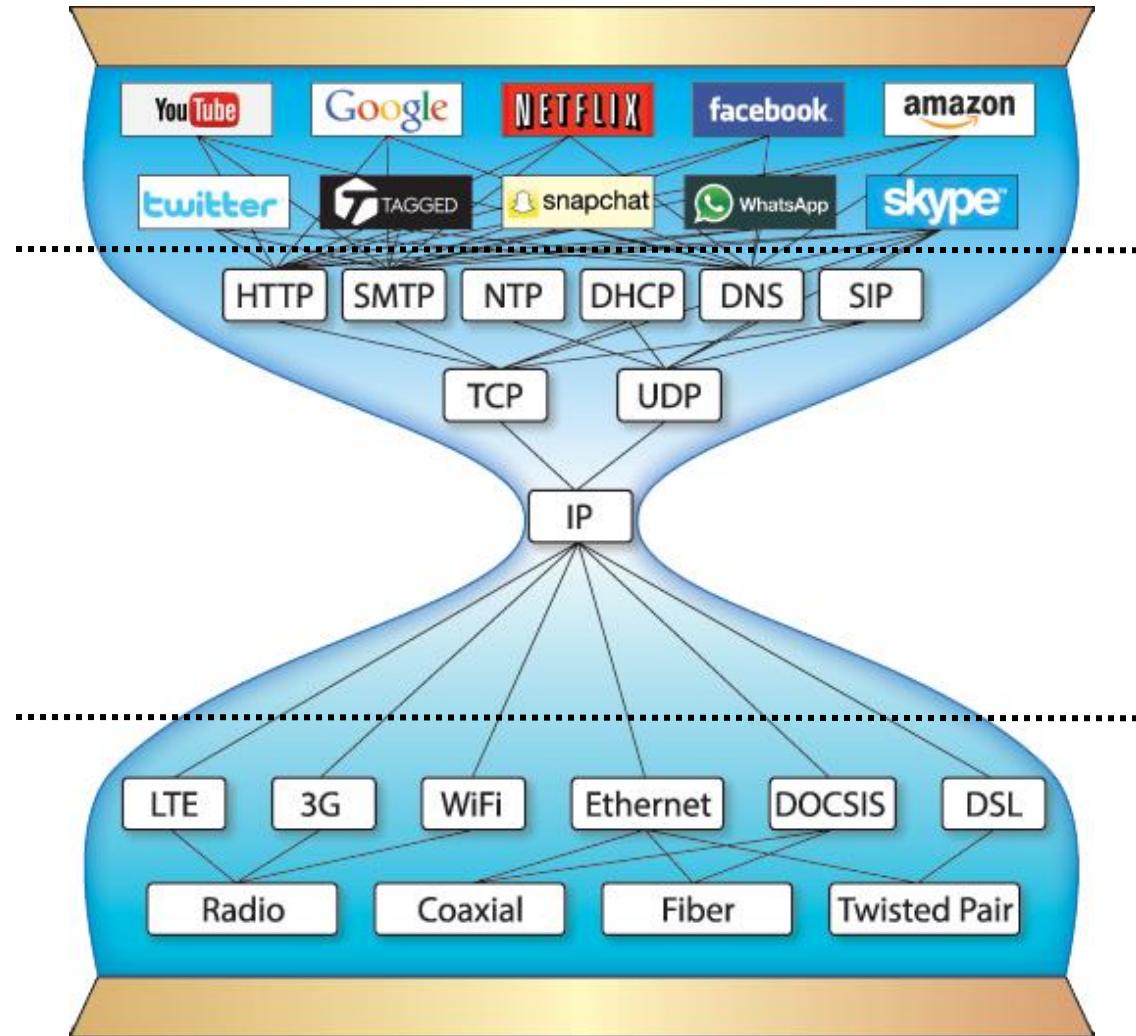
Services

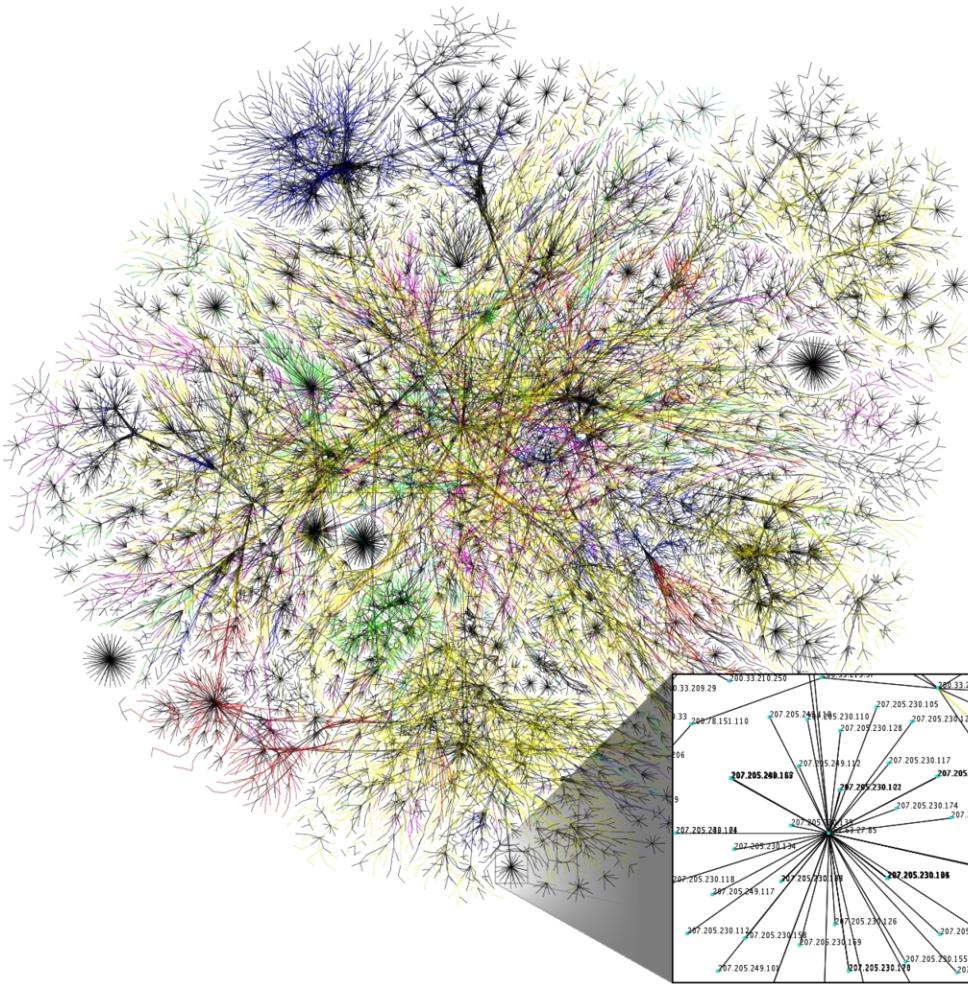
Internet-
protocollen

Transmissie

Snelheid van veranderingen

Snel





https://commons.wikimedia.org/wiki/File:Internet_map_1024_-_transparent,_inverted.png

Groot succes

Niet perfect

Het Internet wordt belangrijker

Voorbeeld: transparantie

Security, Stability and Transparency in inter-network Communication (2STiC)

Doel: Nederlandse en Europese internetgemeenschap voorop laten lopen op het gebied van veilige, stabiele en transparante inter-netwerkcommunicatie



Top-down en bottom-up

Thema's

Nieuwe internetarchitecturen

Programmeerbaar *data plane*

Responsible Internet

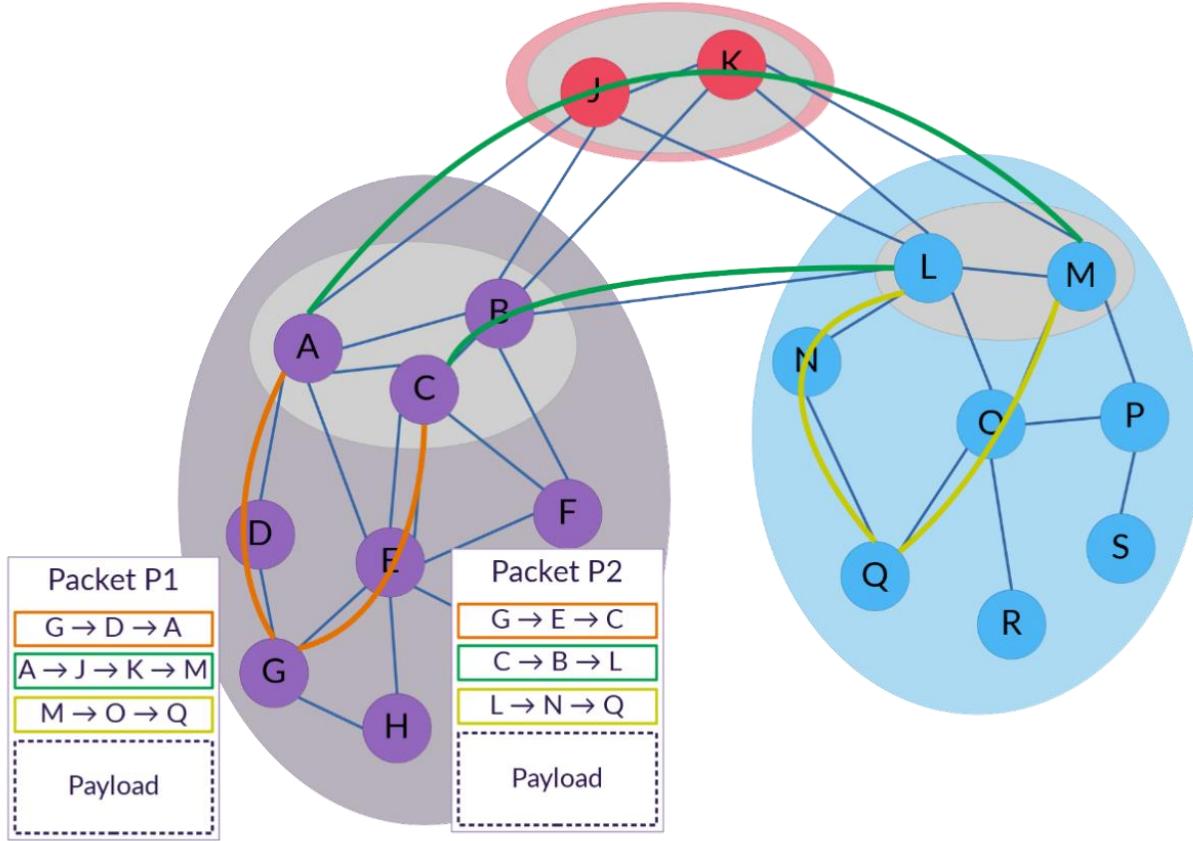
Thema's

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Programmeerbaar *data plane*

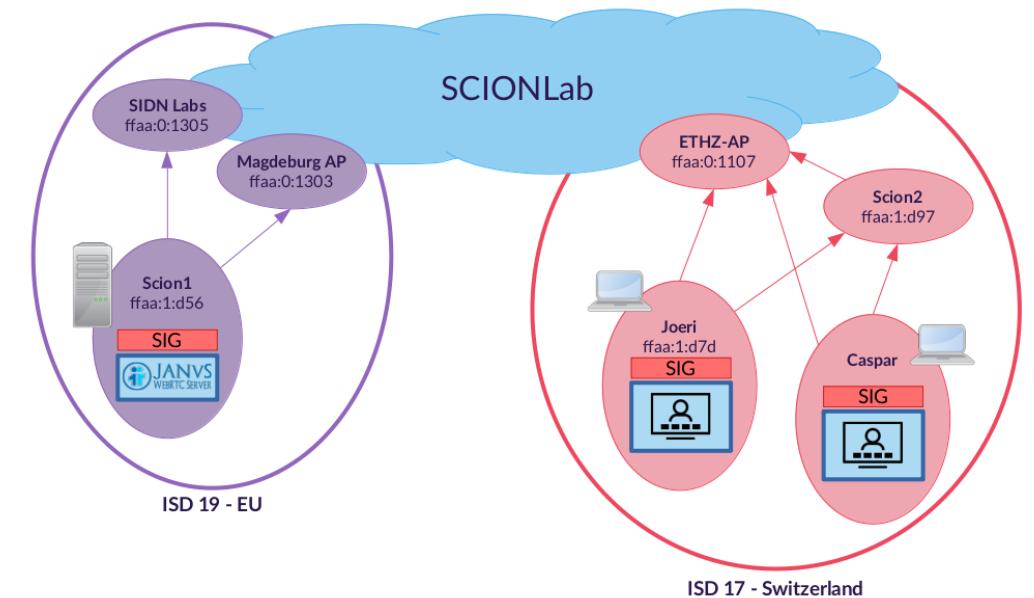
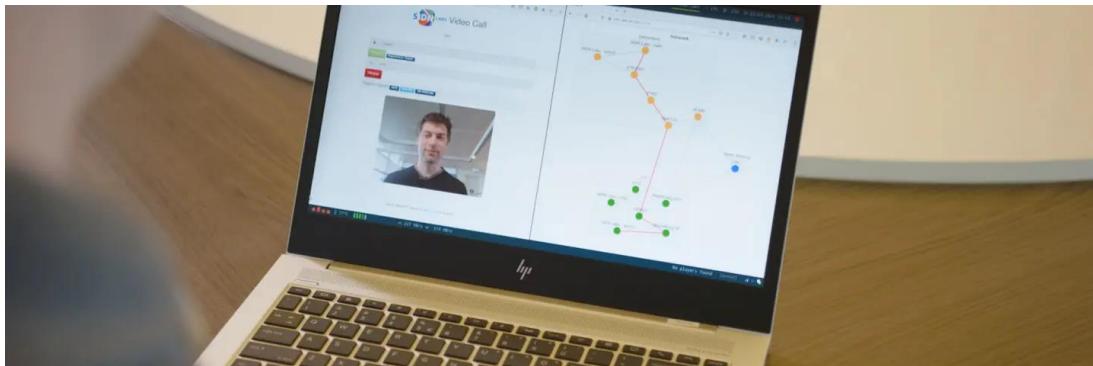
Responsible Internet

SCION



<https://www.sidnlabs.nl/nieuws-en-blogs/nieuwe-internetinfrastructuren-een-inleiding-tot-scion>

Videobeldemo



<https://www.sidnlabs.nl/nieuws-en-blogs/een-praktische-demo-met-de-nieuwe-internetarchitectuur-scion>

Thema's

Nieuwe internetarchitecturen

Programmeerbaar *data plane*

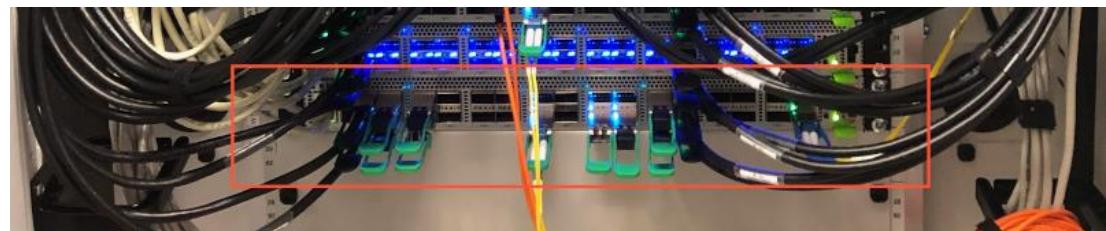
Responsible Internet

P4

“Programming Protocol-independent Packet Processors (P4) is a domain-specific language for network devices, specifying how data plane devices (switches, NICs, routers, filters, etc.) process packets.”

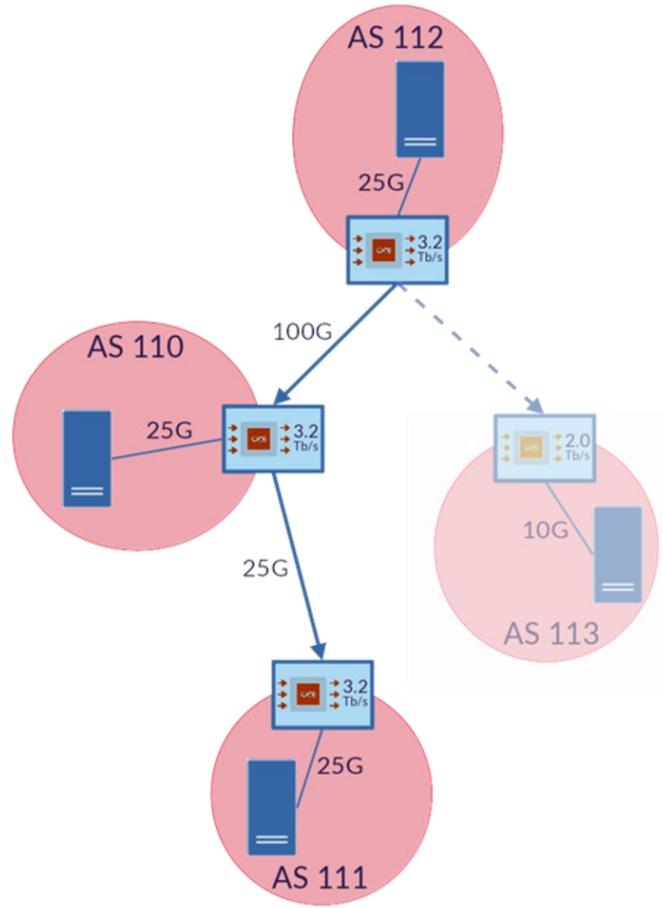
<https://www.p4.org/>

2STiC-testbed



<https://2stic.nl/testbed.html>

SCION voor Intel Tofino



<https://www.sidnlabs.nl/nieuws-en-blogs/toekomstig-internet-met-terabitsnelheden-scion-in-P4>

Thema's

Nieuwe internetarchitecturen

Programmeerbaar *data plane*

Responsible Internet

Responsible Internet

Controllability

Accountability

Transparency

Journal of Network and Systems Management
<https://doi.org/10.1007/s10922-020-09564-7>



A Responsible Internet to Increase Trust in the Digital World

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Abstract

Policy makers in regions such as Europe are increasingly concerned about the trustworthiness and sovereignty of the foundations of their digital economy, because it often depends on systems operated or manufactured elsewhere. To help curb this problem, we propose the novel notion of a responsible Internet, which provides higher degrees of trust and sovereignty for critical service providers (e.g., power grids) and all kinds of other users by improving the transparency, accountability, and controllability of the Internet at the network-level. A responsible Internet accomplishes this through two new distributed and decentralized systems. The first is the Network Inspection Plane (NIP), which enables users to request measurement-based descriptions of the chains of network operators (e.g., ISPs and DNS and cloud providers) that handle their data flows or could potentially handle them, including the relationships between them and the properties of these operators. The second is the Network Control Plane (NCP), which allows users to specify how they expect the Internet infrastructure to handle their data (e.g., in terms of the security attributes that they expect chains of network operators to have) based on the insights they gained from the NIP. We discuss research directions and starting points to realize a responsible Internet by combining three currently largely disjoint research areas: large-scale measurements (for the NIP), open source-based programmable networks (for the NCP), and policy making (POL) based on the NIP and driving the NCP. We believe that a responsible Internet is the next stage in the evolution of the Internet and that the concept is useful for clean slate Internet systems as well.

Keywords Trust · Digital sovereignty · Responsible Internet · Cybersecurity · Transparency · Accountability · Controllability

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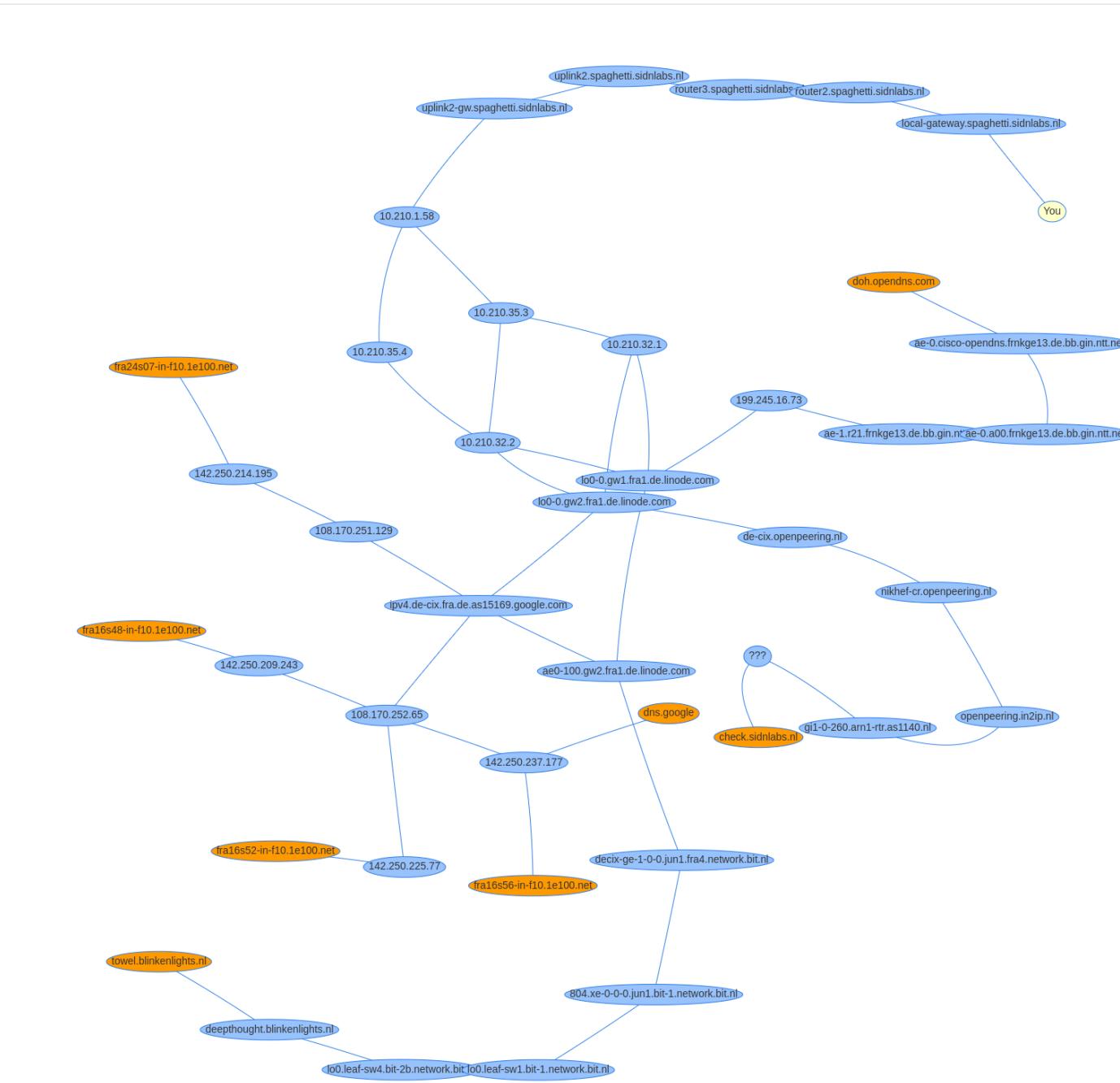
Extended author information available on the last page of the article

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<https://www.sidnlabs.nl/nieuws-en-blogs/een-responsible-internet-meer-vertrouwen-in-het-fundament-van-de-digitale-samenleving>

Pathvis



Thema's

Nieuwe internetarchitecturen

Programmeerbaar *data plane*

Responsible Internet

De toekomst?

F1



2STiC

Vragen?

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