2STiC

Looking at the future of the Internet

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The Internet

- Started as small scale experiment
  - Basic infrastructure in our society
- Not designed with current usage in mind
  - E.g., security
- Reactive approach
- New infrastructures can offer solutions
- Address issues fundamentally and pro-actively

Security, Stability and Transparency in inter-network Communication

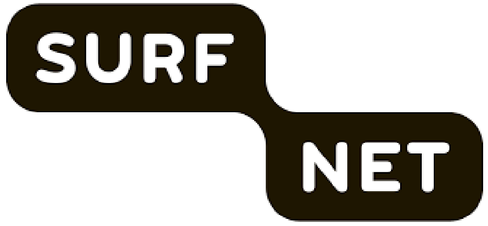
Put Dutch and European internet communities in leading position of secure, stable and transparent inter-network communication


2STiC


amsix


NLNETLABS


SDN LABS


SURF
NET


TU Delft


UNIVERSITY OF AMSTERDAM


UNIVERSITY OF TWENTE.

Motivations for 2STiC

- New applications need new security, resilience and transparency requirements
  - More interaction with physical space (e.g., transport, smart grids, drones, remote surgery)
  - We expect requirements can be met through (multiple) shared internets
- Open programmable network equipment is becoming commercially available
  - Data plane and control plane programmability
  - Eases adoption

Basic approach of 2STiC

- Experiment with and evaluate emerging internet architectures
- Societal relevant use cases and demonstrators
- Multi-domain
- Governance
- Trust
- Deployment

Open programmable networks

- Programmable network devices, such as routers and network cards
  - P4 language to program data plane
- Allows to implement and deploy new protocols
- Devices commercially available
- 2STiC testbed
  - Evaluate new internet infrastructures “in real life”
  - Network provided by SURFnet

New internet architectures

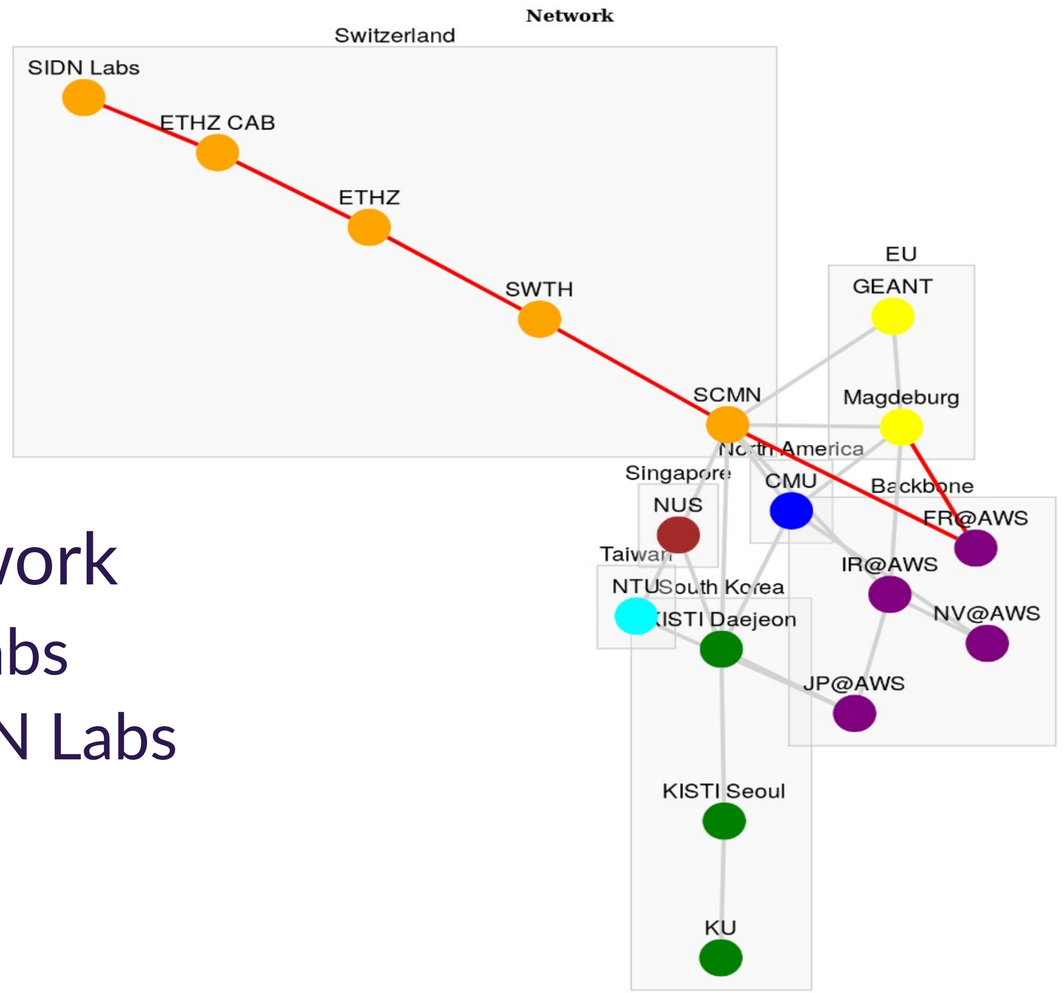
- Selection criteria:
  - Security, stability, transparency
  - Active development
  - Open source implementation
  - Operational testbed
- For example:
  - SCION
  - RINA
  - NDN

SCION

- Scalability, Control, and Isolation On Next-generation Networks
- Research at Network Security Group, ETH Zurich
- Goal: improve security of inter-domain routing and isolation of compromise

SCION activities

- Path visualisation
- SCION-IP gateway
- Anycast
- SCION in hardware
- SCIONLab: international research network
  - Permanent infrastructure node at SIDN Labs
  - Setting up BGP-free connection from SIDN Labs



SCION in hardware

- Working on hardware implementation of SCION in P4
- First in open source P4 simulator
- Currently working on implementation for switch
  - Goal to run SCION on 2STiC testbed
- Sharing experiences with SCION team

2STiC projects

- User-driven Path Verification and Control for Inter-domain Networks (UPIN)
  - Two PhD students (UvA and UTwente)
  - Most 2STiC partners involved
- Proposal: securing IoT/ICS deployments
  - Continuous attestation of trustworthiness
  - Leverage functionality introduced by emerging internet architectures
- Proposal: workshop at Lorentz Center
  - Future Internet: security, stability, transparency
  - On technical and societal mismatch between the design of the Internet and the use and expectations of the users

Applying our findings

- We are developing use cases to experiment with those technologies
  - What are interesting and relevant use cases?
  - How do they perform in practice?
  - Do they solve the corresponding problems?
- Talking to various organizations from several sectors: transport systems, health, energy suppliers, banks, government, industrial control systems
- Current ideas: ICS, home office, remote branches, mobility

Plans with RINA

- Experiment with RINA
- Investigate how RINA can be applied in use cases
- Experiment with RINA on hardware
- If possible, connect to existing testbed(s)
- Share experiences and contribute to RINA

RINA questions

- In what use cases do you think the advantages of RINA can be shown best?
  - ICS, home offices, remote branches, ...
- Can we achieve path verification and control with RINA?
- Can we achieve multi-path communication with RINA?
- What can RINA offer users in terms of transparency?

Thanks for your attention!