A G-Lab Application-to-Network Interface

G-Lab SIG FunComp

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Overview

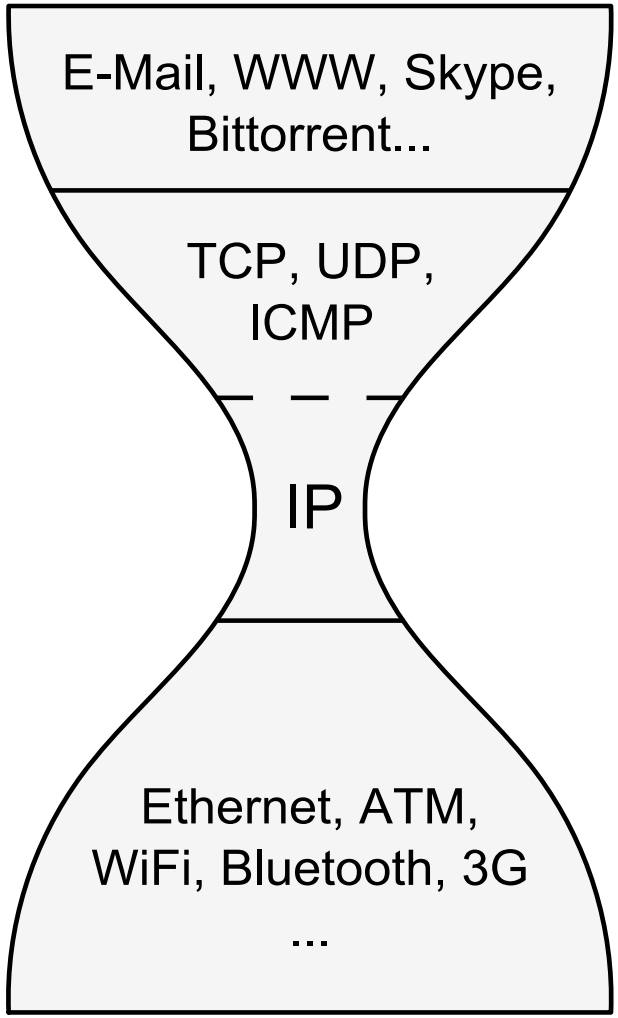
- Motivation
- Current proposals
- SIG proposal: GAPI
  - Overview
  - Interfaces
  - Requirements
  - Call sequence
- Summary and outlook

Motivation

- De-facto Internet standard
  - TCP, UDP, IP
- "New" protocols
  - SCTP, DCCP, IPv6
  - But: deployment and usage only slowly increase

IPv6: 1995
SCTP: 2000
DCCP: 2006

- Why?
  - Infrastructure and/or OS support needed
  - ***Applications need to explicitly support them!***
- How to make applications use new network or transport protocols?
  - Update code, re-compile, re-ship, re-deploy
  - Or not at all
- Thus, one reason that hinders usage of new protocols below the socket API

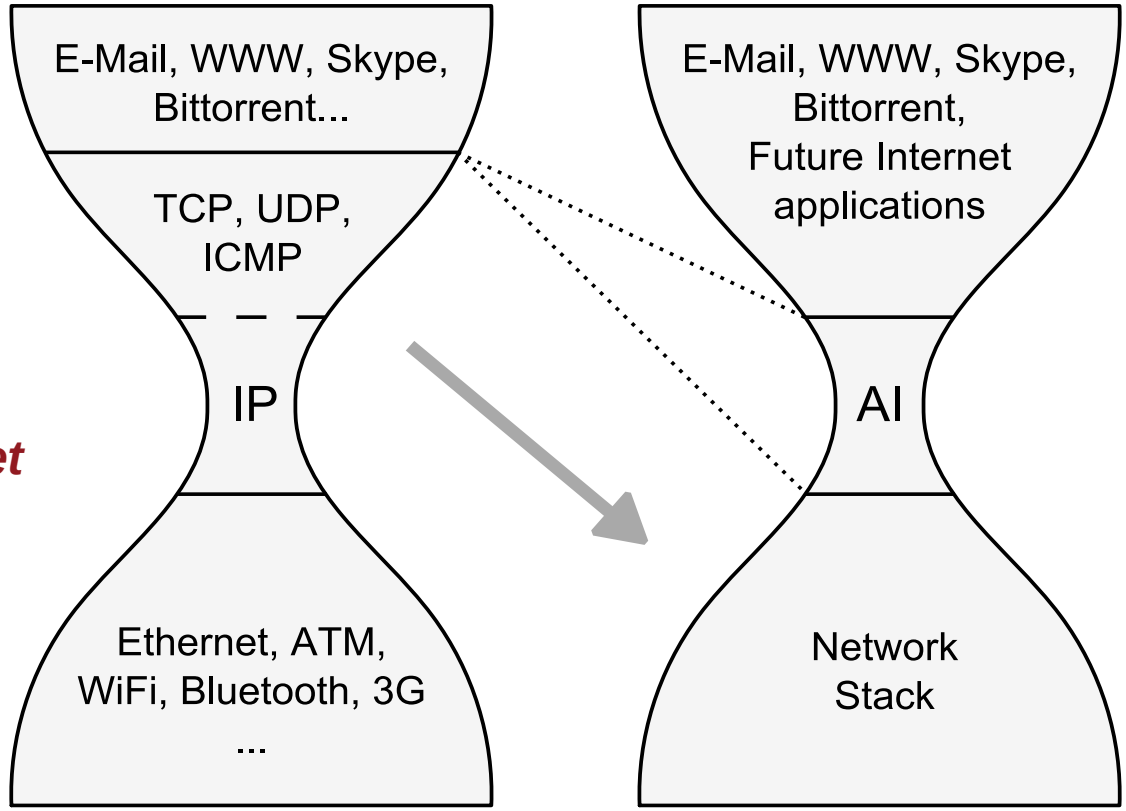


Motivation

- What to change?
  - Relief applications from address-handling
  - Relief applications from protocol selection

→ ***The API needs to become the new waist of the Internet***

At least from the application's point of view



Current Proposals

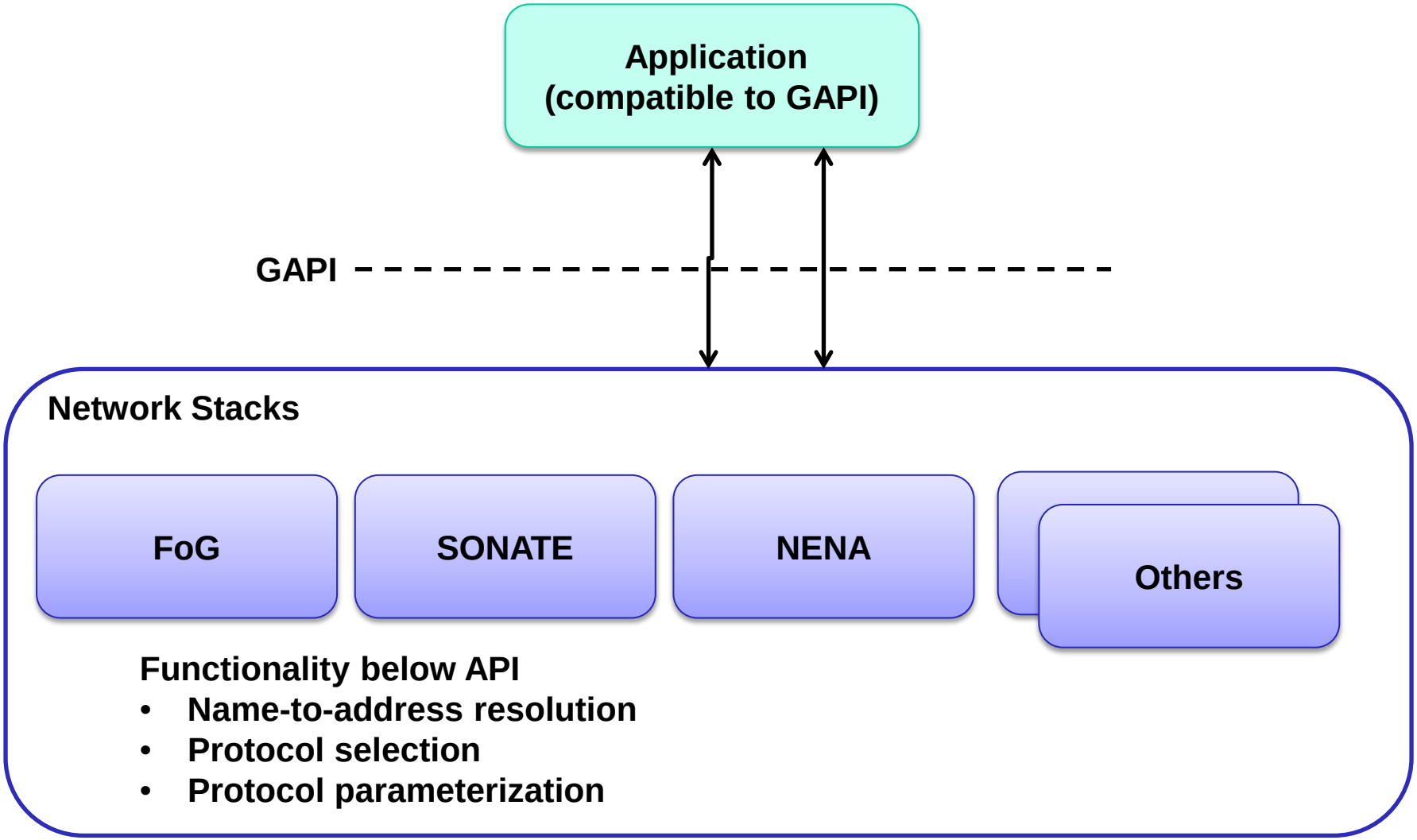
- Name-based Sockets (NBS, IRTF) [1]
  - Names instead of IP addresses
  - Service names (http, ftp, …) instead of protocol + port

- Protocol-Independent Internet Transport API [2]
  - "Generalization" of NBS (but w/o name resolution)
  - Generic services extracted from UDP, TCP, DCCP, SCTP

→ Our proposal:
  - Generalization of the above
  - QoS requirements
  - More suitable for high-level programming languages
  - Pragmatic solution for our Future Internet frameworks ☺

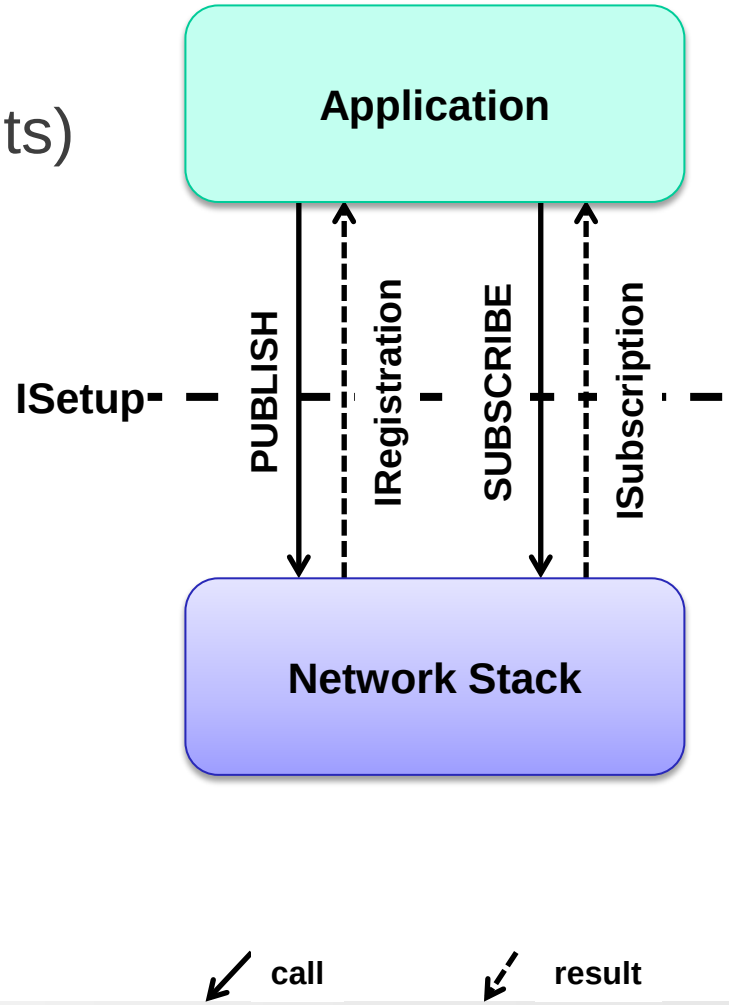
[1] J. Ubillos, M. Xu, Z. Ming, and C. Vogt, "Name-Based Sockets Architecture", Internet Draft (draft-ubillos-name-based-sockets-03), Mar. 2010.
[2] M. Welzl, S. Jörer, and S. Gjessing, "Towards a Protocol-Independent Internet Transport API", in Fourth International Workshop on the Network of the Future (FutureNet IV), 2011.

GAPI Overview



Interfaces

- ISetup
  - Publish(Name, Requirements)
  - Subscribe(Name, Requirements)
- IRegistration
  - Change requirements
  - New subscriptions
  - Cancel
- ISubscription
  - Send/Receive
  - Cancel



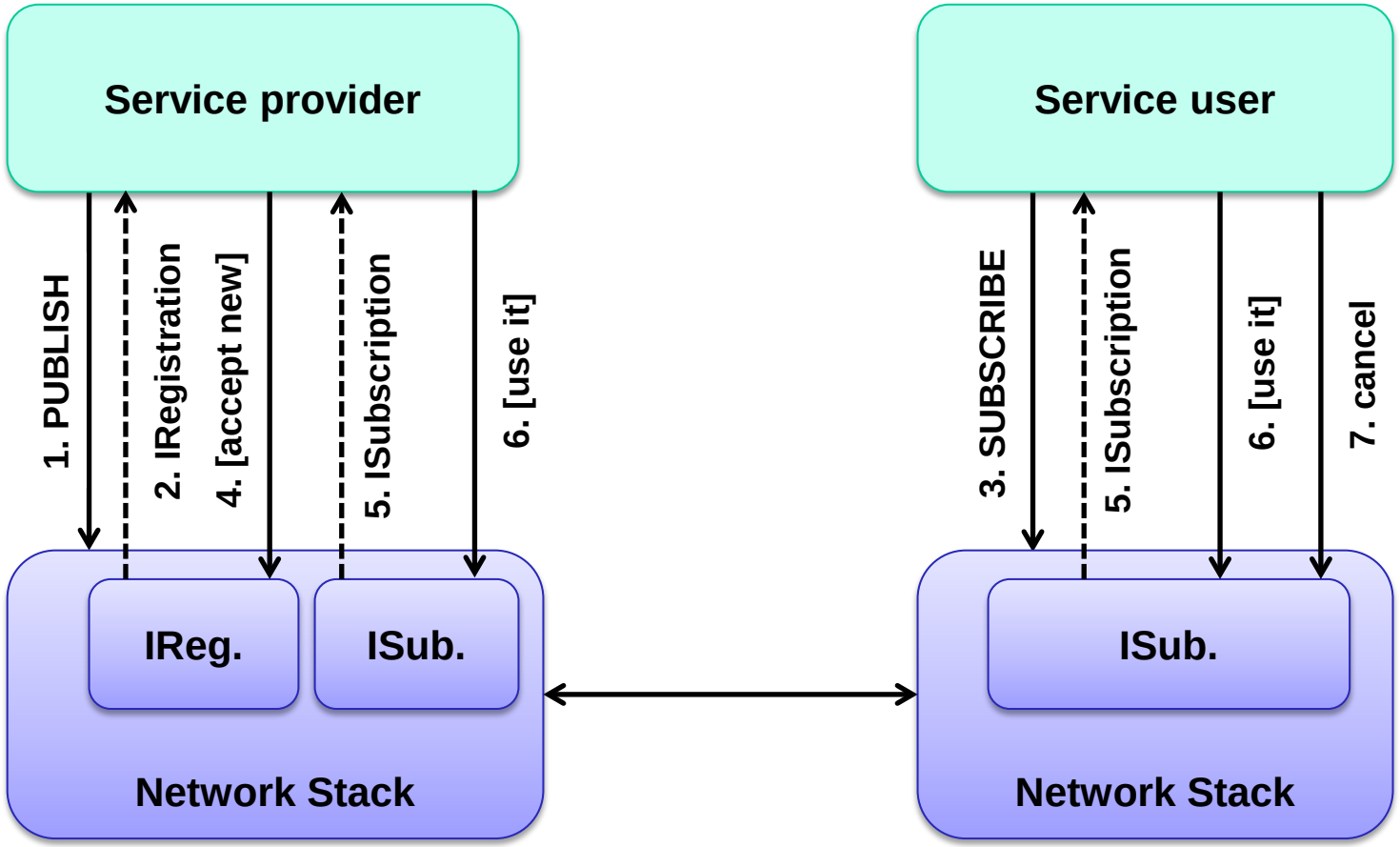
Requirements

- A requirement consists of
  - an effect — describes the visible outcome of an operation of a building block or a network such as Packet Loss and VirusScan
  - an attribute — quantify or qualify an effect such as 5% and True
  - an operator — links an effect to an attribute such as < and ==
- Examples of requirements are

Effects	Operators	Attributes
Packet Loss	<	5%
VirusScan	==	True

Call Sequence

- Simple example call sequence



Summary and Outlook

- Summary
  - Move network knowledge from app to network
  - GAPI: Requirement-based API
    - No protocol knowledge
    - No addressing
  - Requirements
    - Effect, operator, attribute
    - E.g.: Packet Loss < 5%
- Outlook
  - Implementation for our Future Internet frameworks (FoG, SONATE, NENA)
  - Gather practical experience