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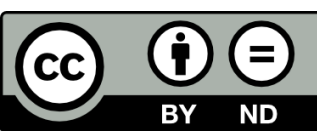


Internet Protocols  
Laboratory

# A Changing Internet in 2023

A personal view

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# What is the Internet?



**The set of  
interconnected  
networks  
running the  
Internet protocols**



The set of  
interconnected  
**networks** are communications infrastructure  
running the  
Internet protocols

that support value-added services  
and content provision



The set of  
they are **interconnected**  
to other **networks** in the sense that they  
running can exchange data  
Internet protocols but remain autonomous



The set of  
**interconnected**  
**networks** with no central authority  
running  
Internet protocols



The set of  
interconnected  
networks  
running

what are the **Internet protocols** ?

**Content**

**HTTP**

**TCP/IP**



**IETF focuses on the common infrastructure**

**HTTP** running over **TCP/IP**  
and other protocols





# Four technology shifts underway



# #1

# TCP/IP



# #1

# TCP/IPv4



# #1

Worldwide 45%

US 48%

Germany 73%

Czechia 25%

# TCP/IPv6



# HTTP

and other protocols

running over

# QUIC/IPv6

# #1



**HTTP** displaces  
the  
other protocols

**#2**



**HTTP** moves to  
delivery via **CDNs**

**#3**



# #3

**HTTP** moves to  
delivery via **CDNs**

while other on-premise services  
move to **cloud datacentres**  
centralising the infrastructure





# #3

**HTTP** moves to  
delivery via **CDNs**

while other on-premise services

move to **cloud datacentres**

centralising the infrastructure

and encouraging direct interconnection to

**hyper-giants and the death of transit**



# #4

## DNS

provided by network operators  
mapping of site names to IP, insecurely  
and accidentally provides a control point

## DoH

per application  
decoupled from operators  
secure  
and incidentally removes the control point



# these changes are invisible

for the users of the network



# what doesn't change?

Accessible infrastructure with a common protocol

Open architecture of interoperable and reusable building blocks

Decentralised management

Common global identifiers

A technology neutral general-purpose network



The protocols have evolved, but we still have a (mostly) common global infrastructure

Performance, security, and privacy have all massively improved – due to centralisation or better protocols?

The infrastructure proved flexible and secure enough to support society during COVID lockdowns – design/policy lessons?

**positives**



**Managing centralisation** – hyper-giants have too much power; barriers to entry are high

**Managing fragmentation** to increase diversity of provision without splintering the network – there is value in having common infrastructure underlying content distribution

**Balancing these with maintaining security and privacy** – hyper-giants have too much visibility into data, but interoperability requirements can introduce security challenges

# challenges



## Blockchain and Web3

Content moderation and  
taming social media

Artificial intelligence

**out of scope**

**Many significant challenges in these areas** – but largely relating to applications that use the infrastructure rather than to the infrastructure itself





# A Changing Internet

- Moving to a modern internetworking and transport, with a single general purpose service layer protocol
- Centralisation and consolidation helps performance – complex relationship to security and privacy
- Mostly common global infrastructure – wide variation in content policy