

# Outage of Facebook & Co.

Short insight into the events of the October 4th 2021



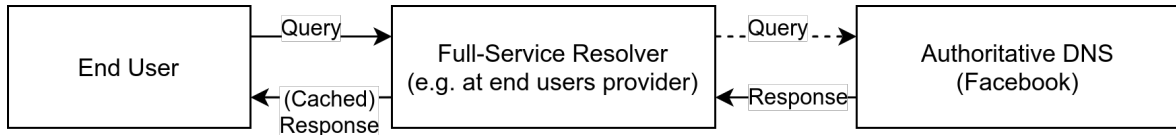
Hochschule  
Bonn-Rhein-Sieg  
University of Applied Sciences

Fachbereich  
Informatik

Lukas Schauer, Marco Roobi, Rubaiya Pranti

- Facebook and related services down for slightly under 6 hours on October 4th 2021
- DNS not reachable
- CDN mostly shut down
- Unrelated providers having issues with their network

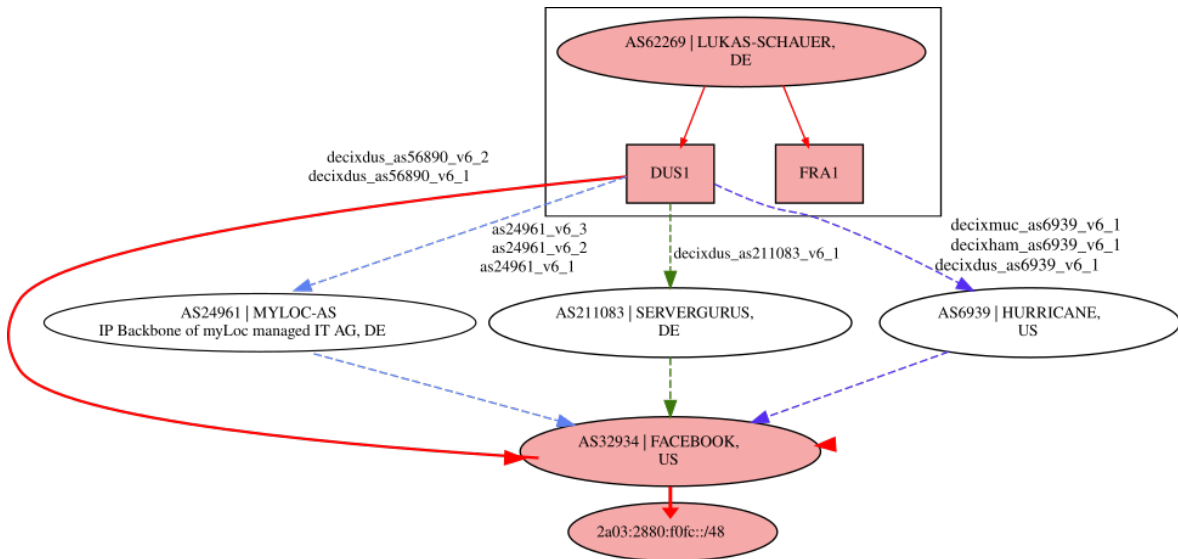
# Introduction to DNS (Domain Name System)



# Introduction to BGP: Basics of the internet

- The internet is basically a giant mesh of interconnected (autonomous) systems
- To reach other networks those AS have to peer with each other
- That can also happen over a third party

# Introduction to BGP: Route map



# Introduction to BGP: The routing protocol

- For this the most used protocol is BGP
- BGP creates a TCP session for communication
- Routes and ASNs can be announced over that session, communication can be established
- Withdrawals or disconnectes remove those routes, systems get disconnected
- If nobody is announcing a route to a system anymore it's basically globally unreachable

# Order of events to failure

- Issues in backbone network configuration
- Issue wasn't stopped because of a bug in their audit tooling
- FB DNS server health checks start failing
- FB DNS servers retract their BGP announcements
- FB CDN nodes shutting down (backends not resolving anymore)
- Facebook is now effectively down
- Various other FB services like Instagram and WhatsApp are down too
- Facebook can't access their own offices and data centers because their door access system also relied on the same DNS

# BGP announcements getting withdrawn



Ryan Landry

@ryan505

...

facebook's loss of specific bgp announcements, from @fastly's point of view (still ongoing at time of tweet). #hugops to the team over there.



Source: <https://twitter.com/ryan505/status/1445072241256013828>



# Common cause failure

- DNS relying on (redundant) backbone network for health checks
- Everything else relying on that (redundant) DNS infrastructure
- This included physical access and internal tools for investigating and resolving outages like this
- Everybody is relying on facebook's infrastructure somewhere (Chat, Advertisement, Like-Buttons, Login, Images, etc.)

# Opening doors at facebooks datacenters



**Cullen**

@cullend



Lmao. Friend at Facebook confirmed they ended up bringing in a guy with an angle grinder to get access to the server cage

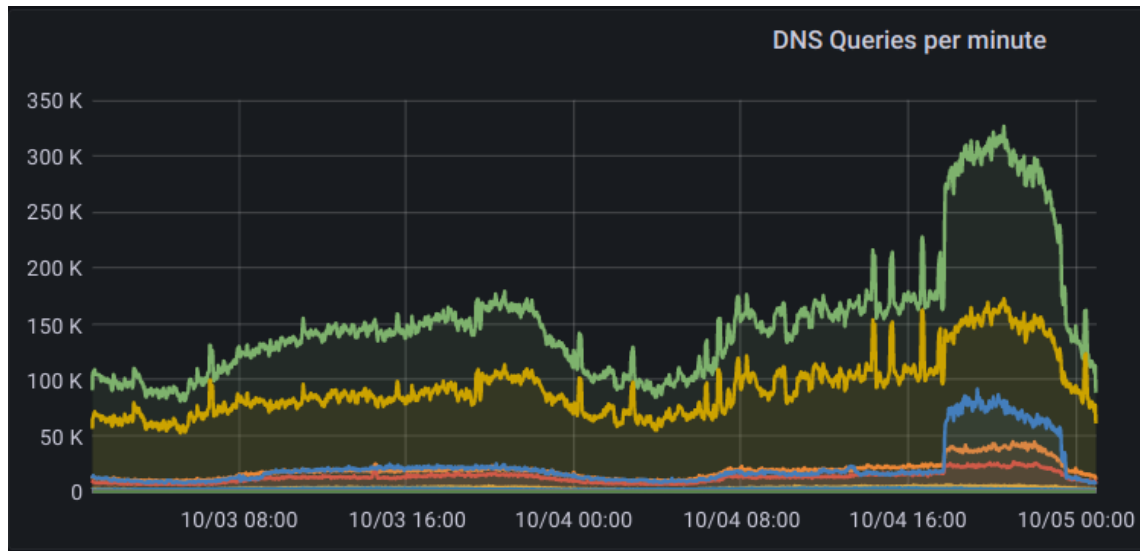
Source: <https://twitter.com/cullend/status/1445156376934862848>

- Better health checks: Systems should not fail in this way
- Backup plans and training on how to proceed in whole-network failures
- Physical access should not merely rely on network systems working correctly
- Decoupling services to not rely on a single network infrastructure (e.g. door access systems, internal tools, etc.)

# Problems in networks of unrelated providers

- High amount of DNS traffic
- Full-Service Resolvers failing under heavy load
- Low-Traffic (wireless) networks congested
- Even big players like Google had issues during this situation

# DNS traffic by example of Freifunk Munich



# It was DNS



Jen Gentleman 🌸  
@JenMsft

...

Time to reset the counter



Source: <https://twitter.com/JenMsft/status/1445065715698962442>

- Facebook started recovering after around 5 hours
- Recovery went quite slow (as intended and outlined in their writeup)

- Multiple cascading common cause failures
- Don't use Facebook, it's already way too big



- BGP view of DNS going down:  
<https://stat.ripe.net/widget/bgplay#w.resource=129.134.30.12>
- Tweet about door access: <https://twitter.com/sheeraf/status/1445099150316503057>
- Facebook: <https://engineering.fb.com/2021/10/05/networking-traffic/outage-details/>
- CloudFlare: <https://blog.cloudflare.com/october-2021-facebook-outage/>
- Major issue: Facebook is not revealing the whole story. Tweets, Reddit Posts, etc by FB-employees mostly got deleted, but third-party information is still available.