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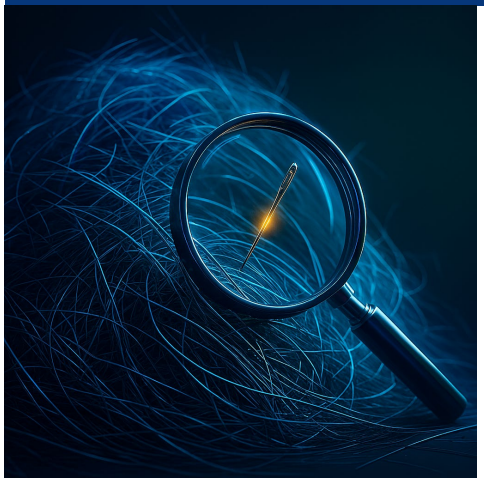
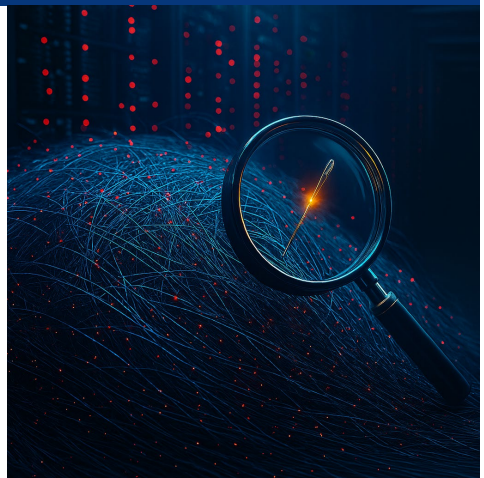
National Bureau of Investigation

IP-addresses in criminal Investigation - Finnish view

How to find the Digital needle in digital haystack

Detective Superintendent Ilmari Viro, Head of Telecommunication Unit, National Bureau of Investigation





Basis of the Investigation

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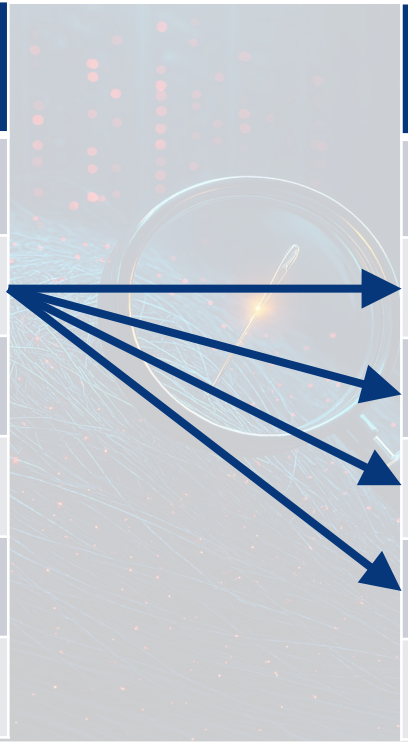
The problem in IPv4 without port number

Web service provider records	
Time	IPv4
1	Z
2	J
3	Z
3	L
5	Z

Suspect



ISP/CG-NAT subcriber database			
Time	IPv4	Port	Subcriber
1	Z	A	? Fredrik
1	Z	B	? Joakim
1	Z	C	? Magnus
1	Z	D	? Andreas
3	Z	A	Ilmari

IPv4 port number provided with the query

Suspect

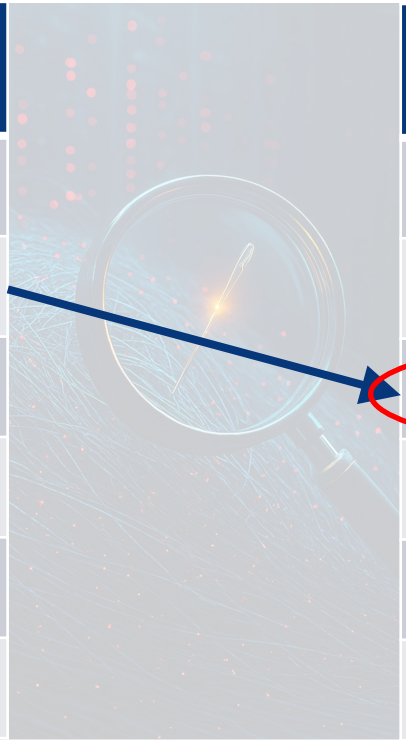
Web service provider records		
Time	IPv4	Port
1	Z	B
2	J	A
3	Z	9
3	L	8
5	Z	7

ISP/CGN subcriber database			
Time	IPv4	Port	Subcriber
1	Z	A	Fredrik
1	Z	B	Joakim
1	Z	C	Magnus
1	Z	D	Andreas
1	Z	1	Ilmari

No problem in IPv6

Suspect

Web service provider records	
Time	IPv6
1	Z:::W
2	J:::N
3	K:::O
3	L:::P
5	M:::R



ISP/CGN subcriber database		
Time	IPv6	Subcriber
1	Z:::X	Fredrik
1	Z:::W	Joakim
1	Z:::Y	Magnus
1	Z:::A	Andreas
1	Z:::1	Ilmari

Year 2012, precautions made

- Back then Finland was evaluating some Data Retention solutions and some reference implementations were seen
- Needle in Haystack – 65536 ports for one IPv4 address – need for better solution
- Meeting with all Mobile network operators in Finland
- Voluntary agreement to limit CG-NAT to absolutely minimum amount of customers behind one public IP
- Growth only step by step 8 (2012)→ 16 → 32 → 64 → 128 → 256 (2025)
- Positive recognition only if investigator can provide timestamp, port and IP – or IPv6 address

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Situation today (in Finland)

- All mobile network operators will assign IPv6 addresses
- Most public web services run also in IPv6
- All small or shady services and still run on IPv4 – need for operators to assign also IPv4 addresses
- Not all Service providers are saving port information in IPv4 services – how to enforce – DR does not apply to web services.
- Is there technical barriers to prevent CG-NAT in IPv6?
- **Indicator exists – if MNO's manage to limit reserved IPv4 allocation down from current 256 customers → then we know that IPv6 is gaining momentum → at least within our "customers".**

Anonymity vs. Lawful Access

- When adopting security BigTech and others utilizes E2EE
  - Security and responsibilities shifted to the User
  - No moderation needed
  - No need for Lawful Access team
  - Only limited access for metadata including location – growing importance for LEA's.
  - Protection of privacy is lifted from criminals by access warrant
  - Need for transparent, accountable and secure lawful access solutions
  - Technical solutions: It would be possible to target individual suspect – willingness is missing – cost of change
  - No regulation was choise to promote innovation in early days of internet – now there is need for regulation – or it will be only the playground for the strongest
  - Law Enforcement Operational Needs LEON-document

Tack