

# IoT Encounters in healthcare networks



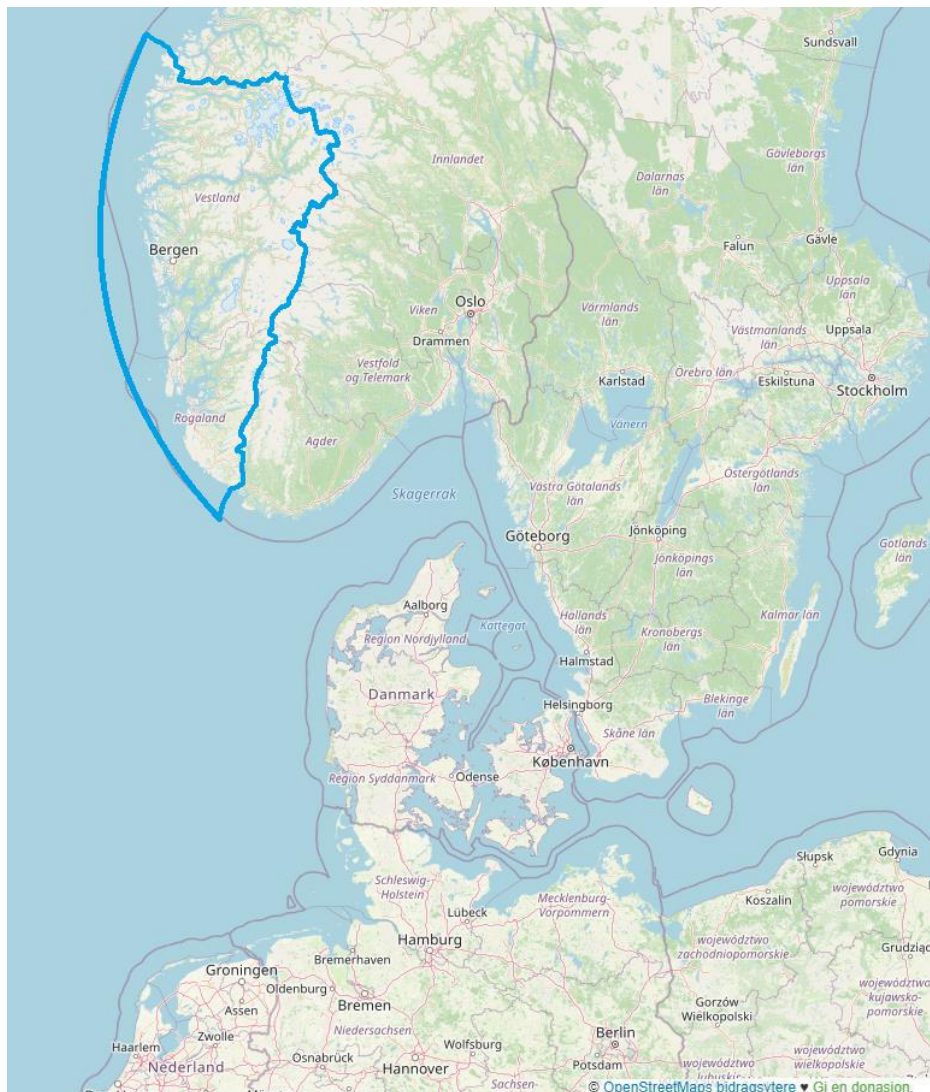
- Supplier of IT services for public healthcare trusts in west Norway
  - Helse Førde, Helse Bergen, Helse Fonna, Helse Stavanger, Apotekene Vest, encompassing about 45 hospitals in public sector
  - Also for other healthcare providers(GP's, private and non-profit healthcare institutions).
- Ca.680 employees mainly based in Førde, Bergen, Haugesund and Stavanger.
- Users/customers in around 290 locations around western Norway
- About 60K active endpoints, IoT segment fastest growing



# Computer network for Helse Vest

- Built in a modular approach for easier life cycle management
- Multiple zones(VRF), terminated in firewalls
- MPLS and Macsec in the Core(P)
- L3 distribution layer, MPLS toward core(PE)
- Access layer is L3 with VRF
- 802.1x on all new access ports, conversion of legacy is almost complete
- In house datacenters
- Estimated 1000 specialist systems
- Demanding systems, latency being the top requirement.
- Implementing SDN for future building and refurbishing projects





- Region population ca 1.1m
- Cities with regional hospitals:
  - Bergen 286 000
  - Stavanger 144 000
  - Haugesund 37 000
  - Førde 10 000



# About me

- Tommy Haga, network engineer
- Part of a networking team of 25 people
- Working in Helse Vest region for 20 years
- Same workplace but still had 3 different employers due to reorganizing
- First RIPE meeting in 2016 at RIPE72



# A quick definition of the IoT

What is my definition of the «IoT»?



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- Sensors, cameras, lab equipment, ultrasound machines etc.



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Why do we use IoT?

- Make things harder, better, faster, stronger
- (easier as well)



# IoT – What is it good for?

Are we creating more problems than we solve?

- IoT devices tend to be discussed in terms of what is broken
- Generally requires more support than other device groups such as workstation PCs



# It Depends



# The freezer that froze

- Deep freezer used to store bio samples (such as viruses)
- Connected to network for logging status
- Windows XP embedded
- Infected during Conficker outbreak
- Vendor refused installation of security patches



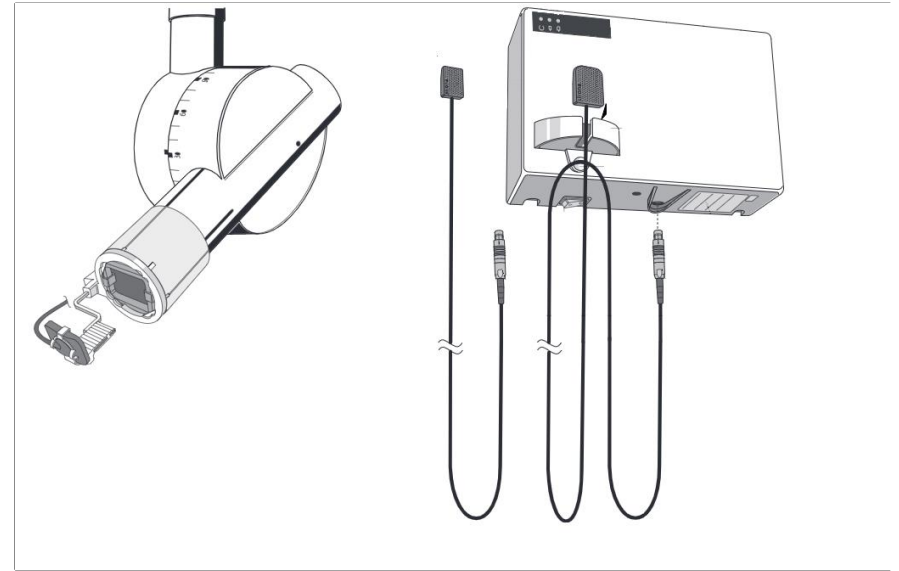
# Lazy uniform dispensers

- Provides staff with uniforms (scrubs)
- Windows NT
- Infected during Conficker outbreak
- Vendor refused installation of security patches citing it would break the system



# «Unique» x-ray machines

- Digital imaging units for dentist offices
- Connects to the network for transferring images
- First generations of each device batch had different speed/duplex
- Vendor have since standardized on auto negotiate NICs



# «Classy» Lab instrument

- Used to analyze various samples
- Connected to the network to forward results digitally
- Uses classful IP addressing
- No support for IP gateway



# Chicken & egg utilities meter

- Device belonging to utility company, measuring heat consumption
- Connected to network for reporting usage data
- Static IP setup, replies only to packets addressed to device
- Authentication requires meter to send data first





# What else?

- Devices/systems that support, speed/duplex negotiation, DHCP, and DNS work out of the box
- Certain vendors of cameras, phones, conferencing, clocks, payment terminals and even building automation have managed this well



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**No.**



# IoT – What is it good for?

Are we creating more problems than we solve?

**No.** If we...

- Not only focus on a device's core function when purchasing
- The device operator is somewhat aware of the requirements
- State clear (network) requirements to vendors
- Account for extended device life cycles
- Have law or standard mandated measures?



# Examples for measures

- Internal document for requirements of end devices
  - Built on experience from earlier purchases and troubleshooting devices
  - Specific for Helse Vest
- Ipv6 requirements by [law](#)
  - Applies for all public organizations
  - Helse Vest to reference RIPE-772 with new purchases

## Krav til infrastruktur

Id	Navn	Viktig
10	<p>IP-krav for</p> <p>Alle IP-krav for alle nye kjøpte utrustninger i Helse Vest er basert på følgende krav:</p> <p>IP-krav for alle kjøpte utrustninger i Helse Vest er basert på følgende krav:</p> <ul style="list-style-type: none"><li>• Ipv4 og Ipv6</li><li>• Ipv6 krav etter RIPE-772</li><li>• Ipv6 krav etter RIPE-772</li><li>• Ipv6 krav etter RIPE-772</li><li>• Ipv6 krav etter RIPE-772</li></ul>	A
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### § 12. Obligatoriske grunnleggende nettverksstandarder

Offentlige virksomheter skal sette krav til støtte av både IPv4 og IPv6 i alt nytt nettverksutstyr og all IP-avhengig programvare som anskaffes.

Offentlige virksomheter skal gjøre alle nye og eksisterende, eksternt publiserte tjenester tilgjengelig både på IPv4 og IPv6, med unntak av peer to peer kommunikasjon mellom offentlige virksomheter, der man kan legge om på best egnet tidspunkt.

Alle interne klienter i offentlige virksomheter skal ha tilsvarende tilgang til eksterne tjenester publisert på IPv4 og IPv6.

Nye interne nett og løsninger i offentlige virksomheter skal ha støtte for IPv6. Det er tillatt å støtte IPv4 i tillegg.

0 Tilføyd ved [forskrift 16 okt 2020 nr. 2063](#), endret ved forskrift [8 okt 2021 nr. 2953](#) (tidligere § 11).



Questions ?

