

oueees-202206 topic 06:  
Wireless/radio and internet  
Information warfare and radio  
surveillance

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On the internet

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# Lecture notes and reporting

- <https://github.com/jj1bdx/oueees-202206-public/>
- Check out the README.md file and the issues!
- Keyword at the end of the talk
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# Wireless/radio and internet





Direct wired network at the maximum extent  
This is the old Stockholm telephone tower in 1890 (see Topic 02)



# Lessons learned: wired networks do not necessarily scale well

- Difficult to install, often impossible
- Easily get cut/disconnected by accidents
- Difficult to reconfigure/rewire
- Individual link management is complex and often erratically done

# Remove the wire!



# Wireless/radio networks as a replacement of wired networks

# Limitations of radio networks by physics

- Speed limited by radio frequency bandwidth
- Latency increased by (de)modulation and packetization
- Excessively large error rate due to obstacles (burst errors), fading, interference, and etc.: *Error-correction encoding required*
- Radiation spillover causes content disclosure: *encryption required*
- The source of interference is immensely difficult to locate
- Still requires a lot of wiring to the base stations





# Advantages of radio networks: Mobility

- Providing connections to where no wires can connect
- Nodes can move around while maintaining the connectivity



# Implementation issues to overcome for 5G era:

## Low channel capacity and short reachability

- Trade-off between frequency bandwidth, reachable range, and base station installation
- Massive interference between nodes and networks
- Latency issues due to (de)modulation will persistently remain

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