



Statens vegvesen
Norwegian Public Roads
Administration



ITS og signalregulering

ITS and Traffic Signal Control

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Statens vegvesen Region midt



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ITS and Traffic Signal Control



Who thinks that Traffic Signal Control = ITS?

ITS and Traffic Signal Control

- Traffic signal control was one of the first areas to utilize mainframe computers.





Forenklet kapasitetsberegning

- Kombinasjon av faser og beregning av kapasitet

Ved bruk av den forenklete metoden er kapasiteten i formelen bare avhengig av antall faser i signalanlegget.

$$\text{Belastningsgrad} = \frac{\text{dimensjonerende trafikkbelastning}}{\text{kryssets kapasitet}}$$

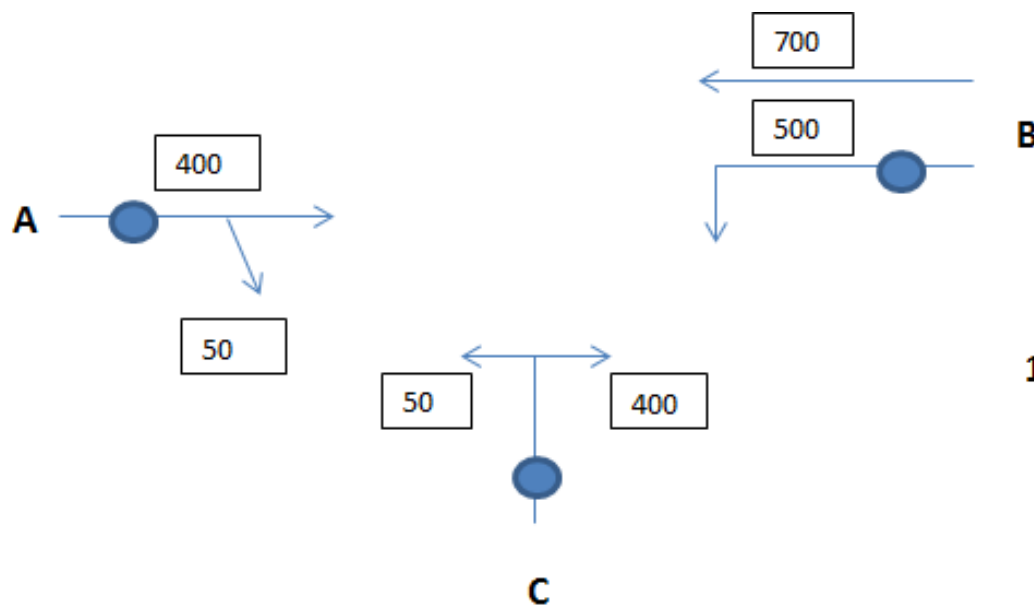
Kryssets kapasitet med hensyn til dimensjonerende belastning settes til 1800 pbe/t minus 100 pbe/t pr. faseveksling i omløpet.

Forskjellene mellom ulike alternativer fremkommer ved at trafikkbelastningen i krysset fordeles på ulike antall felt og faser

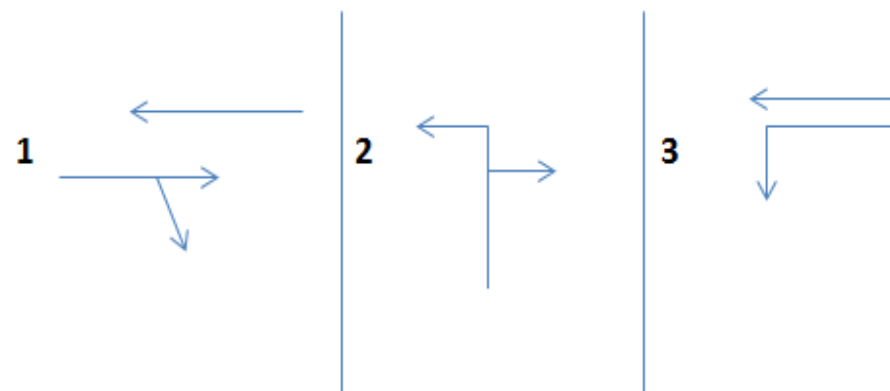


Forenklet kapasitetsberegning

Uten venstresvingefelt fra C



Faseplan uten venstresvingefelt fra C



Dimensjonerende belastning
 $450 + 450 + 500 = 1400$

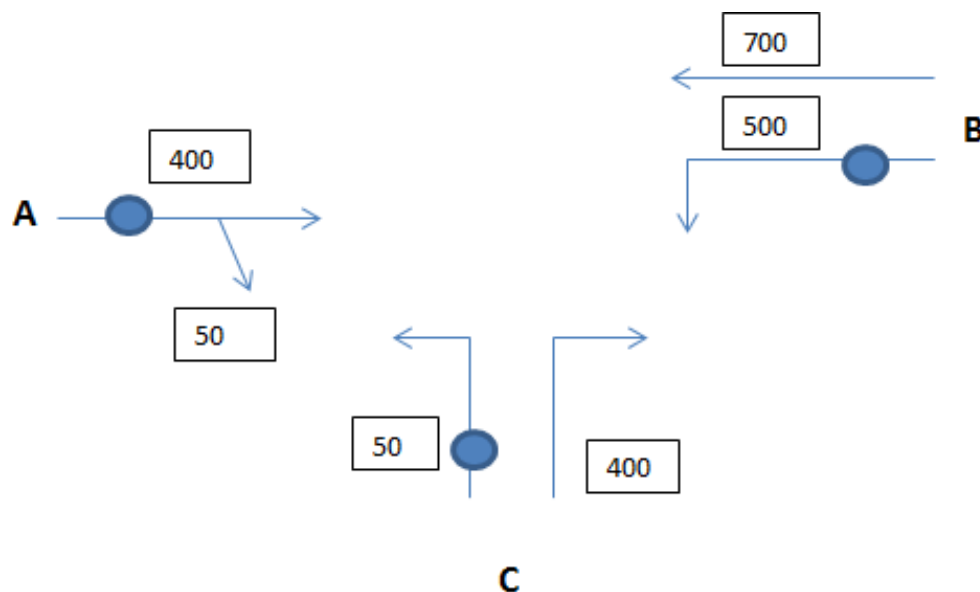
Kapasitet = $1800 - (3 \times 100) = 1500$

Belastningsgrad = $1400 / 1500 = 0,93$



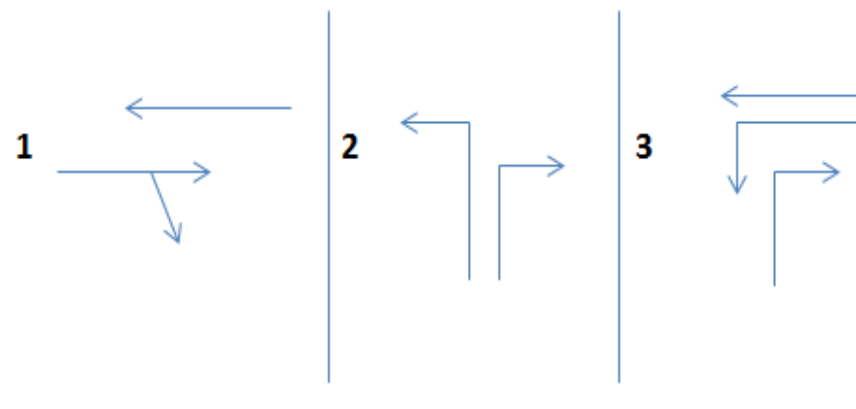
Eksempel på effekten av separat felt for en underordnet svingebevegelse

Med venstresvingefelt fra C



Dimensjonerende belastning
 $450 + 50 + 500 = 1000$

Faseplan med venstresvingefelt fra C



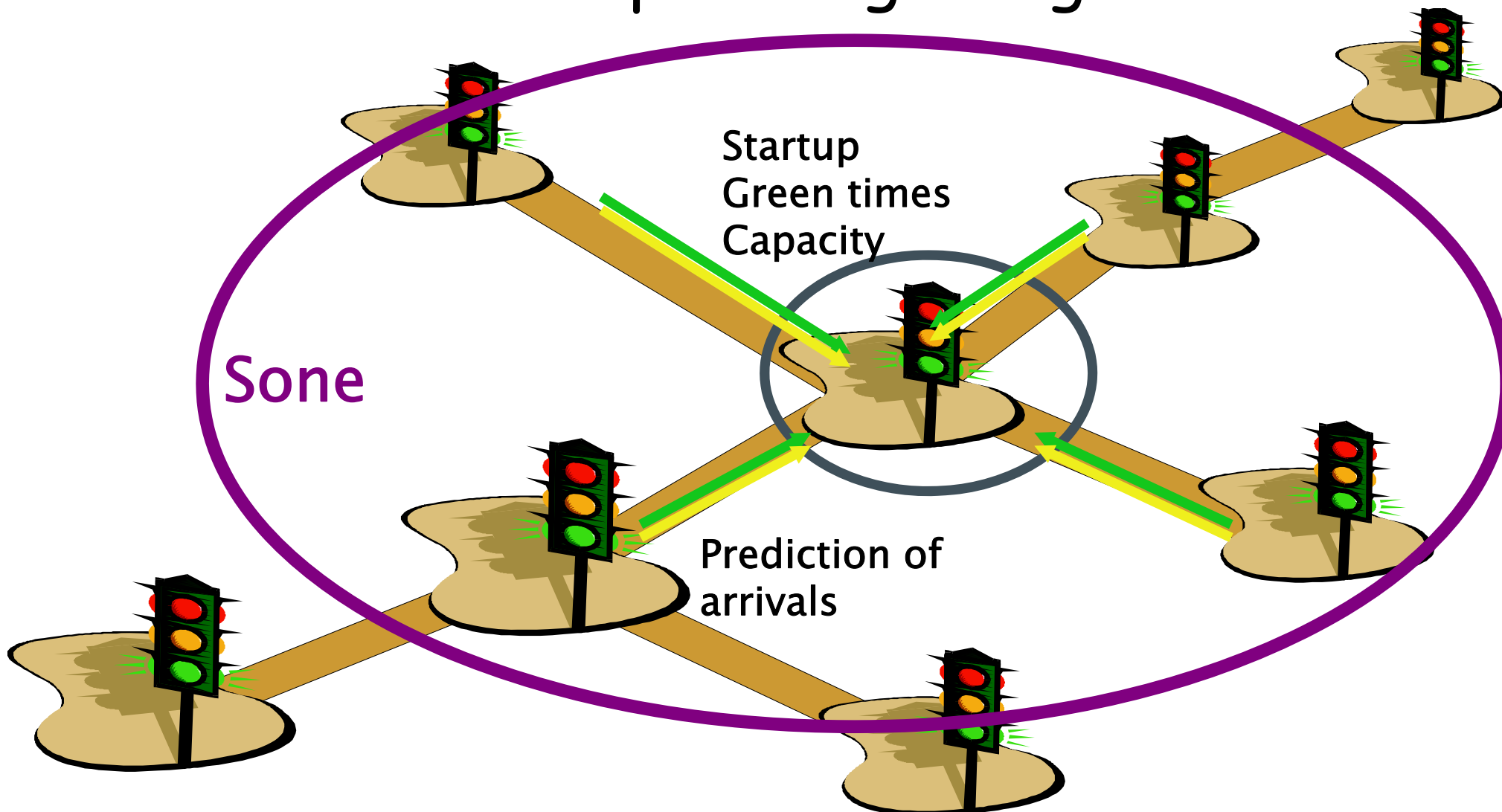
Kapasitet = $1800 - (3 \times 100) = 1500$

Belastningsgrad = $1000 / 1500 = 0,67$



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Adaptive signaling





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This bus should be easy to give priority



Who should we focus on here?





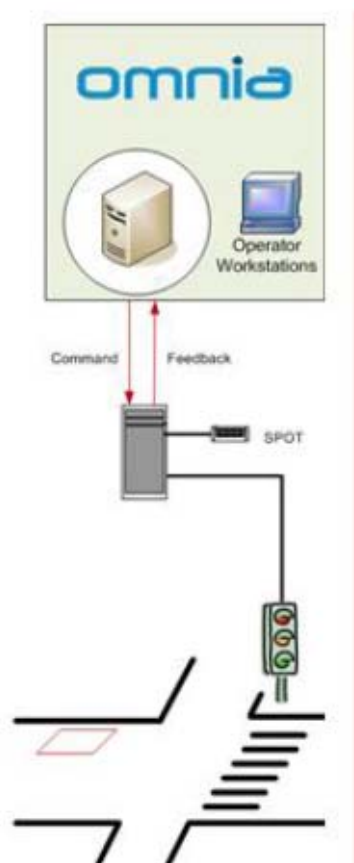
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Practical division and integration for the project

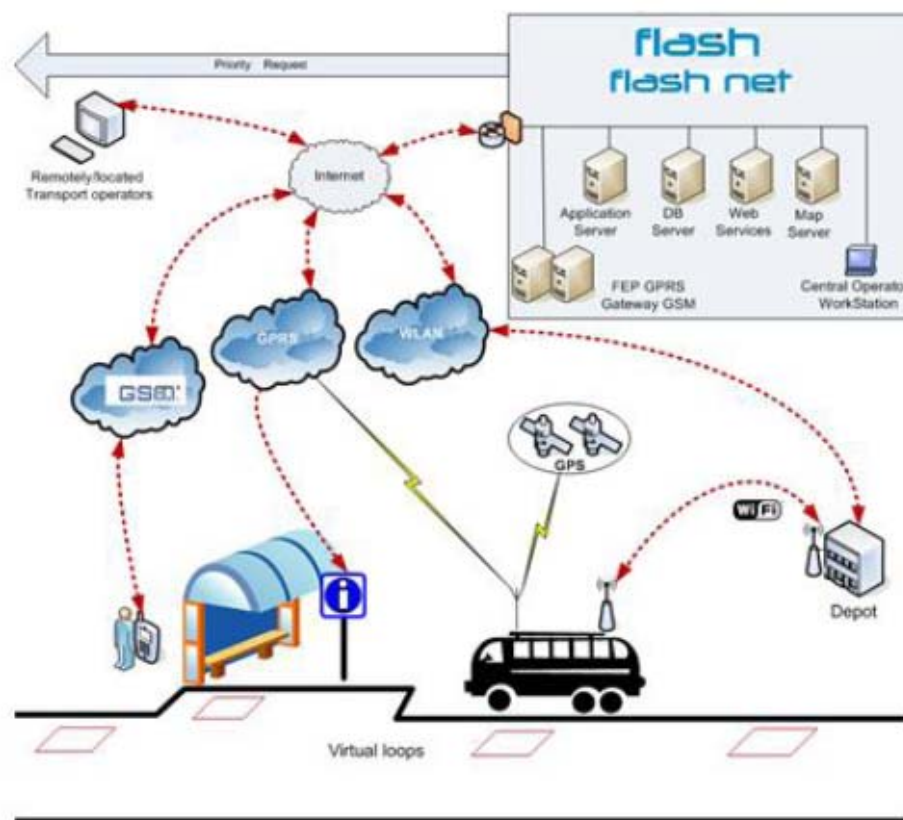
Practical division and integration for the project

Public Roads Administration

Operating company



43 (78) intersections



400 buses

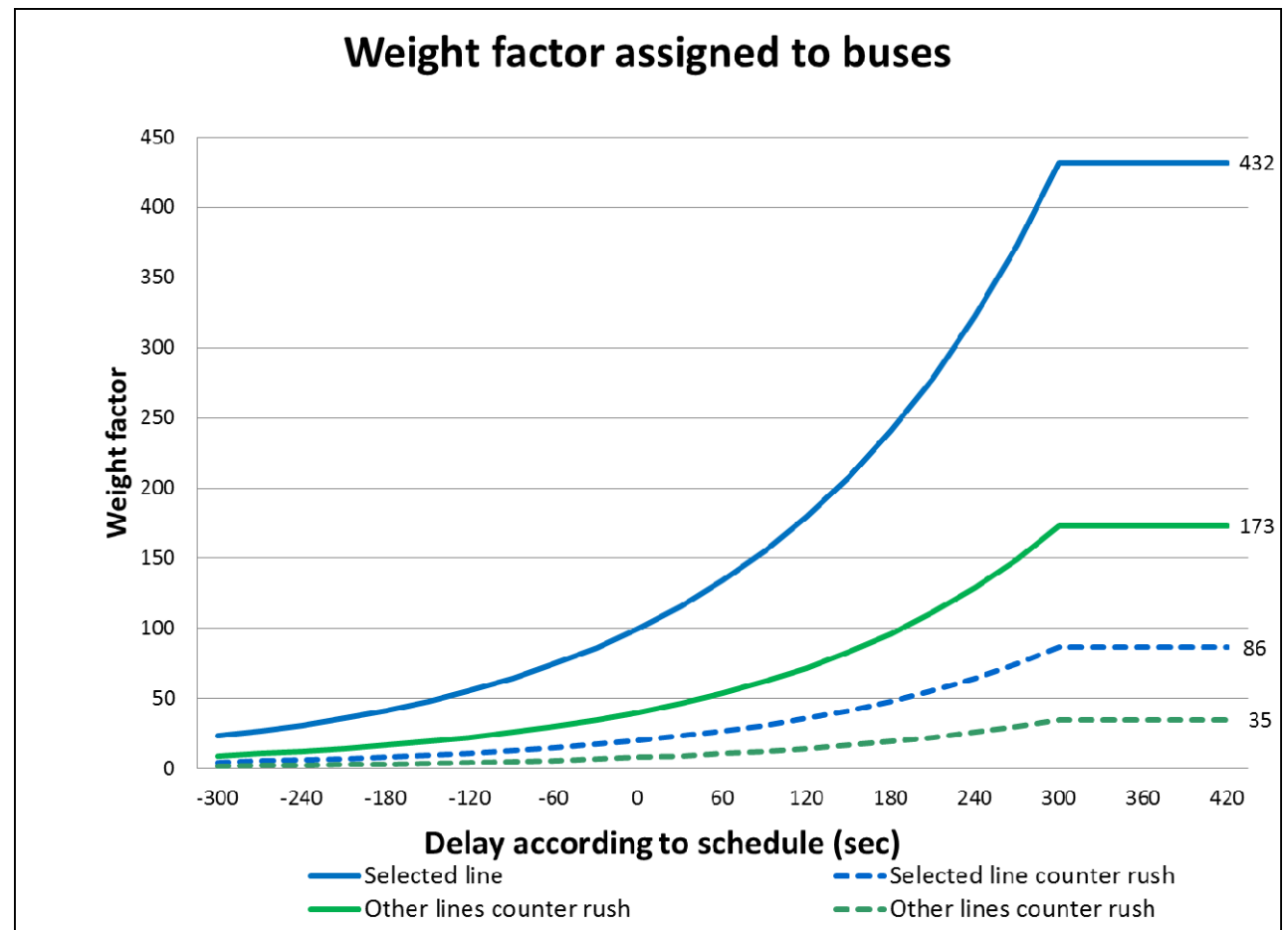




Chosen priority for signaling

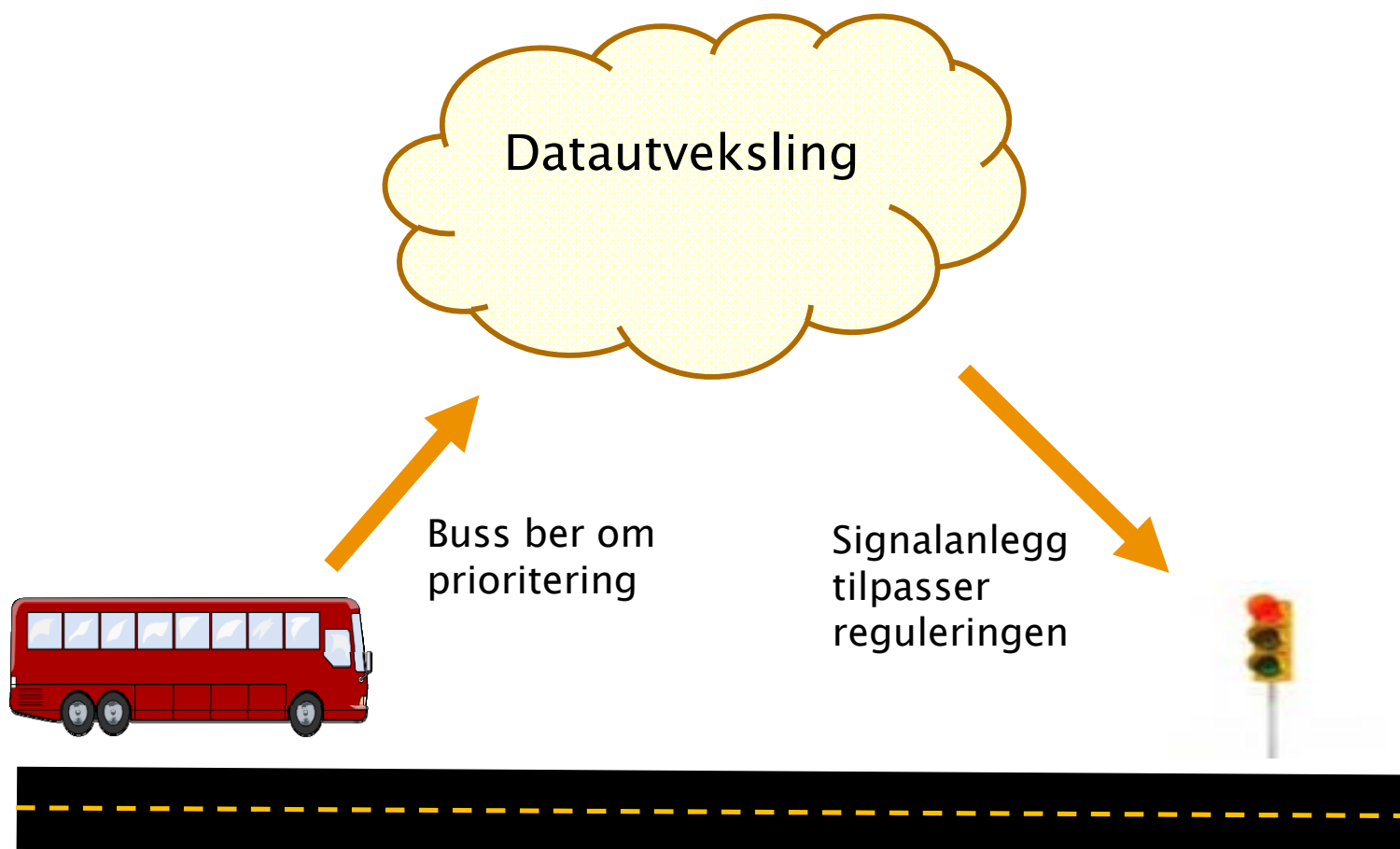
Priority regime:

- **Cars weights**
 - Stopped = 1
 - Driving = 3
 - Platoons = more
- **Pedestrian weights**
 - 2 up to 100
- **Bus up to 430**
 - Separates for:
 - 1) imp routes
 - 2) delay
 - 3) direction
 - 4) location



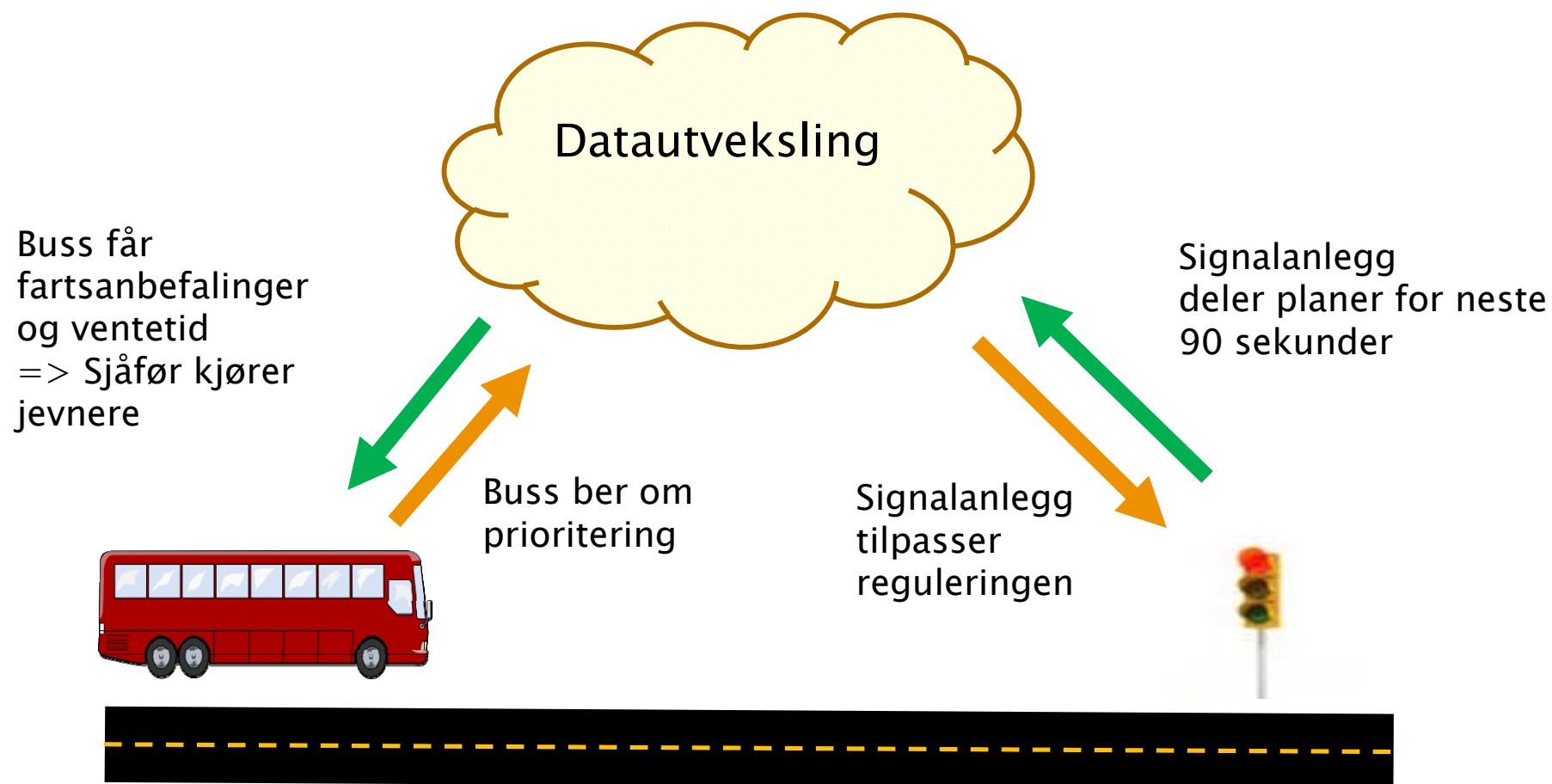


Informasjonsgang ved prioritering





Informasjonsgang ved C-ITS løsning

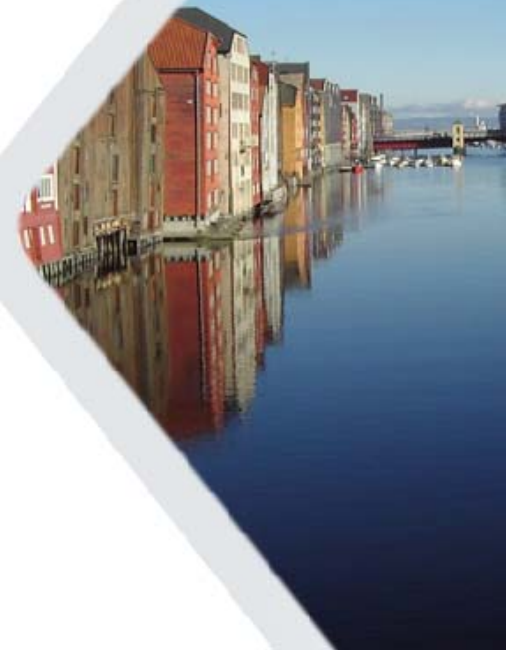




Autonomous vehicles – sharing traffic signals

To gain experience with C-ITS the Norwegian Public Roads Administration are sharing traffic light signals in Trondheim. The project consists of two parts

- Facilitation of data signaling
 - Our responsibility, important to gain experience with the installation and operation
- Use of data from signaling
 - Managed by the market, important to acquire safe solutions



Traffic signals in the vehicle

- Through sharing the traffic signal status and planned shift, a vehicle knows if it must stop or can pass freely at a selected speed.
- Information sharing in the installation in Trondheim is based on cellular communication between the vehicle and a back-end solution
- We have established an solution open for utilization from February 2016 to 2017 (as a start).

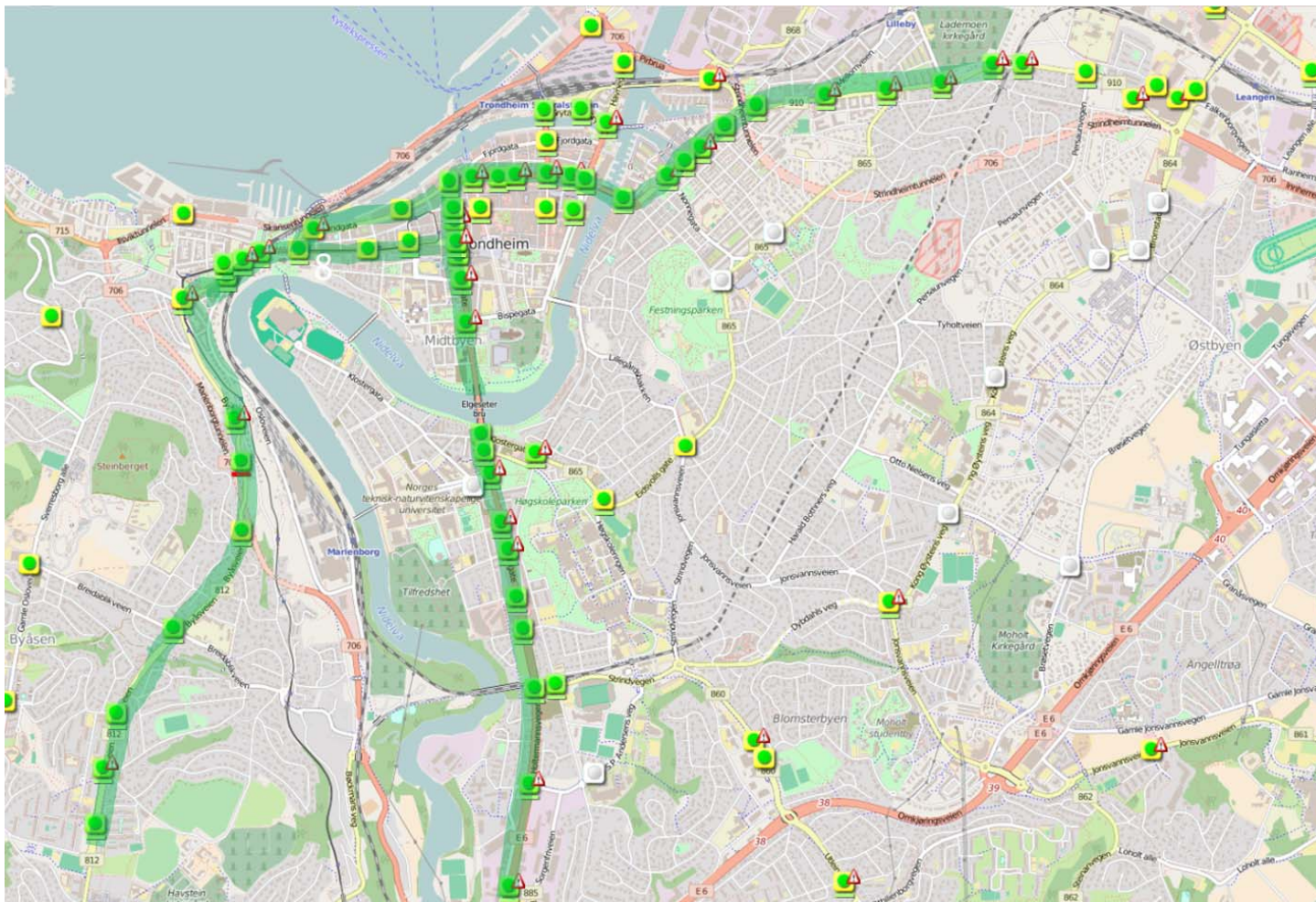




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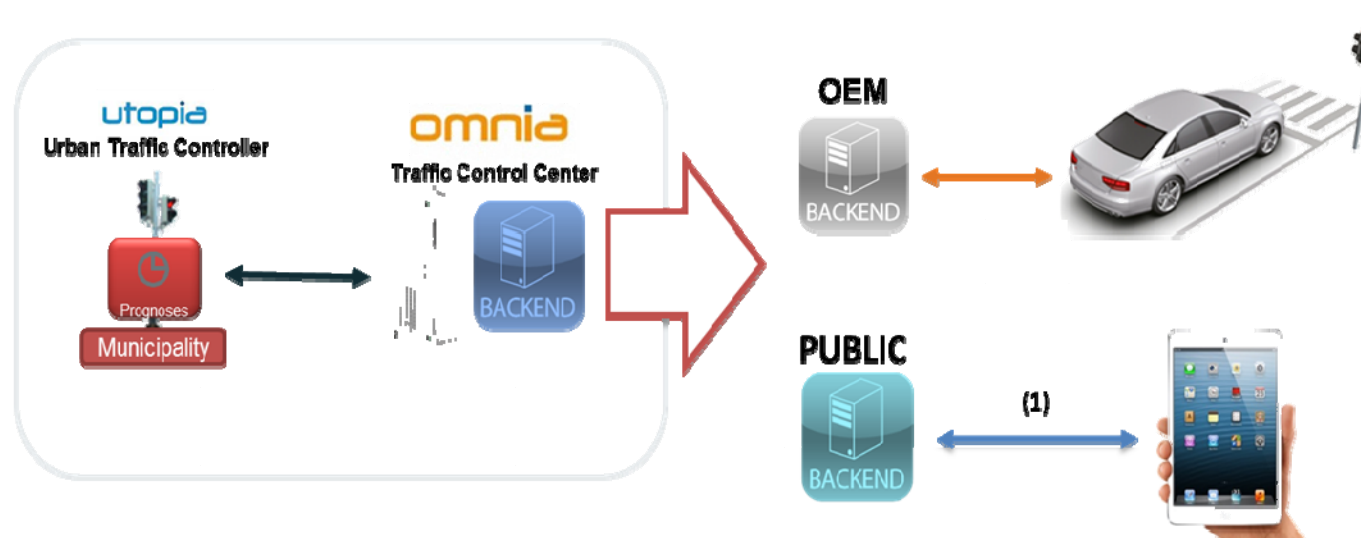
Traffic light assistance in Trondheim

- 48 intersections is online



Information sharing

- We share information with both individual vehicle (apps) and car manufacturers (backend to backend)
- Big difference to serve 19 car manufacturers and potentially up to 100,000 users





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Traffic signal into the vehicle

- NPRA cooperate with Volvo to show recommended speed and countdown to green signal (figures on the right)
- Speed recommendation shall take into account the time to signal changes, distance to the stop line, use of turn signals, speed of cars in front etc.
- The goal is that the car should react to information and adjust it's speed or stop on its own – and not leave this to the driver.





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Samarbeid med Volvo – enkel visning





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Thanks for the attention!

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