

## Travel Time Information

### ITS Seminar

Trondheim 20190321

### Torbjørn Haugen

Associate Professor

Traffic Engineering Research Centre

Department of Civil and Transport Engineering

NTNU

## Why Travel Time?

---

- Traffic Information
- Before – After Studies
- Traffic Analysis
- Performance Index

## Travel Time – Definitions

- Registration
- Estimation
- Prediction

## Road sections

- Main roads in and around some large cities
- Main road between cities in Eastern Norway



## OBU and Antennas



- One antenna in each direction

(C) Traffic Engineering Research Centre

NTNU

## Travel Time - Stavanger



**Green** Delay < 20%  
**Yellow** Delay between 20 and 50%  
**Red** Delay > 50%

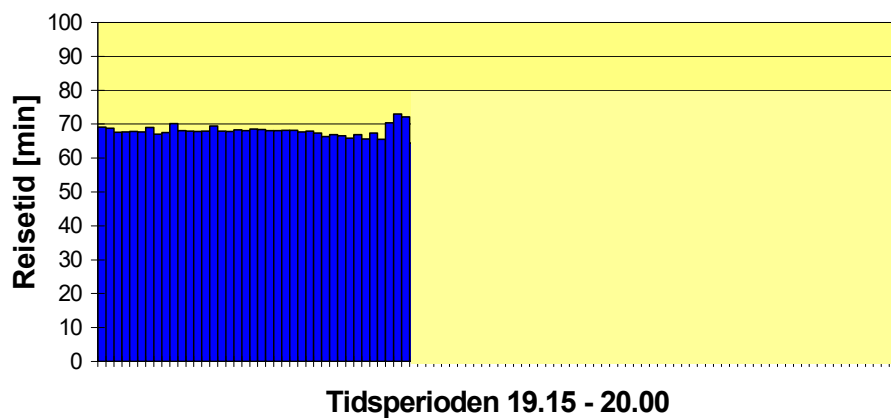
[www.reisetider.no](http://www.reisetider.no)

(C) Traffic Engineering Research Centre

NTNU

## Individual Travel Times

### Reisetider for enkeltkjøretøy Tønsberg - Sande

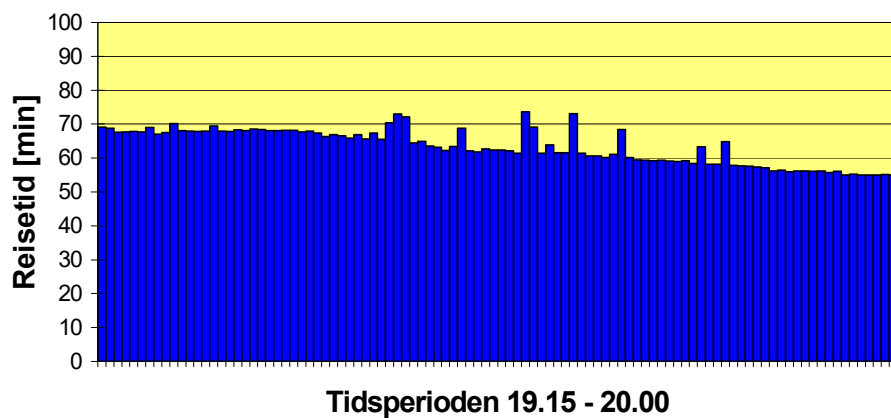


(C) Traffic Engineering Research Centre

NTNU

## Individual Travel Times

### Reisetider for enkeltkjøretøy Tønsberg - Sande



(C) Traffic Engineering Research Centre

NTNU

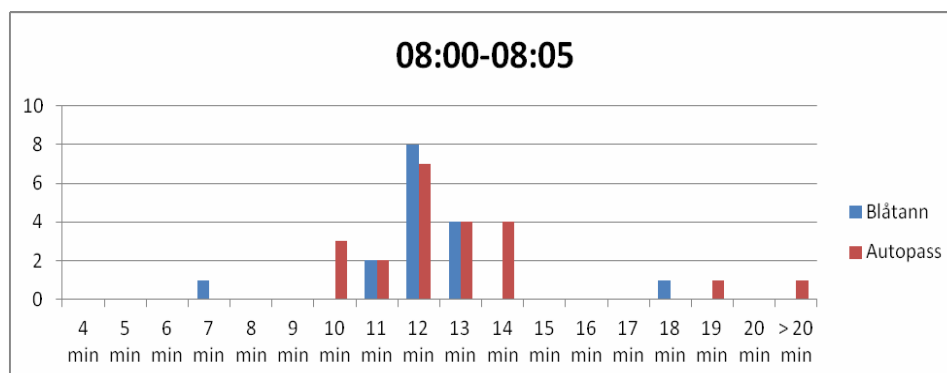
## Average Travel Time

Vehicle	Time A	Time B
1	15.03.00	15.09.00
2	15.04.10	15.09.10
3	15.04.50	15.11.30
4	15.05.30	15.09.50
5	15.06.30	15.10.40

**Average Travel Time 15.05-15.10 ?**

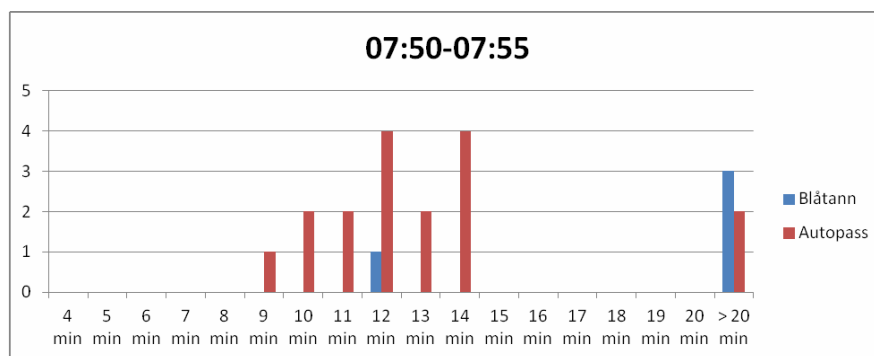
## AutoPASS vs Bluetooth - Test in Trondheim

### Number of travel times



## AutoPASS vs Bluetooth - Test in Trondheim

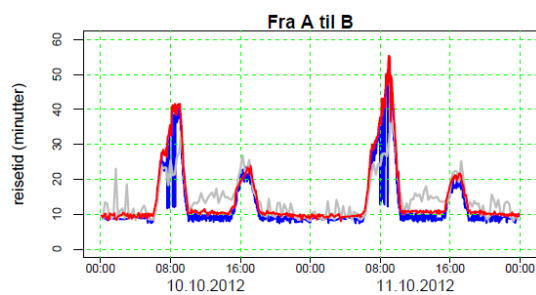
### Number of travel times



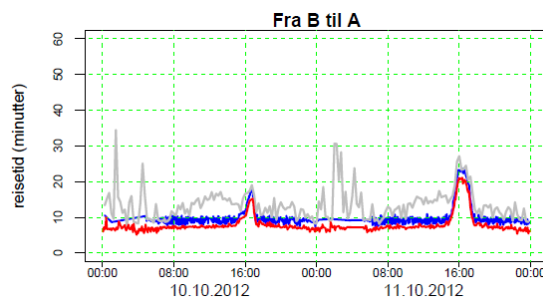
(C) Traffic Engineering Research Centre

NTNU

## AutoPASS vs Bluetooth - Test in Oslo



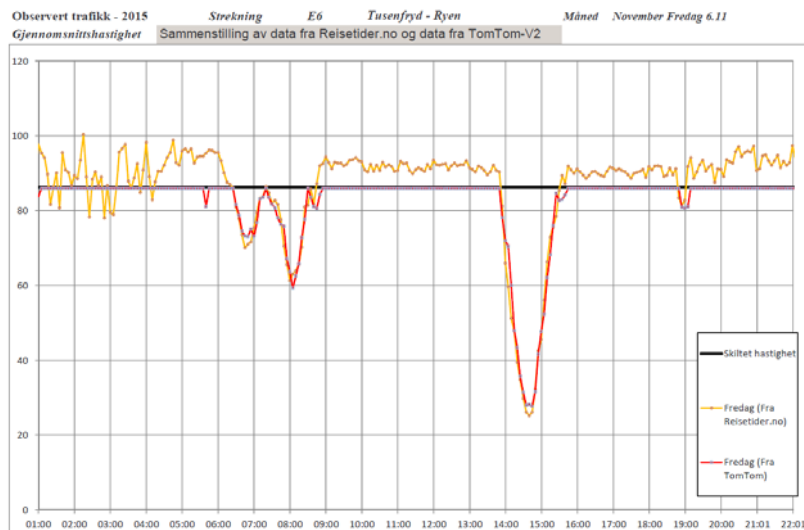
— AutoPASS – Mode based  
 — Bluetooth – Mode based  
 — Bluetooth – AADI (TrafficNow)



(C) Traffic Engineering Research Centre

NTNU

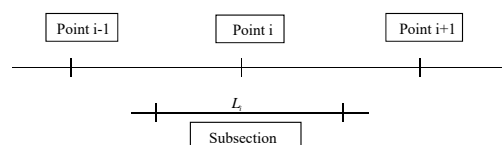
## AutoPASS vs GPS/Floating Cars Data – Test in Oslo



(C) Traffic Engineering Research Centre

NTNU

## Estimation



$$L_i = \frac{1}{2}(L_{i-1,i} + L_{i,i+1})$$

- $L_i$  = Length of subsection  $i$
- $L_{i-1,i}$  = Length of subsection between point  $i-1$  and point  $i$
- $L_{i,i+1}$  = Length of subsection between point  $i$  and point  $i+1$

(C) Traffic Engineering Research Centre

NTNU

## Speed Definitions

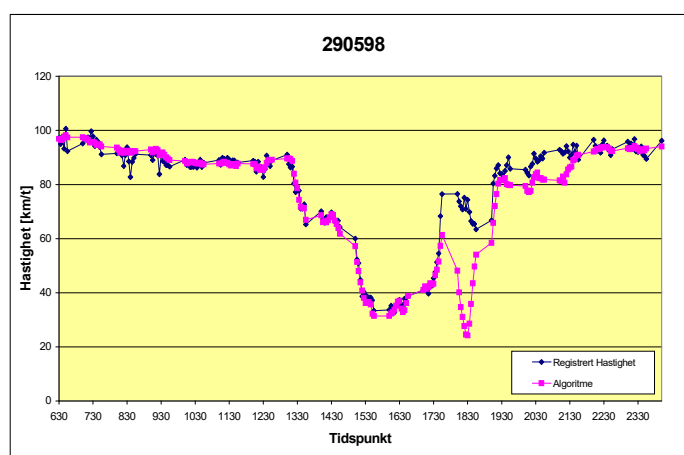
- Average Point Speed  $\bar{u}_p = \frac{\sum u_{pi}}{n}$

- Average Section Speed  $\bar{u}_s = \frac{1}{\frac{1}{n} \sum \frac{1}{u_{si}}}$   $\bar{u}_s = \frac{d}{\frac{1}{n} \sum t_i}$

$$t_i = \frac{d}{u_{si}}$$

$$\bar{u}_p = \bar{u}_s + \frac{\sigma_{us}^2}{\bar{u}_s}$$

## Travel time Estimation





## **Travel Times – Are they comparable?**

- Technology – Sample, Number of Travel Times
- Methods – Registration vs Estimation
- Filtering Algorithms
- Travel Time Aggregation
- Travel Time Calculation (Average, Median, ...)
- Delay – Definition of Undelayed Travel Time
- Colour Codes
- Sections and Travel Time calculation

## **End Remarks - Discussion**

- We need different quality for different purposes
- Specification/documentation is important
- Comparable results?
- Wrong conclusions? Wrong decisions?
- Most people don't know the preconditions? A challenge?

**Thank you for Your attention!**

**Questions ?**

Torbjørn Haugen, [torbjorn.haugen@vegvesen.no](mailto:torbjorn.haugen@vegvesen.no)  
Ass. Professor, Traffic Engineering Research Centre, NTNU