Frisc morgenmøte fredag 4 april 2014 - Mobil betaling
**Ola Martin Lykkja**

Emner

- Q-Free og veiprising
- Krav fra myndigheter og publikum
- Sikkerhet
- Anonymitet
- Nye teknologier
- GNSS-basert veiprising
- Betalingsløsninger
- Forhåndbetaling
- Kredittkort
- Konvergens

Road User Charging

- Toll Collection
– Collect fees to finance infrastructure
– Well-known from Norway

- Congestion Charging
– Reduce and redistribute urban traffic, improve journey times
– Time-varying price
– Göteborg, Stockholm, London

- Time, distance, place – GNSS charging
– Introduced by William Vickrey in 1992, http://www.vtpi.org/vickrey.htm
– Create a marked place for road use.
– Charges should reflect the marginal social cost of each trip
– Charges should vary smoothly over time

- Tax vs fee

Where do trucks pay fees/taxes/tolls today?
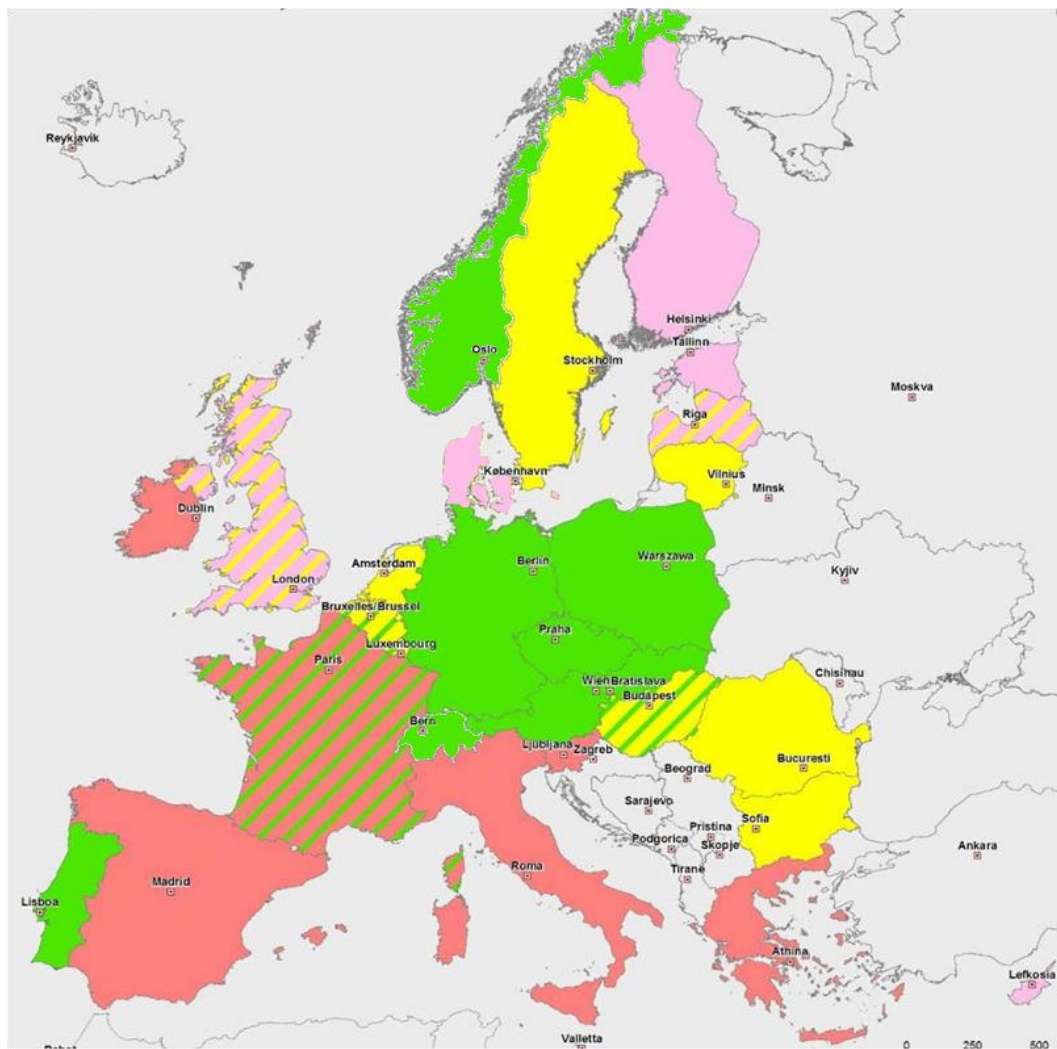
Red: Distance based, physical gantries

Green: Distance, no barriers

Yellow: Vignette (time based)

Pink: No toll

Hatch marks: Under preparation

Germany, France, Switzerland, Slovakia, Austria has GNSS tolling.

Source: EC

Q FREE

AutoPass OBU

- Similar tags are in used world-wide, almost 20 millions issued
- EN standards for **DSRC** created by CEN used world-wide
- Vehicle – Toll Gantry communication has 99.99% performance
- Each user has an account (pre-paid, or post-paid) in the back-office
- OBU = vehicle owner = contract owner
- The OBU has no knowledge about money
- Only detects passage under toll gantry
- Two-way cryptographically secure:
- Toll gantry must authenticate themselves, preserve privacy
- OBU signs each transaction (ensures that transaction is genuine)

Two piece OBU

- Support for Visa, Mastercard, etc.
- DSRC communication to toll gantry
- OBU will reserve a predefined amount from credit card (e.g. 200 NOK)
- OBU will use from this to pay tolls
- After toll is paid, the credit card transaction is updated with correct amount, and another lump sum is reserved for next toll transaction.
- Separates driver role from vehicle owner role

- Note: Product has been discontinued by Q-Free, deployed in Italy before Torino Olympics in 2006.

Privacy of tolling records in Norway

- Press stories of jealous wives calling Fjellinjen to ask for toll passage record details.
- Police ask for passage records routinely
- You get printed passage lists by mail

Har fått interessante opplysninger
Politiet går gjennom mobiltrafikk og Autopass-data for å kartlegge hvem som var i området da tyver stjal 25 uerstattelige kunstverk fra muséet i Bergen lørdag.

Personvernnemnda
Klage på Datatilsynets pålegg om sletting av passeringsdata. Saken gjelder spørsmålet om hvor lenge passeringsdata skal oppbevares hos bompengeselskapet for så vidt gjelder kunder som har forskuddsbetalt konto.

Bomselskap sier de sletter opplysninger «så raskt som mulig» - blir lagret i ti år
Henviser til regnskapsloven.

Q FREE

GNSS Based Tolling

- OBU has a GNSS receiver
- OBU compares position to a map that have virtual toll gantries and zone borders
- Two possible modes:
- **High privacy** mode
  – OBU calculate zone and gantry passages and fees
  – Position information never leaves OBU, stored encrypted there
  – Only vehicle owner knows the key to the local position records
  – Only total weekly fee is sent back to central systems
- **Low privacy** mode
  – OBU transfers all positions back to central systems
  – Position information is available to "all"

Elgeseter bru
10 kr belastet

Q FREE
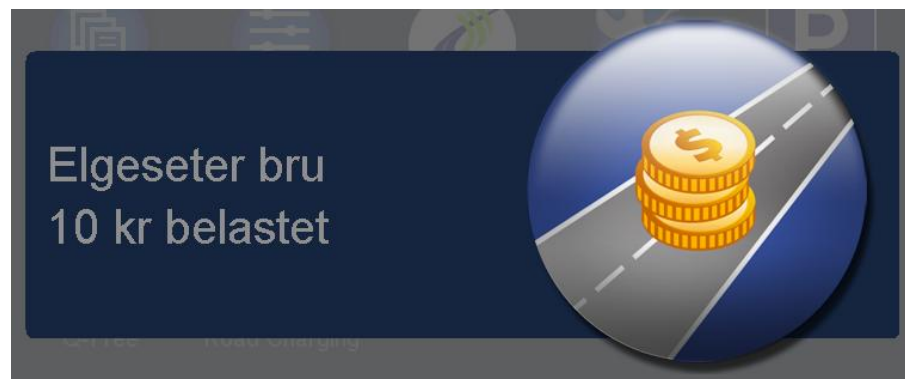
Proliferation of ISO 18000 cards into tolling

- ISO/IEC 18000, also known as RFID
- Cards are cheap and small and sometimes battery-less
- But: Tag logistics are the same as with AutoPass tags
- RFID performs worse than DSRC:
– Shorter range
– Lower drive-by speed
– No multi lane free flow

- Popular in Americas, Asia.
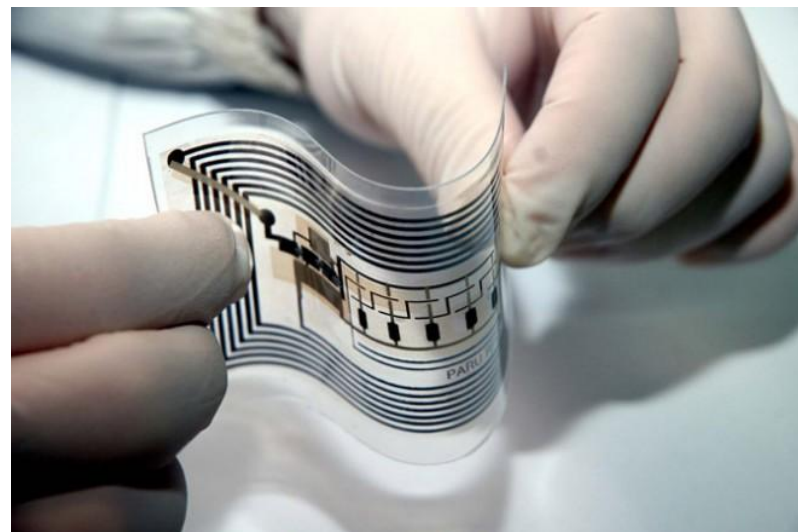
Tachograph in trucks

- EU directive requires all trucks to have a tachograph to enforce driver working hours rules.
- Tolling functions may be merged into the tachograph

Q FREE

Tolling without any OBU

- Cameras at toll gantries
- ALPR – Automatic License Plate Recognition
- No privacy – All vehicles have their photo taken
- No tag distribution cost
- No registration needed – Government already knows everything
- But lower performance due to:
  – Unreadable plates, dirt, snow
  – Unfavourable light and weather conditions

- Popular in Göteborg, Stockholm, and elsewhere

ITS – Intelligent Transport Systems

- ISO and ETSI have created an architecture and a set of communication protocols for ITS for use in vehicles.

- One architecture Many services

- When such ITS-S stations are deployed in vehicles, tolling may just be a service

One tolling tag to pay for it all

- Public transport
- Public parking
- Private parking
- Road toll fees
- Gas stations
- Drive-through restaurants (e.g. McDonalds)
- Ferries (e.g. Fosenferga)

- Subset of this is implemented in Portugal, Brazil, Japan, Korea, USA, Norway

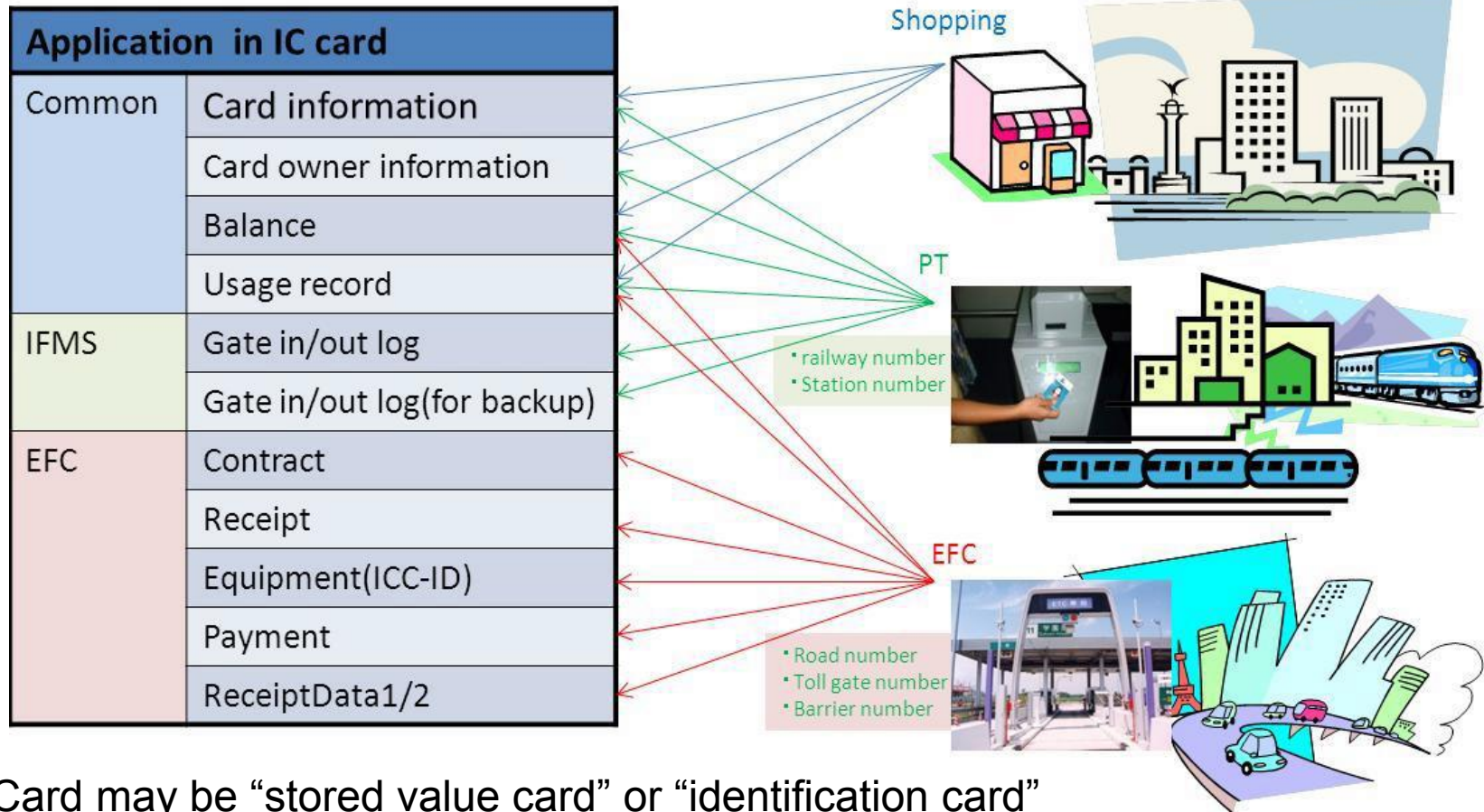# Integrated Mobility Services require Integrated Payment Services

Source: SINTEF

New payment and ticketing media pave the way for converging systems

Source: SINTEF

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Proposed multi-purpose payment card

Application in IC card	
Common	Card information
	Card owner information
	Balance
	Usage record
IFMS	Gate in/out log
	Gate in/out log(for backup)
EFC	Contract
	Receipt
	Equipment(ICC-ID)
	Payment
	ReceiptData1/2

Shopping

PT
· railway number
· Station number

EFC
· Road number
· Toll gate number
· Barrier number

- Card may be "stored value card" or "identification card"
- Pre-paid vs Post-paid
- Central storage of all records or not?

Q FREE

Takk for oppmerksomheten!

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http://www.q-free.com/

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