Operational Concepts and Enabling Technology

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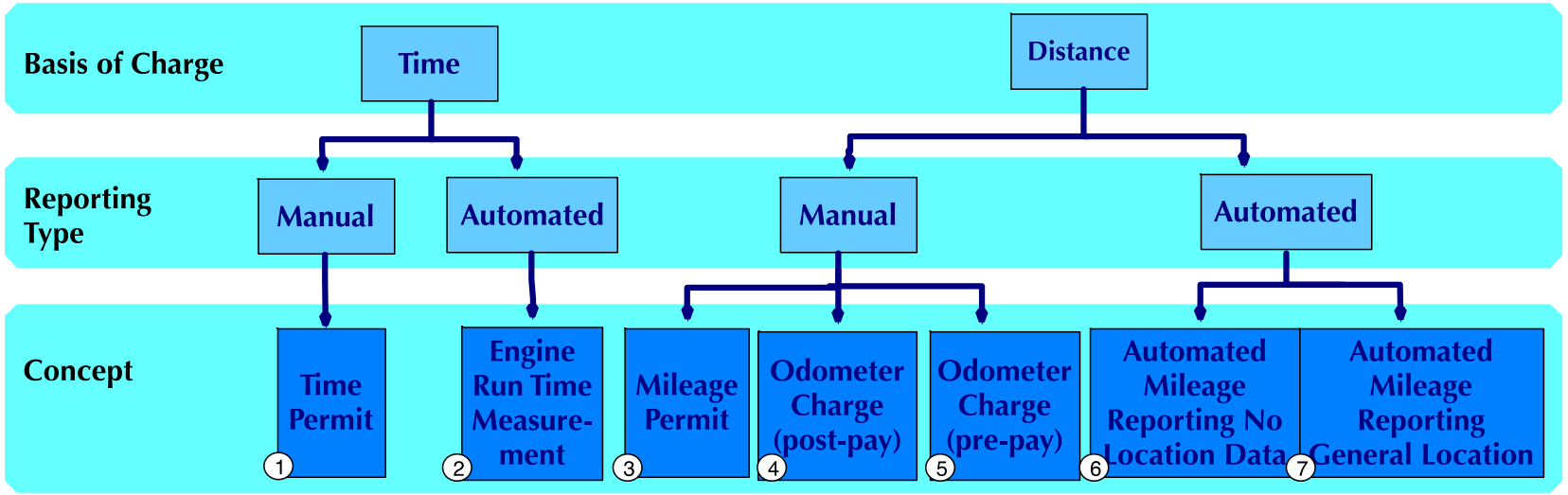
Agenda Item #11

TAC Meeting #3, March 27, 2015

Irvine, CA

Seven Operational Concept Options for Road Charging

- An operational concept is a method for recording and reporting roadway use.
- Operational concepts vary by charge basis (time, distance) and reporting type (manual, automated).
- Today we will discuss seven operational concepts for road charging:



Concept 1: Time Permit (option)

What it is:

- Permit that grants motorist unlimited road use for a specific period of time

Where it is used:

- Several European countries (vignette system)

How it works (two ways):

- Permit as a windshield sticker
- Electronic permit (based on license plate)

Other observations:

- When combined with other user choice concepts, price would need to be high (e.g., based on a large assume distance to prevent overuse of road
- Could be used to charge out of state drivers
- Similar program exists for nonresident commuters who work in California near borders (“Nonresident daily commuter permit”)
- May be appealing to those with significant privacy concerns

Concept 2: Engine Run Time (option)

What it is:

- Per-minute charge when engine is on

Where it is used:

- Nowhere, never been implemented

How it works:

- Engine run time measured by a vibration sensor or vehicle electronics, & reported automatically
- Alternative algorithm needed for electric vehicles (e.g., speed>0)

Other observations:

- Difficult to implement for policy reasons:
  - Could be seen to encourage speeding
  - May cause public to complain about lack of roadway infrastructure in their neighborhoods that leads to longer travel times
  - Would force people to pay for time spent warming/cooling cars

Concept 3: Mileage Permit (option)

What it is:

- Permit to drive a given number of miles

Where it is used:

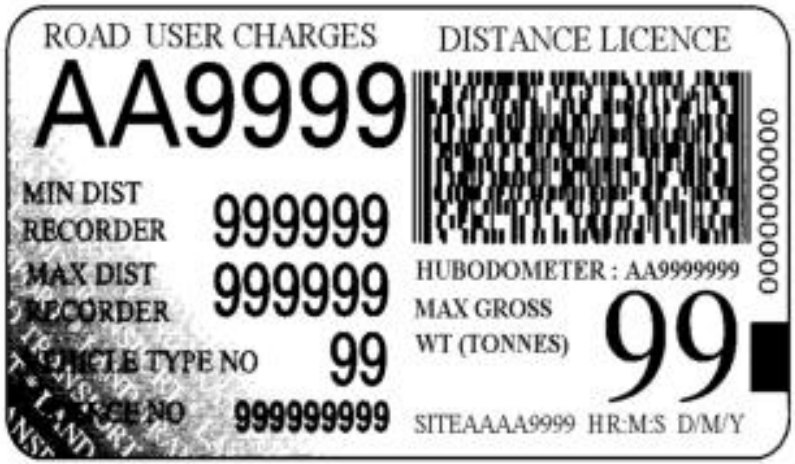
- New Zealand, for all diesel vehicles

How it works:

- Initial odometer reading when vehicle enters program
- Heavy vehicles have hub-odometer, light vehicles use dashboard odometer
- Valid permit checked at all traffic stops, vehicle inspections, etc.

Other observations:

- Permits could be made electronic
- May be appealing to those with significant privacy concerns



Concept 4: Odometer Charge (post-pay) (option)

What it is:

- Charge based on difference between odometer reading at start and end of year, paid at the end of the year

Where it is used:

- Nowhere

How it works (two ways):

- Odometer reading at start and end of driving year
  - Odometer can be read by a state official or representative
- Or road charge payer can provide the odometer reading
  - Random audits and other enforcement used to maintain compliance

Other observations:

- Potential one-time cash flow issues compared to gas tax: all payment at the end of the year (depends on phase-in plan selected)
- Realistically, odometer readings won't be exactly 12 months apart
- Fraud and evasion would need to be addressed

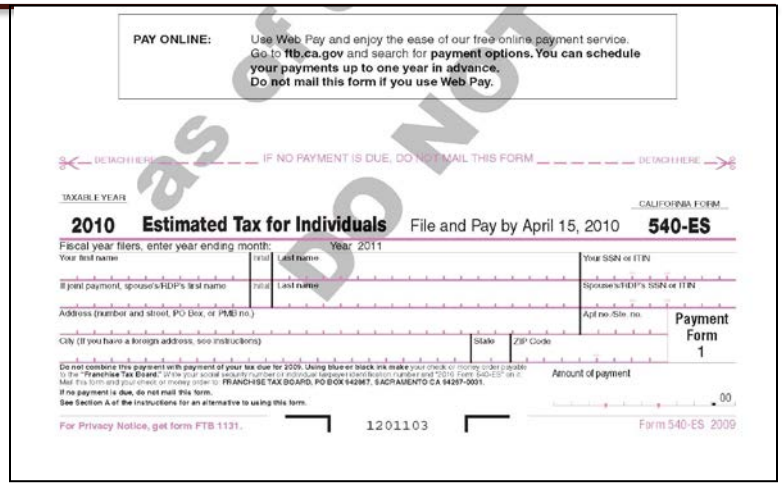
Concept 5: Odometer Charge (pre-pay) (option)

What it is:

- Charge based on difference between odometer reading at start and end of year, distance estimated and paid for at start of year, and reconciled at end of year

Where it is used:

- Nowhere


PAY ONLINE: Use Web Pay and enjoy the ease of our free online payment service. Go to ftb.ca.gov and search for payment options. You can schedule your payments up to one year in advance. Do not mail this form if you use Web Pay.

IF NO PAYMENT IS DUE, DO NOT MAIL THIS FORM

TAXABLE YEAR 2010 **Estimated Tax for Individuals** File and Pay by April 15, 2010 CALIFORNIA FORM **540-ES**

Fiscal year filers, enter year ending month: Year 2011

Your first name | Initial | Last name | Your SSN or ITIN

If joint payment, spouse's/RDP's first name | Initial | Last name | Spouse's/RDP's SSN or ITIN

Address (number and street, PO Box, or PMB no.) | Apt no./Ste. no.

City (If you have a foreign address, see instructions) | State | ZIP Code

Payment Form 1

Do not combine this payment with payment of your tax due for 2009. Using blue or black ink make your check or money order payable to the "Franchise Tax Board." Write your social security number or individual taxpayer identification number and "2010 Form 540-ES" on it. Mail this form and your check or money order to: FRANCHISE TAX BOARD, PO BOX 942867, SACRAMENTO CA 94267-0001.

If no payment is due, do not mail this form.

See Section A of the instructions for an alternative to using this form.

Amount of payment .00

For Privacy Notice, get form FTB 1131. 1201103 Form 540-ES 2009

How it works:

- Motorists estimate how many miles they drive per year and pay for them
- State guidelines may be provided on how to estimate each year
  - For example, first year could be required to be 10,000 miles
  - After that, the number of miles driven the previous year
- Reconcile at year's end: credit in case of overestimate, pay more in case of underestimate

Other observations:

- Fraud and evasion would need to be addressed

Concept 6: Automated Mileage Reporting with No Location Data (option)

What it is:

- In-vehicle equipment reports mileage traveled to an account manager
- No location measurement technology to provide greatest privacy assurance

Where it is used:

- Oregon road charge program

How it works:

- Motorist installs device in vehicle (or activates telematics)
- Account manager invoices motorist periodically

Other observations:

- Automatic credits or non-charging for travel out-of-state or on private lands is not possible electronically

Concept 7: Automated Mileage Reporting with General Location (option)

What it is:

- In-vehicle equipment reports mileage traveled to an account manager
- General location information used to prevent charging for miles driven out-of-state or on private land

Where it is used:

- New Zealand electronic road charging
- Oregon road charge program

How it works:

- Motorist installs device in vehicle (or activates telematics)
- Account manager invoices motorist periodically

Other observations:

- SB1077 requires per-mile rate not vary
- Some devices may allow location data use to be turned off
- Private companies, called commercial account managers could potentially manage user accounts, offer additional services and discounts

Alignment of Operational Concepts to Technologies

Operational Concepts:	Corresponding Technology:
Concept 1: Time Permit	Time Permit Technology
Concept 2: Engine Run Time	Engine Run Time Technology
Concept 3: Mileage Permit	Mileage Permit Technology
Concept 4: Odometer Charge (post-pay)	Odometer Technology
Concept 5: Odometer Charge (pre-pay)	
Concept 6: Automated Mileage Reporting with No Location Data	Usage-based Insurance Devices Smartphone Telematics Other Location-based Devices
Concept 7: Automated Mileage Reporting with General Location	

Technology Evaluation Criteria per SB 1077

- Availability (acquisition, IT availability)
- Adaptability (suitability for all vehicles, changeability)
- Reliability
- Data Security
- Ability to protect Personally Identifiable Information (PII)
- Ease of recording and reporting
- Ease of administering
- Enforceability (methods of maintaining compliance)
- Ease of re-identifying location data
- Increased privacy concerns when data used for other technology

Proposed Technology Evaluation Sheet

SB 1077 CRITERION	TIME PERMIT	ODOMETER CHARGE	MILEAGE PERMIT	ENGINE RUN TIME	UBI	SMART-PHONE	TELE-MATICS	OTHER LOCATION-BASED
Availability (acquisition)								
Availability (IT)								
Adaptability (suitability)								
Adaptability (changeability)								
Reliability								
Data security								
Ability to protect PII								
Ease of recording and reporting								
Ease of administering								
Enforceability								
Ease of re-identifying location data								
Increased privacy concerns when data used for other technology								
Other issues								
Overall rating								

Technologies: Road Charging Database

- Would be used to store the current road charge operational concept information on all road charge liable California vehicles
- Vehicles could be required to be registered for one valid operational concept at all times
- Database could record which operational concept each vehicle is registered for
  - Also, any specific details associated with that concept (odometer readings, etc.)
- Could be used by state for administration and enforcement

Technologies: Time Permit

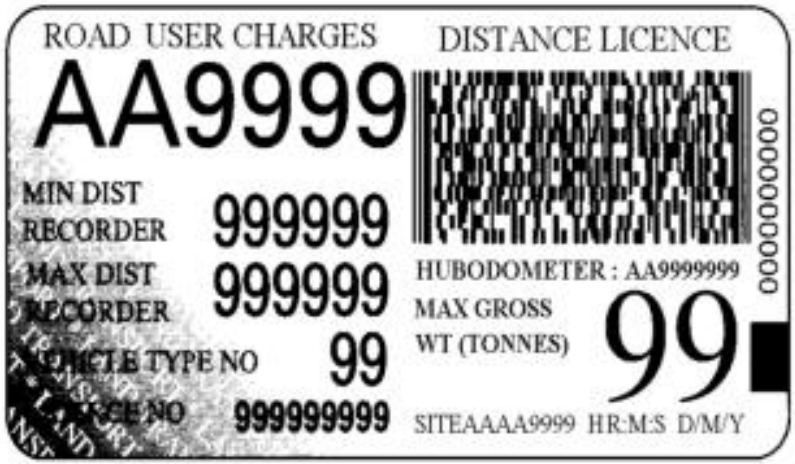
- Primary technology needed is the road charging database
  - Also need window stickers or cameras for enforcement
- Recall that time permit does not measure actual usage
- Pricing will need to be high (e.g., based on driving a very large amount) in order to prevent overuse

Technologies: Engine Run Time Measurement

- Device would combine engine vibration sensor and vehicle anchor
- Devices currently do not exist; need to be developed and tested

Technologies: Mileage Permit

- Primary technology needed is the road charging database
  - Also need sticker or electronic display
- Typically pre-pay
- Challenge: odometer fraud
  - Digital odometers can be manually altered using equipment that interfaces to the vehicle electronics
  - Such equipment can be purchased over the internet
  - Fraud motivation is low when fuel tax remains in place



Technologies: Odometer Charge

- Only technology needed is the road charging database
- Can be pre-pay or post-pay, self-reported or read by an official
- Challenge: odometer fraud
  - Digital odometers can be manually altered using equipment that interfaces to the vehicle electronics
  - Such equipment can be purchased over the internet
  - Fraud motivation is low when fuel tax remains in place

Technologies: Usage-based Insurance Devices

- Support automated reporting with no location data and with general location
- Technology is a device that fits into vehicle OBDII port, and an account manager, in addition to database
- Many devices include GPS, but some do not
- Currently cost roughly $50 per device, subsidized by insurance company
- Can be supported by commercial account managers
- Several innovative California companies that make or manage UBI devices: Metromile, True Mileage, Automatic

Technologies: Smartphone

- Smartphone needs vehicle anchor to be used for road charging
- Anchor: Bluetooth connection to vehicle for authentication, plus pictures of odometer (taken while connected to Bluetooth)
- Offered conceptually by two companies: Geotoll and Vehcon, but further development would still be required for use in a pilot
- Can be supported by commercial account managers

Technologies: Telematics

- Telematics are computer systems embedded in vehicles that can communicate with external computer systems and use this connection to provide a range of services to drivers
- Road charging could be an application running on a vehicle telematics platform
- Each automaker has its own unique telematics system
- Can be supported by commercial account managers

Technologies: Other Location-based Devices

- Location-based electronic devices generally require some sort of vehicle anchor
- Generally need to be installed by a professional mechanic
- One example are heavy vehicle tolling or road charging devices, such as those used in the German heavy truck tolling system shown below
- Well-suited for heavy vehicle road charging program