



trusted
driver



Privacy in Time, Distance, Position Road Pricing Schemes

Charles Palmer 6 Nov 2009

Background

- Road congestion a growing problem.
- It could be relieved by “Time, Distance, Position” (TDP) road pricing across the entire road network.
- Concern about driver **privacy** is a significant issue for public acceptance.
- UK Department for Transport Demonstrations Project trialing TDP.
- Technology choice has important implications for privacy.
- How seriously does DfT take privacy?

Technology Options:

- Thick Client: on-board unit contains road map database and calculates cost of journey on-board.
- Thin Client: on-board unit sends journey details to external computer which calculates cost of journey.
- “Trusted Driver” = our R&D project. Calculates cost externally but anonymously.
- All options need compliance checking.

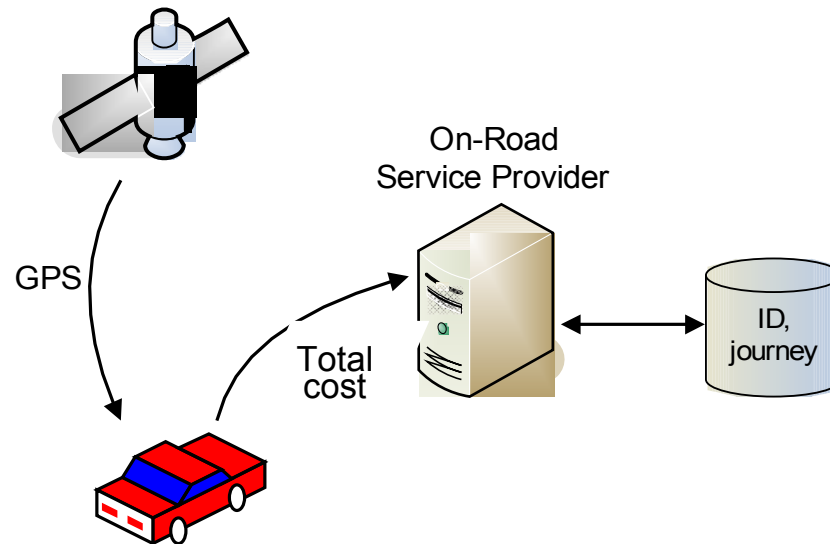
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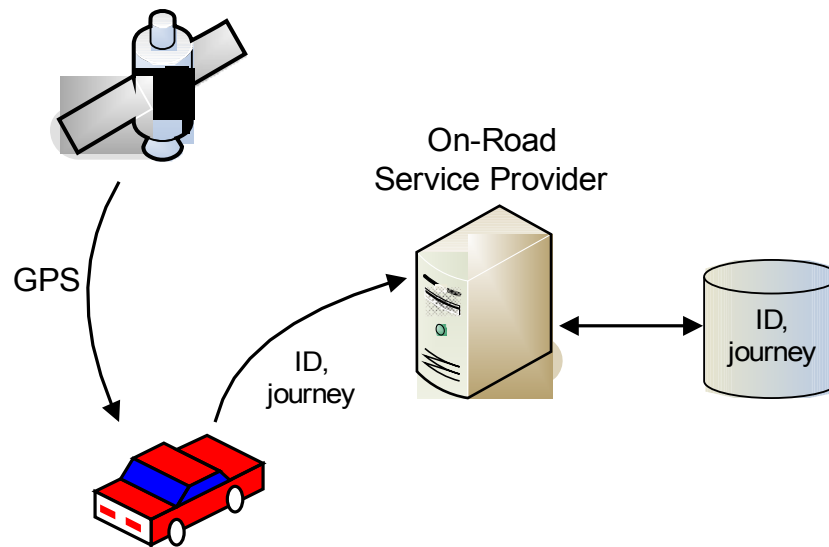
DSP
DESIGN
dspdesign.com

Thick Client



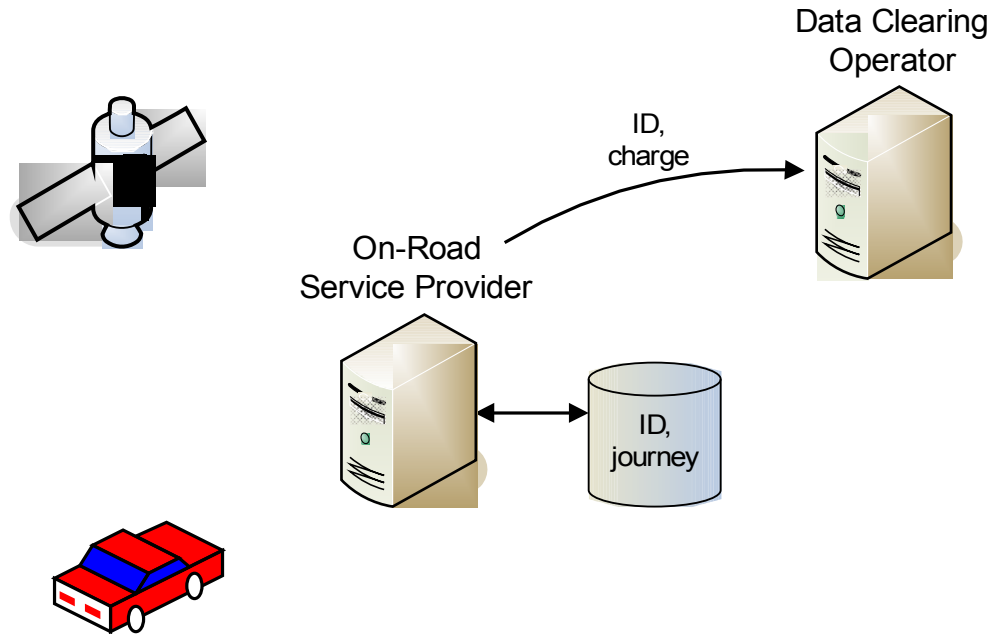
Vehicle uses internal map to calculate the journey cost and reports the total cost (not journey details) and its ID code to a “Road User Service Provider” server.

Thin Client



Vehicle reports journey information and its ID code to a “Road User Service Provider” server.

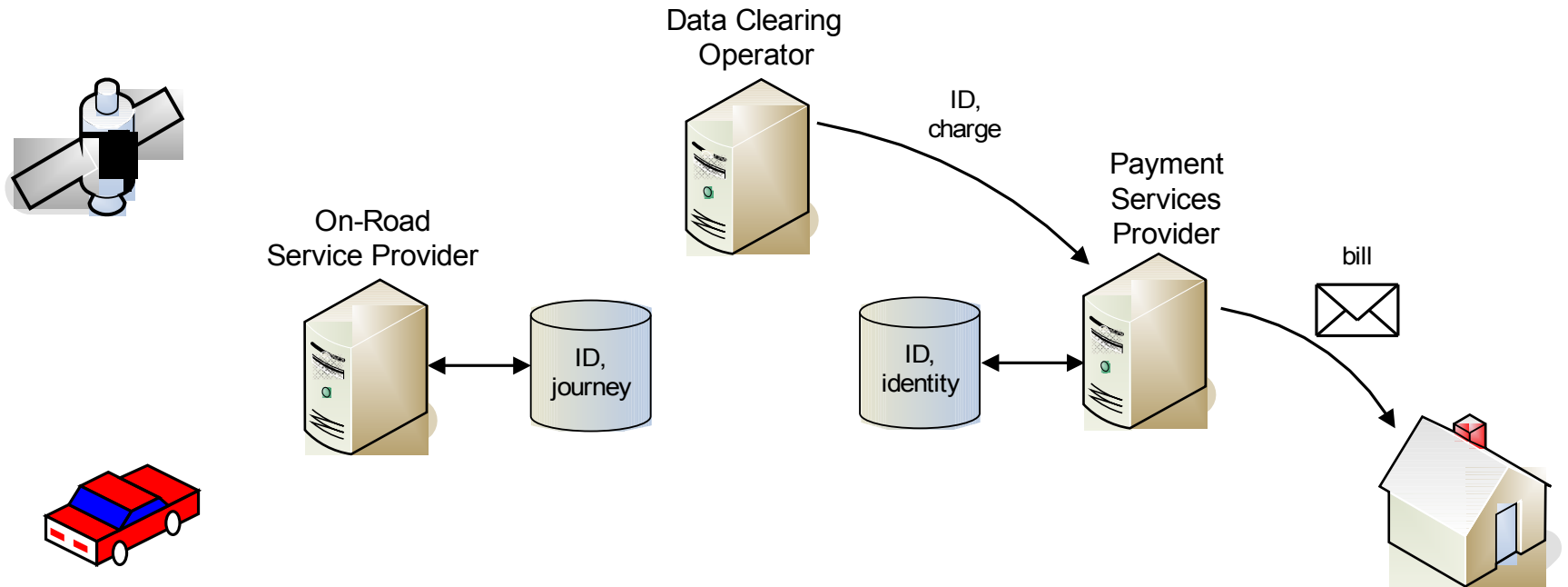
Thin Client



Road User Service Provider calculates the road charge and sends it to a “Trusted Third Party” - the Data Clearing Operator.

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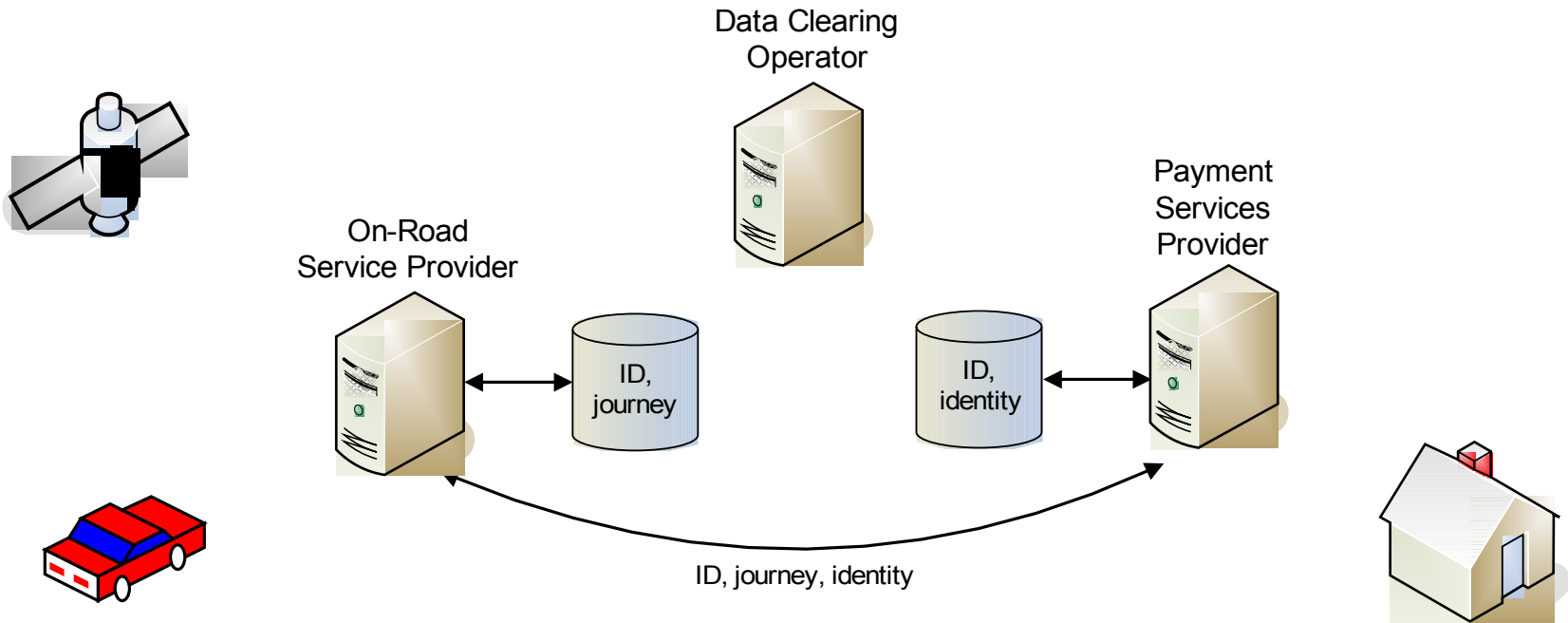
Thin Client



Data Clearing Operator passes charge data to “Payment Services Provider” which looks up the driver and issues a bill.

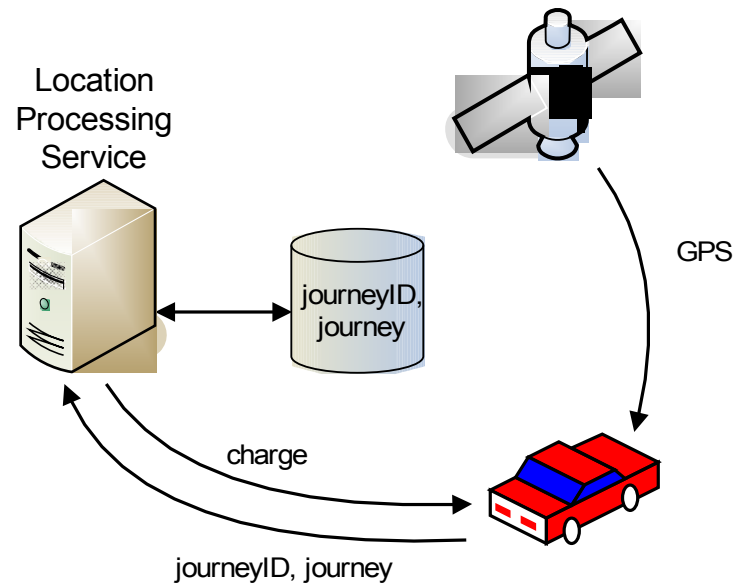
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Thin Client



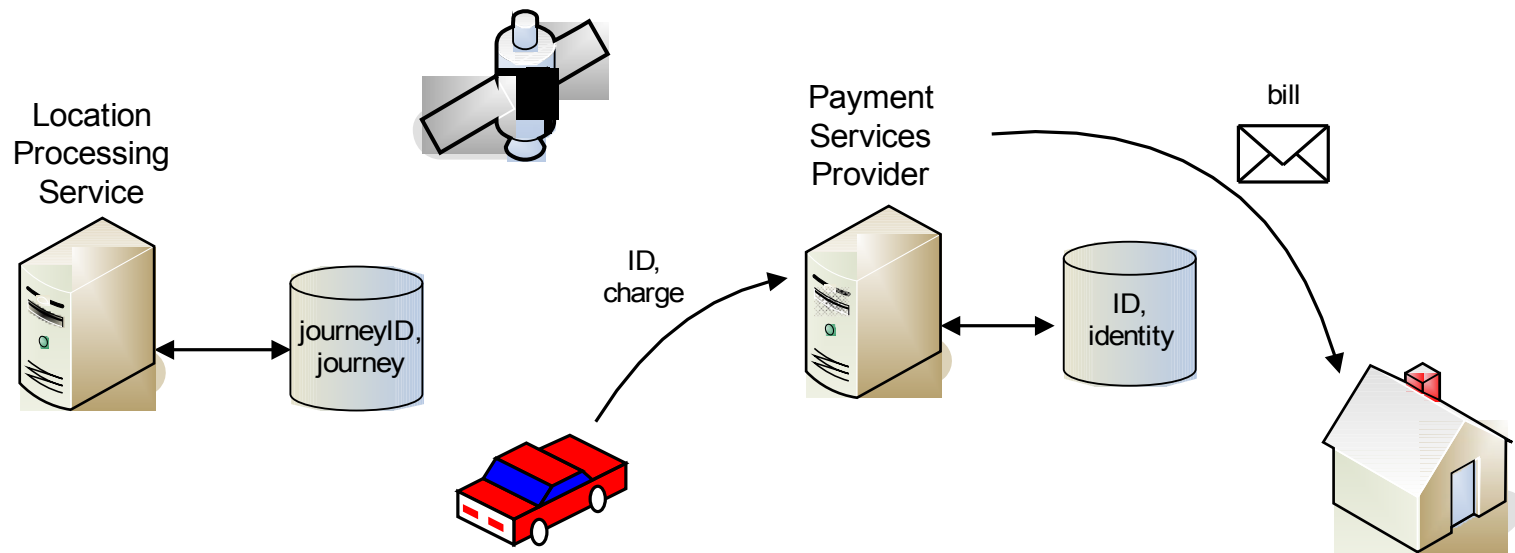
Privacy can be compromised by state-sanctioned intervention, by hackers, and **must** be compromised to issue an itemised bill.

The Trusted Driver Model



Vehicle reports journey information (with journey ID) **anonymously** to Location Processing Service which returns road charge **to the vehicle**.

The Trusted Driver Model



Vehicle sends charge data, with its ID, to Payment Service Provider which looks up the driver and issues a bill.

The Trusted Driver Model

- **Cryptographic protocols** ensure that billing service can trust the vehicle.
- **Journey** and **identity** data only linked inside secure cryptographic module.
- Even people with access to both servers **can't link journey** information to **identity**.
- Now the vehicle is the “Trusted Third Party”.
- Hence the name: Trusted Driver Model

Compliance

- In all cases some level of **compliance checking** is required.
- It seems inevitable that this must require **ANPR cameras**.
- Technology could be designed to check if vehicle was compliant and only identify non-compliant vehicles.
- But this would require legislation.

Government Views

- The UK DfT is not evaluating privacy enhancing technologies as part of the Demonstrations Project. Trials include thin client and thick client.
- Role of EU directives on personal data privacy? 95/46/EC, 2002/58/EC
- German legislation for lorry pricing restricts use of collected data.
- “Sophia Memorandum” and Slovenian Information Commissioner set guidelines.

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Thank you

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Trusted Driver website:

<http://www.trusteddriver.com>

Report and Guidance on Road Pricing - "Sofia Memorandum":

http://www.datenschutz-berlin.de/attachments/596/Roadpricing_engl.pdf?1245751410

Opinion of the Slovenian Information Commissioner on the protection of personal data in road pricing:

http://www.iprs.si/fileadmin/user_upload/Pdf/razno/Opinion_on_electronic_toll_collection_Information_Commissioner_Slovenia.pdf

The Information Commissioner's Office "Privacy by Design" web page:

http://www.ico.gov.uk/about_us/news_and_views/current_topics/privacy_by_design.aspx

and the Privacy by Design report:

http://www.ico.gov.uk/upload/documents/pdb_report_html/privacy_by_design_report_v2.pdf

The Information Commissioner's Office Privacy Impact Assessment web page:

http://www.ico.gov.uk/for_organisations/topic_specific_guides/pia_handbook.aspx

and the handbook:

http://www.ico.gov.uk/upload/documents/pia_handbook_html_v2/index.html

The Cyber Security KTN Privacy Special Interest Group Privacy Engineering whitepaper

http://www.ktn.qinetiq-tim.net/content/files/groups/privacy/CSKTN_Privacy_SIG_White_Paper_08.pdf