Annex C. High level design issues

C.1 Introduction

This annex addresses some of the issues affecting design that go beyond an individual scheme, but that need to be taken into account in formulating scheme designs. In particular, the annex covers issues that affect how a scheme will need to work with other schemes and what can be shared across schemes. The annex's content, intended audience and purpose can be summarised as follows:

- **Content -** the annex describes high level issues that local authorities need to take into account in formulating scheme designs, including:
  - European interoperability directive;
  - interoperability and consistency;
  - common components;
  - privacy and data management;
  - roles of service providers;
  - value added tax (VAT); and
  - links with other services.
- **Target audience -** it is aimed at senior management (e.g. heads of service) and project managers within local authorities and their technical scheme and system design teams working on outline system design and business case development, all of whom need to be aware of the design constraints these issues may impose.
- **Purpose -** the main purpose of Annex C is to inform the target audience about these design issues, in order that they can be taken into account in business case preparation and system design tasks.

C.2 European interoperability directive (2004/52)

C.2.1 Introduction

As indicated in Chapter 2, there are various European directives that impact on road pricing. This section provides further information on Directive 2004/52 on the interoperability of electronic tolling schemes as part as the European Electronic Tolling Service (EETS).

C.2.2 Outline of the directive

EC Directive 2004/52/EC aims to achieve interoperability among electronic road toll systems across Europe. The directive's measures will be required to be met by conventional toll roads and road pricing schemes that use electronic means to communicate with an OBU to collect tolls. Once in full effect, the directive means that owners or drivers of vehicles, if they choose to, will be able to use any electronic road toll or road pricing scheme across Europe with a single OBU, a single account and potentially a single bill.

EC Directive 2004/52 has two principal effects:

- Article 2.1 mandates the use of one or a combination of three technologies - GNSS, GSM and 5.8 GHz DSRC - for all new electronic tolling systems from 1 January 2007; and

- the creation of an EETS which would be complementary to local tolling systems, and would essentially be a set of rules that in principle allow road users to use tolling systems throughout Europe with a single OBU and receive a single bill. Charging scheme operators in the Union would be obliged to allow operators registered with them access to the service and the supporting onboard equipment. The annex to the directive sets out a list of items that the directive must cover. The EETS is to be defined in a decision of the European Commission, approved by Member States, and will come into effect three years after that decision for goods vehicles and five years after for cars. The initial July 2006 deadline for taking the decision was not met and agreement is unlikely to be reached before 2008.

The directive applies to all electronic charging systems for roads, bridges, tunnels and ferries that require an onboard unit. There is an exemption for schemes that are deemed to be small and strictly local, where it is considered that the costs of compliance with the directive would outweigh the benefits. However, these terms have yet to be defined or tested.

C.2.3 Implications of the directive on schemes

The implications of Article 2.1 of the directive are very clear - schemes that are electronic and have onboard equipment will be required to use at least one of the three mandatory technologies. In addition, the use of ANPR is permitted by the directive - both as a primary charging technology (as systems that do not require the use of onboard equipment are not caught by the directive) and for enforcement purposes to support any of the permitted technologies.

The Government has consulted on draft regulations to implement the requirements of this directive, which were laid before Parliament in January 2007. It is transposing Article 2.1 of the directive to ensure that from 2007 new or upgraded electronic tolling systems use one or a combination of the three mandated technologies. The Government is achieving this by introducing a Statutory Instrument *Road Tolling (Interoperability of Electronic Road User Charging and Road Tolling Systems) Regulations 2007*.

The European Commission is yet to provide a full set of proposed requirements for EETS and therefore the precise requirements have yet to be settled on. The implications of the EETS, when it comes into effect, may be summarised as follows:

- scheme owners will be required to make EETS membership available to any vehicle user who registers with them. In effect, this means that scheme owners will need to contract with a third-party EETS provider to offer this service, but the EETS provider will ultimately be responsible for collecting information on use by that vehicle of any other road pricing scheme in Europe; collecting the relevant charges from the user; and remitting them to the scheme owner whose schemes their customer has used;
- scheme owners supporting OBUs will be obliged to accept any vehicle that is an EETS contract holder and to read / acquire the EETS OBU data for the purposes of determining and billing EETS providers for charges incurred by 'external' users;
- these schemes owners will have to have contracted with EETS providers to allow for the recovery of charges. The scheme owner may be required to pay a commission for the collection of this revenue, while the EETS provider may be required to guarantee payment to the scheme; and
- as part of the EETS, there is likely to be an interoperability management authority. The nature of this authority has yet to be defined, but it is likely to consist of representatives of scheme owners, EETS providers, national governments and the European Commission. Its functions are likely to include the specification and approval of compliant equipment; oversight of the contractual arrangements; ensuring the delivery of minimum service standards; and security management.

The UK Government will continue to play an active role in the discussions surrounding the development of EETS, and will make further information available to local authorities as the work develops. In developing business cases, local authorities should assume that there is no current requirement to allow for EETS onboard units from other countries, but that they will need to work within the technology choices this directive sets out. Further, as EETS requirements become clearer, local authorities may need to be able to refine designs.

C.2.4 Other European considerations

In general, the provisions of any charging scheme will need to respect EU treaty requirements, in particular in respect of avoiding discrimination against vehicles from other EU states who are using charging schemes. This requirement will be particularly relevant when considering the treatment of occasional users visiting a charged area. The Eurovignette directive also needs to be considered, as referenced in Chapter 2.

C.3 Interoperability and consistency

C.3.1 Introduction

Interoperability among road pricing schemes is a high priority for Ministers, and an area that will need to be addressed in all system and scheme designs. There are certain aspects of interoperability that will involve conformance with certain specifications. Consistency is more qualitative in nature than interoperability. It concerns making users' and service providers' interactions with different solutions and with different schemes sufficiently similar to minimise the risk of confusion.

C.3.2 Interoperability

The main principle of interoperability is that road users should be able to use a range of different road pricing schemes without the need to register or be equipped separately for each one. It applies particularly to solutions where charging information is collected using onboard equipment and/or where charging is linked to an account.

The Department seeks to promote interoperability among road pricing schemes. Indeed, Ministers have made it clear that interoperability between schemes is a key policy objective as road pricing develops.

The extent to which it is necessary to provide for interoperability is partly dependent on the design of the solutions that make up a scheme. So, for example, for a personal declaration solution the interoperability needs are lower than for a solution that requires a DSRC tag in the vehicle.

In general the conditions of interoperability relate to consistency of vehicle classification, the ease of transfer of data between schemes, and the need to ensure that the means are in place to ensure that payment is collected from users of schemes. These are typically categorised as:

- **technical interoperability:** the capability of different sets of equipment (onboard, roadside, etc.) to work together and be able to communicate information in a consistent and agreed manner;
- **procedural interoperability:** the adoption by different sets of equipment of common data element definitions, procedures for data delivery and presentation formats; and
- **contractual interoperability:** the specification through agreements (including commercial terms) for scheme owners to cooperate and the process by which they do so.

Interoperability includes transferring data among different road pricing schemes so that the charges a user incurs can be accurately calculated and attributed to him and that the income collected from that user can be correctly allocated between respective schemes. This transfer of revenue and the associated contractual agreements are likewise important for interoperability.

These annexes (particularly Annex E) set out various requirements in order to help achieve interoperability between schemes.

In business case submissions, local authorities need to confirm the compliance of their outline system design with the various requirements for technical interoperability set out in Annex E. They need to confirm their willingness to work with the Department and other schemes to achieve procedural and contractual interoperability as they move to detailed design and implementation.

C.3.3 Consistency

Interoperability refers to the ways in which schemes need to work together primarily to serve the objective of a user being able to have a single OBU and a single account. Consistency, on the other hand, focuses more on the user experience.

Users will interact with schemes at various times, in various ways and for various purposes. Where appropriate, it is desirable that these interactions are consistent across schemes. This should help a user's understanding of scheme rules and operating procedures, particularly for those travelling through several schemes.

Areas where consistency is of particular importance are highlighted in Annex E. These cover aspects across all functional areas. For example:

- at registration, it would be beneficial if the kind of information requested were the same for all schemes;
- while driving, it would help if similar signs were used with consistent use of terminology;
- when incurring a charge, driver understanding would be enhanced if some of the basic rules for a scheme were consistent, such as the time a driver has to declare use of a scheme after a charging event;
- it would help the user if the payment options were the same (or at least all included an agreed minimum set), for example via a debit card; and
- if a charge or penalty charge is challenged, it would be beneficial if the procedures were consistent in processing that challenge.

Further, there are many terms used to describe aspects of road pricing schemes. It would improve user understanding if these were used consistently among schemes. For example, it would be desirable if common terms were used for an area or a cordon or if the same terms were used to describe possible peak or off-peak charging periods.

Consistency among road pricing schemes is best delivered by the schemes agreeing on such common terms and operating principles. This should be achievable through consensus development among participating schemes, which the Department will facilitate.

C.4 Common components

Common components are activities carried out above the level of an individual scheme which must be used, or may be used, by multiple schemes. They are largely aimed at achieving consistency and interoperability among schemes or improving value for money. Consequently, the scope and nature of some potential common components may depend on the number, size and scope of road pricing schemes that become operational.

Some common components involve service or support functions. Others will take the form of specifications. The provision of a database (for example, DVLA's vehicles register database) is an example of the former. A national specification for communication between a tag and beacon is an example of the latter. Common components may be provided by the Department for Transport, an external third party, or may be developed and shared among local authorities. Further guidance relating to common components for particular solutions is included in Annex E. Initial discussions on how plans for some of these are progressed will be facilitated through the Systems and Operations Sub-Group of the Road Pricing Local Liaison Group.

A wide range of candidate common components are being considered. Decisions about components that are necessary to achieve interoperability are not heavily contingent on the number and scope of schemes or other current unknowns. Therefore, some of the components necessary for interoperability in solutions that have already been, or will be, deployed can already be identified. They are:

- **national DVLA vehicles register.** All schemes need to be able to identify the registered keeper from a vehicle registration mark (VRM) as a minimum for enforcement purposes. Vehicle registration data may also be used to confirm the characteristics of a vehicle if charges are differentiated by vehicle class;

- **specifications for interoperable data exchange** (e.g. for registration data such as user class, vehicle class and payment means). Annex E describes for each solution, for instance, how registration data might be captured or how schemes may need to provide for bulk data and bulk payment interfaces with service providers. For such data exchanges and interfaces to operate between multiple schemes and multiple organisations, they must comply with common specifications;
- **specifications for a charging tag** (e.g. the DCAS specification for the air interface between a tag and beacon). Such specifications are required to ensure interoperability between tags and beacons from multiple suppliers operating in multiple schemes; and
- **test specifications** (e.g. for testing that systems and equipment comply with the above).

There are a number of other candidate common components. Those that are currently being considered include the following:

- **test and certification facilities.** Facilities are needed where suppliers can submit their equipment, systems and/or services to tests (as defined by the test specifications). This may be undertaken by a trusted authority to establish compliance against the relevant specifications and be certified as being compliant;
- **specification of asset numbering schemes and management of the associated asset registers.** Annex E describes, under the *manage assets* function, the need for assets to be uniquely identifiable within the road pricing domain. The numbering structure and format needs to be specified and mechanisms need to be in place to register assets (such as tags in issue) that are available to all schemes;
- **security regime.** A security policy will need to be defined and mechanisms established to enable secure transactions between parties within the road pricing domain. This is key to ensuring interoperability between schemes; and
- **hotlists** (e.g. for tag management). Hotlists are a mechanism to share information securely among schemes and other organisations to support tag management, enforcement, account management, etc.

Consideration of these candidate common components is continuing. In the meantime, in preparing their business cases, local authorities should assume that these common components will be established and available in a timely fashion to support scheme development at the start of operations. The costs associated with these common components (including how to treat them in business case submissions) need further consideration. More information on this topic is included in Annex G.

Local authorities should develop their business cases based on the assumption that these common components and candidate common components will be available at the appropriate time for their proposed implementations.

C.5 Privacy and the management of data

Concern over privacy presents one of the major risks to the potential success of a road pricing scheme. Links between schemes and functions that cover more than one scheme are essential for interoperability and offer significant potential benefits both for scheme owners and users. However, scheme owners and service providers, as the organisations most likely to be providing services where privacy is an issue, will need to make sure information is gathered and managed with respect to statutory and policy requirements on privacy and associated data use.

Scheme owners will need to have a strategy for handling the information gathered as part of the operation of the scheme. Some of this information will be of a personal nature to users and will be covered by the Data Protection Act, as noted in Chapter 2. This is likely to be of greater significance where users can sign up to accounts.

Scheme designs will need overtly to address these privacy concerns within sensible bounds of practicality and cost. It is not necessary to have exactly the same regime for all users, but is important to offer at least one solution that is available to all potential users that maximises privacy (e.g. providing for cash payments

in a personal declaration solution, as detailed in E.3). In addition, scheme owners will need to consider carefully the privacy implications of offering itemised bills.

Scheme owners need to state clearly the uses to which data will be put. The Government will publish further guidance in due course but local authorities' business cases must not assume that data collected as part of the running of the scheme can be used for any other purpose. In particular it cannot be sold on to defray collection costs.

Business cases will also need to account for the cost and logistical implications of data retention and storage. In general, personal information should be retained for the minimum period necessary to assure compliance with scheme rules and statutory requirements. Some information may be retained for management of contracts and for monitoring the impact of the scheme on traffic flows and patterns. The privacy requirements relating to this data are clearly pertinent throughout.

Local authorities should include in their business case submissions indications of how privacy and data retention issues will be accommodated in the design of individual solutions. They should also include an indication of the privacy policy that may need to be in place once a scheme is in operation.

C.6 Roles of service providers

Participation by private sector organisations in road pricing could potentially help schemes operate efficiently and meet a range of user needs. This may be achieved most effectively via a service provider market.

Service providers are distinct from contractors. Definitions of these terms are included in the glossary in Annex H. They are also set out here:

- **Service providers** may act primarily on behalf of schemes or on behalf of users. They are defined as providers of services associated with road pricing that are specified largely or wholly by the service provider and, typically, are offered under the service provider's own brand.
- **Contractors** may also provide services associated with road pricing. But, in this case, the services are wholly or largely defined by a contract signed with, and specified by, the scheme owner (or other authority) and if offered to users are typically offered under the scheme's brand (not the contractor's own brand).

There are a number of ways in which service providers could potentially contribute to a road pricing scheme. These all involve providing a service that in some way provides a link between the user and the schemes. Service providers will need to meet minimum requirements pursuant to the interoperability and consistency objectives for national road pricing and, if a viable service provider market is to be encouraged, there needs to be consistency and interoperability in the way that schemes interface to service providers. This need is reflected in more detailed guidance in subsequent annexes.

At this stage, five key areas have been identified where service providers could potentially contribute to relevant solutions in both event-based and TDP-based road pricing. These are:

- Registration - capture, verification, provision and maintenance of registration information for schemes regarding:
  - user class (users' eligibility for discounts);
  - vehicle class (vehicle characteristics by which charges are differentiated); and
  - payment means (e.g. account or credit card details for payment of charges).
- Distribution and fitting of in-vehicle equipment.
- Declaration of charge liabilities to the scheme.
- Collection of payment (e.g. account administration, payment processing and debt management).

- Charging services (calculation from raw location data of passages / journeys / distances / routes (according to scheme rules) and the resulting charge liabilities).

A sixth area is more applicable to wide-scale or TDP-based road pricing. It concerns compliance services, which cover the capture of independent sightings of vehicles by, for example, fixed and mobile cameras, through to help for schemes to monitor compliance and detect charge evaders.

In developing their business case submissions, local authorities will need to describe their overall strategy in relation to service providers and show how, and to what extent, they may encourage and facilitate service provider interaction with the scheme owner, with each of their selected solutions.

C.7 Value Added Tax (VAT)

The way in which a scheme is designed will have an impact on which aspects are likely to attract Value Added Tax. This is an area where further analysis is progressing. Local authorities should work on the following assumptions at this stage in preparing business case submissions:

- where local authorities levy and collect road user charges directly from the users, it should be assumed that road user charges will not be subject to VAT;
- if a third party is used to collect charges from road users, the need to charge VAT depends on the relationship between the local authority and the third party. One of the pertinent issues in this case is whether that third party is seen as acting as an agent of the scheme or as a re-seller.

This issue particularly needs to be taken into account by local authorities when considering and planning the role of service providers and contractors within their road pricing scheme. The Department will provide further advice on this area in due course.

C.8 Links with other services

In developing road pricing scheme designs, local authorities may wish to look at linking some functions with related functions in other services in order to achieve efficiency and help user experience. Local authorities are free to do this as they see fit to suit local circumstances.

Examples of where there may be advantages in linking with other services (such as parking, enforcement, public transport ticketing, traffic monitoring etc.) include:

- sharing of services (for example, using wardens that are helping to enforce a range of civil traffic offences to capture information from vehicles that could also support road pricing compliance functions); and
- integrated user services (for example, integrating road pricing user support services with other similar user support services operated by local authorities).

If a local authority incorporates such links within its outline system design, its business case submission should clearly indicate what the links are, the rationale behind them and the potential benefits or efficiencies that will result, as well as any associated risks.

Annex G provides information on how the costs associated with such links need to be articulated in business case submissions.