ElectraLink

The future of ElectraLink's regulated Data Transfer Service

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Prepared by PA Consulting Services Limited for ElectraLink

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Executive Summary

Background

An EU directive mandates that all domestic and small business consumers of gas and electricity should have smart meters by 2022. The UK Government has determined that for Great Britain, this requirement will be fulfilled before 2020 and has created the Smart Metering Implementation Programme (SMIP) to deliver the technical specifications for the smart meters and define their roll-out. The SMIP intends to establish a Data Communications Company (DCC) to manage all interactions with smart meters. Significant work has been undertaken by the SMIP on the establishment of the DCC and how it will communicate securely with the individual smart meters. Work to examine intra industry operability and the impact of smart metering on existing market processes and data communications has only recently commenced.

Introduction

ElectraLink currently provides the infrastructure and services (the Data Transfer Service) to support the complex interrelationships between parties in the retail electricity market and has been actively involved in the industry debate thus far. ElectraLink provided its first report to the Department of Energy and Climate Change (DECC) on the potential for the use of the Data Transfer Network (DTN) to facilitate interoperability between Market Participants at the end of June 2011. This initial report focussed on the changes to the legal and regulatory framework. ElectraLink committed to provide a further report, which examines the technical, security, risk and business case for the DTN to connect Market Participants to the DCC.

ElectraLink initially engaged PA Consulting Services Limited (PA) to produce an independent report that would help it understand:

- Market Participants' requirements in respect of the way that information will need to flow to and from the DCC and between industry parties;
- the appetite for a single or multiple means of communication with the DCC to and from both gas and electricity parties;
- the technology change that would be required to its infrastructure, and the associated consequential costs, if ElectraLink were to offer this service to the market; and
- the comparative cost to implement a new Greenfield solution and the associated infrastructure to provide these services.

The DCC and its services have not yet been fully defined and both are under consideration by the SMIP. As a starting point, PA used information from the SMIP Project Information Memorandum, published in July 2011 to assess potential data exchanges between participants for the initial version of the report. Further information was provided by SMIP at the meeting with ElectraLink, which showed that the programme's thinking had developed further. New data flow and volumetric information provided by SMIP has been used to develop this revised report. The requirements for data exchange may change, as the SMIP continues with its analysis of market processes. To supplement its work, PA engaged with Market Participants to elicit views on future requirements but in many organisations, thinking is still in the very early stages. This has necessitated PA making a range of assumptions about how the DCC may operate and hence, how data exchange may work in the future. These assumptions are set out in Appendix C of this report.

Approach

In order to establish Market Participants' future data exchange requirements, PA adopted a three-pronged approach:

- Engaging with stakeholders to identify possible future requirements;
- Considering and identifying the technology for the DTN and a Greenfield Service provider[1] to deliver the requirements; and
- Estimating the costs for provision by an enhanced DTN (based on information from ElectraLink's current third-party service provider).

In assessing Market Participants' needs, we investigated how their requirements would evolve over the three main stages of SMIP:

- Foundation (pre-DCC) from now until 2014;
- DCC Established from 2014 until 2017; and
- DCC incorporates registration 2017 onwards.

Interviews with Market Participants were conducted in July 2011 with an undertaking of confidentiality, hence, neither the names of those organisations that participated nor identifiable specific comments are provided in this report. As part of the engagement process, PA met with one or more of the following industry participant types:

- "Big Six "gas and electricity Suppliers;
- Niche electricity Suppliers;
- Electricity and Gas Distribution companies;
- Supplier Agents;
- Potential Energy Service Companies (ESCOs);
- Industry representative groups; and
- Central market bodies.

The Data Transfer Network

Both the electricity and gas markets in Great Britain have arrangements that require Market Participants to exchange data with each other and with central bodies to ensure that billing and settlement can occur in a timely and progressively more accurate manner. The data that is exchanged relates principally to meter readings, technical information about the meters and registration information (i.e. which Supplier is registered to a particular meter). The DTN connects all retail electricity Market Participants to facilitate this flow of information. ElectraLink also offers, on a commercial basis, a broader set of data transfer services which means that a proportion of gas Market Participants are also connected to the DTN.

The implementation of smart meters potentially changes the amount, nature and granularity of data that is available and is likely to lead to entirely different arrangements for the metering point registration and settlement of retail markets. However, it must be remembered that:

[1] In this context, Greenfield refers to the development of a new service to provide data exchange services between the DCC and Market Participants.

- any centralisation of registration processes developed as part of the SMIP programme is not scheduled to be complete until 2017 at the earliest;
- the installation of domestic smart meters across Great Britain is not scheduled to be complete until late 2019;
- domestic consumers can choose to neither allow access to their consumption data nor even to have a smart meter installed;
- Suppliers have the choice to use or not to use the DCC for Small & Medium Enterprise (SME) customers;
- Interactions between Market Participants and their agents (Data Collectors, Data Aggregators, Meter Operators and Meter Asset Managers) will not be provided through the DCC; and
- Current half-hourly metered (electricity) and daily metered (gas) customers (the largest consumers of electricity and gas) are not within the proposed auspices of the DCC. The DTN is currently the only regulated means of ensuring that the retail electricity market can continue to support interoperation with respect to these customers.

Given all of the above, the **Data Transfer Service and its associated network will continue to be required for the foreseeable future** to facilitate the continued operation of the retail electricity market.

Identified Requirements

Discussions with Market Participants confirmed the widespread recognition of the above position of the Data Transfer Service, i.e. that it will continue to play a central role in the processes to facilitate interoperation in the retail electricity market, as long as the arrangements for the market remain substantially in their current form.

In addition to a range of technical requirements for data exchanges with the DCC and other parties, those that participated in this review expressed a number of common themes around the type of service that they desire. These include:

- **Cost-effective** data transfer;
- **Re-use rather than re-invent** - given previous timescales and costs for developing and implementing new networks; and
- **Single means of access to the DCC** - this was of particular importance to dual fuel suppliers, who currently have separate communications infrastructures for each commodity and were keen to promote a single method of access to the DCC for gas and electricity thus reducing costs and providing the means to improve and standardise processes such as Change of Supplier.

Market participants also identified a number of new and revised requirements for data exchange. The majority of these apply once the DCC becomes operational (scheduled for 2014). In summary, three new groups of requirements have been identified:

- Scheduled communications;
- Near real-time data exchanges; and
- Online Access.

The table below provides a definition of the each of these groupings and examples of the type of data exchange in each such group. The following sections summarise the key matters in relation to these requirements.

Key Requirements

Requirement Group	Definition	Examples
Scheduled Communications	• A data exchange characterised by longer response times (minutes and hours) and generally large volumes of data. Could be a periodic requirement (e.g. daily, weekly, monthly) or could be an "on demand" requirement for which the response time is not needed to be immediate.	• Meter readings required for settlement • Meter technical details • Diagnostics report (low priority)
Near real time	• Data required to be sent to or obtained from a meter within a few seconds.	• Alerts (Tamper, Off Supply etc.) • Credit updates for pre-payment • Access Control
Online Access	• Authorised Parties "log-on" to the DCC systems to retrieve or upload data. Could be to meet immediate (i.e. near real-time) timescales or longer depending on the nature.	• Providing instructions to the DCC to undertake a schedule of actions (roll out security patch, read all meters monthly etc.) • Obtaining meter readings to address customer enquiry • Diagnostics report (on demand) • Tariff updates • Remote disconnect

Depending on how systems are designed and implemented for the DCC, a number of the above examples for near real-time and online access could fall into either category. For the purposes of this report we have assumed that near real-time data exchange requirements will be limited to alerts (where the meter generates a "message" which needs to be processed and delivered to the required recipient(s) within seconds) and credit updates. Both of these data exchange requirements are generated in response to an external event. For on-line access we have assumed data requirements will be initiated by a party rather than an event.

All parties recognised the need for data exchanges to be highly secure and that a dedicated business-to-business network would be required to deliver the levels of security and availability required. However, the majority of parties reported that they expected DECC, through SMIP, to specify the security standards to which they would adhere.

Technology Path

The DTN uses a distributed architecture, with Gateways at some customer sites and provides a managed data transfer service with intelligence in-built to perform a number of functions, such as:

- Intelligent file management based upon business data;
- Central management of encryption and security keys rather than by individual companies; and
- Automatic management of re-tries, re-sends and re-collections rather than each party having to develop its own applications.

We have examined the extent to which the DTN can scale its existing technical architecture to support the data transfer requirements of the DCC. In addition to scaling its messaging capability, an enhanced DTN would need to introduce bandwidth-only services, carried over the same network infrastructure, to support the requirement for online access.

The DTN already connects to all parties in the retail electricity market and to all of the large gas Suppliers and some Gas Transporters. Based on information pertaining to the number of Market Participants provided by ElectraLink, it would need to be extended to connect:

- the DCC and Xoserve with high volume links;
- 20 Gas Transporters;
- Up to 102 gas supply companies; and
- An indeterminate number of Energy Services Companies (ESCOs).

The DTN would need to gradually upgrade its bandwidth to manage the expected increase in data volumes that DCC data transfer will require. Of the new parties to be connected, we estimate that the 4 Gas Transporters who own the major Gas Distribution Network Licences will need to be connected via a high volume gateway; the remainder of parties will have low volume connection needs that are likely to be met by secure VPN connections. The parties that we assume will require connection to the DCC are detailed in Appendix C.

A summary of existing and required connections to parties is provided in the table below, physical connections for high volume connections would need to be duplicated to provide the required level of network resilience.

Data Transfer Network - Connections[2]			
Party Type	**Total Connections Required**	**Existing Connections**	**Required Connections**
Very high volume parties	3	1	2
Gas Transporters	28	8	20
Gas Suppliers	126	24	102[3]
Electricity Distributors	28	28	0
Electricity Suppliers	76	76	0
ESCOs[4]	19	0	19
Total	**280**	**137**	**143**

View of existing and new DTN links required to support Market Participants

[2] Electricity parties calculated from current DTN user base.

Gas parties sourced from Ofgem website http://search.ofgem.gov.uk/search.aspx?aid=6581&pckid=755724950&pt=6018936&sw=enoi

[3] Many gas suppliers do not currently supply to the domestic market and may therefore not need to connect to the DCC.

[4] Recognising that many current supply companies may acquire ESCO licences and would therefore be covered by the connection to their supply business

Approximately half of the parties that will require a connection to the DCC are already connected to the DTN.

Greenfield Solution

One potential solution for the GB energy industry to exchange data with the DCC would be the acquisition and commissioning of an entirely new network that is dedicated to DCC communications.

A Greenfield network would be designed specifically to meet the needs of smart metering communications with Authorised Parties. It would need to connect all authorised parties via resilient communications links and would require applications logic to manage the flow of data in both directions and to ensure the security of those communications.

A full programme of physical installation and commissioning of the new communications links would be required to ensure that all relevant parties have the appropriate connections. A Greenfield solution would also require the design, development, testing and trialling of a new suite of applications. Based upon previous industry experience of procuring and commissioning new data transfer networks, this is likely to be a complex and time consuming undertaking compared to expanding an existing industry network, such as the DTN.

Portal Solution

The solution that has been proposed by potential DCC Service Providers and which is under consideration by the SMIP, comprises a 'Portal' that would be provided at the DCC, with Market Participants being required to arrange for their own connections to that Portal and the concomitant management and IT processes that this would involve. Headline costs for the DCC would be lower under this solution but cost, time, effort and risk are likely to be pushed onto individual Market Participants where they are less visible but potentially greater.

The table below provides a comparison of the differing approaches that would need to be adopted between providing a 'Portal' solution and using the DTN to deliver data between the DCC and Market Participants.

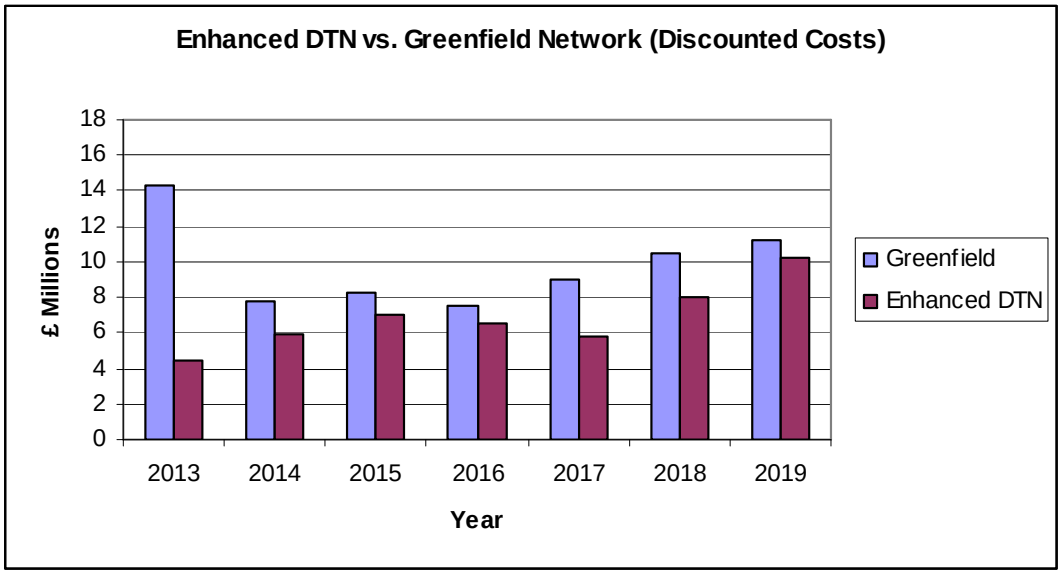
Area of Impact	Portal Solution	Enhanced DTN
Message Validation	New development - DCC and all participants	Standard feature
Communications Lines	Individual procurement by each Market Participant and ongoing management of commercial relationship and upgrade path with provider	Provided as part of the standard DTN package. Central procurement likely to be more cost effective overall
Testing	Full commissioning tests of new lines at each participant and commensurate connectivity and functional testing at both the DCC and participant ends.	Approximately 50% of the required connections are already in place, and operational. Tried and tested routines for implementing new connections DCC treated the same as any new party wishing to connect to the DTN.

Disaster Recovery	All participants would need to switch their own communications lines to the DDC disaster recovery site should there be a need	Automatic switching of all communications as a standard feature
Re-send/Re-collect	DCC may have to re-collect data to re-send to participants Participants would need to develop their own routines and procedures to manage file re-sends	Standard features of the DTN Files can be re-sent without data regeneration and re-collected without the sender having to re-send the data.
User Management	New routines at DCC and Market Participants	Standard feature of the DTN. Participant ID and Role Codes could be used to provide the DCC with pre-validated messages
Audit Trails	DCC and Market Participants would both need to develop processes and software to manage audit trails	Standard feature of the DTN that logs all messages in a robust manner
On-line services	Not proposed under the Portal Solution. Probably more of an issue for smaller participants with less mature IT systems	Some online services already exist within the DTS. Both development and operational costs would be shared across the industry rather than being incurred by each Market Participant.
Security Architecture	Internal Architecture within the DCC but participants would need to manage security between the DCC, across the connection and through their firewalls.	End-to-end architecture provided as standard. Would start within the DCC and extend beyond the participants' firewalls.
Message Translation	Would need to be developed from scratch by the DCC Service Provider	Can already be partially delivered by the DTN and could be expanded to cover remaining gas market messages and new messages to/from DCC
Experience	New Service Provider unlikely to be completely familiar with data transfer requirements around the gas and power markets and would therefore be likely to incur a significant learning curve	Experienced personnel, some of whom have operated the service since its inception in the 1990's

Comparative Costs

Our assessment for Greenfield provision has been made on a fundamentally different architecture to the DTN. For Greenfield, we have assumed the simple provision of network connectivity and bandwidth, which assumes more processing at the centre and that all Market Participants will manage data transfer within their own organisations. As the nature of the DCC architecture has yet to be determined, high-level assumptions have been made regarding the architecture. We have assumed a centralised server architecture, suitably dimensioned to meet the estimated volumes of data required to be processed and delivered. We base this upon our views of the likely offering in the external marketplace, to meet the needs of DCC communications with Market Participants.

A Greenfield solution will require upfront investment to establish both the physical links to participants and the network operations centre, which will manage the overall network and the applications that serve it. Enhancing the DTN will require upgrades to the IT infrastructure and the communications lines over a longer period. A comparison of the estimated costs for the Greenfield solution and the enhanced DTN approach is provided in the figure and table below.



	Foundation	DCC Established			DCC Incorporates Registration			Totals
	2013 (£M)	**2014 (£M)**	**2015 (£M)**	**2016 (£M)**	**2017 (£M)**	**2018 (£M)**	**2019 (£M)**	**(£M)**
Greenfield	14.25	7.77	8.29	7.50	8.98	10.42	11.21	**68.42**
Enhanced DTN	4.43	5.93	7.06	6.52	5.83	8.01	10.24	**48.02**

Comparative incremental costs of Greenfield provision versus enhanced DTN

In overall terms, we estimate the cost of a Greenfield service will be in the range of £20 million (discounted) more than enhancing the DTN in the period from 2013 to 2019. Additionally, the industry would still continue to incur the current costs of the Data Transfer Service, at around £4.5m per annum, for as long as the DTN is required to support the current settlement arrangements.

Conclusions

Our assumption that the industry will require the continued use of the Data Transfer Network for the foreseeable future has resonated with Market Participants. Participants recognised that:

- current half-hourly metered customers are not covered by the SMIP and therefore all flows relating to meter readings, registration, change of supplier etc will need to continue;

- settlement of the current non half-hourly market will need to continue using the current arrangements until sufficient customers have had smart meters are installed and the market arrangements have changed;
- domestic consumers can choose not to have a smart meter installed; and
- Suppliers have the choice to use or not to use the DCC for SME customers.

Consequently, whichever solution is ultimately chosen for the DCC to communicate with Market Participants, the current Data Transfer Services will need to be maintained.

Our high level analysis suggests that an enhanced DTN will be the most effective means of Market Participants communicating with the DCC. Our reasons for this conclusion are set out below.

The DTN meets Market Participants' commercial imperatives

From our engagements with Market Participants, we identified some high-level commercial drivers for the optimal solution to connect to the DCC, these were:

- **Cost-effective** - Our high level analysis suggests that the DTN offers a cost-effective solution to the GB power and gas sectors. The DTN would appear to offer a more cost effective solution than the procurement of a Greenfield Network. It is impossible at this stage to provide a direct cost comparison between enhancing the DTN and the provision of a 'Portal', given that we have not had access to the provisional cost estimates provided to SMIP by potential DCC Service Providers and more significantly that the Portal Solution takes much of the cost out of the DCC and pushes it onto individual Market Participants, where much duplication of effort will necessarily be incurred. In our view, this is likely to be more significant on smaller participants than on larger participants with mature IT systems and infrastructure;
- **Re-use rather than re-invent** - The DTN is capable of re-use to provide the desired services due to its fundamental design and its ability to provide inter participant data exchange. It is well known by Market Participants and has strong governance and robust change processes that are well understood; and
- **Single means of access to the DCC** - All potential solutions considered in this report could provide a single means of access to the DCC for both gas and electricity transactions.

The DTN meets Market Participants' technical requirements

- **Scheduled communications** - this is the core of the current DTN and has proven effective over the years since the introduction of retail competition into the electricity sector
- **Near real-time messaging** - this is currently available on the DTN and being demonstrated to Market Participants - it would require the introduction of 'class of service' across the network to assure priority of these messages over scheduled messages
- **Online access** - the DTN already provides this type of access to its users for current services e.g. webtools

Whilst the precise nature of the requirements is still unknown, the DTN currently provides all of the types of service that are required by Market Participants.

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1 Introduction

The installation of smart meters for all domestic consumers in Great Britain (GB) by 2019 is a key UK Government objective and a large programme of work, headed by the Department of Energy and Climate Change (DECC), is now underway to address this challenge. Part of the wider challenge that smart meters pose to the GB gas and electricity industries is how their implementation will affect the way in which the respective markets operate and how Market Participants will exchange data with each other in order to allow accurate and timely settlement. As the roll-out of smart meters progresses and the Data Communications Company (DCC) is created to facilitate communications with such meters, new services and products will be developed by existing and new Market Participants. These services and products will generate new requirements for data and information to be exchanged between Market Participants, creating a need to facilitate such exchanges.

ElectraLink sits at the heart of the GB electricity industry, providing the means by which all Market Participants exchange the necessary data to allow the retail market to be settled promptly and efficiently. This service - the Data Transfer Service (DTS) - is a regulated requirement placed upon Distribution Network Operators via a Licence obligation which they discharge through ElectraLink. ElectraLink also provides services (on a commercial basis) to gas suppliers and their agents.

In the context of smart meters, the role of the DCC in being the central hub for all communications with such meters for the domestic electricity and gas sectors is under development by the Smart Metering Implementation Programme (SMIP). The primary focus of the SMIP has been to define the programme to install up to 50 million smart meters, the creation of the DCC to mange access to those meters, the specification of the meters themselves and the definition of the security arrangements that will need to be in place between the DCC and the smart meters with which it connects.

As a service provider to the energy sector, ElectraLink wishes to understand the requirements of its stakeholders in terms of how they wish to send data to and receive data from those smart meters via the DCC. There are a number of drivers for this:

- Smart meters provide the opportunity for significant quantities of new data to be made available to customers and the industry, however, a mechanism to facilitate communication of such data to the industry needs to be defined;
- Access to smart meter data needs to be assured, secure and controlled on both sides of the DCC (i.e. from the market to the DCC and from the DCC to the meter);
- The nature and volume of data available is likely to require new methods of data exchange;
- The availability of such data provides opportunities for improvements to the operation of the retail gas and electricity markets so as to streamline industry processes and procedures such as the Change of Supplier process; and
- Provides opportunities for new services to be provided to consumers through new organisations such as Energy Services Companies (ESCOs).

Given this context, ElectraLink engaged PA Consulting Services Limited (PA) to conduct a series of meetings with its stakeholders to assess potential high-level requirements of the

regulated DTS during and after the implementation of smart metering, and the associated creation and implementation of the DCC. In addition, PA was further tasked with:

- identifying the possible high level technical architecture changes required to the Data Transfer Network to deliver the newly identified requirements; and
- estimating the costs which would be incurred by ElectraLink implementing solutions to meet the identified stakeholder requirements - considering both direct and indirect costs.

The majority of the new data exchange requirements were anticipated to relate to data and information required to flow to/from the DCC to/from Market Participants, with some additional inter-participant flows being envisaged. In order to establish a comparator for the provision of such new data exchange requirements by ElectraLink, PA was also asked to estimate the cost which a new service provider would incur to provide the requirements to exchange the identified data requirements between the DCC and Market Participants.

This report outlines the approach PA adopted to deliver the above requirements, summarises the requirements identified through discussions with a variety of existing stakeholders, and provides the requested high-level technology and cost estimations. The remainder of this document is structured as follows:

Section 2 further describes the DTS, the likely future market developments and the scope of work undertaken by PA;

Section 3 provides a high level overview of PA's approach to delivering the assignment;

Section 4 summarises the data exchange requirements identified through the stakeholder engagement process;

Section 5 examines the changes to the technical architecture necessary to deliver the new data exchange requirements;

Section 6 estimates the costs ElectraLink would incur in delivering the new requirements;

Section 7 describes how the provision of a message based 'Portal' at the DCC might impact Market Participants;

Section 8 provides an estimate of what would be required to commission a dedicated Greenfield network to provide these services; and

Section 9 draws conclusions based upon the preceding information.

In addition there are a series of Appendices referred to in the above sections.

2 Background and Scope

This section provides a brief summary of the context for the work undertaken by PA and sets out the precise scope of work undertaken.

2.1 The Data Transfer Service

The deregulation of the retail electricity supply market in 1998 created a requirement for significant volumes of data to be transferred between Market Participants to facilitate the settlement of retail electricity trades for in excess of 22 million electricity consumers. ElectraLink was created by the DNOs in order to discharge their License requirement to deliver a service (the Data Transfer Service or DTS) to facilitate data exchange between Market Participants. The service provides a network and associated services, which connects all electricity Suppliers and their various agents (Meter Operator Parties (MOPs) and both Half-Hourly and Non Half-Hourly Data Collectors (HHDC and NHHDC) and Data Aggregators (HHDA and NHHDA)), ELEXON (on behalf of the Supplier Volume Allocation Agent - SVAA), all DNOs (in the context of ownership of Registration Systems and in their capacity as network operators in order to bill for use of the distribution networks) and various other central service providers. The service facilitates the necessary data flows to enable settlement in accordance with the requirements of the Balancing and Settlement Code.

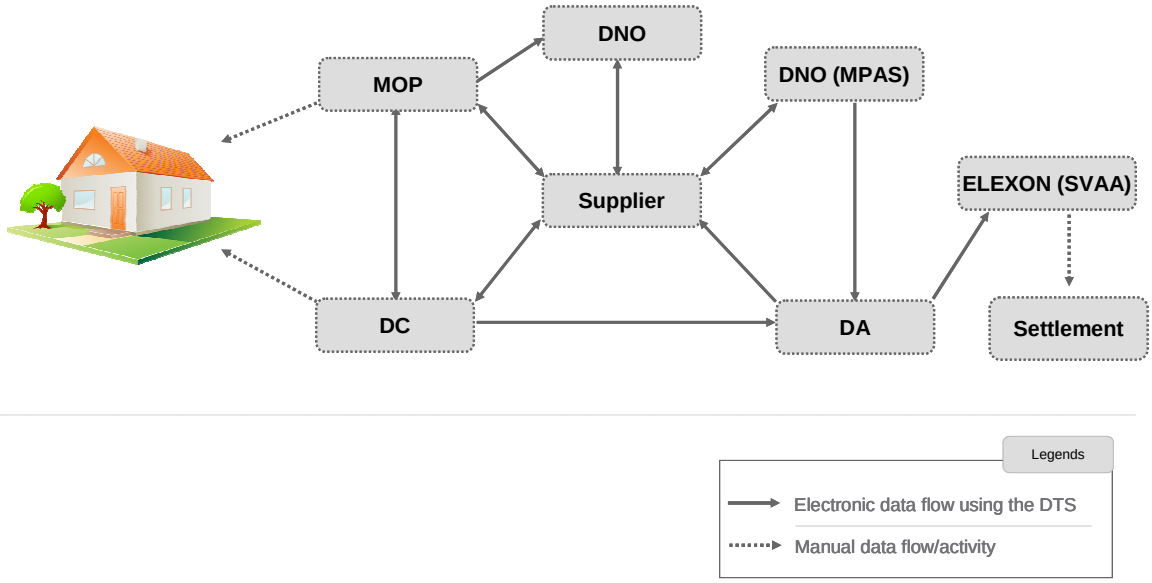

Figure 1 - Schematic representation of electricity retail market message exchanges

Since its creation, ElectraLink has provided the DTS successfully by procuring and managing its provision from third-party service providers. The service delivers industry files sent in a batch oriented manner against specified service level requirements[5]. The network is secure and ElectraLink is unaware of any breaches of data security having occurred since its implementation in 1998. ElectraLink advises that service level requirements are exceeded as a matter of course. Figure 2 below is an extract from a recent DTS Operations Reports demonstrating the service levels achieved - ElectraLink advises that this figure is typical of the achieved service levels.

[5] 100% of files to be processed in 4 hours with targets of 99% of files in 2 hours and 90% in 10 minutes.

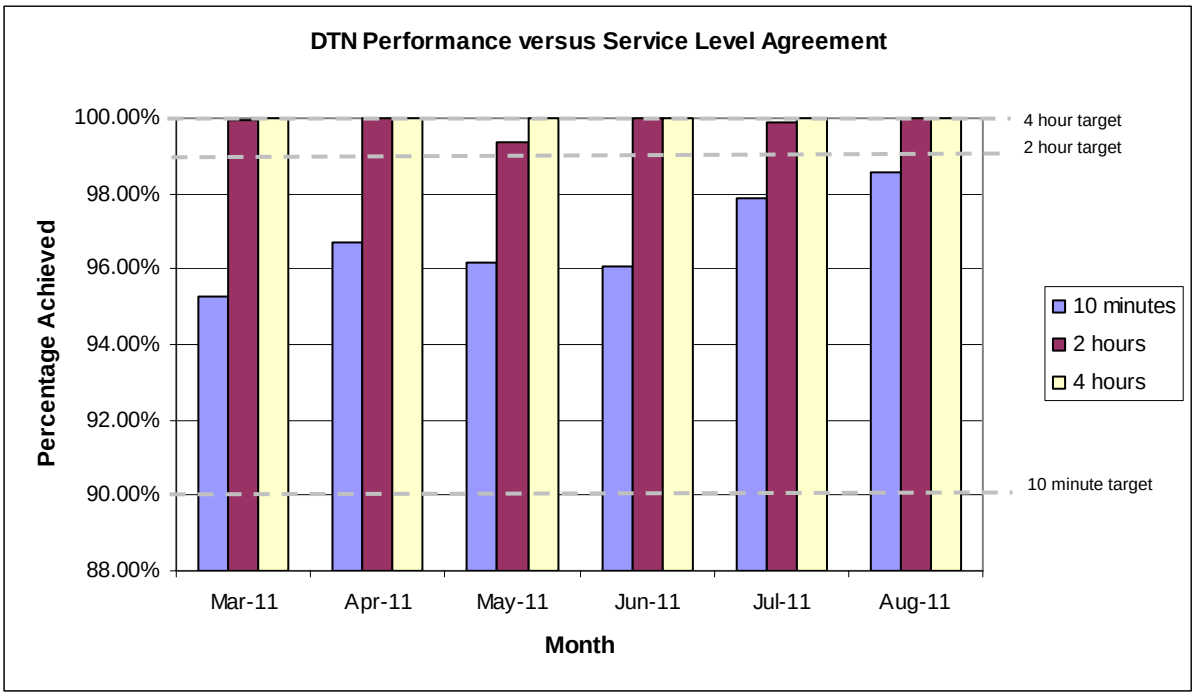

Figure 2 - Extract from DTS Operations Reports showing percentage of delivered messages within targets[6]

The nature and structure of the files, managed over the DTN, are defined in the Data Transfer Catalogue (DTC) and the DTN processes flat files via File Transfer Protocol (FTP) to support processing by Market Participants in their internal systems. The DTN is based on a Multi Protocol Label Switching (MPLS) network, which is protocol agnostic, hence, the DTN also currently supports web services. Furthermore, whilst the existing transfer processes require batch delivery against service levels measured in minutes and hours, the DTN is able to process real-time messages across its network.

Since its creation, ElectraLink has gradually expanded its service offerings and now provides commercial services in addition to the regulated services. While the regulated services are currently confined to the electricity market, the commercial services ElectraLink provides are to both the electricity and gas sectors.

ElectraLink has a continual programme of investment in the service in order to ensure that all service levels are met and to introduce new features. In addition to this ongoing investment, ElectraLink has completed a number of major technology refresh activities, including:

- Central application upgraded to ICAN (Integrated Composite Application Network);
- Migration of all communications links to Next Generation Network from its communications service provider;
- Network sizing increased by a factor of 16 since implementation in 1998;
- Migration to a new, green data centre in Wynyard;
- Upgrade to Oracle 11i; and
- Replacement and re-engineering of all central service hardware.

[6] Data provided by ElectraLink

In addition to the above, the following technology refresh activities are partially complete:

- Replacement of all customer-site Gateway hardware - to be completed in October 2011; and
- Replacement of the Disaster Recovery Router option (used by 17 DTS customers) with new technology - to be completed Q1 2012.

2.2 Other existing data transfer mechanisms in the energy sector

There are two other 'data transfer networks' in the GB energy sector:

- The Central Volume Allocation (CVA) network, which connects electricity generators, suppliers and traders to manage the wholesale electricity market and the balancing mechanism; and
- The IX network, which connects gas Market Participants to manage the GB gas market.

By comparison with the DTN, which facilitates participant to participant data flows, neither the CVA nor IX networks allow direct participant to participant data exchange. Both CVA and IX were created as bi-directional hub and spoke networks to allow Market Participants to communicate to and from a single central party (National Grid for the Balancing Mechanism and Xoserve for gas market related messages, respectively). This means that neither network is designed for nor suited to inter-participant data exchange. Furthermore, the industry coverage of both of these networks is limited to a single commodity, whereas the DTN provides both gas and electricity services.

2.3 Future context

An EU Directive mandates that all European gas and electricity customers will have smart meters by 2022. The UK Government has determined that this will be achieved by 2019 in Great Britain and has set in place the Smart Metering Implementation Programme (SMIP) under the auspices of DECC. As part of this programme, a Data Communications Company (DCC) will be established to retrieve consumption and other information[7] from all gas and electricity smart meters installed in domestic premises and will optionally provide the same services for Small and Medium Enterprises (SME), where the Supplier to those premises chooses the DCC as its communications provider.

[7] As well retrieving consumption information, the DCC will retrieve technical information, alert/alarm data and facilitate the transfer of information such as tariff data and billing information to smart meters. The full scope of data and information to be retrieved from and uploaded to smart meters is currently being finalised by the SMIP.

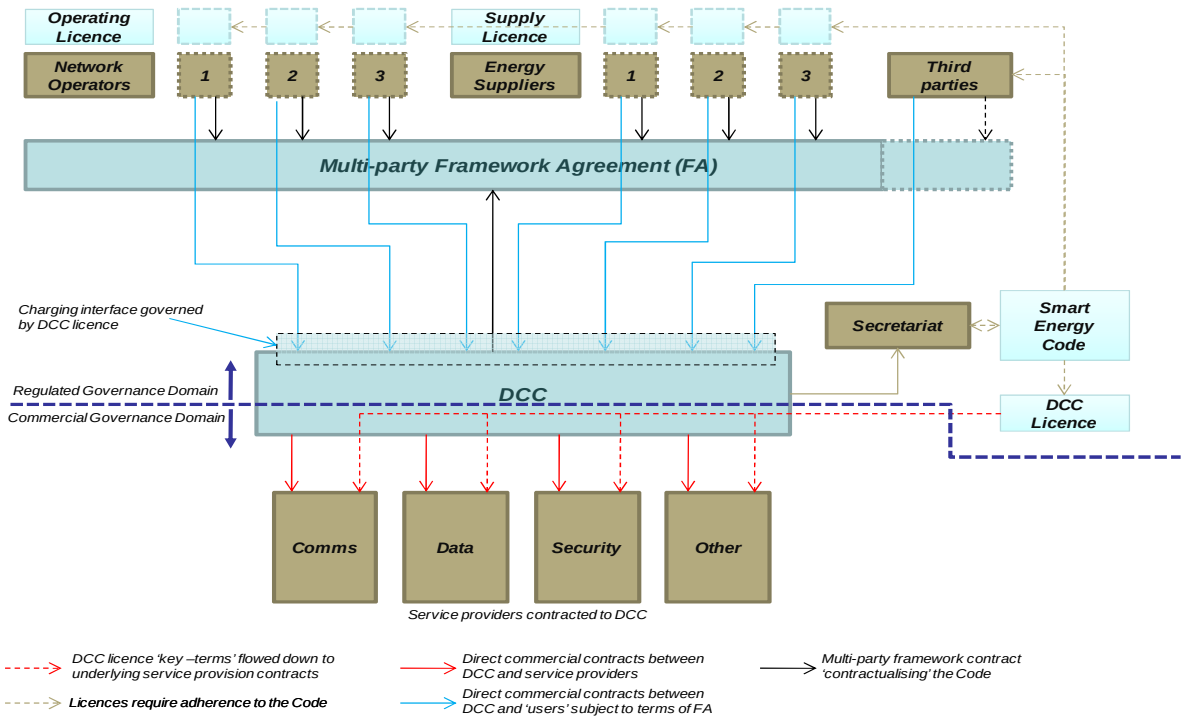

Figure 3 - DCC Context

(source: DECC SMIP - Project Information Memorandum, 7 June 2011)

To enable the operation of the gas and electricity retail markets, data will need to flow from the smart meters, via the DCC to authorised parties, such as Suppliers, while other data and information, such as tariff information will need to flow from such authorised parties to the smart meters. Market arrangements that were designed for a world where real consumption data from domestic consumers was only available in aggregated form a few times a year, will need to be changed extensively to facilitate the use of half-hourly consumption data. The roll-out of smart meters and the implementation of the DCC will, therefore, give rise to new data exchange requirements between the DCC and authorised parties and between authorised parties themselves. It will also require changes to be made to existing data flows over the DTN and IX.

2.4 Future of the DTS in this context

Regardless of any new requirements, which arise as a result of the implementation of smart meters and/or the DCC, Market Participants in the electricity sector will still need to exchange data between themselves and with central market bodies, such as ELEXON, to allow the continued settlement of the retail market. All electricity Suppliers and their agents (i.e. MOP DC and DA) and some 28 distribution organisations (with associated Registration System (MPAS) connections) are currently connected to the DTN. There are also a number of Suppliers and Transporters in the gas market who are also connected to the DTN. Figure 4 below summarises the current position.

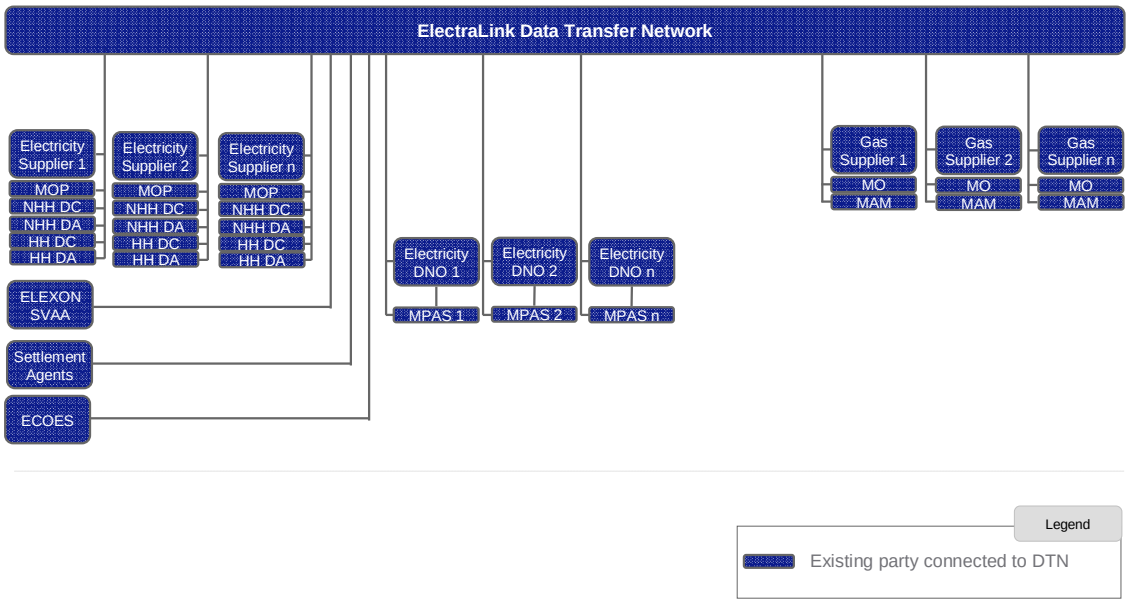

Figure 4 - Schematic representation of the DTN

The flow of data between parties is essential to the continued operation and settlement of the retail electricity market will still be necessary, given that:

- the smart metering rollout programme, which only affects domestic and SMEs, is not due to complete until late 2019;
- there are no plans to change settlement for large consumers managed under the half-hourly arrangements and these consumers are not covered by the SMIP;
- Market Participants will continue to need to interact with their agents;
- domestic consumers can choose not to have a smart meter installed; and
- Suppliers have the choice to use or not to use the DCC for SME customers;

Of the current 158 data flows defined in the Data Transfer Catalogue and implemented in the Data Transfer Service, a high-level analysis shows that:

- **82 data flows will continue** to be needed for large consumers i.e. those who are settled under the Half -Hourly arrangements, assuming that all flows between parties and Half-Hourly Agents (Data Collectors and Data Aggregators), all flows relating to Change of Supplier and all flows relating to Registration will continue to be mandated for settlement;
- **4 data flows can be discontinued soon** after the Smart Metering Technical Specification is approved, these relate to requests from suppliers to their agents to install specific types of pre-payment meter. This assumes that suppliers will install smart meters only, as soon as practicable after the technical specification is agreed;
- **23 data flows** relating to actions on specific types of pre-payment meter can be **discontinued, as soon as suppliers have replaced each type of pre-payment meter** (token, smart card and key meters) with a smart meter;
- **7 data flows** relating to profiling and non-half-hourly estimation techniques **could be eliminated** if the current non-half-hourly market moves towards **settlement using half-hourly data**; and

- **42 data flows are required to support the continued settlement of the non-half-hourly market**. These may change over time and may be eliminated entirely, once the smart metering programme is complete. It is neither possible to specify precise changes nor expected timescales for discontinuation at this time.

Hence, the Data Transfer Service and its associated network will continue to be used, at a minimum, until sufficient smart meters have been rolled out to change the settlement arrangements for the current non-half-hourly market and new arrangements have been made for the treatment of half-hourly customers.

2.5 Scope

Given this background and in particular, the anticipated changes to the industry to give effect to the smart metering implementation, ElectraLink wishes to gain an understanding of:

- stakeholders' likely data exchange over the next several years and how they compare to the current requirements;
- the extent to which the existing DTN could deliver the future data exchange requirements;
- the architecture required to deliver this; and
- the possible service costs for the future DTS under these circumstances.

In seeking to gain such an understanding, ElectraLink recognises that substantial work is currently on-going within the SMIP and industry parties in order to develop and agree future requirements and that any conclusions at this point in time will be subject to change and further clarification in the coming weeks and months. Nonetheless, ElectraLink considers that seeking to establish high-level views at this stage will provide valuable insights into the potential future requirements of its services and enable it to plan and prepare modifications and enhancements to those services.

PA was commissioned to produce an independent report which:

- Sets out the initial, high level views of Market Participants for the future requirements for regulated data exchange services to be provided by the DTS to the retail electricity market during the Foundation period of the SMIP and beyond;
- Assesses the potential, means and appetite of Market Participants for the use of the DTN to process all gas data transfers between the DCC and participants;
- Identifies how these requirements compare to current requirements;
- Identifies high-level technology changes required to the DTN to facilitate delivery of the identified requirements;
- Provides high-level cost estimates for the delivery of a DTS which incorporates the identified requirements;
- Assesses the impact of SMIP procuring a new Greenfield Network to deliver communications between Market Participants and the DCC; and
- Provides an analysis of the impact on Market Participants of implementing the 'Portal' solution that has been proposed by potential DCC Service Providers.

3 Approach

This section provides a summary of the approach adopted by PA to collate the possible future high level data exchange requirements, identify possible technology solutions to deliver the requirements and estimate the costs of their provision by ElectraLink. It also demonstrates the approach that was taken to assess alternative options to fulfilling Market Participants' requirements, namely the procurement and commissioning of an alternative network (the Greenfield option) or the provision of a 'Portal' at the DCC to which Market Participants would need to connect to send and receive their data.

3.1 Introduction

The overall approach comprised three key elements:

- Engagement with stakeholders to identify possible future requirements;
- Identification of technology to deliver the requirements; and
- Assessment of the likely impact of a 'Portal' solution on Market Participants.

In each case, the objective was to identify the requirements, the mechanisms for the delivery of those requirements and the associated costs under three stages of market development:

- The installation of smart meters (DCC not operational) - up to 2014;
- Post implementation of the DCC (from 2014 to 2017); and
- After the expansion of the DCC to cover market registration services (from 2017 onwards).

Prior to describing the approach taken to each of the elements described above, each of the stages of market development is described further.

3.1.1 Foundation

Currently, a number of Suppliers are rolling out smart meters at customer premises and are beginning to utilise the meters to provide services to their customers and to undertake market analytics. As the industry technical specification for smart meters has yet to be determined, the types of meter being rolled out vary between Suppliers and may or may not be compliant with the final technical specification.

In the absence of a DCC to facilitate communication between smart meters and the industry, Suppliers are establishing their own communications infrastructure and are developing their experience of interfacing with such meters. At it simplest, this requires Suppliers to obtain data required for settlement purposes from the meters and route it through to the settlement process.

The objective of discussions with stakeholders was to identify those changes in data exchange requirements that have already been identified, seek to identify other potential changes/additions in data exchange requirements and to explore how these may be facilitated by the DTN.

3.1.2 Post implementation of the DCC

Once the DCC goes live, all data and information exchanges with compliant smart meters will be facilitated by the DCC[8]. While the precise way in which the DCC will provide these services has yet to be finalised, work has advanced and Suppliers and other parties have differing views as to how they may wish to see this operate. For example, some parties may wish to have "direct" access to their smart meters facilitated by the DCC, where the DCC simply provides a conduit to the meters, while others may be prefer the DCC to provide data to/from the meters to a time and quality determined by an agreed service level - each being a particular understanding of the term "access control". The likelihood is that parties may require compliance with both definitions. Some suppliers hold the position that they wish to access their meters directly for some information and would prefer to use the DCC for limited purposes. Given that the role of the DCC is to provide access control, we have assumed for the purposes of this report that the DCC will have a central database to manage t all communications with smart meters and that all parties will be required to access their meters via the DCC.

Whichever definition of the term 'access control' is finally adopted, we have worked on the assumption that the DCC will need to interface (in some manner) with the Registration systems of Xoserve/IGTs and the electricity DNOs. This is discussed in more detail in Section 4 of this report.

The objective of discussions with stakeholders was to identify those changes and additions to data exchange requirements once the DCC is implemented and to explore how these may be facilitated by the DTN.

3.1.3 Incorporation of Registration within the DCC

The incorporation of the registration activity within the DCC could take a number of forms. At one end of the spectrum it could simply involve "lifting and shifting" the current registration systems and processes operated by the DNOs and Xoserve/Independent Gas Transporters (IGTs) into the DCC, such that the existing functionality and operations remain. Alternatively it could involve the creation of a single registration system, which draws together the different systems and aligns the electricity and gas market registration systems. A further alternative could be the concept of a "thin" registration service within DCC, whereby an access mechanism to Registration systems is implemented within the DCC, leaving the authoritative source of registration information within the ownership and operation of the current service providers. Under any of these circumstances, there will be new flow requirements from the DCC to participants, as the current owners of registration processes and systems will continue to need the information contained within those systems to drive day-to-day operational processes.

3.2 Stakeholder Engagement

In order to identify future requirements, under each of the stages of market development, meetings were held during July 2011 with a representative sample of stakeholders to obtain a broad cross section of views. Stakeholders engaged included one or more of each of the following:

[8] As will be referred to later in this document, this assertion was challenged by some of the engaged stakeholders, suggesting instead that while information required for settlement purposes (meter readings, technical details etc.) may be required (mandated) to be retrieved by the DCC on behalf of authorised parties, other non regulated information could be retrieved directly by parties through their own communications infrastructure.

- Suppliers of electricity and gas, both large and small;
- Distribution network operators for both gas and electricity networks;
- Agents and Energy Service Companies (ESCOs);
- Industry representative groups; and
- Central market bodies.

In order to guide the meetings and to seek to ensure consistency of approach, a series of open questions were developed in relation to each of the identified stages of market development. These questions were used to guide the meetings only, rather than to constrain the discussion. Consequently, while the objective was to obtain information pertaining to future regulated requirements, many stakeholders provided views on all data and information irrespective of whether they considered it would constitute regulated information. Furthermore, there were a variety of views on what would and would not comprise regulated information.

To encourage stakeholders to share their views more fully with PA, ElectraLink asked PA to conduct the interviews in confidence, such that none of the information obtained through the discussions would be attributable to the stakeholders directly. Accordingly, the names of the stakeholders with whom PA engaged are not provided in this report.

PA wishes to record its thanks to all the participating stakeholders. The on-going development of the smart meter roll-out programme, coupled with the substantial on-going work in other areas of the markets (such as the Government's Electricity Market Reform project) places a considerable resource burden upon Market Participants and therefore the willingness of stakeholders to engage with PA for this project is highly appreciated.

3.3 Technical Architecture

Based on the requirements identified through the stakeholder engagement process and in the emerging requirements from the SMIP, consideration was given to the possible technical architecture which could be employed to deliver the requirements. In general the architecture considerations for the enhanced DTN approach were additions to the existing DTN necessary to facilitate the new data exchange requirements, addressing the type of data exchanges envisaged (message based or otherwise), the volume and frequency of exchanges and the required speed of exchange. To ensure appropriate expert engagement, a workshop was held with ElectraLink to discuss initial architectural considerations, followed by direct engagement (with representation from ElectraLink at the meeting) with ElectraLink's service providers to further discuss the architecture and potential service cost implications.

We understand from SMIP that the proposed architecture for the 'Portal' solution is physically separate infrastructure to that which will be put in place to manage the collection and distribution of information to and from smart meters. Its boundary will be within the DCC and Market Participants will be required to make their own arrangements to connect to it and manage data that is sent to or received from the Portal.

3.4 Cost Estimation

This report produces cost estimates for enhancing the DTN, using ElectraLink's DTN as the basis for the future required the data transfer service and identifying the incremental costs that would be required to support the DCC and smart meters going forward - the Enhanced DTN Cost Approach.

The report also provides an estimate of the costs that might be incurred if it were decided to commission a wholly new network to provide the communications infrastructure between Market Participants and the DCC. This is covered in Section 8.

It is not possible to estimate the costs to Market Participants of implementing a 'Portal Solution'. However, an assessment of the likely areas of work and its impact on Market Participants has been undertaken. This is covered in Section 7 of this report.

This impact assessment excludes any changes in business processes and applications that Market Participants will need to make, in order to process new types of data coming from smart meters, as this will need to happen for all participants, regardless of the means by which the data is delivered.

Although the requirements capture process outlined in section 3.2, above, identified new data exchange requirements between Market Participants as well as between DCC and authorised parties, it has been assumed (in discussion with ElectraLink) that new data exchange requirements between Market Participants will be facilitated by the DTN given that it already connects all electricity retail Market Participants and a number of gas Market Participants. This is based upon the assumption that the scope of the DCC is and continues to be from meter to Authorised Party only and will not be expanded to cover interaction between Market Participants.

Cost estimates for an enhanced DTN were obtained by PA from the current DTN service provider based upon the identified requirements and the projected data volumes. These estimates are indicative, as precise requirements are yet to be established and confirmed by SMIP.

4 Requirements

This section summarises the business requirements that have been identified through engagement with Market Participants in respect of the data exchanges that will be required to support smart metering. It also looks at emerging requirements from SMIP to supplement these views, as many Market Participants are in the early stages of their thinking in respect of how the SMIP will affect market arrangements. In particular, the requirements set out in Scenario A[9] of the SMIP Project Information Memorandum have been used to supplement information provided by engaged stakeholders.

The following considers three stages of the programme:

- Foundation
- Basic DCC (initial functionality provided at DCC establishment)
- Enhanced DCC (including Registration functionality)

Although the scope of work was to consider regulated data requirements, parties offered information in relation to a wide variety of issues outside the scope of this task. Such issues have been captured and are considered further in Appendices B and C.

4.1 Overview

There is a widespread recognition amongst Market Participants that the DTN will continue to play a central role in the processes to settle the retail electricity market and that this will endure as long as the arrangements for the retail electricity market remain substantially in their current form.

In addition to a range of technical requirements for data exchanges with the DCC and other parties, those stakeholders that participated in this review expressed a number of common themes around the type of service that they desire. These include:

- **Cost-effective** data transfer;
- **Re-use rather than re-invent** - given previous timescales and costs for developing and implementing new networks; and
- **Single means of access to the DCC** - this was of particular importance to dual fuel suppliers, where separate access methods for gas and electricity was considered likely to drive up implementation costs and reduce the industry's ability to improve and standardise processes such as Change of Supplier.

Market Participants also identified a number of new and revised requirements for data exchange. The majority of these will apply once the DCC becomes operational (scheduled for 2014). The data exchange requirements can be grouped into three categories:

- Scheduled communications;
- Near real-time data exchanges; and

[9] Scenario A was chosen over Scenarios B to D as these later scenarios contain significantly more extensive data exchange requirements postulated to facilitate the delivery of smart grids. Since the PIM "consults" on the impact of such further data exchange requirements, the contents of Scenarios B to D was considered less certain and therefore Scenario A was used.

- Online Access.

Table 1 below, provides a description of the each of these groupings and an example of the type of data exchange in each such group. The following sections then summarise the key matters in relation to these requirements.

Requirement Group	Definition	Examples
Scheduled Communications	A data exchange characterised by relatively long response times (minutes and hours) and generally large volumes of data. It could be a periodic requirement (e.g. daily, weekly, monthly) or could be an "on demand" requirement for which the response time is not immediate (i.e. not near real-time).	• Meter readings required for settlement • Meter technical details • Diagnostics report (low priority)
Near real-time data exchanges	Data required to be sent to or obtained from a meter within seconds.	• Alerts (Tamper, Off Supply etc.) • Credit updates for pre-payment
Online Access	Authorised Parties "log-on" to the DCC systems to retrieve or upload data. This could be to meet immediate (i.e. near real-time) timescales or longer depending on the nature.	• Obtaining meter readings to address customer enquiry • Diagnostics report (on demand) • Tariff updates • Remote disconnect

Table 1 - Key Requirements

Depending on how systems are designed and implemented for the DCC, a number of the above examples for near real-time and online access could fall into either category. For the purposes of this report we have assumed that near real-time data exchange requirements will be limited to alerts (where the meter generates a "message" which needs to be processed and delivered to the required recipient(s) within seconds) and credit updates. Both of these data exchange requirements are generated in response to an external event. For on-line access we have assumed data requirements will be initiated by a party rather than an event. We understand that in the 'Portal' solution that has been put forward by some potential DCC Service Providers, all traffic would be treated as messages and processed accordingly.

4.2 Foundation

Very few new requirements were identified for the Foundation period. Suppliers are rolling out smart meters together with their own mechanisms for collecting data from such meters. Data collection is in general via GSM technology with the data either being collected directly by the Suppliers or via third-party service providers with appropriate interface capabilities. Settlement for such meters will remain as it is today (on a Non Half-Hourly (NHH)) basis with actual meter reads being input to the settlement process on a monthly basis. Shorter retrieval timescales are achievable but (a) the business case for such does not exist (the cost of data collection for such would not be outweighed by greater accuracy - for example the current profiles for electricity are reasonable in this regard) and (b) more frequent input of NHH meter reads could have an adverse impact on the EAC/AA calculations which underpin the electricity profiling and settlement process.

Currently, on Change of Supplier, where a smart meter has already been installed, it is being left to the new Supplier to make its own arrangements for interaction with the meter - either by engaging with a third-party capable of interfacing with the smart meter or treating the meter as a "dumb" meter for settlement purposes (with the customer still able to access data via its IHD[10]).

In the event that interoperability is mandated, there may be requirements for data to be exchanged between Suppliers such as meter readings, meter technical details, tariff updates and credit updates for pre-payment meters. However, Suppliers are split regarding these requirements and the industry is currently debating a potential solution. Two options are being considered at this time:

- the old Supplier novates the communications contract for the smart meter to the new Supplier and the new Supplier communicates directly with the meter - this would not involve any changes to the DTS other than new flows to transmit smart meter technical details; and
- the provision of services by the old Supplier to the new Supplier involving the old Supplier sending data to and receiving data from the smart meter on behalf of the new Supplier - the DTN would be able to facilitate such a process.

There are also emerging requirements about how to handle pre-payment customers in these circumstances. There may be a requirement for some near real-time data exchange in order to update credit balances on pre-payment meters. The DTN is able to handle this type of messaging, should it be agreed within the industry. Operational tests have confirmed the DTN's ability to send and receive real-time messages without experiencing delays due to the standard scheduled traffic. However, these messages are not currently prioritised on the network. To ensure delivery of such real-time messages, it would be necessary to implement 'class of service' on the DTN, i.e. dedicating specific network capacity to the processing of real-time messages.

4.3 DCC Established

4.3.1 General

None of the parties, with whom we engaged, expected any significant changes to the market settlement arrangements for electricity in the near future and not for several years after DCC implementation. The arrangements for gas settlement are currently under review by Ofgem and any significant changes to the settlement arrangements would likely require large scale changes to Market Participant systems and business processes. Arrangements for electricity settlement are the subject of a current ELEXON[11] consultation, with views being sought on whether and when the current NHH market should move to using actual half-hourly meter reads for settlement purposes. Such a change, if it were to occur, would also necessitate large scale changes in participant systems and business processes. The latest information on potential data exchanges from the SMIP indicates that the programme views the collection and distribution of half-hourly meter readings as a subject that will be addressed after the completion of the programme i.e. in 2020 at the earliest.

Some Suppliers indicated that a move to half-hourly settlement of electricity consumers may occur as and when appropriate tariffs could be developed while others noted on-going discussions to potentially

[10] Noting that in this case any tariff information on the meter will still relate to the old Supplier and, therefore, billing information on the IHD may not relate to the customers actual bills.

[11] Mandatory Half Hourly Settlement for Customers in Profile Classes 1-4 and the Closure of Non Half Hourly Settlement, 18th July, 2011

mandate half-hourly settlement. Similarly daily settlement of gas market customers, based upon actual half-hourly or daily consumption figures, may occur but this is by no means certain.

Thus, upon DCC implementation, it is envisaged that smart meters will continue to be used to gather register readings and drive settlement in its current form. This will include the continuance of participant-to-participant data exchange as well as participant-to/from-DCC data exchanges.

However, some electricity suppliers, both large and small, are already providing services to their customers that allow them to view their half-hourly consumption data online. It is difficult to imagine that these suppliers will want to reduce the level of service that they offer their customers after the creation of the DCC and hence, we view it as likely that some Market Participants will have requirements to obtain half-hourly data from their smart meters from the inception of the DCC. It is not possible to quantify this requirement at this time.

Whilst the DCC has not yet been established and its services not yet defined, there is an expectation that the DCC will procure a suite of IT systems with which it will interface to the industry. Access to those systems will need to be secure and assured. Availability will need to be high, significantly higher than could be guaranteed by the public Internet and hence some form of Business-to-Business (B2B) network will likely be necessary to meet these requirements for some parties. High availability requirements are driven by a range of factors including:

- The need to access a smart meter in response to a customer call;
- The need for distribution companies to communicate with consumers in relation to planned outages (which could be a scheduled message) and unplanned outages (which will necessarily need to be a close to real-time message);
- The provision of Alerts from smart meters (and the need for recipients to be able to act upon such alerts);
- The need for both Suppliers and distribution companies to access individual meters in close to real-time to resolve supply issues;
- Updates to pre-payment or pay-as-you-go credits; and
- The facility for remote connects/disconnects.

Some Suppliers suggested that data collection and aggregation activities may be transitioned into the DCC by 2015. The possible consequence of this is an increase in the usage of the DTN, as readings from smart meters would be collected and aggregated by the DCC while readings for dumb meters would still need to be collected by NHHDCs and aggregated by NHHDAs. The obvious impact of this would be two separate paths for Data Collection and Data Aggregation, which would require additional data collector and data collector flows into the settlement process and changes to the way that the market is settled (as this would be inconsistent with the current 'Supplier Hub' arrangements). The possible impact on the DTN of such a development has not been quantified as part of this report.

4.3.2 New data requirements

The implementation of the DCC will create new data exchange requirements in three broad categories:

- Scheduled Communications;
- Near real-time data exchanges; and
- Online access.

The requirements for these types of data exchange are discussed below, however, one of the fundamental roles of the DCC upon its establishment is to authorise access to smart meters. To do this, the DCC will need to interact with the Registration Systems of the DNOs for electricity registrations and with Xoserve and Independent Gas Transporters (IGTs) for gas registrations. It is not yet clear how the SMIP envisages this access being provided, i.e. whether the DCC will access these systems to obtain up to date information or whether it will hold a copy of registration information with regular updates being provided by the DNOs/Xoserve/IGTs. Whatever the final decision on this matter, data will need to be transferred between the DCC and the Registration Systems.

If the chosen solution is for the DCC to hold a copy of Registration Data, that data will need to undergo an initial upload to the DCC and then be updated with changes, at least daily, to ensure that access requests are always validated properly.

If the desired solution is for the DCC to interrogate the Registration Systems each time a party wishes to perform an action on a smart meter, this will generate data exchanges between the DCC and those Registration Systems. This solution would necessitate both scheduled and near real-time data exchanges (scheduled for matters such as periodic meter readings and near real-time exchanges for ad-hoc actions such as needing to access a meter to deal with a customer telephone query). The adoption of this alternative is likely to generate significant amounts of network traffic and may extend the overall time taken to access meters in near real-time.

Scheduled Communications

This category relates to data which can be assimilated and delivered to Market Participants over relatively long timescales (when compared to near real-time). The nature of these requirements makes them similar to the process already employed by the DTS. Data in this category includes:

- Scheduled meter readings - this could be:
  - register reads each month for meters settled on an NHH basis - as noted above the expectation is that smart meters will continue to be settled in this manner for some time to come;
  - interval (HH) data collected on a daily basis - generally to be used for trials/data analytics purposes, subject to the customer agreeing for the data to be accessed by the Supplier;
- Ad-hoc meter readings - outside the normal schedule, such as may be required for readings which fail validation;
- Meter diagnostic information;
- Tariff updates;
- Customer billing information updates; and
- Meter technical details.

Authorised parties will trigger these requirements with a request to the DCC. We expect that the DCC will procure a suite of IT systems to manage participant requests and that participants will require access to these systems over a secure, available and reliable network. The scheduling of data retrieval in response to such requests may be left to the DCC (to "smooth" traffic over the networks - both the network to the smart meters and the network to Market Participants) or may be at the behest of the requesting party (subject to the agreed service level). The provision of acknowledgements and an audit trail in relation to such exchanges will likely be required (see section 4.3.3 below) though this may not require a message to be issued to Market Participants, but rather may be accessible on-line.

Near real-time data exchanges

This category relates to data required to be passed from the smart meter to the relevant Market Participant(s) (or vice versa) on an ad-hoc basis but which need to delivered in near real-time and will need to be processed by the recipient's IT systems. In general these will be alerts to Suppliers and distribution companies such as:

- Off supply alarms;
- Tamper alarms;
- Meter fault alarms; and
- Voltage alarms.

These are generated by the meters and the associated data needs to be delivered to the relevant Market Participant. To determine where to send such data the DCC will need to verify the meter/Supplier/DNO/other relationship with the relevant Registration System (see above).

The DTN is capable of delivering such messages in real-time but does not currently prioritise them over scheduled messages. For the DTN to provide this service, we would recommend the implementation of 'enhanced class of service', to dedicate specific network capabilities to such messages, so that they can be prioritised over other scheduled traffic on the network. This data could be configured in a standard message format and managed across the DTN as an extension to the scheduled service currently provided and incorporating similar supporting services currently provided (audit trail, re-collections, acknowledgements etc). We understand that ElectraLink has already implemented class of service on some of its network links to trial and demonstrate this capability.

Online access

This category covers data exchanges where Market Participants will log into a system at the DCC, request and receive the requisite data in close to real-time. In this regard, the network connecting the party to the DCC is merely acting as a conduit between the Market Participant and the DCC with the DCC providing access control to the smart meters. We anticipate parties will utilise this mechanism for many circumstances including:

- Ad-Hoc meter readings when dealing with a customer on the phone;
- Scheduling actions to be taken by the DCC, e.g. monthly meter readings for all customers - this will determine the schedule by which the instructing party will receive the data (via a scheduled file transfer);
- Uploading broadcast/multicast information such as software updates and security patches[12];
- Checking meter technical details for a meter;
- Ad-hoc credit updates in response to a customer enquiry; and
- Connections and disconnections.

Provision of access to the DCC would be a new service to be offered over the DTN, however, this is simply the provision of bandwidth over a secure network and could be of similar form to the access to the DTS Web Tools facility (see below) provided by the DTN to its users. Access to the DTN is already

[12] It is recognised that data exchanges such as this could also be required to be in the form of scheduled communications with authorised parties incorporating software updates into a file for collection by the DCC. Given the design for such data exchange has yet to be determined it has been assumed, for the purposes of service volume considerations, that such requirements will be managed via the on-line mechanism.

secure and this would provide assurance that access requests to the DCC, arriving over the network were from authorised parties. In considering the costings later in this report, we have assumed that the DCC will develop its own access controls for authorised parties based upon specific permissions being granted to individuals based upon the organisation for which they work and the role that they perform within that organisation.

Other potential requirements

Some Market Participants, principally Suppliers and ESCOs, indicated that they require 24/7 access to data from smart meters - in particular consumption data. They argued that this would enable them to provide innovative retail services to domestic and SME customers. Prevention of such access would limit the ability to provide such services. As an example of the kinds of service such access would permit, it would enable a customer with a solar Photo-Voltaic (PV) cell to be able to see live data for the cell via a secure log-in to the Supplier's website.

In considering the potential service volume, we have not sought to size the delivery of such requirements as we are unable to determine the number of smart meters for which such a requirement may exist and the provision of 24/7 access to large quantities of smart meters could be very expensive to deliver. Suppliers were keen that such access should be via a cost effective mechanism. In fact, this was one of the reasons some Suppliers strongly considered that they should be permitted to access smart meters via their own communications system rather than being forced to access via the DCC.

Some ESCOs also identified a requirement to access 13 months of half-hourly consumption data in near real time to enable the provision of services to consumers. Customer switching services have this type of requirement and this could apply to up to 2 million meters per month once the rollout of smart meters is complete.

4.3.3 Value Added Services

The DTS currently provides a number of value added services. These include the provision of:

- Intelligent message collection, including choice of alphabetic or chronological message processing;
- File routing based on business content rather than senders having to use different e-mail addresses or some other means to identify different recipients;
- Automatic file encryption and decryption using 512 bit Public Key Infrastructure (PKI) encryption;
- File compression for transmission;
- Syntactic validation of file contents based on industry-agreed encoding rules;
- Optional enhanced validation further confirming data flow integrity, including:
  - Mandatory data items;
  - Group range;
  - Group hierarchy;
  - Valid set content;
  - Group conditionality (where this can be validated);
- File translation;
- Pro active network management including network level and application level alerting;
- Acknowledgments (Acks) for every file processed, including those rejected (Negative Acknowledgements - NAcks);

- Automatic daily reports detailing all files sent and received;
- Service Level Agreements for availability and speed of data throughput;
- Suite of tools known as Web Tools, including:
  - Audit - real-time view of message status on the service with service-wide accurate timestamps at all processing stages;
  - Automatic Configuration Management Tool (ACMT) - configure where data is delivered in real-time;
  - Re-send - without having to regenerate the data;
  - Re-collect - without having the sender re-send the message;
  - DFlowMaster - to generate/amend/validate network compliant data flows using an intelligent forms-based tool; and
  - Statistics - a view of service level status, usage trends etc.

Some of these services were found to be highly important to Market Participants, such as the ability for the DCC to ensure an audit trail. When talking to business users, the ability to be able to resubmit and recollect files also had some support with the use of Acks and NAcks receiving a mixed reception. However, when speaking to those with direct operational responsibility for the use of the DTN within their organisations, there was significantly more support for these features, as they are used frequently to support daily operations.

4.4 DCC incorporates registration

Significantly less thinking is evident about the period after the DCC assumes responsibility for registration from electricity distribution companies and their gas counterparts. The nature of the registration process within the DCC is not confirmed and we received a variety of views for how this may be facilitated - from full integration of the gas and electricity registration systems into a single system in DCC ("thick" registration), to DCC only having a "copy" of Registration information for authorisation purposes ("thin" registration).

There is some broader conceptual thinking about market processes that will or could be changed as a result:

- Simplification of the Change of Supplier process, when all registrations are held centrally;
- A need for data exchanges between DCC and current registration system owners to ensure that relevant companies have a full and accurate picture of the end points on their network. Of critical importance to the Distributors is the maintenance of accurate address and contact information;
- A potential for the elimination of the Supplier hub concept with the consequence of reducing the complexity of settlement even further, although this is wholly separate from the transfer of the registration system to DCC and given that DCC is only to provide access to the current non-half-hourly market, further market restructuring would be necessary to facilitate this;
- Full half-hourly settlement of the retail market - no clear timetable exists for this and other issues, such as whether smart meters can be rolled out into every domestic premise given that customers are under no compulsion to accept them, may make such a transition a long-term proposition, though we note the existence of the recent ELEXON consultation on mandating half-hourly settlement.

For the purposes of this report we have not specified any new data exchanges once registration moves to DCC given the uncertainty over the likely outcome (i.e. "thin" vs. "thick" registration within DCC).

5 Impact on DTN Technology

In this section we provide a high-level description of the possible DTN technical architecture, which could be used to deliver the stakeholder derived data exchange requirements for each of the three stages of market development. For the purposes of comparison, a similarly high level description of the current (business as usual) technical architecture is also provided.

The architecture is driven by a range of assumptions that have been used to size it:

- There will be 2.5 million smart meters in 2014 and 50 million in 2019;
- In 2019, there will be 30 million electricity smart meters and 20 million gas smart meters;
- There will be 280 parties connected to the DCC, as described in the table below:

Party Type	Total Connections Required[13]
Central Market Bodies	3
Gas Transporters	28
Gas Suppliers	126
Electricity Distributors	28
Electricity Suppliers	76
ESCOs	19
Total	**280**

- Data volumes have been calculated by using current DTC flows, where appropriate and by extrapolating from the SMIP information and assessing the potential impact for data exchange from the DCC to Market Participants; and
- Given the significant uncertainties around the design of the DCC, its applications and the information that it may need to communicate with Market Participants, we have assumed that the contingency required for network and application overheads for each exchange of data will be offset by the compression rates that can be achieved over the network.

5.1 Overview of current Data Transfer Network

The current DTN acts as a message hub for electricity Market Participants, receiving data requests from one participant and forwarding them to another; it also provides an audit log of all messages sent over the network. Many participants in the gas market are also connected to the DTN, although they receive commercial rather than regulated services (e.g. Notification of Old Supplier Information - NOSI).

The DTN operates to a Service Level Agreement (SLA) that provides for:

- 100% of messages to be processed and delivered within 4 hours

[13] Based on data provided by ElectraLink

- 99% of messages to be processed and delivered within 2 hours
- 90% of messages to be processed and delivered within 10 minutes

ElectraLink consistently meets or exceeds the level of service required by the SLA (see example in Figure 2 earlier in this document).

5.1.1 DTN Security

The DTN is a secure private network. ElectraLink has advised that it is unaware of the network having been breached since its creation in 1998. A number of industry standard technical security measures are in place to protect the DTN, along with a number of security management measures. These include Public Key Infrastructure (PKI) based encryption of all messages, providing message authentication, confidentiality, non-repudiation and integrity for messages submitted by participants to the DTN and for messages sent onwards from the DTN to participants. User access controls are in accordance with security measures appropriate to the various means of user access; users who access via gateway servers which are not located on their own sites (i.e. via a so called Remote User Gateway) connect to the gateway via either the public internet secured via VPN, or dial-up secured via technical controls which prevents unauthorised connections. In all cases, once a connection has been established further user identification, authentication and authorisation is required via username and password combinations in order to access functional components of the DTN. DTN security management is recognised as an ongoing requirement and ElectraLink actively seeks to address new security risks as they are identified.

5.1.2 DTN Capabilities

To facilitate analysis of the current and future solutions, the DTN capabilities have been broken down into telecommunications, IT infrastructure and applications in the following table:

Element	Description
Telecommunications	Core network is an MPLS cloud which connects all DTN users to the DTN data centres. Depending on the size and specific requirements of Market Participants there are a number of access options, including leased line access at various speeds (currently 1 Mbps or 2 Mbps - termed Low Volume and High Volume Gateways respectively), higher availability options with ISDN backup and access for occasional users via dial-up (ISDN or PSTN) or VPN over the public internet. Dial-up services are rarely used and are likely to be discontinued in the relatively near future to be replaced entirely by the VPN option. The preferred mode of operation for the electricity industry is flat file scheduled transfer using File Transfer Protocol (FTP). This means of communication has been sustained to support Market Participants' IT systems, which have been built to operate in this manner. The DTN can also manage real-time traffic and can be utilised to provide access to web services - for example access is provided across the DTN to the Web Tools facility ElectraLink provides to its users. Furthermore, ElectraLink is currently demonstrating extended capabilities in real-time messaging to its stakeholders.
IT infrastructure	The DTN message hub is hosted on resilient hardware in a high-availability data centre, with identical disaster recovery hardware provided in a geographically separate data centre. Market participants connect via the MPLS cloud using a DTN Gateway, which is a physical server provided by ElectraLink's third-party service provider and installed at the customer site. Dial-up and VPN users utilise a shared hardware infrastructure provided by ElectraLink - the Remote User Gateway (RUG)..
Application	The DTN is a message-orientated middleware application, which takes data requests from one Market Participant, validates the request and places the request on a queue for

	the recipient to collect or pushes the data onto the recipients' systems. The DTN currently operates in a scheduled queue manner, the underlying software product supports real-time messaging, however this is not currently used for regulated services, as Market Participants' systems have not been amended to process real-time messages. 158 data flows have been agreed between the DTN and Market Participants. These data flows are implemented on the DTN messaging platform. The definition and implementation of these data flows constitutes a significant element of intellectual property (bespoke software development) associated with the current DTN.

Table 2 - DTN capabilities

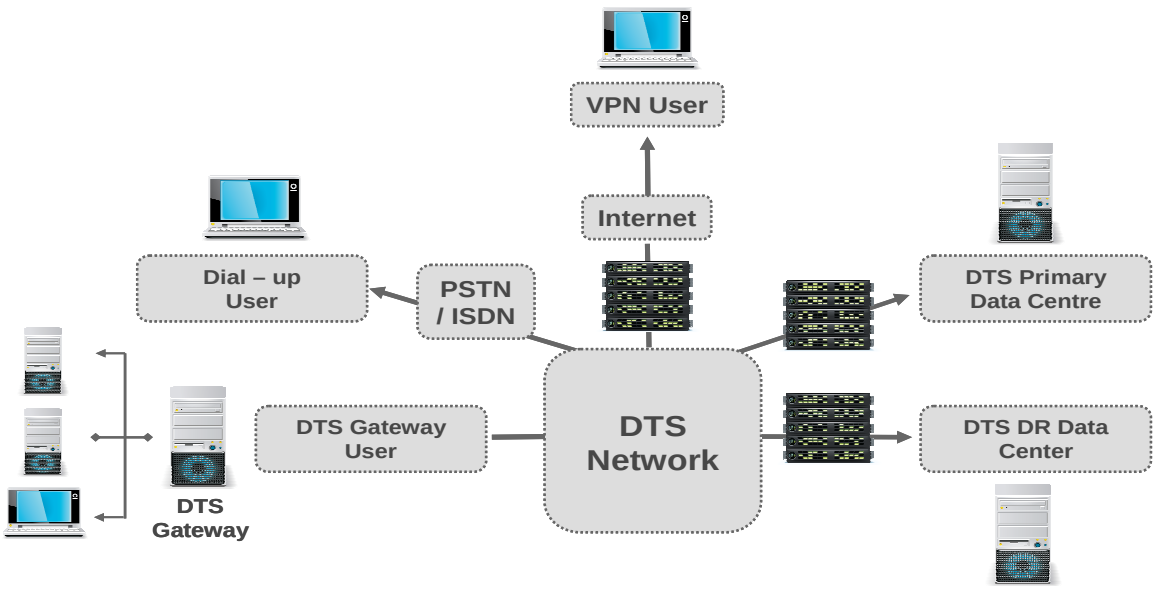

Figure 5: High-level architecture for the DTS solution

As noted earlier, given that:

- the SMIP, which only affects domestic and SMEs, is not due to complete until late 2019;
- there are no plans to change settlement for large consumers managed under the half-hourly arrangements and these consumers are not covered by the SMIP;
- Market Participants need to communicate with other Market Participants;
- domestic consumers can choose not to have a smart meter installed; and
- Suppliers have the choice to use or not to use the DCC for SME customers.

the continued operation of the Data Transfer Service and its network is certain for the foreseeable future.

5.2 Foundation

From a technical architecture perspective, there may be minor changes, as indicated below, to amend some current data flows or to allow different parties to send and receive some of the currently available data flows.

To support the Change of Supplier process for customers with smart meters, during the Foundation period, it may be necessary for ElectraLink to create a new role within the DTS, to allow the 'Operating Supplier'[14] to send meter readings to the new supplier. Furthermore, it may also be necessary for ElectraLink to implement 'class of service' during Foundation, if there is agreement on real-time messaging for pre-payment smart meters[15]. This will allow such messages to be prioritised on the network and ensure delivery in the required timescales.

ElectraLink already has well established processes and procedures for managing the development and implementation of changes to messages and services delivered through the DTS. Furthermore, as highlighted above, ElectraLink has already demonstrated prioritisation of real-time data transfer, using the DTN, to a number of Market Participants.

The only architectural change that will be required to support the Foundation period is to dedicate part of the network bandwidth to real-time messages in order to ensure that they are not, under any circumstances, prevented from reaching their intended recipients by large volume scheduled files.

5.3 DCC Established

When the DCC is established it will be necessary to connect the DCC to Market Participants in order that data can be shared for use in billing and settlement processes and to support customer service. Connection to the DCC will need to be via a secure, high availability network, for the reasons outlined in Section 4 of this report.

The existing DTN already connects a large number of Market Participants - all retail electricity Market Participants and a number of gas market Suppliers. Three infrastructure options are available for connection as described above and each participant can choose the option most appropriate to its size. The schematic diagram below identifies the class of participants currently connected to the DTN and separately identifies those new participants who would need to connect to the DTN once the DCC is established to facilitate smart metering communications and services.

[14] The term used to describe the Supplier, which initially installed (or procured the instalment of) a smart meter at a given customers premises and which, following loss of that customer to another Supplier, is required to provide services to the new Supplier such as the provision of meter readings from the smart meter.

[15] This relates to the Operating Supplier concept in relation to pre-payment meters, whereby the Operating Supplier provides credit update information to the smart meter upon instruction from the new Supplier (or the pre-payment meter infrastructure provider on behalf of the new Supplier).

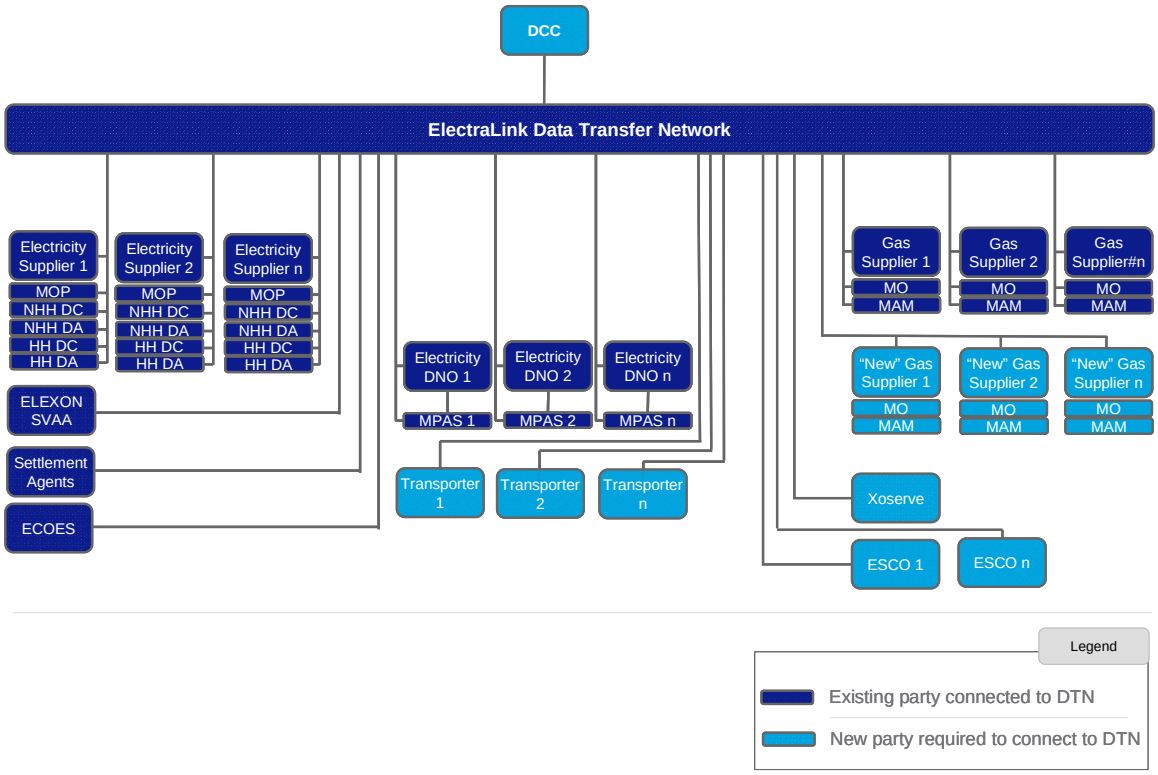

Figure 6: Schematic showing existing and new parties connected to DTN

As previously stated, the requirements for the existing DTS (i.e. the processing and delivery of existing electricity retail market data) will continue to be required once the DCC is implemented and therefore all existing connections to electricity retail Market Participants will need to be maintained. These parties include:

- Electricity Suppliers;
- Electricity Distribution Network Operators as;
  - Network Operators (for Use of System billing); and
  - Meter Point Administration Service (MPAS) providers;
- The Electricity Central Online Enquiry Service (ECOES);
- Electricity Supplier agents:
  - Meter Operator Parties (MOPs);
  - Data Collectors, both Non Half-Hourly and Half-Hourly (NHHDC and HHDC);
  - Data Aggregators, both Non Half-Hourly and Half-Hourly (NHHDA and HHDA); and
- ELEXON (on behalf of the Supplier Volume Allocation Agent - SVAA); and
- Settlement Agents (such as the Teleswitch Agent).

As ElectraLink also provides commercial services to the electricity and gas markets, a number of existing gas market Suppliers are also already connected to the DTN.

New parties who will be required to connect to the DTN (to access the DCC) will be:

- Those gas market Suppliers who are active in the domestic market and not already connected to the DTN;
- Gas Transporters;

- Xoserve; and
- Energy Service Companies (ESCOs).

While the number of existing gas Suppliers and Transporters is already known, the potential number of ESCOs requiring connection once the DCC goes live is unclear. ESCOs will likely include many of the existing utilities (many of whom already have connections to the DTN) plus new organisations and energy switching advisory companies.

Whilst the detailed designs of the DCC architecture and data transfer standards have not been published we believe that this new network will, at a minimum, be based on the following qualitative requirements.

Element	Description
Telecommunications	The telecommunications network will need to be upgraded with regards to (a) the parties connected to the network, (b) security and privacy, (c) resilience and availability and (d) data transfer speeds and classes of service. Each of these points is detailed below: **(a) Parties connected to the network** The number of parties connected to the DTN will increase as highlighted above. For the purposes of analysing future technical requirements we have assumed an increase from the current number of around 140 to 280. It has been assumed that the majority of these will connect via a VPN type arrangement with some of the existing parties (and some of the larger new parties such as the Gas Transporters) upgrading to a Gateway, depending on their "starting point". The telecoms network changes are expected to be: • Extend core network to provide a high-throughput connection between the DTN and the DCC, allowing the network to be used as a secure and high-availability method of connecting the new DCC to existing Market Participants. • Extend core network to provide a high-throughput connection to Xoserve for two-way high volume, scheduled communications relating to the gas settlement process. • Connection from the DCC to gas Registration Systems in Xoserve (as above) and in IGTs for the DCC to verify the Market Participant/meter relationship. • Additional connections for new gas and electricity Market Participants and ESCOs (although these will be mainly VPN links). **(b) Security and privacy** The network will handle confidential data relating to 30 million households in the UK and may have real-time access to meter hardware. Data of this nature will need to be transported on a private network (for high volumes) with the most common solution being an IP-MPLS network from an established UK communications provider. **(c) Resilience and availability** Whilst we do not have any specific information about availability requirements from connected parties, we believe that in the new environment the operational implications of long periods of downtime could be significant. For example, not being able to send a credit update to a pre-payment meter could have a significant impact from a customer service perspective although meters are likely to include an 'emergency credit' feature. As a result the network will need to support enhanced levels of service and we have assumed that the following will apply in respect of network availability[16]: • Access for the DCC data centre and backup data centre: 99.999% (equivalent to 5 minutes downtime per year) • Access for larger authorised parties: 99.99% (equivalent to 52 minutes downtime per year)

[16] Note that while these are assumed network availability requirements they may not necessarily equate to the service availability.

	• Access for smaller authorised parties: 99.9% (equivalent to 8 hours downtime per year) This requirement implies realisation of all significant access connections using leased lines or fibre Ethernet. **(d) Data transfer speeds and classes of service** Connections to high volume usage Market Participants will need to be upgraded as the number of deployed smart meters increases, from an expected 2.5 million in 2014, rising by approximately 9 million per annum in the following five years and with the remainder to be completed in 2019. Our high-level analysis of DCC data messages suggests that this new network will need to handle around 2Tb per year in 2014 rising to a figure approaching 43Tb per year in 2019. Substantially higher volumes are expected post 2019 but these depend on the assumptions made and the potential traffic associated with smart grids (see SMIP Project Information Memorandum). From a cost efficiency perspective, we expect the network to provide sufficient access bandwidth for the full data transfer load from the outset, i.e. each network access point will be capable of supporting the full data load but that the level of bandwidth actually provided will reflect actual requirements, gradually rising over the period 2014 to 2019. This avoids incurring additional installation charges as volumes grow. Within the framework of these access speeds, the supplier may propose lower usage charges to account for the limited usage during the initial stage of operation. Within these access speeds we expect the network to use at least two classes of service: • Enhanced class of service for business-critical applications, such as near real-time meter reading requests and alerts, which will guarantee that these messages are prioritised on the network. We have assumed that this will apply to 10% of the total data load. • Standard class of service for scheduled communications, such as regular meter reading updates.
IT infrastructure	Extension of data centre hardware to reflect increased data volumes. Additional servers will be required.
Applications	It is presumed that the DCC will provide interfaces for the functions it delivers, for example meter reading request and response. There are two solutions at the application layer to facilitate communications between Market Participants and the DCC: 1. Use the real-time capabilities of the DTN hub as an intermediary to the DCC. In this scenario, existing DTS capabilities such as audit and logging would also be available. The DTN application would be enhanced to provide the new messages listed in Appendix B. 2. Route real-time traffic to and from the DCC directly through the DTN telecoms layer, without logging or processing by the DTN application or hardware layers. In this scenario, Market Participants would be communicating directly with the DCC, using the existing and proven DTN as a conduit. We have assumed both of these solutions will be adopted to reflect the differences in data exchange requirements. Scheduled and near real-time data requirements will be facilitated via the first solution while on-line access will be facilitated via the second.

Table 3 - Requirements once DCC established

5.4 DCC incorporates registration

The main effect of registration moving into the control of the DCC will be to eliminate the need for the DCC to access Registration Systems over the DTN to perform authentication services. However,

additional two-way communications will be required between the DCC and DNOs/Xoserve/IGTs to ensure the continued operation of the distribution companies' business as usual processes and systems and Xoserve's ability to manage the gas market.

6 Cost Estimates for an enhanced DTN

This section provides a summary of the estimated incremental cost of developing a solution based around ElectraLink's DTN. It estimates the incremental cost - that is the cost over and above the current baseline cost. The costs are set out to show how they vary across the three different phases, i.e. Foundation, DCC establishment and once DCC incorporates registration, and have been discounted using a rate of 3.5% in line with HM Treasury guidance.

This section is structured as follows:

- Section 6.1 describes the current costs for the provision of the DTN (the Baseline costs);
- Section 6.2 describes the assumptions and methodology employed in estimating the incremental costs before going on to identify the costs in each of the three aforementioned phases; and
- Section 6.3 summarises the estimated costs for the enhanced DTN approach.

6.1 Baseline Costs

The Baseline costs refer to the costs for the provision of the current service provided by ElectraLink. The current cost of the DTS is approximately £4.5m per annum and can be broken down into three key areas:

- ElectraLink's costs which are circa £3.9m per annum, made up of two key components:
  - outsourced service costs for the provision of the operational network and management of the related file transfer processes; and
  - ElectraLink's staff and operational costs;
- Depreciation on the original assets, which have totalled circa £5m from the outset of the service, equating to circa £0.5m per annum; and
- ElectraLink's allowed returns - ElectraLink is allowed to make a return on the invested capital (7% in real terms) but no allowance is permitted on service provision: the allowed return is currently circa £0.1m per annum.

This cost breakdown is illustrated in Figure 7 below.

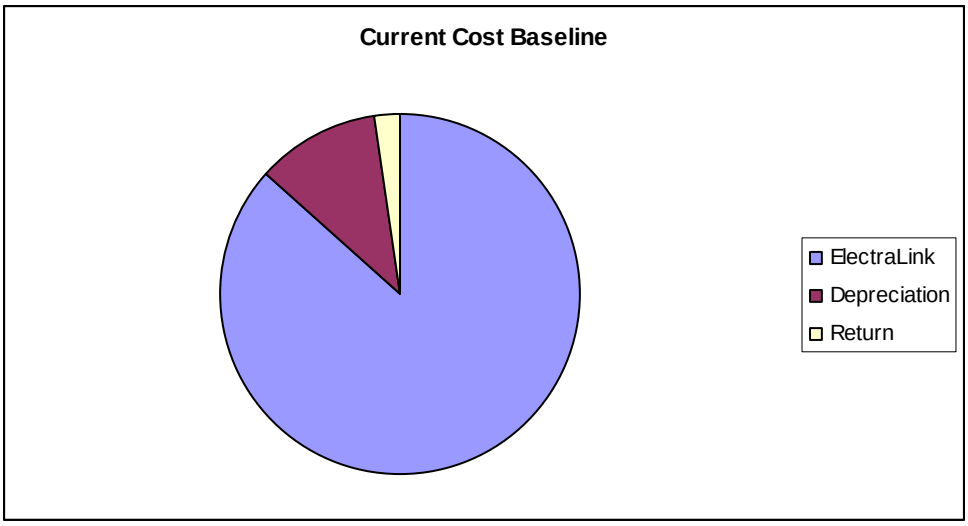

Figure 7: Baseline costs

6.2 Incremental cost estimates for an enhanced DTN

6.2.1 Methodology

This section describes the input data utilised to estimate the incremental costs, the assumptions made and the approach to building up the cost estimate in terms of considering network, IT infrastructure, applications and client side costs.

Inputs

The cost estimates have been based on the following key input data (as set out in Section 5 and Appendix C):

- Total data volumes in 2014 will be of the order of 2Tb (for 2.5 million installed smart meters), increasing to around 43Tb (for 50 million installed smart meters) in 2019;
- The total number of parties connected to the DTN will rise from the current number of approximately 140 to 280

Assumptions

In relation to the above input data, the following assumptions have been applied:

- In order to derive an estimated cost profile to 2019, the above data volumes have been interpolated for the intervening years between 2014 and 2019 on the assumption that the number of smart meters will rise at around 8 million per annum; and
- While some of the new connected parties (such as Gas Transporters) will likely require dedicated network connections to the DTN (i.e. either High Volume Gateways or Low Volume Gateways) to manage the volumes of data expected to be passed to/from such parties efficiently, the bulk of the new connected parties are anticipated to be smaller Suppliers and ESCOs for whom a VPN connection to the DTN has been assumed as the most cost effective solution.

Table 4 below summarises the above drivers and identifies other employed in the estimation.

	DTN Today	Enhanced DTN in 2014	Enhanced DTN in 2019
Data volume per year (Gbytes)	575	2,000	43,000[17]
Split between message based traffic (to go via the DTN application systems) and network traffic	100:00	90:10	50:50
No of very high volume connections[18]	2	6	6
No of large connected parties	23	30	30
No of medium connected parties	5	20	30
No of small connected parties (assumed to be on VPN)[19]	51	230	220

Table 4 - Summary of changes in key cost driver parameters

Network

To meet the volume requirements for both existing and new connected parties, assumptions have been made regarding the requirements to upgrade (or install) network connections. Where higher grade communication connections have been required to meet the volume requirements, these have been dimensioned to be capable of meeting the estimated volume requirements as at 2019, but have assumed to be operated at a capacity appropriate for the volume during any given period. For example, if the volume in 2016 for an existing DTN connected party were estimated to exceed the network connection capability for that party, a new network connection, sized to meet the estimated 2019 volume requirement, would be assumed to be installed but would be operated (and assumed to be charged) at a lower capacity commensurate, with the 2016 volume requirements. The capacity of such a connection would then be gradually increased over time, commensurate with the increases in volumes. Similarly for a new DTN connected party, its connection would be sized for 2019 volumes from the outset, but operated at an appropriately lower capacity and increased over time.

IT Infrastructure

From an IT infrastructure perspective, ElectraLink's current service provider has provided detailed information to PA to facilitate the incremental cost estimate. The cost estimate assumes no fundamental change in technology direction for the DTN so as to maintain continuity in the provision of the DTS to Market Participants and minimise the changes required to participant systems and process[20]. This is fundamental to the enhanced DTN approach as the intention is to capitalise upon an existing tried and tested service to facilitate the processing and delivery of new smart meter data from the DCC to/from participants. To address the estimated data volume increases, new hardware and software will be required in the DTN data centres and in addition new hardware will be required for the

[17] Working on the same assumption as currently being used by SMIP that half-hourly readings from meters will not be required in the timeframes for the rollout programme. However, interviews with stakeholders suggest that this is probably not the case and that half-hourly data may be needed for some businesses from the inception of the DCC.

[18] Currently 2 very high volume connections exist for ELEXON (main and standby) and it has been assumed a further 2 very high volume connections each will be required for Xoserve and the DCC. ELEXON will need to be connected to the DCC, if the DCC takes on responsibilities for Data Collection and Aggregation, thereby becoming a Market Settlement Agent.

[19] It is assumed that 10 of the small (VPN) connected parties transfer to become Medium connected parties in 2016 as the data volumes for parties increase.

[20] It should be noted that no allowance has been made in this estimate for changes required to participant systems

new DTN connectees with High and Low Volume Gateways. Given the length of time being considered it has been assumed that a refresh of the technology will be required at 5 year intervals.

Applications

Other costs include the need to develop and implement data flows for the new requirements for 2014 and an allowance has been made for changes to data flows over the period to 2019. Enhanced class of service has already been implemented to facilitate near real-time messaging.

Client Side Costs

For the purpose of estimating potential increases in client side costs (principally staffing costs at ElectraLink) it has been assumed these costs rise in line with those provided by the current third-party service provider, which in turn are based on the increased number of connected parties and the increases in data volumes.

6.2.2 Foundation

As described earlier in this report there will be only minimal changes required to the DTS by the implementation of smart meters during the Foundation stage. However, there will be incremental costs incurred during the period in order to prepare for go live of the DCC. These will be associated with a network connections, hardware and software for a small number of new parties and upgrades to connections for a few existing parties (where necessary), all of which need to be installed and tested prior to go live. In addition, new data flows will need to be designed, built, tested and trialled prior to DCC go live. Given that ElectraLink (and its service provider) has significant experience of the development of new data flows (and the enhancements to existing data flows), the costs associated with this requirement is not expected to be too significant.

Possible changes may arise from the need to facilitate the Operating Supplier activities described earlier which may result in a requirement to introduce new data. However in the absence of a clear understanding of whether these requirements will be necessary, no allowance has been made for such in the cost estimates.

Table 5 below summarises the estimated discounted incremental costs (in £millions) for the Foundation period under this approach.

Table 5 - Summary of the estimated incremental costs to be incurred by ElectraLink for Foundation period

Cost item	Foundation
	2011 -2013 (£M)
Network	1.08
IT Infrastructure	2.34
Applications	0.10
Client Side Costs	0.91
Total	**4.43**

6.2.3 DCC Established

As identified earlier, with the establishment of the DCC, there will be a need to enhance services across the DTN in order to provide:

- **High-grade communications to the DCC and Xoserve**, plus additional infrastructure for a relatively small number of new users of the DTN, including Gas Distribution Companies and any gas Suppliers (with large volume requirements) that are not currently connected to the DTN;
- **Enhanced Class of Service** - to allow real-time connection to the DCC and prioritisation of this traffic; and
- **Upgrade in bandwidth** to accommodate the increased data volumes.

Based on the assumptions and input data set out above, the estimated discounted incremental cost to enhance the DTN to meet the identified smart metering requirements once DCC is implemented is shown below . As can be seen the majority of the cost incurred is expected to relate to IT infrastructure (hardware and software in the DTN data centre) necessary to manage the increased volume of data associated with the increasing number of smart meters.

Cost item	DCC Established		
	2014 (£M)	**2015 (£M)**	**2016 (£M)**
Network	0.96	1.27	1.52
It Infrastructure	4.07	4.94	4.18
Applications	0.02	0.00	0.00
Client Side Costs	0.88	0.85	0.82
Totals	**5.93**	**7.06**	**6.52**

Table 6 - Summary of the estimated incremental costs to be incurred by ElectraLink from the establishment of the DCC

6.2.4 DCC incorporates registration

As the DCC assumes responsibility for registration services to both the gas and electricity industries, there will be a need to change services across the Data Transfer Network in order to:

- Remove traffic to and from Registration Systems for authentication purposes; and
- Build new bi-directional information flows between the DCC and Distributors/Xoserve/IGTs to synchronise registration information across the markets, allowing those currently responsible for registration to continue to operate in a robust and reliable manner.

Expected discounted incremental costs are summarised below and are again largely in infrastructure costs to deal with the increased volumes of data, which by this stage are approximately 75 times greater than today's volumes.

Cost item	DCC Incorporates Registration		
	2017 (£M)	2018 (£M)	2019 (£M)
Network	1.76	1.98	1.92
It Infrastructure	3.28	5.27	7.58
Applications	0.00	0.00	0.00
Client Side Costs	0.79	0.76	0.74
Totals	**5.83**	**8.01**	**10.24**

Table 7 - Summary of the estimated incremental costs to be incurred by ElectraLink once the DCC incorporates registration

6.3 Summary

The total estimated discounted costs for the enhancements required to the DTN to facilitate the identified new data requirements are shown below in Figure 8 and Table 7.

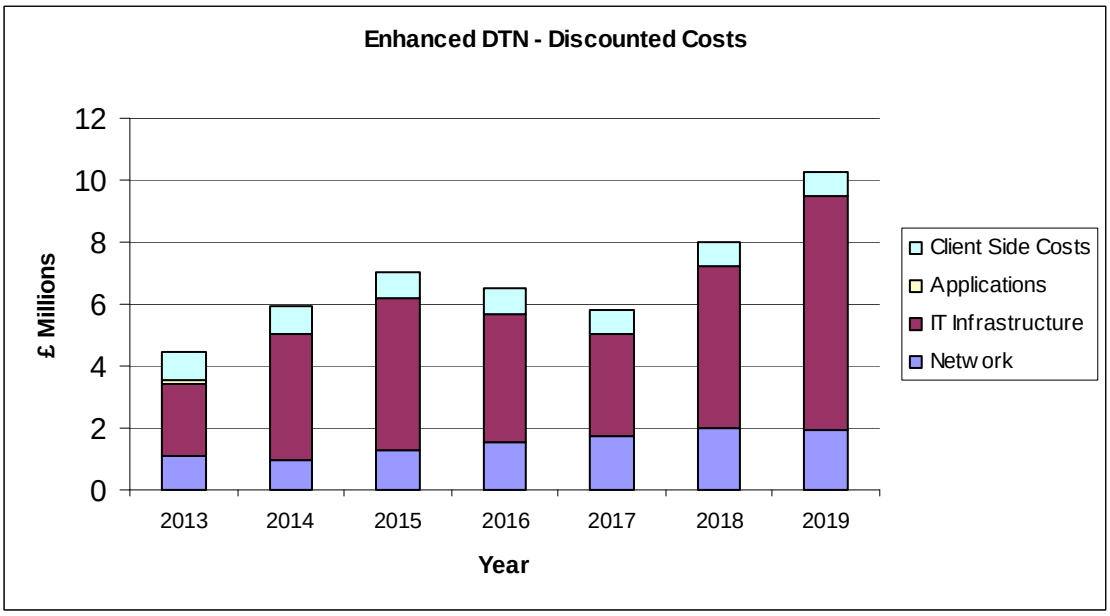

Figure 8: Summary of estimated discounted incremental costs for the enhanced DTN approach

Cost item	Foundation	DCC Established			DCC Incorporates Registration		
	2013 (£M)	2014 (£M)	2015 (£M)	2016 (£M)	2017 (£M)	2018 (£M)	2019 (£M)
Network	1.08	0.96	1.27	1.52	1.76	1.98	1.92
It Infrastructure	2.34	4.07	4.94	4.18	3.28	5.27	7.58
Applications	0.10	0.02	0.00	0.00	0.00	0.00	0.00
Client Side Costs	0.91	0.88	0.85	0.82	0.79	0.76	0.74
Totals	**4.43**	**5.93**	**7.06**	**6.52**	**5.83**	**8.01**	**10.24**

Table 8 - Summary of estimated discounted incremental costs for the enhanced DTN approach

It should be noted that the above costs include provisions for hardware refreshes on a 4-5 year cycle, which means that some infrastructure will need to be replaced towards the end of the period. Hence the dip in costs in 2015/2016, which reflect fewer installations and the increasing impact of discounting. The rise in costs in 2018/2019 represents hardware upgrades. It also includes six months additional operating costs to cover parallel running to cover preparation for DCC go-live.

6.4 Shape and potential costs of the on-going Data Transfer Service

A high-level overview of the flows that will continue to be required and those that can potential be eliminated is provided in section 2.4.

In looking at the shape of the retained Data Transfer Service, we have assessed the potential impact of the introduction of the DCC on flows being passed across the DTN. Our analysis has focused on the top 10 flows (by volume), which represent over 80% of the messages currently sent between Market Participants. The analysis is predicated upon the following assumptions:

- All flows relating to Half Hourly metered customers need to be retained
- All flows relating to Non Half Hourly metered customers will decline proportionately to the number of smart meters installed. Market Participants will receive appropriate data from the DCC and send it to their agents via their own means.
- Meter Technical Details will be eliminated over the period of the SMIP rollout - Meter Operator Parties may still need this information from suppliers in order to perform their functions. We assume that suppliers will receive the requisite information from the DCC and use their own means to send it to their agents

For the top 10 current data flows, we expect the volumes of messages sent over the DTN to reduce by a little more than 50% over the period 2014 to 2019. This can largely be attributed to the decrease in non-half-hourly meter readings. Other flows relating to non-half-hourly metered customers account for the rest of the decline in volumes.

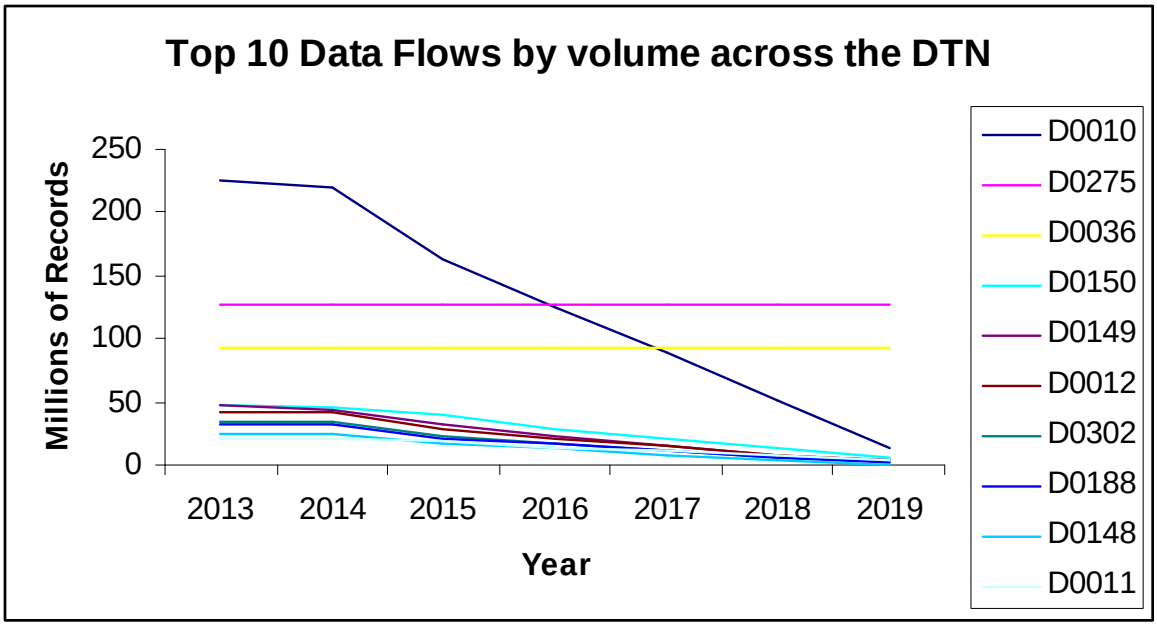

Figure 9 - Top 10 DTN Flows - Decline in volume over the SMIP rollout period

In aggregate, the position is as shown in the chart below:

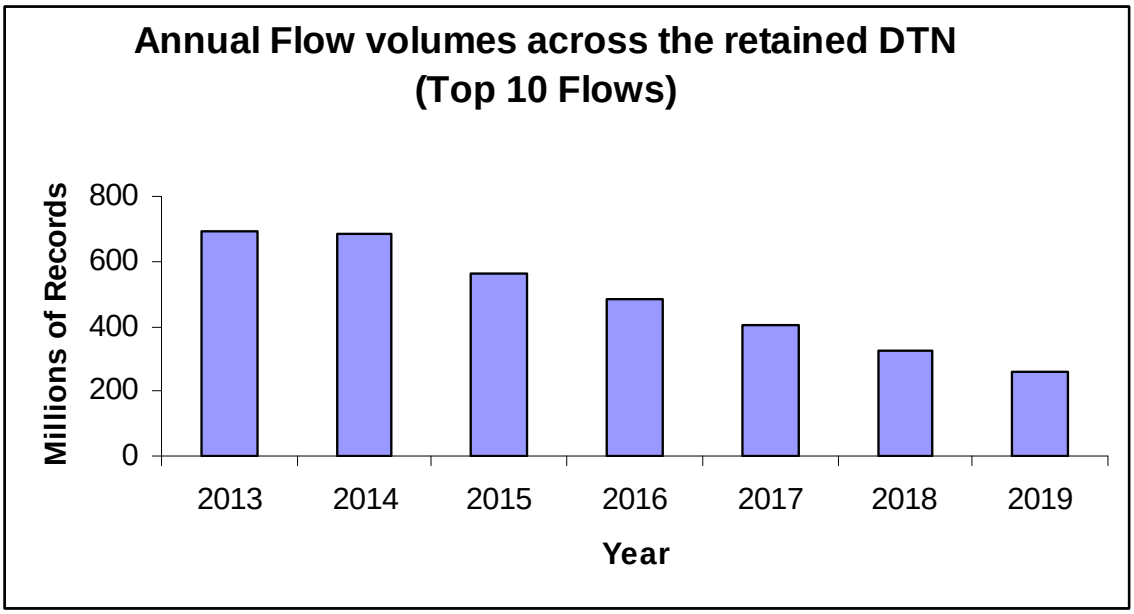

Figure 10 - Aggregate effect of reducing volumes across the DTN over the SMIP rollout period

Although the reduction in message volumes will be significant, this will only drive minor savings on the cost of the Data Transfer Service. Savings of around 5% could be achieved by reducing the available bandwidth to be proportionate to the number of messages expected. However, the main costs in providing the DTS relate to the infrastructure, which is already at entry level and the people necessary to maintain the service at the agreed levels and there is no expectation that service levels could be reduced.

7 Impact of a 'Portal' Solution

This section examines the way in which a 'Portal' solution could be implemented at the DCC and the likely areas of impact that such a solution would have on Market Participants.

It should be noted that some of the new data exchange requirements identified through discussions with stakeholders require exchanges between Market Participants as well as between the DCC and authorised parties. For the purposes of this analysis, it is assumed that any inter-Market Participant exchanges will be achieved via the DTN (or, as the case may be, IX) and that, as a consequence, the costs and effort associated with such exchanges will need to be incurred irrespective of the chosen solution for providing data exchanges between the DCC and authorised parties.

7.1 What is a 'Portal Solution'?

In order to examine the potential impacts on Market Participants, it is necessary to make assumptions about the kinds of services that the 'Portal' might provide and how it might provide them.

Assumptions

The following assumptions have been made in undertaking this analysis:

- The DCC will only perform data exchange functions on receipt of a valid instruction so to do. Such an instruction could either come from an authorised user of the DCC or from a meter. For certain types of instruction, the DCC will develop its own internal schedules to complete the action in line with agreed service levels e.g. when a supplier requests a full set of meter readings for all of its customers, the DCC will determine how and when it will access each individual meter in order to meet the requirement to provide the full set of data back to the Market Participant;
- The interface from the DCC to Market Participants will be effected via a large messaging hub and all most interactions with the 'Portal' will be via messages;
- Each Market Participant will be responsible for acquiring, testing and maintaining its own communications links to the DCC;
- The 'Portal' will be physically separate from the infrastructure provided at the DCC to interact with smart meters;
- SMIP has already identified the need for an enhanced class of service between the DCC and smart meters. This ensures that messages can be prioritised and delivered appropriately. Similarly, enhanced class of service will be required within the DCC's Applications and on the communications links between the infrastructure that interacts with smart meters and the 'Portal' and also between the 'Portal' and relevant Market Participants (likely to be suppliers and distributors);
- Each Market Participant will be responsible for sizing its own communications line and ensuring that where appropriate, it has purchased the required enhanced class of service for those lines. Market Participants will also be responsible for ensuring that the communications lines they purchase are contracted with their providers to ensure the level of availability to allow the participant to discharge its duties in line with the Smart Energy Code;
- Market Participants will be responsible for accessing data on the 'Portal' and ensuring that it is received correctly and in its entirety;

- The 'Portal' will validate data exchanges before they are collected or when they are received and Market Participants will need to do the same;
- Messages between smart meters and the DCC are being defined by the SMIP. These will not necessarily reflect the messages sent between the DCC and Market Participants e.g. some messages will be gathered from smart meters and aggregated prior to being made available to Market Participants;
- The DCC will support current messaging formats for both the gas and electricity markets, where the information contained in data exchanges is required to support settlement of the respective retail markets;

7.2 How will such a solution impact Market Participants?

The SMIP is a large and complex programme that will undoubtedly have significant impacts upon all participants in the gas and electricity markets. Regardless of the solution chosen to deliver data between the DCC and Market Participants, the bulk of the work that will need to be undertaken in participant organisations relates to the development and implementation of new business processes and systems. However, the choice of supplying the interface between Market Participants and the DCC using a 'Portal' solution has potential additional impact.

The term 'Portal' is commonly used to describe Internet based applications that provide a range of services to those who use it. It is characteristically an online service, where users can either access and download information directly (e.g. the music portal iTunes) or post requests for information to be sent to them (e.g. Mortgage quotation portals). We find the term 'Portal', when applied to the suggested solution for the DCC to be a misnomer. The interface to the DCC will be necessarily via a large scale messaging hub, although some services may be provided via online applications.

The implementation of such a messaging hub will impact Market Participants in various ways:

- **Message validation** - outbound messages will be validated by the DCC but each participant will need to develop routines to validate the messages once they have been received;
- **Communications lines** - each Market Participant will be responsible for procuring, commissioning and managing its communications lines to the DCC. Simple 'Internet' connections will not be a valid choice for many, as priority messages would not be guaranteed to be delivered using a standard Internet connection;
- **Testing** - whilst the bulk of testing in the run up to the launch of the DCC is likely to be to ensure that end-to-end business processes and the underlying systems function effectively, under the 'Portal' approach, there will be additional work required to test the new communications links and verify that they deliver the required level of service. This may be a significant element in the run up to DCC launch, based upon network commissioning activities from previous industry-wide reform programmes;
- **Security** - Market Participants would need to establish processes and routines for managing security between the DCC and its own firewalls, in order to protect their businesses;
- **Re-sending/re-collecting files** - currently, the DCC is envisaged not to store any data, other than some transient data. Should Market Participants wish to re-collect data from the DCC, it is possible that, under current DCC terms, the data would need to be re-collected from meters;
- **Re-tries** - each Market Participant would need to develop routines and procedures to manage instances when messages could not be sent to or received from the DCC;

- **Audit Trails** - both the DCC and Market Participants will need to develop routines to ensure that they have comprehensive audit trails of the messages that they send and receive;
- **User Management** - the DCC will need to develop a set of user management procedures to ensure that each request it receives from a participant comes both from an entity that is authorised to make such a request and that the part of the business or person that is making the request is authorised specifically to make that type of request. This will require Market Participants to manage such permissions internally and with the DCC; and
- **Disaster Recovery** - if the DCC needs to switch from its main data centre to its disaster recovery data centre, all participants will be responsible for switching their own communications lines from the primary to the disaster recovery site.

All of the above will incur cost, time and effort in each organisation that needs to connect to the DCC. Each area runs the risk that individual participants will develop and implement disparate solutions and may, therefore, increase the risk of misunderstanding and misinterpretation of requirements.

8 Impact of a Greenfield Network

This section summarises the requirements and estimated costs for the provision of the new data exchange requirements from the DCC to authorised parties by a new service provider, referred to as a Greenfield solution. Under this solution, the current ElectraLink and Xoserve infrastructures (the DTS and IX respectively) would still be required to support existing electricity and gas market processes (and commercial services provided by ElectraLink to both the electricity and gas sectors) alongside any new Greenfield solution. In order to facilitate a comparison with the incremental costs presented in section 6 above for the enhanced DTN approach, this section focuses only on the incremental costs for the Greenfield solution over and above the continuation of the existing DTS.

It should be noted that some of the new data exchange requirements, identified through discussions with stakeholders, require exchanges between Market Participants as well as between the DCC and authorised parties. For the purposes of this analysis, such flows have been ignored - i.e. the costs described within this section refer only to the infrastructure required to deliver information to and from the DCC. It is assumed that any inter-Market Participant exchanges will be achieved via the DTN (or, as the case may be, IX) and that, as a consequence, the costs associated with such exchanges will need to be incurred irrespective of the chosen solution for providing data exchange between the DCC and authorised parties.

The estimated costs are set out to show how they vary across the three different phases, i.e. Foundation, DCC establishment and once DCC incorporates registration, and have been discounted using a rate of 3.5% per annum in line with HM Treasury guidance.

This section is structured as follows:

Section 8.1describes the assumptions and methodology employed in estimating the incremental costs of the Greenfield solution before going on to identify the costs in each of the three aforementioned phases; and

Section 8.2 summarises the estimated costs for the Greenfield approach.

8.1 Incremental cost estimates for the Greenfield approach

8.1.1 Methodology

This section describes the input data utilised to estimate the incremental costs, the assumptions made and the approach to building up the cost estimate in terms of considering network, IT infrastructure, applications and client side costs.

Inputs

The cost estimates have been based on the following key input data (as set out previously in section 4 and utilised in section 6 for the enhanced DTN approach):

- Total data volumes in 2014 will be of the order of 2Tb (for 2.5 million installed smart meters), increasing to around 43Tb (for 50 million installed smart meters) in 2019; and

- The total number of parties connected to the DTN will rise from the current number of approximately 140 to 280.

Assumptions

In relation to the above input data, the following assumptions have been applied:

- In order to derive an estimated cost profile to 2019, the above data volumes have been interpolated for the intervening years between 2014 and 2019 on the assumption that the number of smart meters will rise at around 9 million per annum (again this is consistent with the assumption utilised for the estimation for the enhanced DTN approach); and
- While new connections will be required to all Authorised Parties, the same assumptions regarding the types of connection required for each category of party have been applied for the Greenfield solution - i.e. High Volume connections will be required for parties such as the Big 6 Suppliers, the Distribution Companies, Gas Transporters etc, the equivalent of Low Volume connections will be required for intermediate sized parties, and the majority of parties will connect via a VPN connection.

Table 9 below summarises the above drivers and identifies others employed in the estimation.

	2014	2019
Data volume per year (Gbytes)	2,000	43,000
Split between message based traffic (to go via the application systems) and network traffic	90:10	50:50
No of very large connections[21]	4	4
No of large connected parties	30	30
No of medium connected parties	20	30
No of small connected parties (assumed to be on VPN)[22]	230	220

Table 9 - Summary of changes in key cost driver parameters

In addition to the above input data assumptions, setting up a Greenfield service to connect Market Participants as opposed to upgrading the DTN introduces a number of new risks for all Market Participants which need to be considered. These risks include the following:

Risk 1: Implementing a new Greenfield network and supporting data exchange infrastructure is a time consuming undertaking, particularly if specific requirements such as resilience and high availability have to be taken into account. There is significant implementation risk that can result in both time and cost overruns. Examples of such overruns already exist in the energy industry and are well understood by parties. In estimating the design, build, test and implementation of the Greenfield solution an allowance for such risks has been assumed.

Risk 2: The central feature of the Greenfield network is an independent network to support the new data flows, which will run in parallel to the existing DTN. Consequently, Market Participants may need to receive messages in different formats from the DTN and the DCC. In this case, they would need to

[21] It has been assumed 2 data centres (main and standby) will be required for each of ELEXON (if ELEXON is to assume a settlement role i.e. Data Collector and Data Aggregator) and Xoserve

[22] It is assumed that 10 of the small (VPN) connected parties transfer to become Medium connected parties in 2016 as the data volumes for parties increase.

adapt their processes and systems to enable the processing of these messages alongside the messages they will continue to receive from the DTN. On the other hand, it may be decided that the cost of changing every Market Participant's IT systems is too large and that the DCC will, therefore, send messages (for market settlement) in the current DTC format. In this case, the DCC (or more accurately its Greenfield service provider) would need to develop the DTC flows from scratch and ensure alignment with the DTC and the DTN for all messages. For each process, data flow and exception, Market Participants would need to build new processes and to develop exception routines in their systems, for example to detect misalignment between flows from the DTN and those from the DCC. In either case, it is likely to be a significant undertaking. Given the inherent uncertainty in this area, no allowance for the potential impact on Market Participant costs has been made in estimating the Greenfield costs.

Risk 3: Whilst the DTN has established processes and governance for managing changes to data flows and the introduction of new flows, creating a new network and building new applications to manage data brings a significant possibility of new requirements for significant changes. This may not only be costly and time consuming but the concomitant need for testing such a new development with the industry, could pose a threat to DCC implementation timescales. While this risk may be significant it is difficult to quantify. Thus a forward allowance for possible further changes has been made in line with that assumed for the enhanced DTN approach.

Network

To meet the volume requirements, assumptions have been made regarding the requirements to install network connections. Where higher grade communication connections have been required to meet the volume requirements, these have been dimensioned to be capable of meeting the estimated volume requirements as at 2019, but have assumed to be operated at a capacity appropriate for the volume during any given period. Network connections are provided in 2013 for 30 large, 20 medium and 230 small parties – the latter being on VPN connections. It is assumed that 10 of the VPN parties migrate to become medium connected parties in 2016.

It has been assumed that the Greenfield provider will require 2 data centres – a main and hot standby – and that these will be installed in 2013 prior to go live for the DCC so as to facilitate testing and ensure operations from DCC go live. The network connections for the data centres are sized to facilitate the maximum estimated transfer requirements (i.e. the 2019 requirements) dimensioned to address reasonable peak traffic flows but operated at an appropriate capacity for the given year (in common with connections for other parties as described above).

Two further parties – ELEXON and Xoserve – will require similarly resilient infrastructure and therefore 4 further very high volume connections have been assumed – a main and hot standby for each of ELEXON and Xoserve (ensuring that both organisations can continue to settle their respective markets once the DCC effectively becomes a Market Settlement Agent by taking on Data Collection and Aggregation responsibilities).

Figure 11, below, provides a schematic representation of the Greenfield network. This is shown to overlay the existing DTN which, as identified earlier, will continue to be required for retail electricity market services.

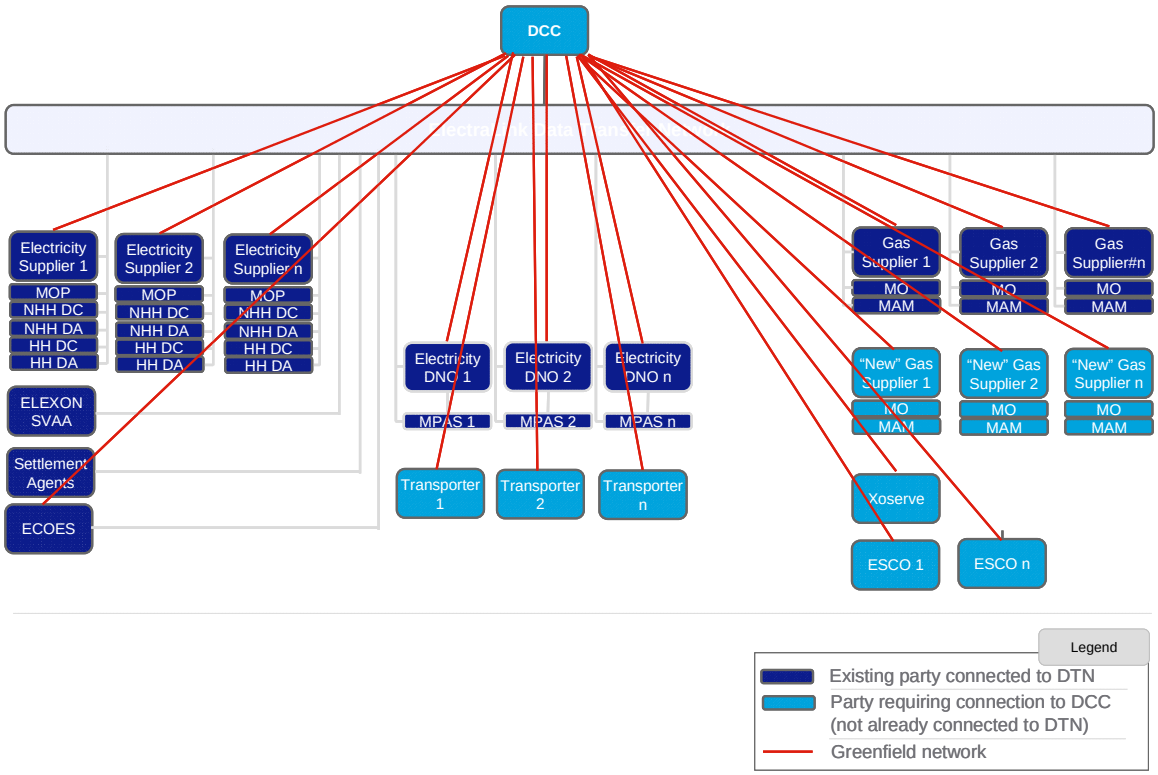

Figure 11: Schematic representation of Greenfield network scope

IT Infrastructure

As the nature of the DCC architecture has yet to be determined, we have assumed a centralised server architecture, reflecting the type of service provision new providers would be expected to offer. These servers have been suitably dimensioned to meet the estimated volumes of data required to be processed and delivered. In estimating the capital costs, average market values based on public data, data from ElectraLink's existing service provider and PA's experience have been used. An allowance has also been made for 6 months of on-line storage of audit information (this is consistent with a similar allowance made by ElectraLink's current service provider in estimating its likely IT infrastructure costs).

As for the enhanced DTN approach and in recognition of the relatively rapid increase in data volumes over the period, it has been assumed that the technology will be refreshed on a 5 year cycle.

For operational expenses an annual maintenance cost of 22% of the original capital expenses and an operations centre at £1.5m per annum have been assumed. This latter estimate assumes that the operations centre will be shared with other operational aspects of the DCC (in respect of upstream data retrieval processes – i.e. meter to DCC interfaces) such that resources can be appropriately leveraged to provide 24/7 service. If the Greenfield service were provided by a service provider independent of the DCC, these costs would likely be higher.

Applications

For the purposes of the Greenfield assessment, it has been assumed that the service provider will need to design, build, test and implement the applications required for delivery of the service. In estimating these costs an allowance has been made for the service provider to develop familiarity with the application requirements. All of these costs will be incurred in 2013 in preparation for go live in 2014.

It has been further assumed that changes to data flows and functionality will be required after the implementation of the DCC – experience from the implementation of previous energy market arrangements suggests that relatively more changes will be required in the first few years after implementation than will be required in later years. However since the nature of the applications to be implemented are not known (and recognising that one of the possible options would be based on the current DTC format), an assumption consistent with current, mature annual DTN flow changes has been adopted.

Client Side Costs

In estimating the possible client side costs (i.e. those of the DCC), it has been assumed that the contract management activities of the DCC would span both the DCC to authorised parties service and the DCC to meter service. Thus the applicable costs would relate to 50% of the total costs associated with service provider management.

8.1.2 Foundation

The operation of the Greenfield service will not be required until go-live of the DCC. However, in order to adequately design, build, test and trial the Greenfield service, preparations for service delivery will need to be made well in advance of live operation. Thus it has been assumed that preparations will commence in 2013 for live operation in 2014.

The majority of the costs incurred in this period will relate to IT infrastructure, networks and applications, all of which must be purchased, installed and tested prior to go live in 2014. A summary of the estimated discounted costs for Foundation is provided below in Table 10.

Cost item	Foundation
	2013 (£M)
Network	1.15
It Infrastructure	5.13
Applications	6.49
Client Side Costs	1.48
Totals	**14.25**

Table 10 - Summary of the estimated discounted costs for a Greenfield service provision incurred during the Foundation period

8.1.3 DCC Established

As set out in the previous section, we have assumed that the network and associated infrastructure will have been already fully established (designed, built, tested and trialled) before the DCC is established in 2014, in order to enable full application testing by each connected party. Also, as identified above, it is assumed that the Greenfield service will be dimensioned to fulfil the data transfer requirements up to 2019 in order to avoid costly re-installation of access links and hardware but that the network will be operated at volumes appropriate for the relevant period of time. Further qualitative requirements for the Greenfield service which differ to those for the enhanced DTN approach are detailed in the table below.

Element	Description
Telecommunications	The Greenfield network will need to provide connectivity for an estimated 280 Market Participants to the DCC Data Centre and be available prior to the DCC go live date in 2014. There will be no connectivity required between the DCC and the DTN data centres. The incremental requirements with regards to security, and availability and resilience will also apply. With regards to bandwidth the Greenfield network will need to carry DCC network traffic of circa 43,000Gb per annum by 2019 and the Greenfield network has been dimensioned with a maximum capacity of 100 Mbps at the DCC data centre to meet this requirement. It has been further assumed that each new network connection will be dimensioned to support the expected traffic up to 2019 in order to avoid additional installation charges and avoid the risk of disruption.
IT infrastructure	The specific nature of the future DCC infrastructure is not known yet. In order to conduct a meaningful cost comparison powerful IT application servers similar to those used to provide fail-safe networked applications by major corporations or online service providers have been assumed. A fully redundant layout with two physical locations plus a testing platform has also been assumed to be necessary.
Applications	Costings have been estimated to reflect a "new build" approach, though no account has been taken of the impact on participant systems and processes.

Table 11 - Greenfield requirements once DCC established

Against this backdrop, the estimated discounted costs which the Greenfield service would incur post DCC implementation (but prior to the incorporation of registration into the DCC) is shown in Table 12, below.

Cost item	DCC Established		
	2014 (£M)	**2015 (£M)**	**2016 (£M)**
Network	0.95	0.96	1.09
IT Infrastructure	5.15	5.69	4.83
Applications	0.25	0.27	0.24
Client Side Costs	1.43	1.38	1.33
Totals	7.78	8.3	7.49

Table 12 - Summary of estimated costs incurred for the Greenfield service once DCC is established

8.1.4 DCC incorporates registration

It is not possible to assess the nature of the registration service which is likely to be provided by the DCC. However, whether the service is "thin" or "thick" the impact on network and infrastructure requirements for the delivery of smart meter information to and from the DCC is not thought to be particularly significant. The key drivers are as previously identified and the infrastructure and network costs will rise in accordance with the increase in anticipated data volumes.

In addition, it has been assumed that a refresh of the IT infrastructure will commence. The timing of this refresh is consistent with the assumption made for the enhanced DTN case.

The estimated discounted costs for the Greenfield service during this period are:

Cost item	DCC Incorporates Registration		
	2017 (£M)	**2018 (£M)**	**2019 (£M)**
Network	1.12	1.11	1.11
IT Infrastructure	6.32	7.85	8.66
Applications	0.25	0.22	0.24
Client Side Costs	1.29	1.24	1.20
Totals	**8.98**	**10.42**	**11.21**

Table 13 - Summary of estimated Greenfield costs once registration is incorporated in the DCC

8.2 Summary

The total estimated discounted costs for the development of a Greenfield solution to facilitate the identified new data requirements are shown below in

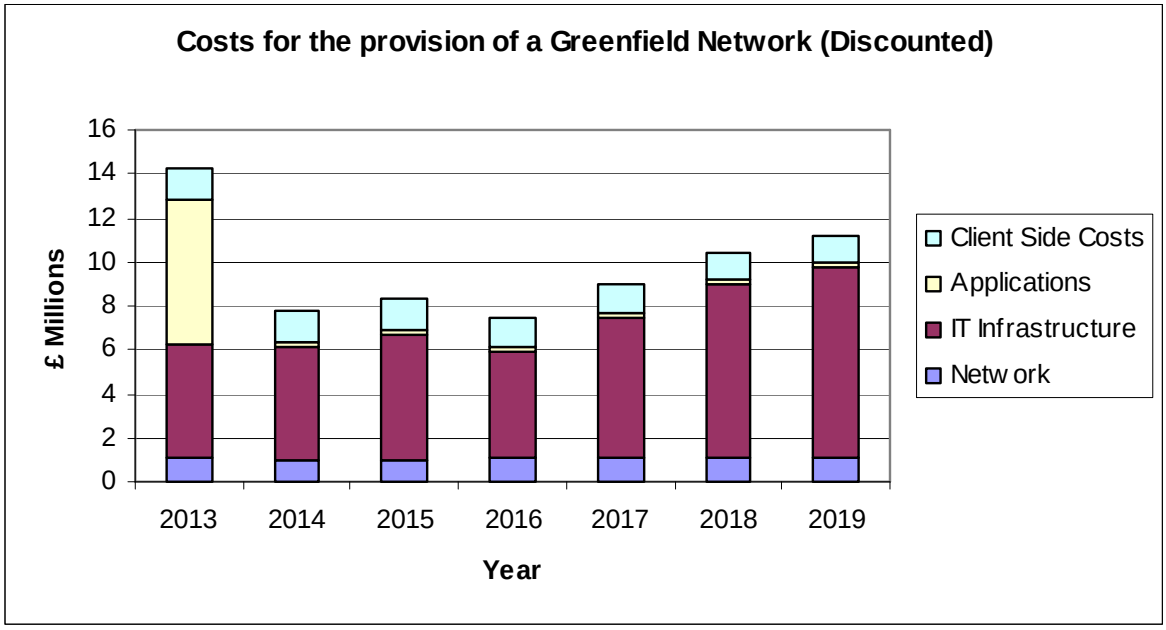

Figure 12 and Table 14.

Figure 12: Summary of estimated discounted costs for the Greenfield solution

Cost item	Foundation	DCC Established			DCC Incorporates Registration		
	2013 (£M)	**2014 (£M)**	**2015 (£M)**	**2016 (£M)**	**2017 (£M)**	**2018 (£M)**	**2019 (£M)**
Network	1.15	0.95	0.96	1.09	1.12	1.11	1.11
It Infrastructure	5.13	5.15	5.69	4.84	6.32	7.85	8.66
Applications	6.49	0.25	0.27	0.24	0.25	0.22	0.24
Client Side Costs	1.48	1.43	1.38	1.33	1.29	1.24	1.20
Totals	**14.25**	**7.78**	**8.3**	**7.5**	**8.98**	**10.42**	**11.21**

Table 14 - Summary of estimated discounted costs for the Greenfield solution

Again it should be noted that the full cost to the industry would also include the costs of the current DTS of around £4.5million per annum, discounted in the same manner.

9 Conclusions

In this section, we set out our conclusions based upon interviews with stakeholders, our analysis of the potential requirements for DCC data transfer emerging from the Smart Metering Implementation Programme, the technology options and our estimation of the associated costs. It considers the suitability of an enhancement to the DTN to provide data exchange services after the establishment of the DCC and it assesses the risks and costs of this versus the procurement and provision of a Greenfield dedicated network to connect Market Participants to the DCC and a 'Portal' provided at the DCC to which participants would be required to make their own arrangements for connection.

9.1 General

Our base assumption that the industry will require the continued use of the Data Transfer Network for the foreseeable future has resonated with Market Participants. Participants recognised that:

- there are no plans to change settlement for large consumers managed under the half-hourly arrangements and these consumers are not covered by the SMIP;
- domestic consumers can choose not to have a smart meter installed; and
- Suppliers have the choice to use or not to use the DCC for SME customers.

Consequently, whichever solution is ultimately chosen for the DCC to communicate with Market Participants, current data transfer services will need to be maintained.

Our analysis suggests that the DTN will be the most effective means of Market Participants communicating with the DCC. Our reasons for this conclusion are set out below.

9.1.1 Foundation

Section 4 discusses the current industry debate around provisions for suppliers being able to access data from smart meters when they acquire them from competitors. The DTN offers the only viable short-term solution to resolve this problem for retail electricity participants.

9.2 Does the DTN provide the capabilities required by Market Participants?

In addition to a range of technical requirements for data exchanges with the DCC and other parties, those Market Participants with whom we engaged expressed a number of common themes around the type of service that they desire. These included:

- **Cost-effective** data transfer;
- **Re-use rather than re-invent** - given previous timescales and costs for developing and implementing new networks; and
- **Single means of access to the DCC** - this was of particular importance to dual fuel suppliers, where separate access methods for gas and electricity would drive up implementation costs and reduce the industry's ability to improve and standardise processes such as Change of Supplier.

Our conclusions on each of these important requirements are set out in the sections below.

9.2.1 Cost effective data transfer

'Portal' versus an Enhanced DTN Solution

Given Market Participants' clear desire to minimise the costs of data transfer, once the DCC is established, the table below provides a comparison of the relative efforts required by Market Participants, when implementing a 'Portal' solution versus extending the use of the DTN. Cost must be viewed from a broad perspective; it does not simply cover the cost of acquisition but may also include:

- Additional project staff costs both in terms of the numbers required and the duration for which they will be required;
- Additional business staff costs due to operational disruption;
- Additional IT Operations staff costs due to increased workload and operational disruption; and
- Increased risk, which can drive up the potential for things going wrong and incurring additional cost.

Area of Impact	Portal Solution	Enhanced DTN
Message Validation	Participants would each need to develop their own message validation routines. Potential for inconsistency in approach and outcomes.	Standard feature to ensure files are formatted correctly. Enhanced validation is available as a standard part of the service to validate file structures.
Communications Lines	Each participant would need to procure its own lines, commission them and manage them on an ongoing basis. Participants would also need to manage upgrades to the capacity of lines in respect of their anticipated data volumes. Many participants will require lines with enhanced class of service, so simple Internet connections will not achieve desired outcomes. Individual negotiations with suppliers may lead to increased costs.	Provided as part of the standard DTN package. Lines are appropriately sized for each participant and upgrades managed across the network in a controlled and proportionate manner. Enhanced class of service has been tested and demonstrated but is not currently available on all network links, but relatively easy to purchase and upgrade. Costs likely to be lower due to increased purchasing power.
Testing	Full commissioning tests of new lines at each participant and commensurate connectivity and functional testing at both the DCC and participant ends.	Tried and tested routines for implementing new connections that are well understood by many Market Participants. DCC would be treated as a new party and would not need to test the communications infrastructure with each authorised party.
Re-send/Re-collect	DCC only holds transient data, so any request to re-collect information outside of the transient window would require re-collection of data from the meters involved.	Standard features of the DTN Files can be re-sent without the originator having to regenerate the data Files can be re-collected without the

	Participants would need to develop their own routines and procedures to manage file re-sends	sender having to re-send the data.
User Management	Both DCC and Market Participants would need to develop processes, procedures and software (DCC only) to ensure that only authorised parties could submit requests to the DCC and that the person submitting were authorised to submit that specific type of request	Standard feature of the DTN. Current users have administration rights that allow them to determine who in their organisation can access the DTN and what they can do. Participant ID and Role Codes are standard features and could be enhanced to provide the DCC with pre-validated messages
Disaster Recovery	When DCC switches to its DR data centre, all participants would need to switch their communications lines to communicate with that DR data centre	Automatic re-routing of flows to DR data centre is part of the standard service on the DTN
Audit Trails	DCC and Market Participants would both need to develop processes and software to manage audit trails Could be disputes around timings of messages from sender and receiver making it difficult to assess SLA compliance	Standard feature of the DTN that logs all messages in a robust manner Unified industry "data clock" as standard
Reports	Would need to be developed from scratch	Standard feature of the DTN
On-line services	Some potential DCC service providers may not offer this service. Unlikely to be a major problem for larger Market Participants but may generate significant additional cost and effort for smaller parties e.g. to develop software that allows them to send scheduling messages to the DCC, such as 'Read all of my meters in distribution area XX for the period commencing dd/mm/yyyy and ending on dd/mm/yyyy	Some online services already exist within the DTS. These could be expanded to offer flexible functionality to all Market Participants. Using the same example, an online service could be provided to all Market Participants that would allow them to input such messages in a user friendly way and to have these messages delivered to the DCC for action. Both development and operational costs would be shared across the industry rather than being incurred by each Market Participant.
Security Architecture	Internal Architecture within the DCC but participants would need to manage security between the DCC, across the connection and through their firewalls.	End-to-end architecture provided as standard. Would start within the DCC and extend beyond the participants' firewalls.
Security Keys	Market Participants would need to manage their own security keys	Managed centrally as a standard feature of the service
Message Translation	Would need to be developed from scratch by the DCC Service Provider	Can already be partially delivered by the DTN and could be expanded to cover remaining gas market

		messages and new messages to/from DCC
Experience	New Service Provider unlikely to be completely familiar with data transfer requirements around the gas and power markets and would therefore be likely to incur a significant learning curve	Experience personnel, some of whom have operated the service since its inception in the 1990's

In summary, the DTN offers Market Participants a range of opportunities to save costs, lower implementation effort and mitigate implementation risks.

Greenfield Network versus enhanced DTN Solution

This section brings together the estimated incremental costs for Greenfield and ElectraLink DTN based solutions and compares them to see which is more cost effective.

	Total Incremental discounted net present cost from 2013 to 2019
ElectraLink DTN based solution	£48.02m
Greenfield solution	£68.42m

Table 15 - Summary of estimated discounted costs for the Greenfield and enhanced DTN solutions

Based on our high level cost estimates, the table shows that re-using the existing DTN infrastructure is substantially more cost effective than developing a Greenfield solution. These cost estimates do not include any assessment of the industry participant costs in changes that they need to make to connect to the solution. Previous industry experience would suggest that the costs could be much larger in an untried and untested solution than would the case in the extension of an existing solution.

The chart and table below expand on the cost comparison and show how the costs of the ElectraLink based DTN and Greenfield approach compare over time. As would be expected, there is a far larger set up cost in 2014 under the Greenfield solution as a whole new solution has to be developed from scratch.

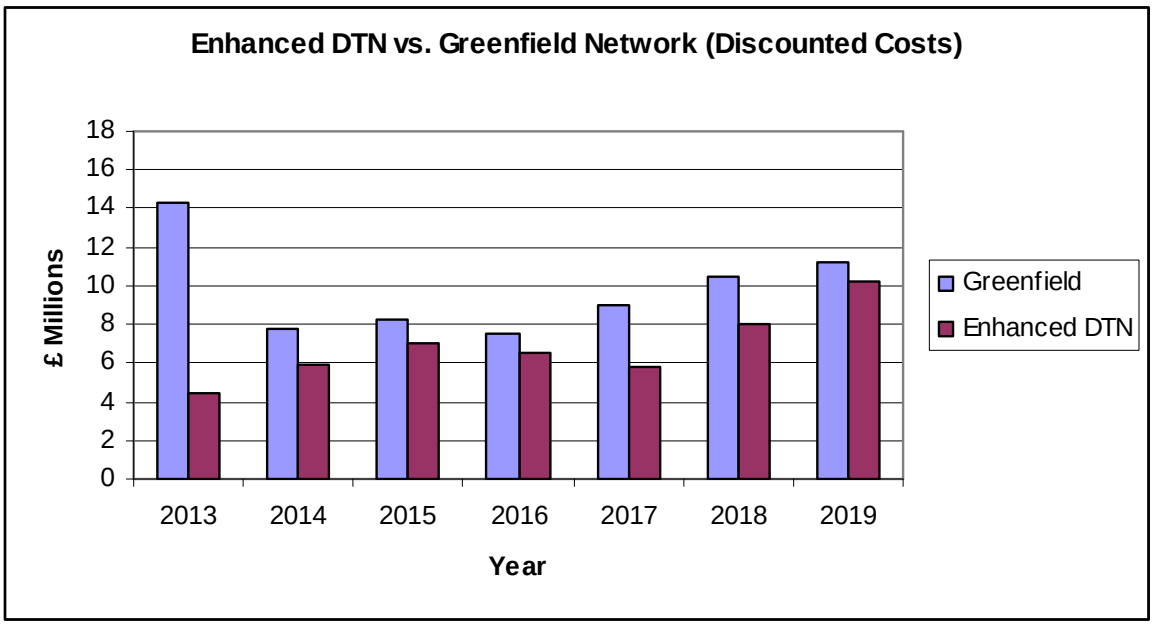

Figure 13: Comparison of the estimated discounted costs for the Greenfield and enhanced DTN solutions

	Foundation	DCC Established			DCC Incorporates Registration			Totals
	2013 (£M)	2014 (£M)	2015 (£M)	2016 (£M)	2017 (£M)	2018 (£M)	2019 (£M)	(£M)
Greenfield	14.25	7.77	8.29	7.50	8.98	10.42	11.21	**68.42**
Enhanced DTN	4.43	5.93	7.06	6.52	5.83	8.01	10.24	**48.02**

Table 16 - Comparison of the estimated discounted costs for the Greenfield and enhanced DTN solutions

Our high-level analysis of the potential costs of an enhanced DTN Solution compared to the acquisition and commissioning of a Greenfield network, indicate that an enhanced DTN Solution would cost around £20.4 million less over the period 2013 to 2019.

9.2.2 Re-use rather than re-invent

A number of those interviewed expressed concern that the industry should not 're-invent the wheel' as a result of the move towards smart metering. It was generally considered that re-using existing components would lower the risk profile of the overall programme to implement smart meters (and allow the industry to continue to function effectively). Procuring and commissioning an entirely new network would likely be a lengthy and complex process based upon similar experiences in significant market reform programmes. Both the risk and the cost perspective make this option unattractive.

Of the three existing industry data transfer networks, only the DTN currently connects to participants in both the gas and electricity sectors. The CVA network connects electricity Market Participants to ELEXON for the purposes of wholesale settlement, trading and balancing. The IX network connects gas Market Participants to Xoserve for all matters relating to the operation and settlement of the gas market. The CVA and IX networks are hub and spoke networks that allow Market Participants to communicate with a central body (National Grid and Xoserve, respectively) and allow the central body to communicate back to the Market Participant. Neither network allows direct participant-to-participant communications.

Of these three candidates, the DTN offers the best fit solution, given its connections across both markets, its focus on retail transactions and that it was created specifically to allow inter-participant data exchange. Additionally, processes for modifying the network and its capabilities are well understood by the majority of Market Participants and have been tried and tested over 14 years.

The DTN is based upon a robust and standard Multi-Protocol Label Switching (MPLS) network that is built to handle many forms of data exchange using a range of technical protocols. This means that it is already capable of significantly more than it currently delivers to the retail electricity market. The current service provides scheduled transmission of flat files using the File Transfer Protocol (FTP). The DTN uses this protocol because Market Participant systems were originally developed in this way and have been enhanced to use this type of data exchange. The network is not constrained to this mode of data exchange. It already supports web services and real-time messaging, although the real-time functions would need to be upgraded to ensure that they were separated from the scheduled functions to give confidence of real-time delivery at industry volumes.

9.2.3 Single means of access to the DCC

All potential technical solutions support this requirement. However, the DTN's capability to translate messages as they are routed through the network would allow transactions that are needed for the settlement of gas and electricity to be correctly formatted and routed to the desired recipient.

A 'Portal' solution would offer a single point of access to the DCC but with each participant making its own arrangements for access to the 'Portal' and technical management of the data to and from the 'Portal'. Similarly, a Greenfield network would also offer a single means of access to the DCC but would also require participants to make their own arrangements for the technical management of data to and from the DCC.

9.3 Does the DTN meet the technical and business needs of Market Participants?

The design of the DCC and the services it will provide are still under development by the SMIP. The procurement of service providers to deliver these services has only just commenced and hence, the precise design of services and solutions is therefore unclear. However, in discussing the requirements for data exchange with Market Participants, we have been able to establish that they require a range of services to meet their business needs. From a technical perspective, these can be categorised into three groupings:

- **Scheduled communications** - to facilitate the transfer of larger volumes of data to be further processed by their internal systems;
- **Near real-time data exchanges** - to ensure that important communications can be delivered quickly and in a form that allows them to be captured in internal IT systems and responded to in a controlled manner e.g. off-supply alerts where a DNO may need to assess whether the alerts received imply a major or minor outage on the network and respond accordingly; and
- **Online services** - to allow access to IT systems provided by the DCC to perform actions that require either an immediate response, for example accessing a customer's meter to resolve an issue whilst the customer is on the telephone, or to perform actions that schedule activities for the DCC to perform on their behalf, e.g. setting periodic meter reading schedules or informing the DCC of which smart meters should be accessed for electricity quality reads and when.

In respect of each of the above:

- **Scheduled communications** - this is the core of the current DTN and has proven effective over the years since the introduction of retail competition into the electricity sector;
- **Near real-time data exchanges** - this is currently available and being demonstrated to Market Participants - it would require the introduction of an enhanced class of service to assure priority of these messages over scheduled messages, however, this is standard functionality delivered by network providers to many clients; and
- **Online access** - the DTN already provides this type of access to its users for current services e.g. webtools.

Whilst the precise nature of the requirements is still unknown, the DTN currently provides the types of service that are required by Market Participants.

Appendix A: Stakeholder Comments

This appendix provides a more detailed summary of stakeholder comments received through the engagement process.

A.1 Foundation

This stage of the market development covers the period where Suppliers are rolling out smart meters to their customers, prior to the establishment of the DCC (i.e. the current situation). This sub-section therefore summarises stakeholder views on the potential for considers whether any new data exchange requirements are required for immediate implementation.

A.1.1 Smart Meter Roll Out

Suppliers are progressing with the roll out of smart meters at varying speeds depending on their internal business strategies. At this stage, there is no agreed industry-wide technical specification for smart meters and for the data that they will need to hold and provide to industry participants. It is therefore not clear how many of the meters that are currently being installed will be compliant with the industry technical specification once it is agreed. One Supplier indicated that it considered all meters that are or will be installed prior to the agreement of the technical specification to be non-compliant and hence in need of replacement during the implementation phase of the Smart Metering Implementation Programme (SMIP) - though it also noted that it may schedule such meters to be replaced towards the end of the roll out in order to extract maximum value from the assets. Other parties were circumspect on the likelihood of existing smart meters being "deemed" compliant once the agreed specification is issued.

A.1.2 Current Smart Meter Data Interactions

In general, the stakeholders engaged saw very few changes occurring to settlement processes during the Foundation period. Domestic premises with smart meters installed will continue to be settled on a Non Half-Hourly (NHH) basis using the current profile processes and periodic register readings. None of the stakeholders engaged considered the need or desire existed to move toward Half-Hourly (HH) settlement of domestic customers during Foundation. The existing NHH settlement process was considered sufficiently accurate for domestic customers and one Supplier suggested that if actual HH data were to be compared with profile data (for class 1 and 2 profiles), the differences were would not material. Given this and the additional costs associated with the collection of HH granularity data, Suppliers did not consider the benefits would outweigh the costs.

A number of Suppliers have (or are) establishing their own Meter Data Management Systems (MDMS) to receive, store and analyse readings from smart meters. Communication is either directly from the Suppliers' MDMS to the smart meter (generally via GSM technology) or via an intermediary providing data retrieval services (which could be an existing Non-Half-Hourly Data Collector (NHHDC) agent).

The current electricity market settlement processes require that NHHDC agents submit readings to Non-Half-Hourly Data Aggregator (NHHDA) agents for aggregation and further submission into the settlement process. In general Suppliers are retrieving data register readings (as opposed to interval readings) on a monthly basis and providing such readings to their NHHDC agents, or their intermediary data retrieval service provider is submitting the data direct to the requisite NHHDC on the

Supplier's behalf. In the former case for the engaged stakeholders, the NHHDC tends to be an in-house service for the Supplier requiring no external flows. Should a formal external flow be required between the Supplier and NHHDC during Foundation, a data flow already exists within the Data Transfer Catalogue between the two parties - D0071: Customer own reading or Supplier estimated reading on Change of Supplier. It could be possible to extend the scope of this DTC flow to provide smart meter readings to NHHDC on a routine basis and thereby maintain the status quo in respect of the settlement processes through Foundation. Such a change to an existing data flow would fall within normal working practise for ElectraLink and would therefore be readily accommodated. However, the D0071 is currently is currently restricted in its use, the same outcome could be achieved by another route. This would require Suppliers to send a D0010 to the NHHDC, as is currently the case for readings for pre-payment meters obtained from the Pre-Payment Meter Infrastructure Provider (PPMIP). In this case, it would seem advisable to modify the allowable values for the data item 'Reading Type' to specify a new value that distinguishes this type of reading from others. Again, this would be a business as usual change for ElectraLink. If the reading were to be obtained by a party that were neither the Supplier nor the Data Collector, this party could also use the D0010 to communicate the meter reading but would need to do so using the market role of Non-Half-Hourly Data Retriever (NHHDR). This would also subject to the same extension of the valid set for 'Reading Type', described above.

A.1.3 Smart Meter Readings

As suggested above, stakeholders do not expect any changes to the electricity settlement process during Foundation and meter readings from smart meters used for settlement will continue to be register readings retrieved on monthly or longer period frequency. Indeed it was suggested by one party that the provision of more granular meter readings into the NHH settlement process for electricity (i.e. more frequently than monthly) would be likely to have an adverse effect upon the profiling process, which generates Estimated Annual Consumption (EAC) and Annualised Advances (AA). EAC and AA data are and will remain fundamental to the settlement of the existing suite of analogue electricity meters and their on-going resilience to changes in input data will need to be considered.

Similarly stakeholders with gas smart meters identified no changes to the current gas market settlement processes during Foundation.

In addition to data required for settlement purposes, Suppliers who have installed smart meters are, in general, obtaining half-hourly data from their customers' meters but the frequency of retrieval varies. This is dependent upon a number of factors. Suppliers are either using the data during the Foundation phase for discovery and learning purposes through a variety of different trials or are providing the data to their customers for their own use (checking billing accuracy, consumption patterns etc.). Some trials include daily capture of half-hourly data from some or all of their smart meters, whereas others capture half-hourly data at less frequent reading intervals. One niche Supplier indicated that it would only require regular scheduled delivery of half-hourly data if the market arrangements were to be changed to enforce half-hourly settlement of all customers. This Supplier prefers to obtain half-hourly data for its customers when it requires it - the provision of such data is considered part of the customer experience and is a key tool for this Supplier in maintaining good customer relationships. Frequency of meter reading will ultimately be a commercial decision for Suppliers (unless it becomes mandated).

DNOs expressed no interest in receiving data from smart meters beyond that normally provided for other domestic premises during Foundation, other than where they are conducting trials (such as for Low Carbon Network Funding work).

A.1.4 Other Smart Meter Data

Although in the near future (i.e. post implementation of the DCC) DNOs see a potential requirement for the receipt of new data from smart meters (such as Alerts and voltage information - see later) no appetite exists for the receipt of such data during Foundation.

There is scope for some simplification of the interactions of Market Participants during Foundation. An obvious example is the ability for Suppliers to make changes to the meter configuration directly rather than have to send a message to its Meter Operator (MOP) and wait for the MOP to perform the change manually. Should Suppliers opt to change meter configurations directly (rather than via their MOP) they will need to provide such information (once the update is complete) to the DNOs - the flow of changes to meter technical details is currently provided by the MOP directly to the DNO and a process already exists for Suppliers to inform their MOPs when meter technical details are changed. Currently, this is in place for key and smart card pre-payment meters. Additional investigation will be required to determine if this process could be extended to cover significantly higher volumes. Aside from this particular data exchange requirement we have not been advised of any other revised data exchange requirements for DNOs either for gas or for electricity during Foundation.

A.1.5 Change of Supplier

If a customer who's Supplier has installed a smart meter at the customer's premises, opts to change Supplier, there is no agreed means of the new Supplier obtaining meter readings directly from the smart meter. In general Suppliers considered that this was a matter for the new Supplier to manage and their actions, as the old Supplier, were simply to terminate their own access to the smart meter from the change over date and time. Although a proposal has been made to oblige the old Supplier to provide meter communication services to the new Supplier (creating the so called "Operating Supplier" concept), this has yet to be worked up in detail and a number of the Suppliers we met were sceptical of the likely success of agreeing such arrangements, particularly since it would require Suppliers to invest in system changes which would only be required for a relatively short period of time.

If the above requirement were to be mandated, those Suppliers who use intermediate data retrieval service providers would prefer the new Supplier to be required to contract with an appropriate data retrieval service provider. Some Suppliers with in-house data retrieval capability indicated that they would be willing to offer such services to the new Supplier on commercial terms, but that the data exchange process may have to be simplistic (perhaps Excel file based) rather than a more formal exchange process to reduce implementation and operational costs.

One Supplier indicated that it already has commercial agreements in place to purchase meter reading services from old Suppliers when it acquires a customer with a smart meter, while another stated its contract with its data retrieval service provider required the party provider to develop the necessary interfaces (if they did not already exist) to facilitate data retrieval - the Supplier also noted that it had committed its own in-house resource to help support the development of such data retrieval services where this was necessary.

One Supplier suggested that it would be impossible to develop a sound business case for the development of new data flows to support the Change of Supplier process for smart meters during Foundation (given the short duration over which such new arrangements would apply. It further considered) and that the introduction of prescriptive arrangements to force this issue mandate such a requirement would likely lead to it discontinuing to install smart meters during the Foundation phase.

A further issue exists on Change of Supplier for Pre-Payment smart meters - that of providing credit update information to the meter as and when customers purchase news credits. If the new Supplier

has no means of communicating with the meter, credit updates cannot be facilitated. One possible route would be for the old Supplier to provide a credit update signal to the meter on instruction from the new Supplier - this mechanism was not favoured by those Suppliers who expressed a preference. In some cases Suppliers of Pre-Payment customers were resetting the meters to credit meters at the point of change over to the new Supplier. Another Supplier suggested that payment operators such as PayPal should be tasked with resolving the problem.

Generally, suppliers felt that if new data flows data flows were required (i.e. mandated) to facilitate Change of Supplier (for Pre-Payment or otherwise) they would seek to utilise the most cost efficient mechanism to facilitate this. This could be via the DTN if a cost efficient solution could be identified or alternatively could be via a secure exchange of an Excel file.

In the absence of a mechanism for the new Supplier to communicate with the smart meter installed by the previous Supplier (i.e. in the absence of an ability to retain the interoperability of such smart meters), such meters will need to be read manually. All such meters will continue to have smart capability and will interface as normal to the customers In Home Display (IHD)[23], but will, in effect, be treated as 'dumb' meters by the new Supplier.

A.2 DCC Established

In all of the organisations with whom we have engaged, it is reasonable to say that much of the organisational thinking about the SMIP is focussed on the physical installation of the meters themselves and around how the DCC will function in the future. Very little thought seems to have been given to the requirements around the continuing operation of the retail market and its settlement. This section summarises the views expressed by stakeholders in relation to new data exchange requirements likely to emerge once the DCC has been implemented.

A.2.1 General

There was a general recognition that the DTS will continue to be required after the implementation of the DCC. Reasons for this included:

- The DCC only considers domestic smart meters (and those non-domestic premise smart meters where the Supplier has chosen to use DCC services) and therefore a requirement to communicate other (non-DCC connected) meter data will remain;
- The roll-out of smart meters is not scheduled to complete until 2019 and therefore data transfer for non-smart meters for domestic premises will need to be facilitated until the roll-out completes;
- There are no plans for changes to the existing HH settlement processes; and
- There will continue to be a requirement for participant to participant data flows to facilitate settlement for some time to come.

Parties also recognised that in respect of data exchanges, Market Participants recognise that there is ongoing need for participant-to-participant data exchange as well as participant-to/from-DCC data exchange. The nature of data exchange arising with the advent of smart meters and the DCC will be different to today's requirements in a number of areas:

[23] Though in the absence of the new Supplier being able to communicate with the meter, the tariff information on the IHD (should there be any) may not bear any relationship to the actual tariff between the new Supplier and the customer.

- Near real-time data exchanges for Suppliers to access meters via the DCC (or directly - see later) on a limited basis, e.g. to obtain a current reading or customer credit (on Pay-as-You-Go tariffs) when a call centre is interacting with a customer on the telephone (which would need to be completed within "normal" customer call timescales);
- Scheduling messages - these are messages from a Market Participant to the DCC, which instruct the DCC to perform specific actions on a scheduled basis. For example, this may be an instruction that requires the DCC to read all of a Supplier's meters at a specific time, e.g. each month, and may provide the timing by which the response is expected, e.g. by 5 calendar days after month end. Alternatively the message could be an instruction issued each month (or other chosen frequency) by the Supplier for an "immediate" read of all (or a selection of) its meters - with the response time being determined via the DCC's service level agreement. This type of message could also be used to support the roll out of new tariff information to customers and for the provision of billing information to customers. Other messages in this category may be technical in nature, e.g. software updates or security patches for meters and IHDs, where the DCC will be required to ensure that the software is updated as quickly as possible, without impacting the day-to-day services that it provides;
- DCC may need to provide confirmation messages back to Market Participants, e.g. to Suppliers to confirm that a security patch has been rolled out to its customers;
- The retention of an audit trail by the DCC is generally seen as a requirement, for example to allow it to address any concerns regarding the access it has provided to a metering system;
- Some dual fuel Suppliers confirmed that it would be desirable to have a single means of interfacing with the DCC for both electricity and gas purposes;
- Other ad hoc messages that will be required during this phase include:
  - the ability to upload cumulative consumption or billing information;
  - change of tariff information and associated change to the meter configuration where relevant, e.g. from credit to pre-payment and vice-versa;
  - the ability to download meter technical details on Change of Supplier, Change of Tenant or at any other time as necessary - this may be a requirement stemming from the Supplier or the DNO;
  - receiving alert messages from smart meters;
  - diagnostics - to check that a meter is working correctly, possibly whilst dealing with a customer on the telephone (and therefore also needing to be completed within the "normal" duration of such a call); and
  - messages to assist distribution companies in fault inferencing;
- There will be a continued need for inter-participant scheduled data transfer to support the retail market settlement processes - i.e. the current DTS provided by ElectraLink;
- Interfaces between the DCC and registration systems to confirm registration details for each Supplier request to access a meter; and
- Load management messages, once DNO's have the ability to use these.

The following sub-sections discuss some of these points in further detail.

A.2.2 Settlement

None of the participants, with whom we have engaged, have indicated that they expect any major changes to the settlement process as a direct result of the implementation of the DCC. In general

smart meters will continue to be settled via NHH arrangements with meter reading frequencies no greater than monthly. DCC will, upon request from a Supplier or in accordance with a schedule pre-agreed with a Supplier, retrieve and pass meter register data to Suppliers and Suppliers will need to pass this data to their NHHDCs (noting that where such agents are in-house to the Supplier no external flow of data will be required). All parties considered that, for the majority of cases, such data would be retrieved via a batch scheduled process under an agreed service level (akin to the batch scheduled processing service currently provided by the DTS) and that this would be true whether the collected meter data was for NHH settlement or HH settlement. Some DNOs specifically identified that they expect Suppliers to continue to provide meter data to them in D0010 format as required by the DCUSA.

Some parties expressed concern that the data flow route of: DCC to Supplier to NHHDC (or HHDC); could create some inefficiencies. DCC's role is only to retrieve the meter reading data and pass it to Suppliers. Validation of such data will be undertaken by the NHHDC (or, as the case may be, HHDC). In the event that the file fails validation, it will need a notification to be sent to the Supplier, which, in turn, would need to request a re-collection by the DCC. It should be noted that one Market Participant stated that its current data collection success rate was 98%, suggesting that the DCC will be required to recollect data from a proportion of smart meters in addition to having to recollect data which fails validation by the Data Collectors.

Some parties considered that the DCC should be allowed to perform a degree of validation (perhaps checking for file corruption only) to reduce the number of validation failures (and subsequent recollection requests from Suppliers). Others were clear that the DCC should perform Data Collector activities (see below). However, other some parties considered any form of validation to be strictly beyond the scope of DCC. These latter parties saw the responsibility for performance resting with the Supplier and that, accordingly, the Supplier should have control over its own performance rather than have a third-party (the DCC) discharge this for them.

Another party highlighted that the requirement for DCC to pass meter data to Suppliers, rather than to Data Collectors, would require a change to current settlement processes and, furthermore, a renegotiation of the contracts between Suppliers and their Data Collector agents. Data Collectors currently have service level agreements establishing performance criteria against which they are measured by their Suppliers. Once the DCC is implemented, the performance of the Data Collectors would be contingent upon their own Suppliers performance (due to the need for Suppliers to pass the meter data to their Data Collectors). It was suggested that Data Collectors (NHHDC and HHDC) should be permitted to become Authorised Parties and thus receive information directly from the DCC. As this is not currently being proposed we have not considered this data exchange mechanisms within this report.

In the longer term, there is a distinct possibility of a move towards HH settlement of the whole market. ELEXON is currently pursuing mandating HH settlement for premises with profile class 5-8 and a similar move for domestic smart metered customers is also a possibility[24]. However, it is not clear whether a mandated approach can, or will, be adopted. With customers holding the right to determine whether HH data from their meter is made available to their Supplier, the potential for the on-going continuation of NHH settlement of smart meters is clear. Furthermore, some parties expressed doubt that smart meters will be installed in all domestic premises by 2019 as required by the Government. Installation of such meters is at the customer's discretion and Suppliers are prevented from offering

[24] ELEXON have recently issued a consultation "Mandatory Half Hourly Settlement for Customers in Profile Classes 1-4 and the Closure of Non Half Hourly Settlement" to seek views on this issue.

tariffs to encourage up-take of smart meters. In the absence of clear benefits, it was suggested that some customers may not wish to agree to smart meter installation. Thus NHH settlement for a segment of the domestic market may continue for many years to come.

In the absence of mandatory HH settlement for installed smart meters, Suppliers are likely to seek to move to HH settlement on a commercial basis only. Some Suppliers may choose to bill customers against HH data but continue to settle on an NHH basis. Others argued that the absence of mandated HH settlement for smart meters would allow Suppliers to differentiate themselves in service offerings to customers and, therefore, a mandatory HH settlement requirement was neither necessary nor welcome.

Should any move to HH settlement occur, Suppliers would wish to retrieve HH data from their smart meters on a daily basis. This would significantly increase the number of "checking" authentication flows between DCC and Registration Systems (see below) and the volume of data being sent through to Suppliers. It would also create a requirement for an HH flow between Suppliers and their HHDCs.

A.2.3 Authentication

Unlike in Foundation, there will be a need for the DCC to verify any request for meter data by a Supplier (and any request for data to flow in either direction between Supplier and smart meter) to confirm the Supplier is registered to the relevant meter. Generally it was felt that this authentication process would require the DCC to check with ECOES/SCOGES on each request, creating new data exchange requirements to and from these Registration Systems and the DCC. One party suggested that in respect of electricity the check should be with the relevant MPAS system rather than ECOES as ECOES can be up to 4 days out of date since it only receives updates from MPAS systems on working days[25]. However given that industry processes currently operate on the basis of MPAS operation on working days only this was not seen to be an issue by other stakeholders and ECOES was identified as the preferred authentication route for DCC for the electricity market.

A.2.4 DUoS under HH Settlement

Under either HH settlement circumstances (i.e. mandated HH settlement or commercial HH settlement i.e. Suppliers choosing to move smart metered customers from the current NHH arrangements into the HH arrangements), it has been suggested that DUoS charging for domestic customers would need further consideration. One party highlighted that its analysis suggested that a customer switching from NHH DUoS billing to HH DUoS billing (i.e. switching from a configuration class to a site specific approach) would attract higher DUoS charges due to the allocation of additional charges on a site specific basis (such as capacity charges). However another party suggested that HH DUoS based treatment for domestic customers was unlikely to happen in its current form, given the volume of DUoS bills that would need to be created each month (one bill per customer site) and the volume of validation work which this would create for Suppliers receiving the bills. DNOs suggested that, subsequent to changes to the DUoS charging regimes, domestic customers could continue to be billed as a "class" via the super-customer mechanisms but using HH data rather than profiled NHH data. This was seen as a more likely route.

[25] All MPAS systems update via an overnight batch process each working day (i.e. they are updated with all registration data change requests received over the DTN the previous working day). Once updated, a snapshot of each MPAS database is sent to ECOES to upload. Thus with coincident Bank Holidays and weekends ECOES could be up to 4 days out of date.

A.2.5 Data Collector and Data Aggregator

There was also a view expressed by some parties that the Data Collection and Data Aggregation functions within the current arrangements may be transitioned to the DCC from 2015 onwards. This was advocated on the basis of the savings which could be made, both in terms of timescales (by reducing the numbers of parties involved in the settlement process) and costs (for the same reasons). It would also address a potential issue with the retention of the current Supplier hub arrangements once DCC goes live - that of the flows which will be required between DC, Supplier and DCC to resolve data errors (see Section 4 above). There could, however, be issues associated with potential legal challenges - it was suggested that existing agents could argue that their business, which they had been encouraged to establish by Ofgem introducing competition in data collection/aggregation, had been made obsolete by the Government (or Ofgem) deciding to remove competition from a section of the market. It may be possible to address this latter point by allowing the DCC to offer DC and DA services on a commercial basis rather than a regulated, mandatory basis. This would, of course, require appropriate measures to ring-fence the commercial activities from the regulated activities.

If DC and DA activities were to be incorporated into the DCC it would simplify the data exchange processes between Market Participants (largely by removing a number of those Market Participants). However, as this is not a firm proposal at this stage we have not considered the consequential data exchange processes which would occur under such an arrangement within this report.

A.2.6 Real-Time Access Requirements

As highlighted above, parties recognised the need for some near real-time access to smart meters. This could be for a variety of reasons including retrieving meter data (readings, technical data or running diagnostics) in response to a call from a customer, providing remote access capability for customers in an on-line format (for example where a customer has solar panels and wishes to be able to check at any time their level of production) or receiving Alerts (such as customer off supply). These requirements have been considered within this report and used in seeking to estimate the impact on the DTS from a technical and cost perspective.

While the potential value of the provision of alerts (in real-time) was generally recognised, some parties were not convinced they would wish to receive all the potential alert data. For example, an off supply alert may be useful to Suppliers - one Supplier wished to ensure it received such a notification in near real-time such that it could advise its customer. Similarly Tamper alarms and Overheating alarms may also be of use to Suppliers such that they can inform their MOP to investigate - though the need for such alarms to be near real-time is highly questionable. However a single off supply notification would not necessarily be useful to a network company - the alert could be generated for a number of reasons not necessarily related to the network. Similarly a low voltage alert may be of limited use to a DNO, as the ability for it to be able to act upon such an alert (in terms of system management actions) may be very limited (and certainly virtually impossible until a sufficient number of smart meters have been installed). More generally the quantity of information potentially available to Market Participants was recognised to be extremely large, but the usefulness of such information (i.e. the ability of a Market Participant to extract value from the information - either for itself or its customer) needed further consideration.

The mechanism for access to smart meters in real-time raised some particular issues. Some Suppliers were strongly of the view that real-time access (for the provision of alerts, or meter reads or any other such matter) should not be mandated through the DCC, but rather that Suppliers and other service providers should be permitted to access the meter directly via their own communications mechanisms.

This would increase the opportunity for innovation and would be consistent with customers owning their data - the opportunity to facilitate innovation was a particular requirement for some Suppliers and direct access would be used principally for providing services to customers and would not need the type of security requirements reserved for settlement data - such settlement data would go via DCC. Other Suppliers were strongly against such direct access, stipulating that all communications with smart meters must be via the DCC in order to ensure compliance with security requirements. Given that the DCC be a regulated activity and will likely be precluded (at least in the first instance) from offering commercial services, this latter view would mean all data exchanged with smart meters would be considered regulated data. In the absence of a clear position in this regard we have adopted the latter position - i.e. that all smart meter communications will be via the DCC and, therefore, all data and information exchanged with smart meters will be considered regulated information as this provides the most extreme case for consideration of the volume of data exchange processes.

A.2.7 Volume Data Exchanges

As is clear from section 4 above, the DCC will be required to provide authorised parties with a not insignificant amount of data. Suppliers will require register reads on a monthly basis and may require interval (i.e. half-hourly) data on a regular daily basis if settlement for some (or all) smart meters moves to HH. In addition Suppliers may want register or interval data or an ad-hoc (near real-time) basis.

Network operators may similarly wish to have internal data but this may be more on an ad-hoc rather than regular basis. Network companies may be able to use such data for network planning purposes - however as the cost of regular retrieval and storage is not known the precise requirement for such is not clear. An alternative to network companies storing all such data may be for them to access the entire storage of interval data on smart meters (i.e. 13 months of data) on an as required basis. For example if a network company is considering reinforcement in a particular area, it may wish to obtain the entire 13 months worth of interval data from all smart meters connected to that element of its network. If this approach were adopted it could give rise to yet a further high volume data exchange requirement.

Parties' views differed in considering the mechanism for securing high volume data for settlement (or other purposes) particularly in the event of HH data being required. One Supplier considered that transferring high data volumes via an internet connection would not be tenable on a sustained basis and therefore a private network would be required. The time required for the transfer over the internet coupled with the reliability of such connections was, in the parties view, unacceptable for day to day bulk data transfers. This was not only true for meter data for settlement but also for software updates which could also require large volumes of data to be transferred. Another party considered a private network would also offer greater data security compared to the public internet. Other parties thought the volume and security matters to be less of an issue in terms of the type of communication mechanism, noting that communications technology was now such that the volumes of data being considered would not be beyond the reach of internet based traffic management and confidential data was also routinely exchanged over the internet.

One Supplier noted, in respect of high volumes of data, that the DTS currently stipulates thresholds for Loading Profiles above which ElectraLink cannot guarantee that the messages placed on the DTS can be processed within the required service levels. Each party connected to the DTS is responsible for managing its own Loading Profile. This Supplier considered that the same approach should be adopted in relation to communications with the DCC, in that each authorised party would request data to be provided by the DCC and the DCC would provide such within the requirements of the agreed service level subject to the authorised party not requesting a volume of data which exceeded its

Loading Profile with the DCC. It considered that this would be a preferable route to the alternative which had been proposed by some parties whereby authorised parties send requests to the DCC and the DCC schedules when it obtains the data from the smart meter and then provides it back to the requestor in accordance with that schedule.

Another party considered it would wish to have redundancy in its connections to the DCC to ensure continuity of its data provision, particularly in respect of the need to provide credit updates to pre-payment meters.

A.2.8 Value Added Services

The DTS currently provides a number of functions which we have labelled Value Added Services. These include the provision of Acknowledgements (Acks) and Negative Acknowledgements (NAcks) upon file processing, access to an Audit trail, validation of data files (and enhanced validation, offering the potential for greater process robustness), file re-submissions/re-collections etc.

The provision of an audit trail by the DCC is generally seen as important. This is particularly true in relation to granting access to meters. Data security is seen as important, though the level of security remains undefined. Ensuring only authorised parties are provided access to meters is key in this regard and therefore the DCC must maintain an audit trail. This is true both for Suppliers registered to metering systems and in relation to ESCOs, where current discussions propose access to be given to ESCOs only subject to them having signed up to the Smart Energy Code - such transactions will be subject to audit with the ESCO needing to provide evidence that it had the customers permission to gain access to the meter and the DCC needing to demonstrate compliance with its obligations. The audit trail provided by the DTS could be valuable in confirming the actions taken by the DCC in response to an access request from a Supplier. Whether the current DTS audit trail mechanism could also assist in relation to an access request from an ESCO remains to be determined.

The provision of Acks and NAcks had a mixed reception from stakeholders. Some considered their provision by the DCC to be extremely useful (particularly given the above comments about the need for the DCC to maintain an audit trail) while others felt that their own internal systems would provide sufficient comfort. In general, those parties which supported the provision of such file confirmations would wish to see the obligation placed upon the DCC and for the DCC to determine how best to meet those requirements. - the existence of such a facility within the current DTS would seem an easy way for this obligation to be discharged.

The facility to be able to re-submit or re-collect files was also generally supported.

The validation service provided by the current DTS created a greater debate when applied to the role of the DCC. Some parties strongly felt that the role of the DCC should be minimal ("access control" only) and file validation should be left to the Supplier/Data Collector. Other recognised a degree of file validation could prove useful - though validation of the data itself was generally felt not to be appropriate. It should be recognised that validation undertaken by the DTS is very limited in its scope. At the simple end of the spectrum the DTS validates the file header only to ensure that the file type, sender and destination information is valid (for example that the D flow number is a valid number or that the recipient ID exists and that the recipient is entitled to receive such a file from the sender). A number of parties considered that their requirement for such validation services would be dependent on the cost of the service.

A.2.9 Security

Market participants are expecting to conform to the security requirements set down by DECC and expect that all service providers will also comply. They have not taken an individual stance on the issues surrounding security and privacy of data.

However some preferences were stipulated in relation to data exchange which relate to security. Each smart meter can hold a schedule - this stipulates when the smart meter is to "push" data out to the DCC. Some parties stated that this approach (i.e. smart meters "pushing" data to the DCC) would not be as secure as the DCC "pulling" the data from the smart meter. It was recognised that Alerts would be "pushed" by the smart meter and that DCC ought to be established such that it would be able to recognise and process such a pushed data flow. However it was viewed that requiring the DCC to also be able to recognise meter readings being pushed to it, in addition to meter reading s which it would need to pull from the meter (such as in response to a request from a Supplier dealing with a customer call - see earlier) would weaken the overall security of the "system" and should not be permitted. One Supplier confirmed it would not permit any data (other than Alerts) to be pushed to it by the DCC which it had not explicitly requested.

A.3 DCC incorporates registration

Significantly less thinking is evident about the period after the DCC assumes responsibility for registration from Distribution companies. The nature of the registration process within the DCC is not confirmed and we received a variety of views for how this may be facilitated - from full integration of the gas and electricity registration systems into a single system in DCC ("thick" registration), to DCC only having a "copy" of Registration information for authorisation purposes ("thin" registration).

There is some broader conceptual thinking about market processes that will or could be changed as a result:

- Simplification of the Change of Supplier process, when all registrations are held centrally;
- A need for data exchanges between DCC and Distribution companies to ensure Distribution companies have a full and accurate picture of the end points on their network. Of critical importance to the Distributors is the maintenance of accurate address and contact information;
- A potential for the elimination of the Supplier hub concept with the consequence of reducing the complexity of settlement even further, although this is wholly separate from the transfer of the registration system to DCC and given that DCC is only to provide access to the current non-half-hourly market, further market restructuring would be necessary to facilitate this;
- Full half-hourly settlement of the retail market - no clear timetable exists for this and other issues, such as whether smart meters can be rolled out into every domestic premise given that customers are under no compulsion to accept them, may make such a transition a long-term proposition, though we note the existence of the recent ELEXON consultation on mandating half-hour settlement.

Moving registration to DCC will eradicate the need for some of the flows created by the implementation of the DCC - namely those flows between DCC and the registration systems required to confirm the Supplier/smart meter relationship. However, it would also create new flow requirements between the DCC and network companies to keep their systems up to-date with any changes made to registration data by Suppliers - these flows already exist between MPAS and DNO systems in electricity but are internal to the DNOs.

The above assumes a straight "lift and shift" of the registration systems into DCC, however most parties we have met have indicated a desire to seek to harmonise registration systems between electricity and gas. Further refinements to systems cannot be ruled out and, therefore, the possibility of new data exchanges (ones which have not, as yet, been thought of) cannot be ruled out.

One DNO questioned the scope of DCC activities post implementation of registration within the DCC. The current scope of DCC relates to smart meters in all domestic premises and within those non-domestic premises which the associated Supplier chooses to utilise the DCC for communication to the meters in such premises. Thus, while DCC will have a registration system covering all metering systems in the gas and electricity markets, there may remain some metering systems outside of the scope of other DCC activities.

For the purposes of this report we have not specified any new data exchanges once registration moves to DCC given the uncertainty over the likely outcome (i.e. "thin" vs. "thick" registration within DCC).

Appendix B: Data Flow Requirements

This Appendix sets out the new data flows identified from interactions with Market Participants and from the SMIP. A legend explaining the colour coding used in the table is provided at the end of this Appendix.

SODR Service Reference or Source	Service description	Variant	% of population	Gas	Electricity
SG3a	13-month meter read upload	On demand	34%	1	1
1.68	Consumer meter interaction	On demand	100%	1	1
1.71	Credit balance update	On demand	30%	1	1
1.58.1	Diagnostics	High Priority	100%	1	1
1.58.3	Diagnostics	Low priority	100%	1	1
1.58.2	Diagnostics	Routine	100%	1	1
1.62.2	Download/clear data from meter	On demand	100%	1	1
1.62.1	Download/clear data from meter	Specified date/time	100%	1	1
1.83.2	Electricity quality read (on demand)	On demand	10%	0	1
1.83.1	Electricity quality read (programmed)	Periodic schedule	100%	0	1
1.83.1	Electricity quality read (programmed)	Periodic schedule	100%	0	1
1.83.1	Electricity quality read (programmed)	Periodic schedule	100%	0	1
1.83.1	Electricity quality read DG (programmed)	Periodic schedule	1%	0	1
1.83.1	Electricity quality read DG (programmed)	Periodic schedule	1%	0	1
1.83.1	Electricity quality read DG (programmed)	Periodic schedule	1%	0	1
1.66	Energisation status check	On demand/Schedule	100%	1	1
1.80.2	Feed in tariff update	On demand	5%	0	1
1.80.1	Feed in tariff update	Specified date/time	5%	0	1

SODR Service Reference or Source	Service description	Variant	% of population	Gas	Electricity
1.77.2	Gas calorific value update	On demand	100%	1	0
1.77.1	Gas calorific value update	Specified date/time	100%	1	0
1.57.2	IHD, meter or comms unit s/w upgrade	Specified date/time	100%	1	1
1.57.2	IHD, meter or comms unit s/w upgrade	Emergency	100%	1	1
	Load curtailment for frequency response	automated command	100%	0	1
1.89	Load management (assume 0 to 24/day)		100%	0	1
1.89	Load management (assume 0 to 6/day)		100%	0	1
	Load Monitoring	Periodic schedule	100%	0	1
1.74	Maximum demand read	Specified date/time	100%	1	1
1.61.2	Message to consumer via IHD	On demand	100%	1	1
1.61.1	Message to consumer via IHD	Specified date/time	100%	1	1
1.56	Meter fault alarm triggered	On event	100%	1	1
1.65.1	Meter read (import & export) eORg	Periodic schedule	100%	1	1
1.65.2	Meter read (import & export) eORg	Specified date/time	100%	1	1
1.65.3	Meter read (import & export) eORg	On demand	100%	1	1
	New device added to HAN	On demand	100%	1	1
1.7	PAYG services:	On demand	30%	1	1
E.ON	Remote Top up Payment	On demand	30%	1	1
E.ON	Remote balance Adjustment (ex gratia payment)	On demand	30%	1	1
E.ON	Remote config of non disc periods	Specified date/time	30%	1	1
E.ON	Remote config of debt settings	Specified date/time	30%	1	1
	Query devices on HAN	Scheduled	100%	1	1
1.79	Read distributed generation data		100%	0	1
1.63	Remote configuration of settings	On demand	100%	1	1

SODR Service Reference or Source	Service description	Variant	% of population	Gas	Electricity
1.63	Remote configuration of settings	Specified date/time	100%	1	1
1.67.2	Remote dis/enablement of supply	On demand	100%	1	1
1.67.1	Remote dis/enablement of supply	Specified date/time	100%	1	1
1.57.1	Security or software patch	On demand	100%	1	1
1.53	Self registration on installation	On demand	100%	1	1
1.73	Supply fault alarm triggered		100%	1	1
1.69.2	Switch between credit and PAYG	On demand	100%	1	1
1.69.1	Switch between credit and PAYG	Specified date/time	100%	1	1
1.55	Tamper alarm triggered (and reset)		10%	1	1
1.72.2	Tariff update	On demand	100%	1	1
1.72.1	Tariff update	Specified date/time	100%	1	1
E.ON	RTS (Radio Teleswitch) replacement		20%	0	1
E.ON	Last Gasp Outage Management	for DNO's to provide view	2%	0	1
E.ON	HH reads for billing settlement	not day 1 but maybe required as DCC develops; Industry already discussing proposals to move to HH settlement for all customers	100%	0	1
	Signalling:				
	Charge EVs now		50%	0	1
	Reduce all non-essential loads		50%	0	1
	Reduce all non-essential loads		100%	0	1
	Switch on / off EV chargers		100%	0	1
	Switch on / off heat pumps		100%	0	1
	Switch on / off immersion heaters		100%	0	1

SODR Service Reference or Source	Service description	Variant	% of population	Gas	Electricity
	Switch on / off immersion heaters		50%	0	1
	415V load mediation:				
	EVs		50%	0	1
	EVs		100%	0	1
	Heating		100%	0	1
	Smart Appliance downloads				
	Security or software patch		20%	1	1
	Security or software patch		60%	1	1
	Software upgrade		20%	1	1
	Software upgrade		60%	1	1
	Curtail microgeneration		100%	0	1
	Despatch/curtail 400V generation		50%	0	1
	Localized weather forecast reports		20%	1	1
	Managing 415V generation		10%	0	1
	Managing consumer demand		100%	0	1
	Over/under voltage alarm		100%	0	1
	Real-time rewards/penalties information		100%	1	1
	Re-synchronization of "islands"		10%	0	1
	rms voltage read for LV network voltage control		10%	0	1
	Small-scale generation management		10%	0	1
	V2G support (bids)		50%	0	1
	Voltage sag/swell alarm		100%	0	1

It should be noted that the proportion of 'Near real-time message exchanges' and 'Online Access' could vary significantly depending on the design of the DCC and its supporting systems. As noted in Section 4 of this report, there will be a need for some message types to interact with participant systems for the purposes of further action and to ensure an audit trail, whilst other actions may be performed by accessing the DCC's systems directly. The split we have shown above is indicative and any or all of the data exchanges in either category may move to the other category when the DCC design and systems build is complete.

Appendix C: Assumptions

To estimate both the enhanced DTN costs necessary to enable the DTN to facilitate the identified required data exchanges and review the impact of a 'Portal' solution on Market Participants, an estimate of the data exchange “volumes” was produced. This estimate was based on the following assumptions:

- The volume of smart meters accessed by the DCC in 2014 will be 2.5 million – we believe this is a realistic estimate of the number of compliant smart meters that will be installed by the end of 2014, given that the specification for those meters has not yet been finally agreed.
- The volume of smart meters accessed by the DCC in 2019 will be 50 million. This number ignores possible shortfalls arising from customer choice, non-availability of access to premises and other factors, which could impede the installation of compliant smart meters in all domestic premises by 2019.
- We have assumed a rollout profile of 8 million per annum from 2014 until 2018, with remaining smart meters to be installed in 2019.
- We have assumed that by 2019 there will be 30 million electricity smart meters and 20 million gas smart meters.
- The estimated number of parties required to connect to the DCC is 280. Given that the definition of an Authorised Party (i.e. one which is permitted to “connect” to the DCC) has yet to be agreed, an assumption about the types of party has been made and a contingency assumed to cover for unanticipated developments. The estimate is based on information provided by ElectraLink pertaining to the current number of parties connected to the DTN and Xoserve's IX network (with the elimination of duplicates as far as possible). This gives the following number of parties by type:
  - Gas Transporters - 28
  - Gas Suppliers - 126
  - Electricity Distributors - 28
  - Electricity Suppliers - 76
  - ESCOs - 19 (recognising that many current suppliers may also acquire ESCO licences and would therefore be covered by the connection provided to their supply business)
  - Parties that require a very high volume connection - Xoserve and the DCC.
- The DCC will procure a suite of IT systems to which connected parties will require secure access in real-time as well as the ability to upload and download information in a scheduled manner.
- Data volumes have been based upon information from the SMIP and upon current DTC data flows, where appropriate.
- The volume of near real-time traffic (such as alerts) has been assumed to require a class of service equating to 10% of the total bandwidth requirement.
- The DCC will have 2 data centres – a main and hot standby – and these will be installed in 2013 prior to go live for the DCC so as to facilitate testing and ensure operations from DCC go live. The network connections for the data centres are sized to facilitate the maximum estimated transfer requirements (i.e. the 2019 requirements) dimensioned to address reasonable peak traffic flows. It is assumed that such connections are installed in 2013 (for the above reasons) but operated at reduced capacity (with an assumed lower charge) in the initial period – capacity is gradually increased as necessary to meet transfer requirements.

- Two further parties – ELEXON and Xoserve – will require similarly resilient infrastructure and therefore 4 very high volume connections have been assumed – a main and hot standby for each of ELEXON and Xoserve. The network installation timing and sizing takes the same approach as for the DCC data centres. ELEXON already has such facilities in its role as Supplier Volume Allocation Agent (SVAA) and hence these would not need to be upgraded to meet expected increases in data volumes.
- Network connections are provided in 2013 for 30 large, 20 medium and 230 small parties – the latter being on VPN connections. It is assumed that 10 of the VPN parties migrate to become medium connected parties in 2016.
- As the nature of the DCC architecture has yet to be determined the analysis of the potential impact of a 'Portal' solution is based on high-level assumptions about which decisions the DCC may (or may not) adopt. These include an assumption that the DCC will take no action unless instructed by an authorised party or by a meter
- In recognition of the relatively rapid increase in data volumes over the period and the need to add infrastructure to the architecture to meet these requirements, it has been assumed that the technology will be refreshed on a 5 year cycle. This would place the commencement of the refresh suitably within the likely contract timeframes (assumed to be 8 years).
- For operational expenses for the Greenfield solution, we have assumed annual maintenance of 22% of the original capital expenditure and an operations centre at £1.5m per annum. This latter estimate assumes that the operational centre will be shared with other operational requirements of the DCC (in respect of upstream data retrieval processes – i.e. meter to DCC interfaces) such that resources can be appropriately leveraged to provide 24/7 service. If the Greenfield service was provided by a service provider independent of the DCC service provider, the costs would likely be higher.
- It should be noted that we have made no allowance for costs incurred by authorised parties in developing/enhancing their systems and processes to interface with the DCC.
- It has been further assumed that additional changes to data flows and functionality will be required after the implementation of the DCC – experience from the implementation of previous energy market arrangements suggests that relatively more changes will be required in the first few years after implementation than will be required in later years. However since the nature of the applications to be implemented are not known (and recognising that one of the possible options would be based on the current DTC format), an assumption consistent with current, mature annual DTN flow changes has been adopted.
- We have made a further assumption that the costs will depend on the number of connected (authorised) parties.
- We have not included data volumes related to half-hourly meter readings being obtained by suppliers in the electricity sector prior to 2020, based upon the updated information received from SMIP. However, we note that some suppliers have indicated requirements for this type of data to be obtained from the DCC at an earlier stage.
- Market settlement of domestic and SME customers will migrate to being half-hourly towards the end of the decade, such that the market can take advantage of the more accurate time of consumption data that smart meters enable. This is more likely to happen when a substantial proportion of such customers have smart meters installed but is not accounted for within the volumetrics.
- A similar approach to the above meter data has been adopted for many other scheduled data exchange requirements – i.e. with shorter period collections towards 2020.

- The number of Alerts has been limited to those identified in Scenario A set out in the SMIP Project Information memorandum (DECC, 7th June 2011) rather than the substantially larger number (in excess of 100) suggested by some stakeholders with whom we engaged, as now being considered through the SMIP working groups.
- The additional bandwidth required for network and application overheads will be offset by data compression across the network.

Matters excluded from consideration in the analysis were as follows:

- Authentication requirements – i.e. the process undertaken by the DCC to verify the Supplier/smart meter relationship. The nature of this process is very unclear and could comprise a message exchange between DCC and the relevant registration system, an internal process to the DCC based on a reflection of the registration systems, access via a web-link to the appropriate registration system or some other underdetermined process.
- Error messages, such as could be generated following a file failing validation by a Data Collector or following a failure to collect data from one or more smart meters (either via a scheduled or real-time collection process) – the number and nature of such messages could vary extensively and therefore are extremely difficult to estimate.
- No account has been taken of any Reports which may be produced by the DCC and issued to parties.

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