PUBLIC

Settlement of Dynamically Switched Meters

PSRG consultation

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ELEXON

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

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SETTLEMENT OF DYNAMICALLY SWITCHED METERS

EXECUTIVE SUMMARY

ELEXON is seeking views on behalf of the Profiling and Settlement Review Group (PSRG) on the drivers, opportunities/issues and Settlement options for the dynamic switching of smart Meters.

This consultation forms part of a PSRG project[1] to identify options to ensure accurate Settlement of any loads (and/or time of use registers) that are dynamically switched by means of smart or advanced Meters. ELEXON welcomes responses from Suppliers, Licensed Distribution System Operators (LDSOs), the Transmission Company, Supplier Agents, other industry code administrators, trade associations and any other interested parties.

1. Context

The introduction of smart metering and the Data and Communications Company (DCC) will result in changes to how remote load control and dynamic switching instructions are issued.

Currently the Radio Teleswitch Service (RTS) is the only widely-used mechanism for the dynamic switching of Non Half Hourly (NHH) tariff registers. About 1.8 million customers have their electrical storage and immersion heating controlled remotely via the RTS. Messages are sent via the BBC's 198 kHz long wave network to a teleswitch device connected to a customer's Meter to turn the customer's heating on and off. The Teleswitch Agent (a role performed by the Energy Networks Association (ENA)) provides a single, daily report to the Supplier Volume Allocation Agent (SVAA) summarising the broadcast teleswitch times. The SVAA uses this file as part of the calculation of profile coefficients to ensure that Metered Volumes are allocated to the correct half hour periods (Settlement Periods).

Under the new smart arrangements, the DCC will process requests from Suppliers to remotely switch registers and control load and will send commands to be applied by the relevant smart Meter.

The requirement for dynamic switching is likely to continue into the future, whether to:

- provide continuity of service to those customers who currently have their electrical storage and immersion heating controlled remotely by the RTS;
- enable other electrical loads (such as electric vehicle (EV) charging points) to be controlled remotely for the purposes of Demand Side Response (DSR); or
- support dynamic Time of Use tariffs (where the Meter register, rather than electrical load, is switched remotely).

Unless Metering Systems subject to dynamic switching are settled Half Hourly (HH), any future use of dynamic switching will require a mechanism for Suppliers to confirm the out-turn (or scheduled) switching times to the SVAA. This will continue to ensure that switched volumes are settled accurately for Suppliers and avoid any misallocation of energy and resultant cross-subsidies between different consumers.

2. Responding to this consultation

We have incorporated the consultation questions into the relevant sections of this document and include a consolidated list of questions as Appendix 1. We also provide a separate Word document for you to complete your response.

Please send your response to *BSC.Admin@elexon.co.uk* **by 27 June 2014.**

[1] The terms of reference for this project can be found in 'Project Initiation Document : Settlement of Dynamically Switched Registers' (PSRG29/04 10 December 2013).

Please address any questions to Jon Spence (*jon.spence@elexon.co.uk* or 020 7380 4313) or Kevin Spencer (*kevin.spencer@elexon.co.uk* or 07551 124671).

3. Next steps

ELEXON and the PSRG will review the consultation responses. If these indicate support for changes to central systems, ELEXON will obtain estimated costs for the preferred development option(s) from its service providers. The PSRG will then provide a report to the Supplier Volume Allocation Group (SVG) setting out:

- how switch times for RTS Standard Settlement Configurations (SSCs) are currently processed;
- options for amending central systems to process switch times for dynamically controlled registers on smart and advanced Meters;
- the likely impacts for Supplier and LDSO systems and processes; and
- estimates of central system costs (as appropriate).

The project scope does not include the implementation of any of the options identified. Parties can consider whether to raise Modification Proposals or Change Proposals to implement any of the solutions identified.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

INTRODUCTION

1. Background

In April 2012 the PSRG consulted on the potential requirement for a new mechanism for Suppliers to notify the SVAA of switching times[2]. Responses to the consultation were mixed. In February 2013, the SVG agreed with the PSRG's recommendation that:

- no changes should be initiated to the BSC processes for notifying dynamic switching to the SVAA until a stronger business case can be made; and
- the PSRG should review the position once version 2 of the Smart Metering Equipment Technical Specifications (SMETS 2) has been published and more information is available on Meter variants with dynamic switching capabilities.

At a workshop on 30 October 2013, the PSRG agreed that the time was right to carry out a more detailed analysis of how dynamic switching times can be notified for Settlement purposes. This follows the publication of SMETS 2, the continuing roll-out of smart Meters during the Foundation stage of the smart roll-out and interest in switching in relation to Low Carbon Network Funds (LCNF) and other Time of Use trials.

2. Scope

The interface between Suppliers, LDSOs and smart Meters is defined in the Smart Energy Code (SEC) and its subsidiary documents. The technical aspects of how Meters are (or will be) dynamically switched are outside the scope of the project. The PSRG project and this consultation will consider the notification of switch times, but not the mechanisms for switching.

Although the main focus of the consultation is on the notification of switching times for dynamically switched Meters, some consideration is also given to teleswitched and clock-switched Meters on static and semi-static regimes.

Whilst the report will consider the impact on LDSOs, it is not proposed that an operating framework for dynamic switching between Suppliers and LDSOs should fall under BSC governance.

Any Party raising a Modification Proposal will need do so with due regard to the wider industry context of DSR, DCC processes and Supplier and LDSO interactions. This may require parties to raise complementary changes to other codes, for example the Master Registration Agreement (MRA), Distribution Connection and Use of System Agreement (DCUSA) or the SEC.

3. Consultation structure

The consultation consists of two main sections.

'Drivers for Change' describes the current RTS and the functionality for switching load (and registers) under the SEC / DCC arrangements. It considers the implications for Settlement of moving from the existing to the new arrangements.

'Options for Change' considers whether there is an enduring need to notify switch times to the BSC central systems. It explores options for how this could be achieved where load and registers are switched using smart metering.

[2] 'Consultation on Dynamic Switching in the Smart World' (11 April 2012) and report to the PSRG (PSRG19/01).

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

DRIVERS FOR CHANGE

1. Current arrangements : Radio Teleswitch Service

Suppliers use the RTS to deliver flexible tariffs to consumers and some LDSOs use it for network management.

Under the current arrangements, there are two ways in which the switching of load or time of use registers can be effected:

- locally by **clock switching** i.e. via a clock in (or attached to) the Meter; or
- remotely by **Radio Teleswitching**.

In the case of clock-switched Meters, both the time-of-use registers and the switching times are pre-defined and registered as part of Market Domain Data (MDD). In the case of teleswitched Meters, the registers are pre-defined and registered in MDD, but the Teleswitch Agent notifies switching times to the SVAA on a daily basis.

There are three types of switching regime:

- **Static** – registers/load are switched at the same time every day of the year;
- **Semi-static** – registers/load are switched at the same time every day within a defined season or change only to accommodate British Summer Time and/or Bank Holiday adjustments; and
- **Dynamic** – registers/load can be switched at variable times (for example, some night storage heaters are controlled dynamically to take into account prevailing or forecast weather).

Static and semi-static regimes are supported by both clock-switched and teleswitched Meters. Dynamic switching is only currently supported by teleswitched Meters.

Group Code Sponsors (usually the ex-Public Electricity Supplier (PES) for the GSP Group) are responsible for:

- scheduling register switching times, in agreement with the LDSO; and
- communicating them to the RTS Access Provider (usually LDSOs) for onward transmission to Metering Systems, via the administrator of the switching infrastructure (the role fulfilled by the ENA).

There are two types of teleswitch command:

- **Programmed** commands are issued in advance (typically day ahead); and
- **Immediate** commands are used to shed (and, potentially, boost) load quickly e.g. in the event of loss of generation or periods of high demand. We understand that these are currently used sparingly.

The current RTS arrangements are described in more detail in Appendix 2. A glossary of terms is provided in Appendix 4.

2. Categories of dynamic switching

Dynamic switching regimes fall into three categories.

Weather (or wholesale price) based

Before the separation of supply and distribution business in 1998, a number of PESs offered customers tariffs for which night storage heaters were controlled dynamically to take into account prevailing or forecast weather. This was intended to optimise the comfort level of the end consumer. Some of these tariffs have endured. Where dynamic switching takes place, it is managed by a Group Code Sponsor (the current incarnation of the ex-PES), even though individual Metering Systems assigned to the relevant SSC may now be registered to different Suppliers. In some cases dynamic tariffs were offered to customers, with switch times based on the wholesale prices within

different time bands (e.g. afternoon, evening and night). However, we understand that these tariffs are no longer dynamically switched.

Load management

Under the present RTS arrangements, Suppliers set the expectation of how a regime will work, but LDSOs can use the flexibility within the regime to manage local network constraints. For example, if a customer is guaranteed seven hours' switched load within a 10 hour 'Operating Window', the LDSO can utilise this flexibility to off-set different Teleswitch Groups to manage system constraints. For example, switching times across different Teleswitch Groups in the Scottish Islands may be varied to ensure that the load across the various islands is maintained within distribution capacity or generation availability. This provides an alternative to network reinforcement and so avoids investment costs for LDSOs.

Load shedding (or boosting)

'Immediate' commands can be used to provide DSR for short periods (usually no more than a few minutes). These are issued very infrequently.

As 'Immediate' commands are to shed load for very short periods, they create issues for profiling accuracy in terms of determining whether a Settlement Period in which load shedding occurred should be treated as "on" or "off".

3. Load (and register) switching with smart metering

Load switching with smart metering will be achieved by means of an Auxiliary Load Control Switch (ALCS), which is internal to a smart electricity Meter, or by an external device connected to the Meter by a Home Area Network (HCALCS). Up to five ALCS or HCALCS will be supported per Meter, to allow for different types of switched load. These are defined in SMETS 2. For the purposes of this consultation, both integral and HAN-connected switches are referred to as ALCS or ALCS [n], where n = one to five.

The DCC will provide functionality to open and close the ALCS. This functionality will take two forms. Up to five **Auxiliary Load Control Calendars** (each in respect of a different type of switched load) will store up to 200 date and time based switching rules.

The ALCS will then open or close the relevant load according to the ALCS [n] Calendar. Suppliers will be able to configure the calendars using requests to the smart metering system via the DCC User Gateway. The Supplier will also be able to issue **Ad-hoc requests** to the ALCS.

These commands will only be available to Suppliers. LDSOs will not be able to issue requests to switch load.

Ad-hoc Requests

Suppliers will be able to request a number of ad-hoc HAN interface commands:

- Open Auxiliary Load Control Switch – opens the specified ALCS [n] immediately. The command includes a duration and, when this time period has elapsed, the switch is either closed or remains open as defined in the ALCS [n] Calendar;
- Close Auxiliary Load Control Switch – closes the specified ALCS [n] immediately. The command includes a duration and, when this time period has elapsed, the switch is either opened or remains closed as defined in the ALCS [n] Calendar; and
- Reset Auxiliary Load Control Switch – opens, closes the specified ALCS [n] or maintains the status in the ALCS [n] Calendar.

Commands will only be applied if the smart Meter is 'enabled' (i.e. the supply to the customer premises has not been remotely 'disabled').

For dynamic regimes, Suppliers will have two methods of achieving the same end:

- Static calendars, with daily calendar overrides as required; or
- Individual ad-hoc overrides to the calendar.

It is expected that even where Suppliers use dynamic ad-hoc commands to implement dynamic tariffs, a default switching calendar will be active in the Meter. This will then apply at times when the DCC Wide Area Network (WAN) is unavailable.

Boost buttons

Additionally, consumers will be able to issue commands via the user interface:

- Activate Boost Period – closes the ALCS [n] for a period of 15 minutes before reverting to the ALCS [n] Calendar;
- Extend Boost Period – closes the ALCS [n] for an additional 15 minutes, subject to a maximum of three executions (i.e. up to a total of one hour) before reverting to the ALCS [n] Calendar; and
- Cancel Boost Period – reverts to the ALCS [n] Calendar (where the active boost period is 60 minutes).

Tariff registers

Tariff registers (Time of Use Register) and load control switch schedules are independent. The Time of Use registers will be subject to a separate set of configurable rules (the Tariff Switching Table) to the load control switches (the ALCS [n] Calendar). Suppliers will need to ensure that the Tariff Switching Table and ALCS [n] Calendar are configured consistently.

Addressing multiple Metering Systems

The DCC will not initially hold any information that allows Metering Systems to be grouped (e.g. by SSC) and meters to be addressed as a group. This may change, if and when registration is incorporated within the scope of the DCC. Suppliers will need to identify all the Metering Systems that they wish to address in requests to the DCC.

Communication with the smart Meter will be by 'multiple unicast' messages – i.e. addressing individual Meters in quick succession (as opposed to multicasting, where messages are addressed to multiple Meters, or broadcasting, as used by the RTS).

Access to information

The DCC service will provide access to information about the number of ALCS and associated load types via a Self-Service Interface (SSI). Suppliers, LDSOs and Other Users will have 'read access' to the Meter (or HCALCS) to obtain additional details from the Meter (via the DCC User Gateway), including the calendar for each ALCS and whether the ALCS has a boost button configured. Current or pending Suppliers will have access to this information in their own right. Prospective Suppliers can access it, with customer permission, using an 'Other User' role.

Only the Supplier whose security credentials are held on the meter (i.e. the current registered Supplier) will be allowed to update the ALCS calendars and issue switching requests. On Change of Supplier, the ALCS calendars will remain as configured by the losing Supplier until such time as the gaining Supplier reconfigures.

4. The future of the RTS

Suppliers and LDSOs have raised concerns about continuity of service, given a previous announcement by the BBC that it planned to discontinue long wave broadcasting.

However, the BBC and ENA have recently reached an agreement to keep the RTS infrastructure working. We understand this will endure until March 2020.

5. RTS volumes

Under the current arrangements about 1.8 million customers have their electrical storage and immersion heating controlled remotely via the RTS. Of these, about 106,000 (5.7%) are Profile Class 4 customers (Non-Domestic Economy 7) and the remainder are Profile Class 2 (Non-Domestic Economy 7) customers. A breakdown by regime type is shown below. Values are as at the Settlement Final (SF) Run for 10 March 2014.

Regime	Profile Class 2 MSID count	Profile Class 4 MSID count	Total MSID count
Dynamic	159,475	2,796	162,271
Static / Semi-static	1,602,333	103,645	1,705,978
Total	**1,761,808**	**106,441**	**1,868,249**

An energy breakdown by regime type is shown below. Values are annualised energy on the switched register(s) only.

Regime	Profile Class 2 Energy (MWh)	Profile Class 4 Energy (MWh)	Total Energy (MWh)
Dynamic	838,564	27,521	866,085
Static / Semi-static	4,364,837	674,881	5,039,718
Total	**5,203,401**	**702,402**	**5,905,803**

Dynamically switched regimes are mostly found in two GSP Groups – South Scotland and North Scotland. About 38,000 Metering Systems in the East Midlands GSP Group, allocated to the split 10-hour Heatwise SSC, have been excluded from the counts. This is because we understand the switching programme has not been updated for several years. About 83,000 Metering Systems in the London GSP Group, allocated to an SSC which has previously been used for load shedding, have also been excluded on the understanding that this is no longer taking place.

Appendix 3 provides Metering System counts and energy totals by regime type within Profile Class and GSP Group.

The classification of SSCs into static/semi-static and dynamic is based on the ENA's 'RTS Access Provider Report' (Quarter 4 2010), responses from Suppliers and LDSOs to our 'Consultation on Dynamic Switching in the Smart World' (11 April 2012) and more recent updates from PSRG attendees.

Ofgem estimated that there are about 550,000 customers in Great Britain with dynamic teleswitched Meters[3]. This count was based on information from Suppliers on the number of customers on dynamic tariffs.

6. Implications of change

Implications for Settlement

[3] 'The state of the market for customers with dynamically teleswitched meters' (ref 133/13, 26 July 2013).

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In order to reflect switched load as accurately as possible in profiling, there needs to be a mechanism for Settlement to capture switch times. Currently, the Teleswitch Agent notifies switch times for Meters on dynamic SSCs to the SVAA as a single file on a daily basis. Switching instructions are issued by multiple RTS Access Providers (on behalf of multiple Group Code Sponsors), although there is only one RTS Access Provider and Group Code Sponsor per GSP Group. As switch times are centrally monitored by the Teleswitch Agent, central notification (from the Teleswitch Agent to the SVAA) works well.

Under the smart arrangements, the switching mechanism moves from GSP Group specific RTS Access Providers/Group Code Sponsors to individual Suppliers. This presents a new challenge in terms of how switching times are notified to the SVAA.

Central monitoring of requests to the smart Meter (or confirmation back from the smart Meter) is unlikely to be cost-effective, as highly complex algorithms would be needed to interpret Meter System level data and determine what was intended at the aggregate (i.e. SSC) level. So to mirror the existing RTS arrangements (and continue to support dynamic switching under the NHH profiling arrangements), Suppliers would need to notify switching times for groups of customers on the same regime within each distribution region to the SVAA. This could be directly, via an RTS Access Provider equivalent or via a Teleswitch Agent equivalent.

Implications for Suppliers and consumers

How the switching mechanism is used does not impact Settlement in its own right, but needs to be considered, as it will impact the business case for modifying the BSC processes.

The RTS arrangements do not readily support Suppliers, other than the Group Code Sponsor, establishing new switching regimes. This provides limited choice for consumers, who, on change of Supplier, may be offered a non-dynamic tariff or a "mirror" tariff (with the same structure as the tariff offered by the original Group Code Sponsor). No new RTS SSCs, dynamic or static, have been created since September 2004.

Dynamic tariffs also present an energy balancing risk to Suppliers other than the Group Code Sponsor, as dynamic switching times are not published in advance. Whilst this risk is low for small numbers of customers, it could deter Suppliers from competing for RTS customers.

There is an existing mechanism that allows a teleswitched SSC to be allocated to an Additional BM Unit, so that load shedding can be used for DSR. This has never been used and the distribution of customers across multiple Suppliers arguably reduces its feasibility.

Supplier controlled switching would appear to offer greater choice for consumers, reduced risk of incurring imbalance charges and better opportunities for DSR. However, it presents challenges to LDSOs.

Implications for LDSOs

Teleswitched Meters provide an opportunity for LDSOs to manage their networks. This is because heating loads can be grouped to provide a volume of energy that can be remotely flexed in critical locations and at critical times. Under the RTS, this can be controlled by a single RTS Access provider. To derive the same benefit, when these loads are controlled independently by Suppliers, will require:

- An individual Supplier to have a sufficient heating load across its customer base in the relevant GSP Group to be able to provide a load management service to the LDSO; or
- An LDSO to be able to communicate effectively with a number of Suppliers, such that they can synchronise their commands to the relevant smart Meters and provide sufficient load collectively.

Synchronisation between Suppliers is unlikely to be feasible for 'immediate' commands, but could work for 'day ahead' programmed commands.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

Ofgem has observed fewer changes of Supplier among customers with dynamically teleswitched Meters. Ofgem notes that 'in Scotland, where most DTS[4] meters are located, incumbent suppliers continue to have high market shares in this segment, close to or above 90 per cent'. This may act to the benefit of the LDSO, who would not need to co-ordinate switching across many Suppliers. If these lower switching rates are due to the specific features of the radio teleswitching technology, the advent of smart metering may create a greater spread of dynamically switched Meters across different Suppliers. However, the reverse may be true.

Dynamic switching is currently controlled by a small number of ex-PES Suppliers. Other Suppliers, especially those with low numbers of RTS customers, will have little or no experience of dynamic switching. Smart Meters will avoid the need for a site visit to reprogram switches, but Suppliers will still need to make process and system changes to support dynamic switching. As such these Suppliers may prefer to move RTS customers onto static or semi-static regimes in the shorter term. This will increase the ex-PES share and make the mirroring of the existing RTS regime with smart Meters a viable option for the ex-PES/LDSO.

On the other hand, if Suppliers embrace the possibilities of dynamic switching, they may want their own offerings. This could be on a national, rather than regional, basis to achieve a simpler tariff structure. This will reduce the viability of using existing RTS regimes for load management. But it could lead to a diversity of switching times, that mitigates the same risks that the RTS regimes were designed to address.

It is also possible that LDSOs' network management requirements could largely be met by the use of (semi-) static regimes, with appropriate grouping and randomisation, and that dynamic switching would only be needed at times of network duress and when security restrictions are in place. It is difficult to predict when or if material problems will arise in relation to areas like the Scottish islands, but it is safe to say that changes to central Settlement systems (or network reinforcement) would need to be planned and implemented in advance of material problems arising.

Electrical storage heating is more common in areas without mains gas, often in the remoter areas of the country. Network constraints can also be more acute in remote areas (hence the use of dynamic switching in the Scottish Islands). These are the same areas where WAN coverage is likely to be more challenging for the DCC. Full coverage may only be achieved in the later stages of the smart metering roll-out, so impacting the timescales (if not the feasibility) of dynamic switching with smart Meters.

[4] Dynamically teleswitched (DTS) Meters

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DCUSA Change Proposal 204

DCUSA Change Proposal (DCP) 204 'Smart Metering Related Amendments to Schedule 8' seeks to 'amend DCUSA Schedule 8 to reflect the migration of load switching technologies deployed by Suppliers in customer premises from established devices, such as radio teleswitches (RTS) and timeswitches, to smart metering technologies'. DCP 204 describes Schedule 8 as relating to 'Demand Control measures which can be initiated by Distributors to preserve security of supply and integrity of their networks and/or to avoid or minimise network investment'.

The CP 'seeks to replicate the existing functionality afforded by existing metering systems (around tariff time switching and load switching) to network operators in a Smart Metering regime and also seeks to clarify and/or simplify aspects of the Schedule'.

Dynamic switching by LDSOs

Under the initial DCC arrangements, LDSOs will not have access to the commands that allow dynamic switching. However, this may change in the longer term.

Work Stream Six of the Smart Grid Forum (SGF) is chaired by Ofgem and includes representatives from LDSOs, electricity Suppliers, consumer groups and other industry stakeholders. The group is reviewing the commercial and regulatory challenges of implementing a smart grid in Great Britain. This includes consideration of how remote automation can best be used to provide DSR, and the interactions between Suppliers, LDSOs and the DCC. A number of the options identified would require a change of policy to permit LDSOs to control smart devices remotely.

No.	Consultation question
1	What are the key opportunities and risks of moving from the RTS arrangements to the smart arrangements? *Please provide rationale and any additional comments.*
2	For Suppliers: What are your plans, including indicative timescales, for rolling-out smart Meters to Profile Class 2 and 4 customers (with particular regard to replicating or changing the current SSC)? If you have been unable to plan, what does your planning depend on? *Please provide rationale and any additional comments.*

7. Future changes

This section describes a number of future changes and the implications of these changes for implementing a solution for dynamic switching with smart Metering.

Change
Universal HH Settlement
The issue at the heart of this consultation is the notification of switch times to allow profiled NHH energy volumes to be allocated to the correct Settlement Periods. HH Settlement avoids the issue. However, the current HH Settlement arrangements were designed primarily (allowing for a few concessions to below 100kW elective HH Settlement) for premises with above 100kW maximum demand. The costs of HH Settlement reflect, in part, the more rigorous processes and controls required for these higher demand sites. The elective HH arrangements would need to be modified to accommodate domestic and small non-domestic customers currently on dynamically switched tariffs. Modification P272 'Mandatory half hourly settlement for Profile Classes 5-8' raised the issue of mandating HH Settlement for certain customers. The BSC Panel will consult the industry on a revised proposed Implementation Date for P272 once it believes there is greater certainty around the implementation approach for DCP179 'Amending the CDCM tariff structure'. P272 is currently with the Authority noting a minded-to position to approve the Alternative Modification. Ofgem has also recently published 'Electricity Settlement Reform – Moving to Half Hourly Settlement' (4 April 2014). Ofgem considers that 'it is in consumers' interests to be settled against their half-hourly consumption data' because it will 'create the right environment for demand-side response (DSR)' and 'help to reduce consumer bills'. Any changes that transition towards increased or universal HH Settlement are likely to be some years away. Additionally, there are currently no defined industry processes for using HH data from DCC-serviced smart Meters.
Key assumptions
• If universal HH Settlement is adopted, it is unlikely to be implemented ahead of the completion of the mass smart metering roll-out in 2020; • The availability of SMETS variants and load control switches and WAN coverage in remote areas will determine whether RTS Meters are replaced from the start of the mass roll-out in 2015 or later. But the likely lead times mean that a decision on whether to implement changes to Supplier and central systems for dynamic switching will need to be made before there is certainty about whether universal HH Settlement is adopted.

Dynamic Time of Use (e.g. critical peak pricing)

Profiling allows for static Time of Use tariffs, where registers are switched, but there is no load switching (or rather, load is switched by the customer in response to price messages from their Supplier). However, profiling does not currently support dynamic Time of Use tariffs. If Suppliers start to introduce innovative tariffs, such as critical peak pricing, there will be a need to:

a) notify central BSC systems of the switch times; and

b) consider the impacts of such switching on network management (including an assessment of the magnitude of the load that was likely to be switched).

Key assumptions

- A solution whereby dynamic switch times are notified to the SVAA by Suppliers to support RTS customers, when they have smart Meters installed, would also support dynamic Time of Use;
- There is currently too much uncertainty about the uptake of dynamic Time of Use tariffs (and the actual load which could be affected) to make this a quantifiable element of the business case for change;
- NHH profiling would only need to cater for dynamic Time of Use, if universal HH Settlement is not adopted or for the interim period prior to its implementation;
- On the one hand, increased dynamic Time of Use tariffs would appear to strengthen the business case for introducing Supplier notifications of switch times. On the other hand, uncertainty about the uptake of dynamic Time of Use might encourage shorter term options to be adopted.

Other load types (e.g. electric vehicle charging)

Currently remote load management can be used to control electrical storage heating and immersion. In the future, remotely controlled load switching could be possible for other types of circuit – for example, at electric vehicle charging points. In addition, the Load Limiting functionality in SMETS could be used to manage existing space / water heating loads and new types of controllable load. SMETS 2 compliant ALCS will support up to five separate load types, with an initial set of:

- NC – No load Connected
- WH – Water Heating
- EB – Electric Boiler heating
- RS – Resistive Space heating
- HP – Heat Pump
- CH – Combined Heat and power
- EV – Electric Vehicle charger
- OT – Other Type – undefined.

Energy can be allocated to the correct time periods using dedicated Time of Use registers for switched loads, but where separate loads are metered concurrently separate Metering System Ids would need to be assigned. Two

loads could be metered using the twin element variant SMETS Meter. However, there are currently only two switched load profiles, one for domestic and another for non-domestic electrical storage heating. Although storage and immersion loads can be separately controlled, they are measured in aggregate for the purposes of profiling.

A number of factors would need to be considered before introducing new profiles for other types of switched load. Too many profiles would arguably be counter to the ethos of profiling, which seeks to apply average demand shapes to large groups of customers. Consideration would need to be given to how widely spread a type of switched load would need to be to warrant having its own profile. It could require too many samples to be cost-effective. Other types of switched loads may be insufficiently distinctive to warrant their own profiles. For example, EV charging may be similar to storage heating, with a high initial load but then tailing off. Alternatively, at any given time, some EV chargers will be on and others off. The average is therefore unlikely to be representative in the same way as storage heating, where blocks of circuits all come on at the same time.

As there are only one (or two) metering elements per Meter, new profiles may be required for combinations of new switched loads. These may be switched at different times from each other and be of different magnitudes. Even if a case were made for new profiles, significant research and development would be needed to establish the optimum number of new profiles.

Key assumptions

- A solution whereby dynamic switch times are notified to the SVAA by Suppliers to support RTS customers, when they have smart Meters installed, would also support additional load types. This is subject to these loads not requiring their own load profiles (and the ability of smart Meters to handle concurrent Time of Use Registers);
- NHH profiling would only need to cater for additional load types, if universal HH Settlement is not adopted or for the interim period prior to its implementation;
- There is too much uncertainty about the uptake of these additional load types to factor into a decision about how (or if) dynamic switch times should be notified to the SVAA.

Smart appliances and load control by internet / mobile telephony

An increase in controllable loads will, of course, not necessarily mean that they will be controlled remotely by Suppliers (or LDSOs). Smart appliances will provide new possibilities for load management, with limited or no customer or Supplier intervention. Additionally thermostats and appliances will be controllable remotely by other means, such as the internet or mobile telephony, without any visibility to industry parties.

Key assumptions

- Where customer load control is incentivised by Time of Use tariffs, energy should be allocated to the appropriate Time of Use registers on the smart Meter;
- But if the customer is providing DSR through a third-party aggregator, load switching would not be synchronised with any Time of Use registers on the smart Meter;
- Where load switching is not synchronised with Time of Use registers, HH Settlement offers the only viable solution for accurate Settlement.

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LDSO access to load control functions
As described in the previous section, the work of the SGF may in the future result in changes to smart metering policy to allow direct control of smart devices by LDSOs for the purposes of DSR.
Key Assumptions
• There is too much uncertainty about future access of LDSOs to smart metering load control functions to factor into a decision about how (or if) dynamic switch times should be notified to the SVAA.

In conclusion:

- there is a short term need to ensure the accurate Settlement of any Metering Systems that continue to be dynamically switched following the installation of smart Metering;
- whilst increased Time of Use, DSR and load types such as EV charging, could strengthen the business case for changes to the NHH profiling arrangements, the potential for universal HH Settlement post-2020 weakens the business case; and
- there is too much uncertainty about these future changes to look beyond the immediate issue of transitioning from RTS to smart Metering Systems.

No.	Consultation question
3	Do you agree with the conclusion of the 'Future changes' section? Please provide details of how any solutions for transitioning the current RTS Metering Systems to smart metering could take these future changes into account. Do any new arrangements for notifying dynamic switch times need to be in place for the start of the mass roll-out of smart metering, scheduled for late 2015? *Please provide rationale and any additional comments.*

OPTIONS FOR CHANGE

1. Static / Semi-static regimes

The current differential between clock-switched and static/semi-static teleswitched Meters will disappear under the new smart arrangements.

When replacing a teleswitched Meter with a smart Meter, the Supplier (or their Meter Operator Agent) will need to set the ALCS Calendar to align with the appropriate SSC. This could be:

- the existing teleswitched SSC (the Supplier will need to obtain the teleswitch times from the RTS Access Provider in order to programme the ALCS Calendar and reassign the Metering System to a clock-switched SSC by March 2020, when the RTS messages will no longer be broadcast);
- an existing clock-switched SSC (if an SSC with equivalent clock intervals exists); and
- a new SSC (if no SSC with equivalent clock intervals exists).

All three approaches can be adopted without the need to make any changes to existing BSC arrangements. If new clock-switched SSCs are needed, Suppliers can progress this through the MDD change process. A problem with retaining non-teleswitch Meters on teleswitch SSCs would be that the distinction between smart Meters and teleswitch Meters would be lost. The migration of Metering Systems could not be tracked and they would be mislabelled.

Although this represents a straightforward solution for Metering Systems on static/semi-static teleswitched SSCs, Ofgem has argued that 'for a large proportion of DTS meters the dynamic functionality is not used and we are concerned that these customers may not obtain the potential benefits associated with the dynamic switching of their heating load'[3].

As the ALCS Calendar can be reconfigured remotely, the smart Meter offers greater flexibility than a conventional timer on a traditional Meter. By assigning the Metering System to a clock-switched SSC, the Supplier would effectively constrain this flexibility.

No.	Consultation question
4	Do you agree that no changes are needed to the BSC or Code Subsidiary Documents (CSDs) to accommodate static/semi-static switching using DCC-serviced smart Meters? *Please provide rationale and any additional comments.*

2. Randomisation

Some LDSOs have noted that they are more concerned about static and semi-static switching than they are about dynamic switching. This is due to the larger volumes of static and semi-static switched loads.

Clock-drift for clock-switched Meters creates an unintended, but useful, randomisation effect. It ensures that Meters on static and semi-static regimes do not all switch at the same time, which would cause load spikes on the distribution network and energy balancing problems for the Transmission Company. It is expected that smart Meters will keep good time, as they will be regularly synchronised with an accurate clock at the DCC. This creates greater risk in terms of network management, but is mitigated by the randomisation functionality defined in SMETS 2.

When switching auxiliary loads, smart Meters must be capable of applying a 'Randomised Offset'. This is a random delay (in seconds) up to a configurable maximum value, the 'Randomised Offset Limit' of 1799 seconds (i.e. up to, but not including, 30 minutes). The 'Randomised Offset' is the product of a 'Randomised Offset Number' (a randomly generated value of between 0.01 and 1.00) and the 'Randomised Offset Limit', rounded to the nearest second. The same value is used to delay the switching times of both the Tariff Switching Table and the Auxiliary Load Control Switch. There is only one Randomised Offset value which is applied to each of the five types of switched load supported. The 'Randomised Offset Number' is set by the manufacturer so that the 'Randomised Offset' is constant and the customer will know when their register/load switches.

Although SMETS 2 allows randomisation up to, but not including, 30 minutes, the 'Randomised Offset Limit' is configurable. It could therefore be constrained by governance, potentially under the BSC or the DCUSA. DCP 204 seeks to minimise the coincidence of load switching through the use of the randomised offset capabilities of the SMETS Meter and the management of load switching times. LDSOs and the Transmission Company are unlikely to be comfortable with Suppliers setting the limit to zero, which would prevent randomisation, so they may seek a standard value which could be the full 1799 seconds initially. This limit was selected based on the input of LDSOs, who were looking to replicate the randomisation available under the RTS (in seven and a half minute increments, with an additional three minutes built into the teleswitch itself).

The threshold value needs to strike an appropriate balance between being high enough to meet LDSO network management and the Transmission Company's system/energy balancing requirements, whilst being short enough to avoid Settlement inaccuracy. A 'Randomised Offset Limit' of 30 minutes would create an average Settlement drift of 15 minutes. Given that switch times are already rounded to the nearest half hour boundary and that mechanical switches can drift by hours, this would seem not to present an excessive risk to Settlement accuracy.

No.	Consultation question
5	If the maximum 'Randomised Offset Limit' of 1799 seconds is used for network management and system / energy balancing purposes, would this present an excessive risk to Settlement accuracy, given the inaccuracies already inherent in profiling and the existing 'drift' inherent in switch times where load is switched by time-switches? *Please provide rationale and any additional comments.*

3. High level options for dynamic switching by smart Meters

The following options are designed for the short-to-medium term. This covers the period from the start of the mass roll-out of smart metering in late 2015 to the targeted completion in 2020.

Option 1 – Manage within the existing framework

Suppliers could move dynamically switched Metering Systems to clock-switched SSCs. Alternatively Suppliers could settle customers on dynamic tariffs under the HH arrangements (i.e. on an elective basis). This would present the same challenges as Option 2 below. Assuming that it would not be within the remit of the BSC or desirable to prevent Suppliers from utilising the ALCS functionality dynamically, any Metering Systems that remained NHH settled would be subject to inaccurate Settlement if dynamically switched. The total volumes allocated to Time Pattern Regimes would be correct, but there would be a misallocation of energy between individual half hours/Settlement Periods (i.e. to a greater extent than the misallocation that occurs as a result of the estimation already inherent in Settlement profiling).

This misallocation of energy could be time-bound by creating SSCs that reflect the 'operating window' of the dynamic tariff. So if a customer is offered seven hours of heating load within a ten-hour operating window, the SSC would be set up with a ten-hour switched period to which all switched load would be allocated.

Option 2 – Mandate HH Settlement for dynamically switched Metering Systems

HH Settlement avoids the need to make changes to the NHH profiling arrangements. However, the current HH Settlement processes are primarily geared towards large consumption sites. There are also currently no defined industry processes for using HH data from DCC-serviced smart Meters. In the meantime, mandating HH Settlement for customers who are currently on dynamic RTS tariffs could be challenging, given that the same customers currently enjoy the benefits of dynamic switching without the need for HH Settlement. Delaying the installation of smart Meters for this group of customers (pending changes to the HH processes) might also be problematic.

Option 3 – Co-ordinated dynamic switching

During the mass roll-out of smart Meters, customers on existing dynamically switched tariffs will progressively move from traditional teleswitched Meters to smart Meters. To provide continuity of service to these customers, Suppliers may wish to switch their load at the same times as those remaining on the RTS SSCs. This will also allow LDSOs to continue to use the RTS Groups for load management purposes during the roll-out. For this to be achievable, the Group Code Sponsor will need to publish switch times (day ahead or as far in advance as is feasible), such that Suppliers can switch load at the same times using co-ordinated instructions to the smart Meter through the DCC.

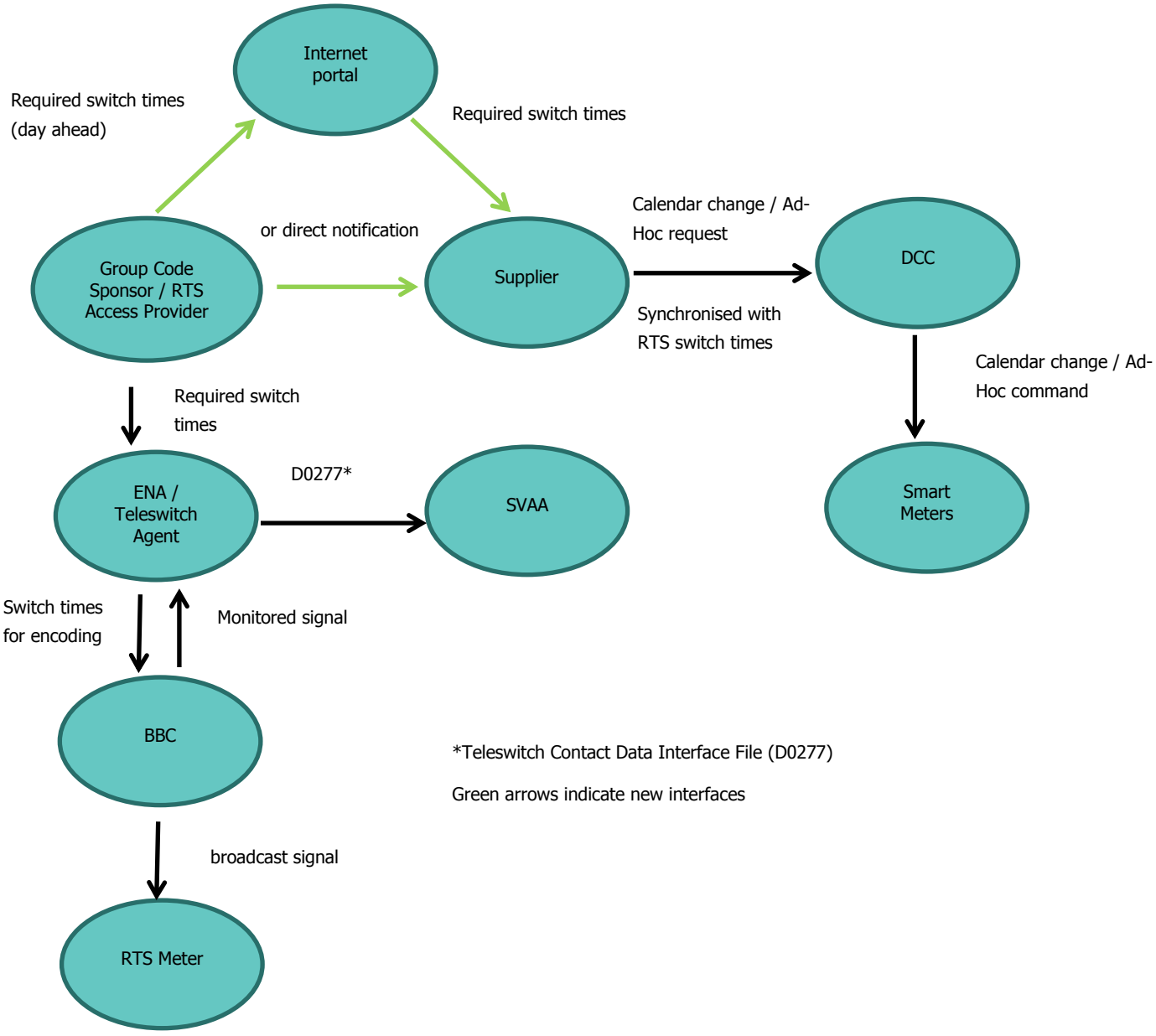
Although this ensures alignment of switching information into Settlement, this approach has a number of drawbacks:

- it will clearly not work for 'immediate' commands, but we understand that these are rarely used;
- it would not readily support new dynamic SSCs; and
- some dynamic switching may be automatically triggered – i.e. driven by bespoke calculation tools feeding into the RTS scheduling.

No changes would be needed to the SVAA system or the BSC. The obligation on Group Code Sponsors to publish switch times in advance would probably need to be added to the Radio Teleswitch Agreement (or an equivalent agreement under the DCUSA).

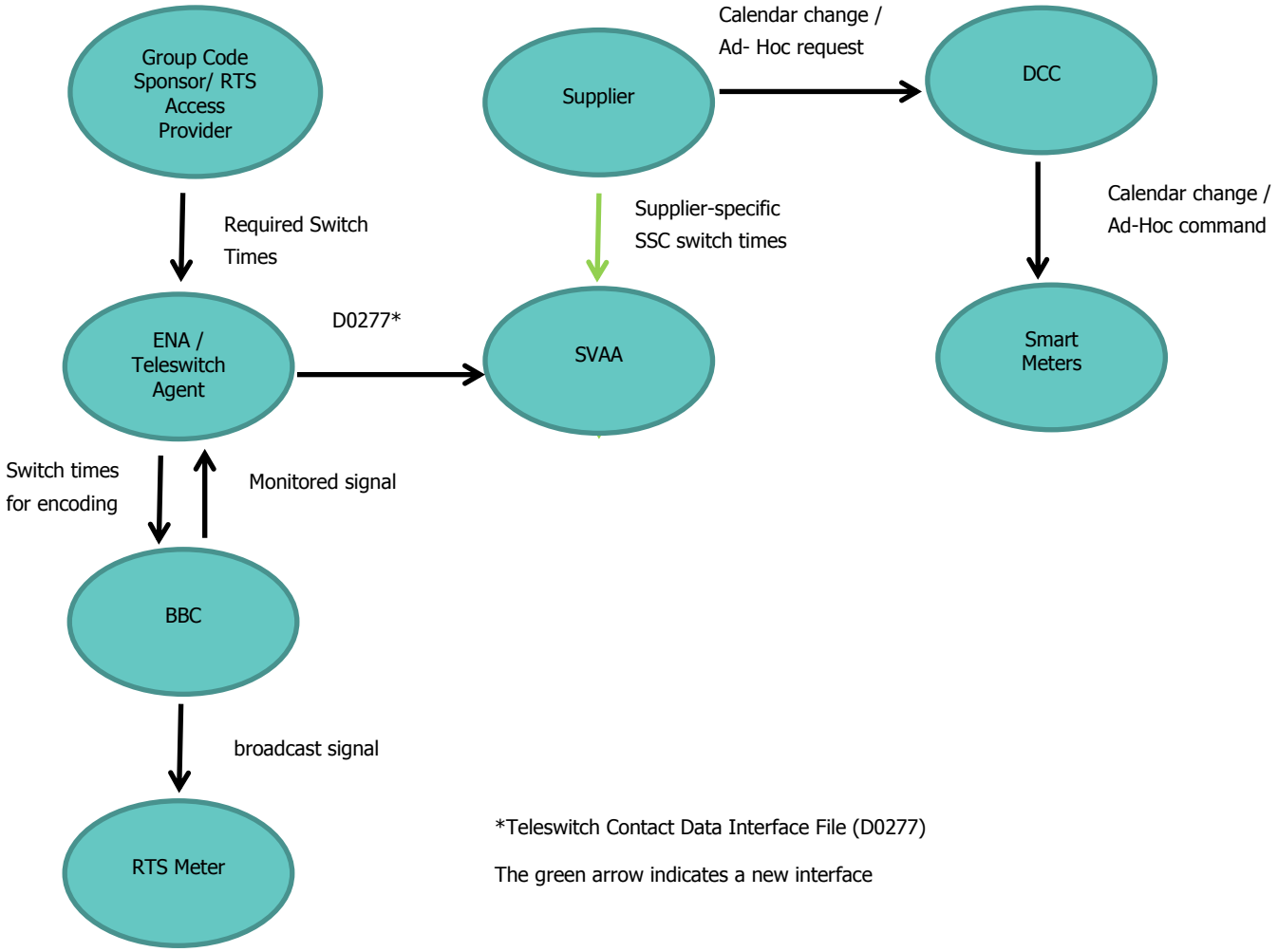
As this option continues to rely on the switch times notified by the Teleswitch Agent, it will only work for as long as the RTS arrangements are in place (probably only until 2020 unless the role of the Teleswitch agent outlives that of the RTS arrangements). It will however buy time to allow further consideration to be given to HH Settlement as a longer term alternative to Option 4.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS



Option 4 – Amend the process for notifying switch times

This would involve changes to the SVAA system and Supplier systems, such that Suppliers (whether directly, through an RTS Access Provider equivalent or through a Teleswitch Agent) notify the SVAA of switch times. It would need a variant of the Teleswitch Contact Data Interface File (D0277). New dynamically switched SSCs would become Supplier-specific, existing RTS SSCs would be allocated to the Group Code Sponsor and all other SSCs would remain generic. The SVAA would need to perform completeness checks to ensure that switch times had been received from all Suppliers and apply appropriate SSC-specific defaults where data was missing. During the smart Meter roll-out, the SVAA would need to process multiple versions of the new dataflow alongside the existing D0277 flow.



Profiling splits load across registers (with an estimated split between switched load and base-load). The register switch times are defined in the Tariff Switching Table in smart Meters, rather than the ALCS [n] Calendar which defines the switch times for the switched load. So Suppliers will need to notify register switch times from the Tariff Switching Table.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

On change of Supplier, the new Supplier will need to check whether the Metering System is assigned to a Supplier-specific SSC, and if so, will need to change the SSC. It is doubtful whether the registration systems could enforce this change without either delaying the change of Supplier or leaving the Metering System without an SSC. This would create a risk that energy volumes for the new Supplier were being allocated according to the old Supplier's switch times.

There are currently 391 RTS SSCs. Of these 72 are understood to be dynamic, but only 51 have associated Metering Systems. There are 656 combinations of dynamic teleswitched SSC and Supplier. In the longer term the number of SSCs could reduce, assuming that Suppliers will want to use one or a low number of national dynamically switched tariffs. However, in the short term, a large number of SSCs could be required, if Suppliers elect to mirror the existing RTS SSC. This is unlikely, given the low number of RTS Metering System registrations that most Suppliers (other than the GSP Group Sponsors) have. For example, if Suppliers with less than a hundred Metering Systems on a dynamically switched SSC migrated to static or semi-static SSCs, the number of Supplier-SSC combinations would reduce from 656 to 61.

738 SSC Ids have currently been allocated, out of the 10,000 available, so an additional 9,262 are currently available for use, without extending the format. A large increase in SSCs would, however, increase the volume of data in the 'Supplier Purchase Matrix Data File' (D0041) and the number of SSC, Profile Class, Line Loss Factor Class, Meter Timeswitch Class combinations that need to be approved by LDSOs and supported in MDD.

There are a number of variants to this option, which are described in sections 5 to 7 below.

This option will need a Modification Proposal. Changes will need to be made to the following:

- BSC Section S: Supplier Volume Allocation;
- BSC Annex S-2: Supplier Volume Allocation Rules;
- BSC Section K: Classification and Registration of Metering Systems and BM Units (potentially); and
- BSCP508: Supplier Volume Allocation Agent.

4. Comparison of high-level options

The table below shows the merits and drawbacks of each of the four high-level options. Costs are shown in relative terms only.

Criterion	Option 1 (manage within existing framework)	Option 2 (mandatory HH for dynamically switched customers)	Option 3 (co-ordinated switching)	Option 4 (amended process for notifying switch times)
Settlement accuracy	Poor	Best	As current	As current
Operational complexity and risk	N/A	Low	Highest	Moderate
Requires a Modification Proposal	No (see note 1)	Yes (see note 1)	No	Yes
Changes to other industry governance	No	No (see note 1)	DCUSA	MRA
SVAA development and operational costs	N/A	N/A	N/A	High
Supplier development and operational costs	Low	Medium	Medium	High
Long-term solution beyond 2020	See Note 2	Yes	No	Yes

Note 1: Whilst Suppliers could settle dynamically switched Metering Systems as HH, changes would be required to accommodate domestic and DCC-serviced Metering Systems. The progression of such changes could be constrained by the wider debate about universal HH Settlement. A Modification Proposal would be needed to mandate selective HH Settlement under Option 2 but not for elective HH Settlement under Option 1.

Note 2: Although it would be theoretically possible to manage within the existing framework beyond 2020, the Settlement risk would increase if Time of Use tariffs, DSR and alternative types of dynamically switched load start to take off.

No.	Consultation question
6	Do you agree with the relative merits/drawbacks of the four short-to-medium term options described in the 'Options for change' Section 4? *Please provide rationale and any additional comments.*
7	What is your preferred option and why? *Please provide rationale and any additional comments.*

No.	Consultation question
8	Are there any other options that we should consider? *Please provide rationale and any additional comments.*

5. Responsibility for notifying switch times

This section describes a number of variants within high-level Option 4 'Amend the process for notifying switch times'.

As Suppliers will be issuing switch commands to smart Meters and controlling the load and register switching calendars, they are a prime candidate for notifying switch times to the SVAA.

However, for DSR purposes, there may be a future need to co-ordinate load switching across multiple Suppliers. The concept of a RTS Access Provider/Group Code Sponsor could thus be carried forward into the new arrangements. The Group Code Sponsor/RTS Access Provider equivalent could be used for Suppliers, LDSOs or other parties co-ordinating DSR for an SSC. The RTS infrastructure limits Teleswitch Users to 16, but 100 users could be accommodated by the existing 2-digit Teleswitch User Id. This would also mean that the notification process would remain flexible, should the smart metering policy be amended to allow LDSOs to control switching in the future (although an SSC could only be the responsibility of a Supplier or LDSO, but not both).

It would also be possible to carry forward the concept of a central role to co-ordinate and validate switch times from multiple Suppliers (or Group Code Sponsors). It makes sense for the ENA to provide the Teleswitch Agent service for RTS, given that they are also providing a centralised service as the administrator of the teleswitch infrastructure. It makes far less sense to have a centralised notification role, when switching is not centralised. The SVAA already provides successful data marshalling functions for receiving data from multiple sources, identifying and chasing missing data and applying appropriate defaults.

If switch times are configured day-ahead, an efficient communication mechanism will be needed to ensure that the SVAA can receive and process files in short timescales. The Data Transfer Service (DTS) may be appropriate or an alternative communications infrastructure could be deployed.

No.	Consultation question
9	Do you agree that Suppliers should be responsible for notifying switch times? *Please provide rationale and any additional comments.*
10	How should switch times be notified? Is the Data Transfer Service appropriate for multiple notifications in short timescales? If not, what other communication methods should be considered? *Please provide rationale and any additional comments.*

6. Daily notification versus notification on change

This section describes alternative notification options within high-level Option 4 'Amend the process for notifying switch times'.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

Under the RTS arrangements, the Teleswitch Agent notifies the switch times for each Teleswitch User, Teleswitch Group and Teleswitch Contact on a daily basis, irrespective of whether they are the same as the previous day. This process could also be adopted for smart Meters.

The alternative is a hybrid of the current clock-switching process (where the calendar is recorded in MDD) and the teleswitch process. Suppliers (or notification agent) would need to provide the SVAA with calendar details, which the SVAA would need to store. Every time the Supplier updated the Tariff Switching Table, it would need to send a revised set of calendar details. Similarly, every time the Supplier issued an immediate switch command to the smart Meter, the Supplier would need to notify the SVAA of the on/off times of the register. The SVAA would need to check the day's switch times using the latest version of the stored calendar and then check for any overrides by ad-hoc commands.

The relative merits of the two approaches are shown below.

Criterion	Daily notification	Notification on change
Dataflow volumes	Higher (redundancy where dynamic switching only occurs infrequently for load management purposes)	Lower
Consistency with RTS notifications during smart roll-out	More	Less
Reflective of the requests Suppliers are making to smart Meters	No	Yes
Complexity of SVAA processing	Lower	Higher
Complexity of Supplier processing	Higher	Lower
Missing data files can be identified	Yes	No
Defaulting process needed when switch times are not received	Yes	No
Impact of missing notification	Single day	Continuous (until a further notification received)

No.	Consultation question
11	Should the Supplier (or notification agent) provide daily switch times or only notify switch times by exception? *Please provide rationale and any additional comments.*

7. Collating switch times

This section describes alternative options for collating switch times within high-level Option 4 'Amend the process for notifying switch times'.

Switching instructions and calendar reconfigurations will be directed to individual Metering Systems rather than to groups of Metering Systems. This will place the onus on the Supplier to ensure that these instructions are sent to all Metering Systems assigned to the relevant SSC. It would seem more practical and cost-effective for Suppliers (or other notifying party) to notify *intended* switch times to the SVAA, than for multiple Metering System level requests or responses to requests to be interpreted for the purposes of deriving SSC switching times.

While some commands to individual Meters will fail, this is also true of messages broadcast to teleswitched Metering Systems, where there is no guarantee that Metering Systems assigned to a teleswitch SSC still have a switched load, or that the teleswitch is still in place or functioning.

However, the process would need to be subject to strict auditing to ensure that the switch times notified by Suppliers to the SVAA matched the logs on a sample of Meters.

No.	Consultation question
12	Do you agree that notifying intended switch times by Suppliers would be more practical and cost-effective than interpreting individual commands to/responses from smart Meters? Please describe any alternative methods of collating switch times. *Please provide rationale and any additional comments.*

Please send your response to *BSC.Admin@elexon.co.uk* **by 27 June 2014.**

APPENDICES

Appendix 1: Consolidated consultation questions

No.	Question
1	What are the key opportunities and risks of moving from the RTS arrangements to the smart arrangements?
2	For Suppliers: What are your plans, including indicative timescales, for rolling-out smart Meters to Profile Class 2 and 4 customers (with particular regard to replicating or changing the current SSC)? If you have been unable to plan, what does your planning depend on?
3	Do you agree with the conclusion of the 'Future Changes' section? Please provide details of how any solutions for transitioning the current RTS Metering Systems to smart metering could take into account these future changes. Do any new arrangements for notifying dynamic switch times need to be in place for the start of the mass roll-out of smart metering, scheduled for late 2015?
4	Do you agree that no changes are needed to the BSC or Code Subsidiary Documents (CSDs) to accommodate static/semi-static switching using DCC-serviced smart Meters?
5	If the maximum 'Randomised Offset Limit' of 1799 seconds is used for network management and system / energy balancing purposes, would this present an excessive risk to Settlement accuracy, given the inaccuracies already inherent in profiling and the existing 'drift' inherent in switch times where load is switched by time-switches?
6	Do you agree with the relative merits/drawbacks of the four short-to-medium term options described in 'Options for change' Section 4?
7	What is your preferred option and why?
8	Are there any other options that we should consider?
9	Do you agree that Suppliers should be responsible for notifying switch times?
10	How should switch times be notified? Is the Data Transfer Service appropriate for multiple notifications in short timescales? If not, what other communication methods should be considered?
11	Should the Supplier (or notification agent) provide daily switch times or only notify switch times by exception?
12	Do you agree that notifying intended switch times by Suppliers would be more practical and cost-effective than interpreting individual commands to/responses from smart Meters? Please describe any alternative methods of collating switch times.

Appendix 2: Radio Teleswitch Service

Teleswitch groups

The Radio Teleswitch Service is co-ordinated by the ENA.

In each GSP Group, a Supplier (usually the ex-PES Supplier) acts as a Group Code Sponsor and determines, in agreement with the LDSO, the switching times for pre-established groups of Meters. These are approved under the BSC and recorded in MDD as SSCs, Teleswitch Time Pattern Regimes and Teleswitch Register Rules.

Meters are installed with a special teleswitch device at consumer premises. Meter Operators configure the Meters according to the pre-defined rules, including the programming of the Group Code Id. Radio teleswitches with the same Group Code Idd and other features respond simultaneously to broadcast messages.

LDSOs perform the role of RTS Access Provider. This is an intermediary role between the Group Code Sponsor and the administrator of the teleswitch infrastructure (the ENA). Before the Radio Teleswitch Agreement was created in 1999, LDSOs acted as Group Code Sponsors and RTS Access Providers. Under the Agreement, LDSO have to provide Suppliers with access to the teleswitch infrastructure. The LDSO can provide access by switching load on behalf of the sponsoring Supplier, or can provide access gateway arrangements to allow the sponsoring Supplier to issue the relevant switching messages.

Switching instructions

The radio teleswitches installed at consumer premises each respond to a pre-set Block Application Code (BAC), User ID (LDSO-specific) and Group Code. Radio teleswitches with the same BAC, User ID and Group Code respond simultaneously to a command (apart from a random offset of plus or minus three minutes to prevent demand spikes). The load is therefore aggregated. For example, a command to Group Code XX might switch 100MW. This aggregated load can be geographically dispersed. Charge to a storage heater can be a single block (e.g. 7 hours) or split into small blocks (down to a resolution of 7.5 minutes).

The RTS Access Provider notifies switching instructions to the Central Teleswitch Control Unit (CTCU), where the instructions are validated and queued for transmission.

LDSOs can also issue immediate messages (used to shed or boost load) in addition to programmed messages, within pre-determined operating windows.

The CTCU is owned by the ENA and operated and maintained by Cygnet Solutions under a contract with the ENA. The BBC, under a contract with the ENA, then encodes switching instructions on its 198 kHz signal and these are transmitted simultaneously via three radio transmitters at Droitwich, Westerglen and Burghead (operated by Arqiva under a BBC contract). This process is illustrated in Figure 1 later in this Appendix.

Teleswitch Monitoring

BSC Section E defines Teleswitch Monitoring as a BSC service. The role of Teleswitch Agent is fulfilled by the ENA. The primary functions of the Teleswitch Agent, as defined in BSC Section S 4.3, include monitoring and logging switching time messages and sending details to the SVAA. The Teleswitch Agent uses a network of monitors, which are supplied, operated and maintained by Cable and Wireless, to log the messages broadcast by the three radio transmitters. Translation of the data log into files for notification to the SVAA is then performed by PowerDev on behalf of the Teleswitch Agent. The data is sent to the SVAA daily on a Teleswitch Data Interface File (D0277). This process is illustrated in Figure 2 later in this Appendix.

Teleswitch Contact Rules

The D0277 dataflow includes switch times for a day starting at midnight UTC. For each combination of Teleswitch User, Teleswitch Group and Teleswitch Contact, the file provides the on/off status of the Teleswitch Contact at midnight UTC and any changes to the on/off status of the Teleswitch Contact over the course of the day.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

Each combination of Teleswitch User and Teleswitch Group maps to an SSC in MDD.

The Radio teleswitches have four logical contacts, labelled A to D. The switching of these contacts, either individually or in combination, determines whether a logical register (or Time Pattern Regime) is active or inactive.

Each Teleswitch Time Pattern Regime has one or more Teleswitch Rules, which are defined in MDD. For example, TPR 01006 has three Teleswitch Rules, labelled 1 to 3. These rules are detailed in the Teleswitch Contact Rules table within MDD.

Time Pattern Regime ID	Teleswitch Register Rule Id	Teleswitch Contact Code	Teleswitch Contact Rule
01006	1	A	1
01006	1	D	0
01006	2	A	0
01006	2	D	1
01006	3	A	1
01006	3	D	1

The effect of the above rule is that register 01006 is 'active' when either contact A (rule 1), contact D (rule 2) or both (rule 3) are switched.

Figure 1: RTS transmission

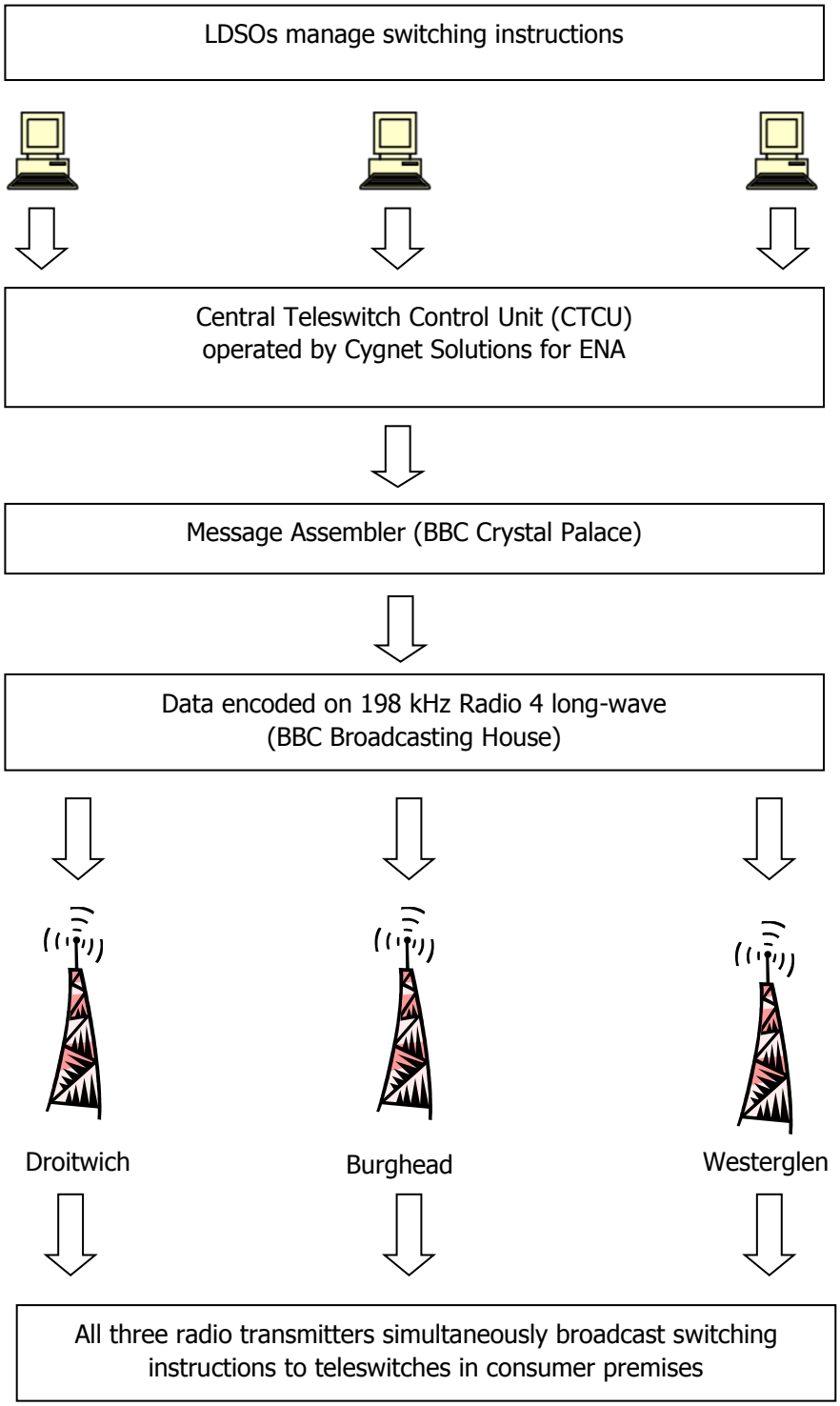
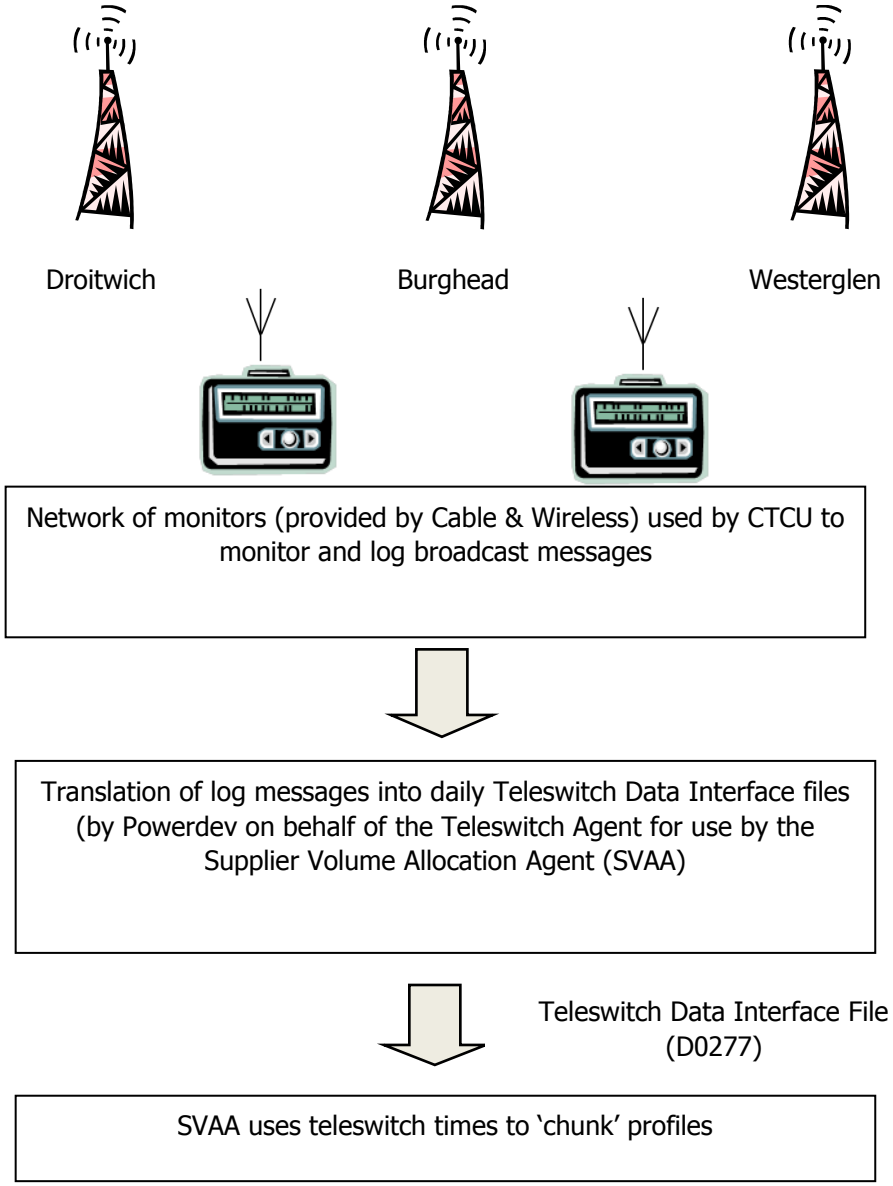


Figure 2: RTS monitoring



Appendix 3: RTS volumes

Dynamic regimes (Metering System counts)

GSP Group	Profile Class 2 MSID count	Profile Class 4 MSID count	Total MSID count
Merseyside & N Wales	38	3	41
Southern	2,792	0	2,792
South Eastern	0	1	1
South Scotland	76,149	1,416	77,565
North Scotland	80,496	1,376	81,872
Total	**159,475**	**2,796**	**162,271**

Dynamic regimes (annual energy)

GSP Group	Profile Class 2 MSID count	Profile Class 4 MSID count	Total MSID count
Merseyside & N Wales	89	19	108
Southern	16,072		16,072
South Eastern		3	3
South Scotland	292,672	9,748	302,420
North Scotland	529,730	17,751	547,481
Total	**838,564**	**27,521**	**866,085**

About 38,000 Metering Systems in the East Midlands GSP Group, allocated to the split 10-hour Heatwise SSC, have been excluded from the counts and energy volumes. This is because we understand that the switching programme has not been updated for several years. About 83,000 Metering Systems in the London GSP Group, allocated to an SSC which has previously been used for load shedding, have also been excluded on the understanding that this is no longer taking place.

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

Static /Semi-static regimes by GSP Group (Metering System counts)

GSP Group	Profile Class 2 MSID count	Profile Class 4 MSID count	Total MSID count
Eastern	215,007	12,131	227,138
East Midlands	360,017	13,812	373,829
London	88,417	4,991	93,408
Merseyside and N Wales	10,294		10,294
Midlands	51,021	374	51,395
Northern	54,874	3,003	57,877
North Western	56,434	3,531	59,965
Southern	184,585	14,055	198,640
South Eastern	246,674	20,698	267,372
South Wales	28,315	5,222	33,537
South Western	76,356	7,829	84,185
Yorkshire	52,562	4,676	57,238
South Scotland	155,698	8,429	164,127
North Scotland	22,079	4,894	26,973
Total	**1,602,333**	**103,645**	**1,705,978**

SETTLEMENT OF DYNAMICALLY SWITCHED METERS

Static /Semi-static regimes by GSP Group (annual energy)

GSP Group	Profile Class 2 energy (MWh)	Profile Class 4 energy (MWh)	Total energy (MWh)
Eastern	499,876	68,328	568,203
East Midlands	631,191	59,410	690,601
London	253,443	35,900	289,343
Merseyside and N Wales	47,752	0	47,752
Midlands	123,638	1,619	125,257
Northern	164,484	20,574	185,059
North Western	190,293	23,070	213,363
Southern	754,052	105,702	859,754
South Eastern	545,370	129,798	675,169
South Wales	100,784	36,978	137,762
South Western	310,623	47,654	358,277
Yorkshire	166,507	25,672	192,180
South Scotland	455,905	67,443	523,347
North Scotland	120,917	52,733	173,650
Total	**4,364,837**	**674,881**	**5,039,718**

Appendix 4: Glossary

Term	Abbreviation	Description
Administrator of switching infrastructure		This role is responsible for the IT systems and communications infrastructure needed to transmit signals to Meters. It is currently performed by the ENA and its contracted agents (including the BBC).
Auxiliary Load Control Switch	ALCS	As defined in Part D of the ESME specification in SMETS 2.
Auxiliary Load Control Switch Calendar		Defined in SMETS 2 as 'a set of rules for setting the commanded state of up to five Auxiliary Load Control Switches as open and closed. The rules stored within the calendar shall support 200 Time-of-use switching rules per annum. The rules shall support changes in state based on: i. half-hour, half-hours and half-hour ranges; ii. day, days and day ranges; and iii. date, dates and date ranges. All dates and times shall be specified in UTC'.
Block Application Code	BAC	Used in conjunction with a Teleswitch User Id and Teleswitch Group Id to identify a group of Teleswitched Meters that are to be switched simultaneously (subject to a randomisation factor).
Broadcast		Transmit the same data to all possible destinations (see also Multicast and Unicast).
Central Teleswitch Control Unit	CTCU	The system used to collate and direct switching times to the BBC.
Data and Communication Company	DCC	The entity that has recently been created and licensed to deliver central data and communications activities for smart metering in domestic and small non-domestic premises.
DCC Self-Service Interface	SSI	A DCC interface allowing DCC users to access information about smart Meters from the DCC's own inventory, rather than via the smart Meter itself.
DCC User Gateway		A DCC interface allowing users to send, receive or schedule commands and responses to and from smart Meters.

Term	Abbreviation	Description
Demand Side Response	DSR	Actions taken by consumers or Suppliers to change the amount of electricity they take off the grid at particular times in response to a signal.
Dynamic Switching		Switching of a customer's electrical load (or Meter registers) that can vary by both time and duration on a daily basis.
Energy Networks Association	ENA	Represents the 'wires and pipes' transmission and distribution network operators for gas and electricity in the UK and Ireland. Acts as the Teleswitch Agent under the BSC and administrator of switching infrastructure under the Radio Teleswitch Agreement.
Electricity Smart Metering Equipment	ESME	As defined in SMETS 2.
ex-PES		The five companies (EDF Energy, E.ON UK, RWE npower, SSE and Scottish Power) which from privatisation in 1990 until 1998 were known as Public Electricity Suppliers (PES) and had a monopoly of electricity supply and distribution in their designated areas.
Foundation		The period between publication of the Government's Response to the Smart Metering Prospectus consultation (March 2011) and the beginning of the mass roll-out of smart Meters. In particular, the period following the finalisation of the SMETS (during 2012) and the mass roll-out, when parties responsible for delivering smart Meters test the end-to-end system and its individual elements.
Group Code Id		An identifier used to define groups of teleswitched Metering Systems that will be switched simultaneously. Defined in the BSC as Teleswitch Group.
Group Code Sponsor		A role that determines, in agreement with the LDSO, the switching time for pre-established groups of Meters.
HAN Connected Auxiliary Load Control Switch	HCALCS	An ALCS that is connected to a smart Meter across a Home Area Network (HAN). As defined in Section 8 of SMETS 2.
Low Carbon Network Funds	LCNF	Funding to support projects sponsored by the LDSOs to try out new technology, operating and commercial arrangements with a view to providing cost-efficient security of supply in a low carbon economy.

Term	Abbreviation	Description
Market Domain Data	MDD	The central repository of reference data used by Suppliers, Supplier Agents and LDSOs in the retail electricity market.
Message Assembler		The device (at BBC Crystal Palace) that encodes the teleswitch instructions for broadcast on 198 kHz Radio 4 Longwave.
Multicast		Transmit messages to a specified group of destination addresses (see also Broadcast and Unicast).
Operating Window		Dynamic switching can be used to provide a customer with a fixed or variable number of hours' switched load (e.g. seven hours) within a longer 'Operating Window' (e.g. 10 hours).
Profile Class 2 (Domestic Economy 7) customers		Customers at a domestic premises, as defined in the terms of the Supply licence, that are on a Domestic Economy 7 or similar tariff and have a Metering System that is capable of switching load, e.g. Storage and Immersion Heating.
Profile Class 4 (Non-Domestic Economy 7) customers		Customers at a non-domestic premises, as defined in the terms of the Supply licence, that are on a Non-Domestic Economy 7 or similar tariff and have a Metering System that is capable of switching load, e.g. Storage and Immersion Heating.
Profiling and Settlement Review Group	PSRG	A group established in March 2010 by the Supplier Volume Allocation Group (SVG) to assist in a review of the BSC profiling and settlement arrangements in light of the rollout of smart and advanced metering.
Public Electricity Supplier	PES	The Public Electricity Supplier for one of the 14 electricity regions in England, Wales and Scotland which, from privatisation in 1990 until 1998, had a monopoly of electricity supply and distribution in their designated areas.
Radio Teleswitch Agreement		The commercial framework that allows Suppliers access to the teleswitching infrastructure.
Radio Teleswitch Service	RTS	The Service co-ordinated by the Energy Networks Association (ENA) on behalf of Market Participants.
Randomised Offset		As defined in SMETS 2, this is the product of the Randomised Offset Limit and the Randomised Offset Number rounded to the nearest second. This value is used to delay the Tariff Switching Table times, and the Auxiliary Load

Term	Abbreviation	Description
		Control Switch Switching times.
Randomised Offset Limit		As defined in SMETS 2, this is a value in seconds in the range - 0 to 1799.
Randomised Offset Number		A randomly generated value of between 0.01 and 1.00.
RTS Access Provider		The design of the RTS infrastructure limits the number of 'users' to 16, making it impossible for individual Suppliers to communicate directly with the administrator of the switching infrastructure. To overcome this, the Radio Teleswitch Agreement assigns to LDSOs the role of RTS Access Provider, acting as 'middle man' between Suppliers and the administrator of the switching infrastructure.
Semi-static switching		Teleswitching that varies occasionally e.g. at weekend, by season or by GMT/BST.
Smart Metering Equipment Technical Specifications	SMETS	Describes the minimum physical, functional, interface and data requirements of a Electricity Smart Metering Equipment (ESME) (and its gas equivalent) that an electricity (or gas) supplier is required to install to comply with conditions 39 (or 33 respectively) of their licences.
	SMETS2	Second version of the SMETS, including ALCS functionality.
Standard Settlement Configuration	SSC	A standard Metering System configuration recognised by the Supplier Volume Allocation Agent System.
Static switching		Teleswitching where the switch times do not vary between one day and the next.
Tariff Switching Table		Defined in SMETS 2 as 'A set of switching rules for allocating half-hourly Consumption to a Tariff Register for Time-of-use Pricing and Time-of-use with Block Pricing. The rules stored within the table shall support at least 200 Time-of-use switching rules per annum. The rules shall support allocation based on: i. half-hour, half-hours and half-hour ranges; ii. day, days and day ranges; and iii. date, dates and date ranges.

Term	Abbreviation	Description
		All dates shall be specified as UTC.
Teleswitch Agent		The BSC Agent for Teleswitch Monitoring in accordance with Section E of the BSC. Currently the ENA.
Teleswitch Contact		One of the (usually four) logical contacts within a teleswitch or teleswitched Meter. Typically A and B will operate Meter registers and C and D will switch electrical load.
Teleswitch Contact Data Interface File (D0277)		The data file sent to the Supplier Volume Allocation Agent detailing the Switching times for each Teleswitch Group.
Teleswitch Group		A collection of teleswitched Metering Systems that will be switched simultaneously.
Teleswitch Monitors		The devices that record the broadcast teleswitch signals and log them on the CTCU.
Teleswitch Register Rules		The rules that define which Teleswitch Registers are operational when the teleswitched Meters implement switching instructions.
Teleswitch Time Pattern Regime		The mapping of Teleswitched Registers to the Teleswitch User Id and Teleswitch Group Id in MDD.
Teleswitched Meters		Meters that are connected to a Teleswitch.
Unicast		Transmit messages to a single destination identified by a unique address (see also Broadcast and Multicast).