

PUBLIC

Market-wide Half-Hourly Settlement

Design Working Group: Draft Skeleton
TOMs for Evaluation



ELEXON

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MARKET WIDE HALF-HOURLY SETTLEMENT

CONTENTS

INTRODUCTION.....	3
1. Ofgem SCR on Market-wide Half-Hourly Settlement.....	3
2. What is a Target Operating Model (TOM) for MHHS?	3
3. What is the Objective for Stage 1 of the DWG work.....	3
4. What are the Draft Skeleton TOM Evaluations?	4
5. What are the Market Segments that are covered in the TOM design?	5
6. Why do the TOMs not mentions the Supplier?	5
7. Why do the TOMs refer to Settlement Period Level data and not Half-Hourly data?	6
WHAT ARE THE SERVICES FEATURED IN ALL TARGET OPERATING MODELS (TOMS)?.....	6
WHAT WERE THE MAIN CONSIDERATIONS WHEN GROUPING SERVICES?	11
THE FIVE DRAFT SKELETON TOMS FOR EVALUATION	13
Advantages common to all TOMs as a result of design principles adopted	13
TOM A: COMBINED RETRIEVAL AND PROCESSING WITH SEPARATE AGGREGATION	15
TOM B: COMBINED PROCESSING AND AGGREGATION WITH SEPARATE RETRIEVAL	17
TOM C: END TO END SERVICE COVERING RETRIEVAL THROUGH TO AGGREGATION.....	19
TOM D: SEPARATE SERVICES	21
TOM E: SINGLE CENTRAL SERVICE COVERING RETRIEVAL THROUGH TO VOLUME ALLOCATION	23
INITIAL DWG RECOMMENDATIONS.....	25
Appendix A: DWG TOM development work.....	26
Appendix B. Glossary of terms	27

MARKET WIDE HALF-HOURLY SETTLEMENT

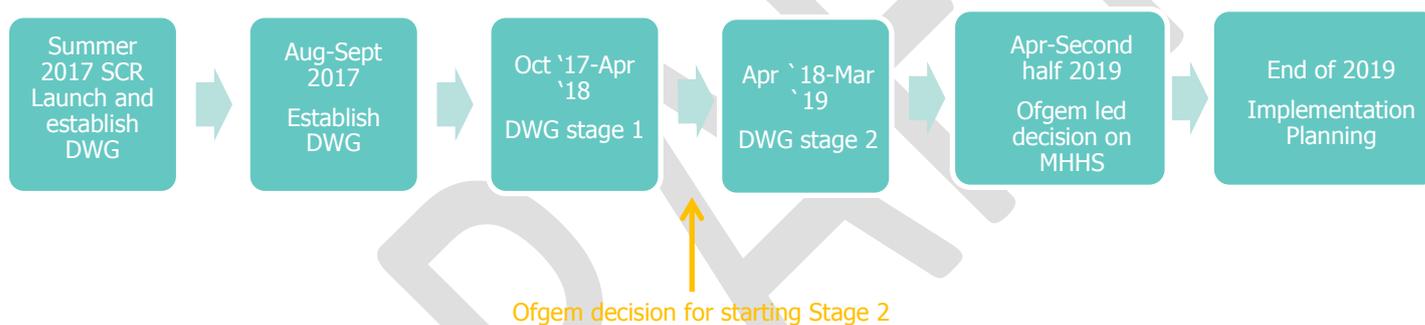
INTRODUCTION

1. Ofgem SCR on Market-wide Half-Hourly Settlement

This report sets out the five draft Skeleton Target Operating Models (TOMs) developed by the ELEXON led Design Working Group (DWG). The TOM development work forms part of the Ofgem led Significant Code Review (SCR) on Market-wide Half-Hourly Settlement (MHHS). The main objective of the TOMs is to create an enduring settlement process that is simple, more accurate and facilitates innovation based on the [Design Principles](#) set out by Ofgem.

The report covers the key services of the end-to-end settlement process for MHHS, describes the DWG developed TOMs, the advantages of the design common to all TOMs and then separately the key features and advantages and disadvantages of each TOM. Appendix A sets out the DWG approach used in developing the TOMs and its rationale (in the first 4 meetings of the DWG, up to their last meeting on 10 January 2018).

This report will be used by the DWG in their evaluation of the draft skeleton TOMs. The Skeleton TOMs and their DWG evaluation will form the basis of the final report for Ofgem on DWG Stage 1 of the settlement design work for MHHS. The detailed timeline for the settlement design work and overall Ofgem SCR process can be found in the Ofgem SCR Launch [Statement](#). The high level timetable for this project is as follows:



Appendix A report also covers the key discussions and agreements of four meetings of the DWG (see [ELEXON website DWG](#) for further details on the meetings). It sets out the TOM baseline principles agreed by the DWG and used to develop the TOM service groupings and then the draft TOMs.

2. What is a Target Operating Model (TOM) for MHHS?

A TOM for MHHS is a set of services and processes required to deliver Settlement Period (SP) level data from a Meter to a central Settlement body to enable the calculation of the amount of energy a Supplier's customers have consumed for each Settlement Day (SD). This calculation is then used in the Imbalance Settlement process which compares the Supplier's contracted purchases of energy to the amounts deemed to have been consumed (sales) by each Supplier's customers (and recognises any amounts of energy contracted by National Grid under the Balancing Mechanism). In further developing the TOMs there will be consideration of the additional benefits that can be realised by having access to such data: for example, for smart grid development, innovation or flexibility offerings. Additionally, it is intended that the TOMs will allow for settlement timescales (from the current 14 month reconciliation window) to be reduced (due to more accurate and more timely meter reading data) to provide further benefits (e.g. reduction in credit cover).

3. What is the Objective for Stage 1 of the DWG work

Stage 1 of the DWG work is to develop several potential TOMs (Skeleton TOMs) for the end state when most customers will have a Meter capable of delivering Settlement Period level data for Settlement purposes. All the

MARKET WIDE HALF-HOURLY SETTLEMENT

TOMs will be evaluated with the aim of identifying the TOM which best meets the [Design Principles](#) set out by Ofgem.

The evaluated Skeleton TOMs will then feed into a consultation which will seek to identify any further detail that can be fed into the evaluations of the optimum TOM.

Stage 1 will not seek to consider low level detailed processes. For example, how meter data is validated or how data is estimated when data is missing or invalid. Detailed design will be considered as part of DWG Stage 2.

Stage 2 will also deliver detailed transitional arrangements to the TOMs. These will be consulted on as part of Stage 2.

4. What are the Draft Skeleton TOM Evaluations?

A draft Skeleton TOM is a description of services that covers the E2E settlement arrangements (meter to bank) for Market Wide HHS. Each TOM covers all the different Metering types, e.g. smart Meters, Advanced Meters, non-smart Meters (dumb/legacy) and the unmetered supplies. See below for details and Appendix B for glossary of terms.

The draft Skeleton TOMs will be evaluated using the DWG agreed objectives and evaluation criteria set out in the DWG working document '[Evaluation Criteria for HHS Target Operating Models](#)' [link to be inserted once finalised]. The objectives are listed here.

DWG agreed objectives

Objective	Description
Accurate	Use of actual half-hourly consumption data Cost-reflective and equitable Improves energy forecasting for Suppliers
Timely	Less commercial risk, e.g. credit cover and settlement timescales Reduces barriers to entry for new Suppliers and new market participants
Efficient	Reduces settlement costs Facilitates efficient use of energy resources and flexibility
Facilitates innovation	Stronger incentives on suppliers to offer new products that benefit the consumer Enables energy production/use flexibility, e.g. Demand Side Response or peer to peer trading Supports new technologies Flexible to include new entrants (Third parties, new Suppliers, new market types)

MARKET WIDE HALF-HOURLY SETTLEMENT

The eleven Evaluation Criteria for draft Skeleton TOMs:

1. Coverage
2. Cost Reflectivity
3. Timing
4. Design Simplicity
5. Design Flexibility
6. Consequential Impacts
7. Data Privacy
8. Solution costs
9. Ease of Implementation
10. Facilitates new technologies and innovation
11. Impact on small suppliers/ new entrants

5. What are the Market Segments that are covered in the TOM design?

The TOMs are designed to cover all Metering Points connected to the distributions networks and settled under the Balancing and Settlement Code in Supplier Volume Allocation (in England and Wales and Scotland) regardless of the type of data that can be obtained from the Metering System. The five Market Segments for the target end-state are:

- i) Smart Meters with Settlement Period-level data available;
- ii) Smart Meters with only Register Readings available;
- iii) Non-smart Meters with Register Readings;
- iv) Advanced Metering Systems with Settlement Period-level data available;
- v) Unmetered Supplies.

It is assumed that in the target end-state the majority of Meters will be smart. Therefore, the number of non-smart Meters will be small and that Advanced Meters (typically AMR Meters) in the current non-half hourly sector will either be replaced with a smart Meter or move to the non-smart Meter or Advanced Metering Systems Market Segments.

6. Why do the TOMs not mention the Supplier?

In the context of the TOMs the Supplier is the party as currently defined under the [Electricity Act](#) and the holder of a [Supply Licence](#) with these functions/obligations under the BSC:

- Registrant of Metering Systems;
- Party liable for settled energy costs;
- Provider of retail electricity services;
- Accessing Smart Meters via the [Data and Communications Company \(DCC\)](#).

The Supplier will also be responsible for configuration of the smart Meters and collection of data for customer billing.

The Supplier is not mentioned in the TOMs as it could be the party that is providing, procuring or interfacing with the services defined in the TOMS.

It is also recognised that in the future the role of the Supplier may change and could become part of a wider bundled service to customers. For the purposes of this document the Supplier is the party providing the functions/obligations set out above.

MARKET WIDE HALF-HOURLY SETTLEMENT

7. Why do the TOMs refer to Settlement Period Level data and not Half-Hourly data?

Currently Settlement is based on a Settlement Period equal to thirty minutes.

The TOMs refer to Settlement Period level data rather than Half-Hourly data as the Settlement Period could change, e.g. be harmonised across Europe to a lower granularity or be required for innovation of flexibility purposes.

Therefore, the Settlement Period could be fifteen minutes or even more granular in the future.

This may mean Metering Systems will need to be replaced or re-configured to provide data at the harmonised level.

Additionally, where Metering Systems only provide Register Readings there would also be a requirement to 'load shape' or 'profile' the Meter advances to a more granular Settlement Period (e.g. less than thirty minutes currently).

WHAT ARE THE SERVICES FEATURED IN ALL TARGET OPERATING MODELS (TOMS)?

This section describes all the services that cover the E2E settlement process for MHHS that have been used to construct the TOMs. Within some of the TOMs, some of these services have been combined into a single service. However, the core components of each service do not change. The services are:

1. Registration Service

- registrar for all Metering Systems (and other related registration information) in Supplier Volume Allocation (SVA)- a service currently undertaken by the Licenced Distribution System Operators

2. Metering Service

- responsible for installing, commissioning and maintaining all Meters and associated technical details, (and associated equipment)

3. Meter Reading Service

- responsible for obtaining Register Reads (RRs) from non-smart Meters only

4. Retrieval Service

- responsible for accessing and retrieving energy usage data (import and export) from Meters and associate technical details

5. Processing Service

- responsible for validating and estimating meter data (SP and RRs), converting Register Reads (RR) to Settlement period (SP) data, providing data to relevant parties and exception reporting

6. Load Shaping Service

- responsible for deriving 'Load Shapes' to be used by the Processing Service in converting Register Reads (RR) to Settlement period (SP) data

7. Settlement Period level Unmetered Supplies Service

- responsible for calculating Settlement Period level data for unmetered supplies such as street lights and traffic signals

8. Aggregation Service

- responsible for receiving and aggregating Settlement Period data for use in Settlement, network charging and other purposes (e.g. flexibility)

9. Volume Allocation Service

MARKET WIDE HALF-HOURLY SETTLEMENT

- responsible for receiving aggregated meter volume data by Supplier by GSP Group, applying correction and calculating [Balancing Mechanism Unit](#) (BMU) volumes.

In each of the TOMs, various market implementations of each service have been considered (competitive provision or single/multiple monopoly providers), except where a particular implementation is a key feature of the TOM or not appropriate for that service.

Services have also been defined in a way that allows different ways for market participants to deliver them, such as self-serve (in house say for a Supplier) and/or independent provider options. Where services have been combined, this does not preclude individual services within the grouping being subcontracted to other providers. However, a single organisation will remain responsible for ensuring the delivery all the services in a particular grouping.

All TOMs assume that the Licenced Distribution System Operator (LDSO) will remain responsible for providing the necessary Distribution Losses data to allow the application of losses by the relevant service.

The detailed functions and responsibilities of each service are listed below and are split by market segment where relevant.

Registration Service

This service will be responsible for:

- acting as registrar for all Metering Systems;
- receiving, validating and processing updates from the registrant;
- maintaining and updating data items as appropriate within the Registration system; and
- provision of registration data or access to registration data to other parties as required.

Metering Services for Advanced, Smart and Non-smart Metering Systems

This service will be responsible for:

- installing, commissioning and maintaining Advanced, smart and non-smart Metering Systems;
- configuration of non-smart Meters;
- maintaining the accuracy of Meter Technical Details (MTD);
- energisation and de-energisation of both smart and non-smart Meters;
- connection and disconnection of both smart and non-smart Meters; and
- Meter fault investigation where a site visit is required.

Meter Reading Service for non-smart Meters

This service will be responsible for:

- obtaining non-smart Meter Register Reads (RRs) from non-smart Meters either via a site visit or remotely as applicable;
- providing non-smart Meter Register Reads (RRs) to the Processing Service for smart and Non-smart Metering Systems; and
- providing non-smart Meter Register Reads (RRs) to the party responsible for customer billing.

MARKET WIDE HALF-HOURLY SETTLEMENT

Retrieval¹ and Processing Service for Advanced Meters

This service will be responsible for:

- receiving appointments to Advanced Metering Systems;
- retrieving the Settlement Period level Active Import (AI) and Active Export (AE) consumption (and other data as required e.g. reactive power) data from Advanced Metering Systems;
- receiving and maintaining Meter Technical Detail (MTD) data from the Metering Service for Advanced Metering Systems;
- validating Settlement Period (SP) level consumption data for Active Import and Active Export (and other data as required) using a common set of agreed validation rules to be implemented electronically where possible;
- estimating Settlement Period (SP) level consumption data for Active Import and Active Export (and other data as required) where such data fails validation or is missing or unavailable;
- maintenance of standing data as appropriate;
- exception reporting for any Metering Systems where data is deemed to be invalid or where access or issues with Metering Systems are identified;
- providing access to validated Settlement Period (SP) level data to the separate Aggregation Service(s); and
- providing validated Settlement Period (SP) level data to the other parties as appropriate.

Retrieval Service for smart Meters

This service will be responsible for:

- receiving appointments to Metering Systems (except where such a service is a procured monopoly responsible for a defined set of Metering Systems);
- retrieving Time of Use (TOU) Register Reads (RRs) for Active Import Registers and the Active Export Register and Meter configuration data from smart Meters. This retrieval communication method will be achieved via the Data and Communications Company (DCC) service;
- retrieving the Active Import (AI) and Active Export (AE) data log (Settlement Period level) data from smart Meters. This retrieval communication method will be achieved via the Data and Communications Company (DCC) service; and
- providing access to the retrieved data to the Processing Service for smart and non-smart Metering systems.

¹ The retrieval and processing is combined in all TOMs as the processor is likely to need access to the meter for this Market Segment. However, it is noted that there are currently a number of instances where the retrieval service is outsourced in this Market Segment. The TOMs do not explicitly preclude these situations.

MARKET WIDE HALF-HOURLY SETTLEMENT

Processing Service for smart and non-smart Metering Systems

This service will be responsible for:

- receiving appointments to Metering Systems (except where such a service is a procured monopoly responsible for a defined set of Metering Systems);
- accessing Time of Use (TOU) Register Reads (RRs) for Active Import Registers and the Active Export Register and Meter configuration data for smart Meters from the Retrieval Service for smart Meters.
- accessing the Active Import (AI) and Active Export (AE) data log (Settlement Period level) data for smart Meters from the Retrieval Service for smart Meters.
- accessing Meter Register Read (RR) data and Meter Technical Details (MTDs) for non-smart Meters from the Meter Reading Service according to a reading schedule defined by the Supplier;
- conversion of Settlement Period (SP) level consumption data for Active Import and Active Export from Watt hours (Whs) to kilo-Watt Hours (kWhs);
- conversion of Settlement Period (SP) level consumption data for Active Import and Active Export from Co-ordinated Universal Time (UTC) into Clock Time;
- validating Settlement Period (SP) level consumption data for Active Import and Active Export or smart Meter Register Reads (RRs) using a common set of agreed validation rules to be implemented electronically where possible;
- calculating Meter Advances (MAs) for Register Read (RR) data;
- estimating Settlement Period (SP) level consumption data for Active Import (AI) and Active Export (AE) where such data fails validation or is missing or unavailable;
- conversion of Meter Advances for Metering Systems with Register Reads (RRs) into Settlement Period (SP) level data using information on Meter configuration and data provided by the Load Shaping Service (LSS);
- estimating Settlement Period (SP) level data for Metering Systems with Register Reads (RRs) where such data fails validation or is missing or unavailable;
- estimating Settlement Period (SP) level data for Metering Systems with Register Reads (RRs) for periods between Meter Readings;
- maintenance of standing data as appropriate;
- exception reporting for any Metering Systems where data is deemed to be invalid or where access or issues with Metering Systems are identified;
- providing access to validated Settlement Period (SP) level data to the Aggregation Service(s); and
- providing access to validated Settlement Period (SP) level data to any other parties as appropriate).

Load Shaping Service

This service will be responsible for:

- receiving smart Meter Settlement Period (SP) data for Active Import (AI) and Active Export (AE) from the Processing Service for Smart and Non-Smart Metering Systems according to an agreed schedule;

MARKET WIDE HALF-HOURLY SETTLEMENT

- deriving 'Load Shape' data for an agreed number of categorisations relating to the type of Metering Systems for which Load Shaping information is required; and
- providing 'Load Shape' data for the agreed categorisations to the Processing Service for Smart and Non-Smart Metering Systems according to an agreed schedule.

Settlement Period level Unmetered Supplies Service

This service will be responsible for:

- contracting with and receiving appointments for unmetered supply customers;
- receiving inventory data associated with unmetered Supplies from distribution businesses;
- validating the inventory data as appropriate;
- accessing other dynamic information relating to the operation of unmetered Supplies;
- accessing standing data relating to unmetered supplies;
- calculating Settlement Period level data for unmetered supplies according to a defined schedule; and
- providing access to calculated Settlement Period level data to the Aggregation Service for Advanced Metering Systems.

The Aggregation Service

The Aggregation Service will be responsible for:

- receiving appointments to Metering Systems (except where such a service is a procured monopoly responsible for a defined set of Metering Systems);
- maintenance of standing data as appropriate;
- receiving registration data from the Registration Service;
- accessing validated Settlement Period level data for Smart and non-smart Meter from the Processing Service for smart and Non-smart Metering Systems according to a defined schedule;
- accessing validated Settlement Period level data for Advance Metering Systems from the Processing Service for Advanced Metering Systems to a defined schedule;
- accessing validated Settlement Period level data for unmetered supplies from the Settlement Period level Unmetered Supplies Service to a defined schedule.
- identifying duplication or omission of Metering System data;
- Estimating data where missing according to Settlement timescales;
- aggregating the Settlement Period level data based on defined aggregations for the calculation of Imbalance Settlement purposes based to defined Settlement timescales;
- aggregating the Settlement Period level data based on defined aggregations for the calculation of Network Charging (as appropriate) based on defined Settlement timescales;
- aggregating the Settlement Period level data based on defined aggregations for other purposes, e.g. flexibility or smart grids (as appropriate) based on defined Settlement timescales;

MARKET WIDE HALF-HOURLY SETTLEMENT

- applying network loss factors to aggregated volumes as appropriate using data provided by distribution businesses;
- provision of aggregated consumption volumes and losses to the Volume Allocation Service according to Settlement timescales; and
- provision of aggregated consumption volumes and losses to other parties as required.

Volume Allocation Service

This service will, according to Settlement timescales, will be responsible for:

- receiving aggregated Settlement Period level data from the Aggregation Service;
- receiving information from other central services on the net volume of energy entering a distribution region for each Settlement Period (as currently provided by the Central data Collection Agent (CDCA));
- aggregating data for Suppliers by GSP Group (distribution region);
- aggregating all Supplier data within a distribution region;
- comparing and calculation differences between the aggregated Supplier data with the information on the net volume of energy entering a distribution region for each Settlement Period;
- correcting the Supplier data within a distribution region as appropriate;
- aggregating the corrected Supplier data across distribution regions for use in the imbalance Settlement calculations;
- providing out-turn data to the Service responsible for the Imbalance Settlement calculation;
- maintaining standing data as appropriate; and
- providing reports and data to other parties as appropriate.

8. What were the main considerations when grouping Services?

The DWG started from the basis that the Services from the activity mapping exercise would be separately defined so that market participants would have maximum freedom in how these might be organised and delivered. In considering a TOM with four separately defined Services (Retrieval, Processing, Aggregation and Volume Allocation) the DWG noted that Aggregation (as currently defined) in the traditional HH (Advanced) market is an extension of Processing and therefore there was less justification for maintaining this as a separate service. Any defined Aggregation Service would best sit across the whole HHS market, with MPAN level meter data as input.

The DWG also approached the Advanced HH market segment with the principle that any change from the current baseline would largely be driven by the design choices taken in the Smart Meter segment. That is, the DWG felt that there was little reason for changing the process to address any obvious defects. However, the DWG noted that the existing split of HHDC and HHDA into separate roles was not necessary for the MHHS TOMs. Previously, the NHH arrangements required this split because NHHDCs use common ELEXON-provided software and therefore there is a clearly defined interface between NHHDCs and NHHDCs. Furthermore, in some cases NHHDCs hold data for more than one NHHDC for the same settlement dates. As the new TOMs propose to dispense with EACs and AAs, the Aggregation service will largely be a summation across the MPAN portfolio held by the Data Processing service in a set of defined categories.

For the centralised options the DWG noted that a single 'Retrieval to Volume Allocation' service was possible for Smart Meters, but that this option had less clear benefits from the Advanced HH market where competitive Data

MARKET WIDE HALF-HOURLY SETTLEMENT

Processing services already exist. Therefore, any TOM based on a centralised model would need to integrate the Advanced segment in a way that left the existing 'Retrieval + Processing' services intact. Such a TOM would then need to use common market-wide Aggregation and Volume Allocation for both segments.

When considering services across market segments the DWG felt that, even though some services like Processing could look very similar for 'Smart with SP data' and Advanced Meters, it was safer to leave these as separate services until the detailed requirements for each service became clearer. For TOMs which combined Retrieval and Processing, this automatically separated the Smart and Advanced segments as the rules for retrieving settlement data from meters was almost certain to differ due to the former using the DCC.

When considering which of the separately developed Advanced Meter TOMs would fit best with the Smart Meter ones, the DWG chose only those which were consistent with the service grouping decisions taken for the latter. Consequently there is typically only one Advanced TOM that is compatible with each Smart Meter TOM as the others apply fundamentally different groupings or definitions of services that do not align with those for Smart meters.

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MARKET WIDE HALF-HOURLY SETTLEMENT

THE FIVE DRAFT SKELETON TOMS FOR EVALUATION

The following section sets out the five draft Skeleton TOMs developed by the DWG:

- A.** Combined Retrieval and Processing with Separate Aggregation;
- B.** Separate Retrieval with combined Processing and Aggregation;
- C.** End-to-end service covering Retrieval through to Aggregation;
- D.** Separate services; and
- E.** Single central service covering Retrieval through to Volume Allocation.

Each TOM has been designed to provide advantages over the current baseline. These are set out below.

Advantages common to all TOMs as a result of design principles adopted

The TOMs have been designed to create an optimal end to end settlement process for all five Market Segments and focussing on the majority of Meters in the target end state being smart Meters. The following lists the advantages that the TOMs will provide over the current market mode for NHH and HH Settlement.

Creating upfront Settlement Period level data at Metering System level for Meters with Register Reads

- For meters with only Register Reads, the TOMs produce Settlement Period level meter data earlier in the settlement process (than currently in central Volume Allocation). This allows Settlement Period level data for all Meter segments to be available consistently and much earlier (and potentially to a wider set of parties for flexibility purposes). This is done by creating a new Load Shaping Service and the removal of existing complex NHH 'profiling' process. The conversion of Meter register advances into Settlement Period level also allows for greater optionality in how certain services can be delivered;

Simplifying data aggregation

- Aggregation becomes a much more simplified service overall (and potentially across meter Market Segments) as it will only need to aggregate Settlement Period level data;

Simplifying Change of Agents processes

- Change of Agent (CoA) process is hugely simplified as there is no separate NHH processes and data hand-offs of data for Meters with register reads are reduced (as a processing service covers both non smart and smart meters);

Improvement of the Settlement of embedded export

- This design also allows for more accurate settlement of embedded export due to having access to accurate Settlement Period level data for export on smart Meters (provided that export is registered by a Supplier);

Simplifying the switch between Settlement Period data and Register Read data

- The Retrieval and Processing services allows Meters to move from being settled on Register Reads and Settlement Period processes without requiring a change of settlement process (and agent as currently the case). Additionally, the services will ensure continuity in service provision and accuracy in data even where Settlement Period level data may not be available;

More accurate and simpler Settlement of Unmetered Supplies

- The creation of a common Settlement Period level process for Unmetered Supplies (facilitated by the Settlement Period level Unmetered Supplies Service) will deliver a more accurate calculation. It will also make it easier for new entrants and smaller Suppliers to enter this segment;

MARKET WIDE HALF-HOURLY SETTLEMENT

Improving Settlement Timescales²

- Accessing Settlement Period level data remotely from Smart meters should allow for improved accuracy of settlement at earlier reconciliation runs. Thereby it will facilitate shorter reconciliation periods than are used currently and hence impacts on Suppliers and cost to service their customers;

Efficiency in provision of enduring arrangements

- The TOMs avoids having to maintain separate enduring processing arrangements to accommodate any remaining legacy non-Smart meters once the transition to the target state has been completed.

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² It should be noted that the overall timescales for Settlement will have a dependency on the number of Metering Systems that cannot be remotely read and will require a site visit. If sufficiently small numbers these could be read much faster than at present. If small enough numbers consumption for such Meters could be estimated for Settlement purposes and only read for billing. This would also allow for faster Settlement.

MARKET WIDE HALF-HOURLY SETTLEMENT

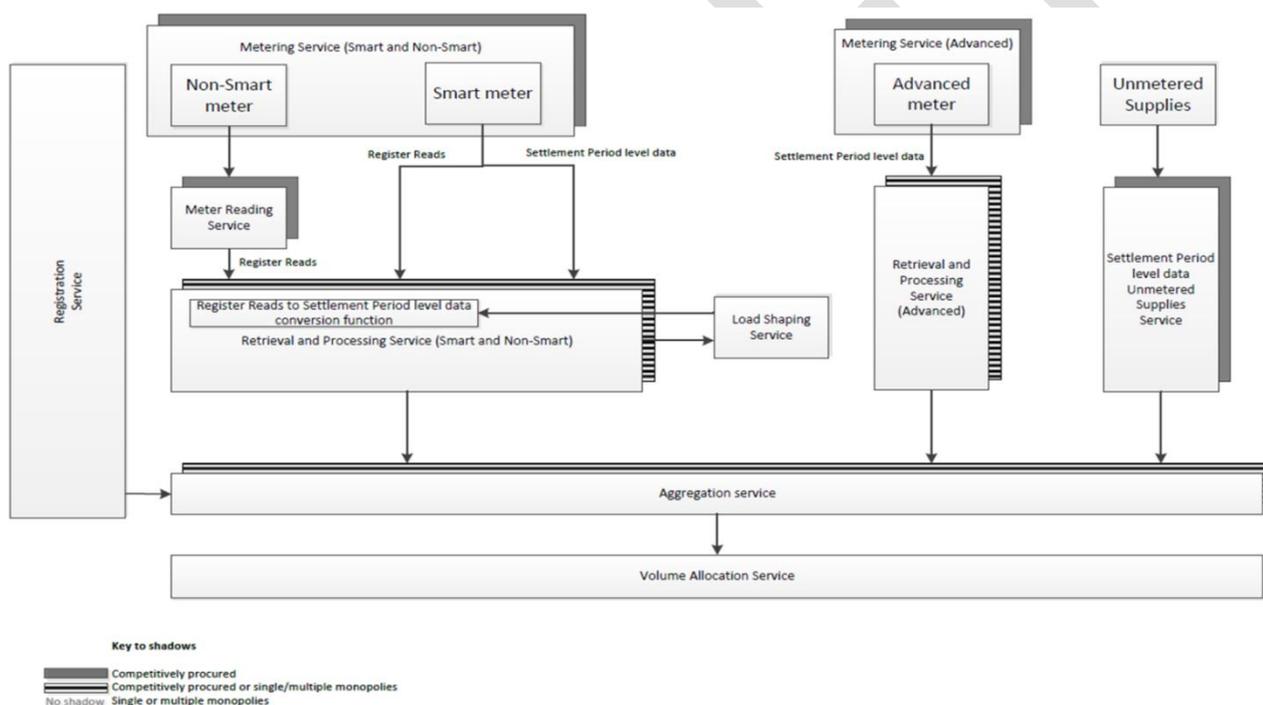
TOM A: COMBINED RETRIEVAL AND PROCESSING WITH SEPARATE AGGREGATION

Description of TOM A:

The basis of this TOM is that Retrieval and Processing are bundled into a single service, one for Smart and one for Advanced, reflecting the different ways of communicating with these Meters and the Meter functionality and configurations. The Smart Retrieval and Processing Service will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period data to the Aggregation Service that covers all market Segments. The Aggregation Service will sum up the data provided for all market Segments before providing access to market segment aggregated volumes to a single Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter segments, these are defined separately because of the need to convert Register Readings into Settlement Period level data for smart (and non-smart) meters which is not required for Advanced Meters.

If there was a single aggregation service (subject to Ofgem policy decisions), all the Settlement Period level data would be aggregated across market, thus facilitating flexibility, e.g. aggregators, demand-side response, peer-to-peer arrangements, Distribution System Operators and Meter data for new network charging arrangements.



MARKET WIDE HALF-HOURLY SETTLEMENT

Key features of TOM A:

- Data Retrieval and Data Processing combined;
- Separate process for Advanced meters due to different meter communication method and Advanced meter data not used for load shaping;
- Data Processing element converts Register Reads to Settlement Period level data;
- Settlement Period level data aggregated across market Segments; and
- Cross-market segment aggregation service. Can facilitate independent aggregators (e.g. For demand-side response), peer-to-peer, system operation by DNOs, data for network charging if a single service (subject to Ofgem policy decisions)

Advantages:

- Defining new Smart Retrieval and Processing services separately from Advanced will minimise the impact on existing HH processes, even though the same organisations may provide services in both Market Segments;
- Creating an Settlement Period level system will allow the Aggregation service/s to operate across all Market Segments and facilitate aggregations of specific groups of customers across Supplier portfolios for a range of purposes;
- Processing services can provide Meter level data that they hold for provision to Suppliers for other activities such as marketing and forecasting (where not constrained by data access restrictions). This would be a reporting-only activity that will form part of processing and not an input to the Settlement process;
- Could allow some earlier reporting activity to be provided from Aggregation service rather than waiting for Volume Allocation Runs to be completed; and
- Making changes to the Aggregation service system(s) could be simpler if a small number of providers than at present are involved.

Disadvantages:

- Procurement of the Aggregation service could be required, depending on the policy decision;
- If the Aggregation service/s is not competitively provided, a charging model with price controls may be required;
- Would require a changes to [Smart Energy Code \(SEC\)](#) (and other Codes) if the Smart Retrieval and Processing service will be collecting consumption data from the smart Meter. This change may not be required in TOMs where retrieval remain separate since the Supplier could still provide the Retrieval Service;
- This TOM could still encounter issues with data handoffs between the Processing and Aggregation Services. This could be addressed by requiring the Aggregation Service to access the data from the Processing Service without receiving or holding copies of the data; i.e. the Processing service still holds the master data.

MARKET WIDE HALF-HOURLY SETTLEMENT

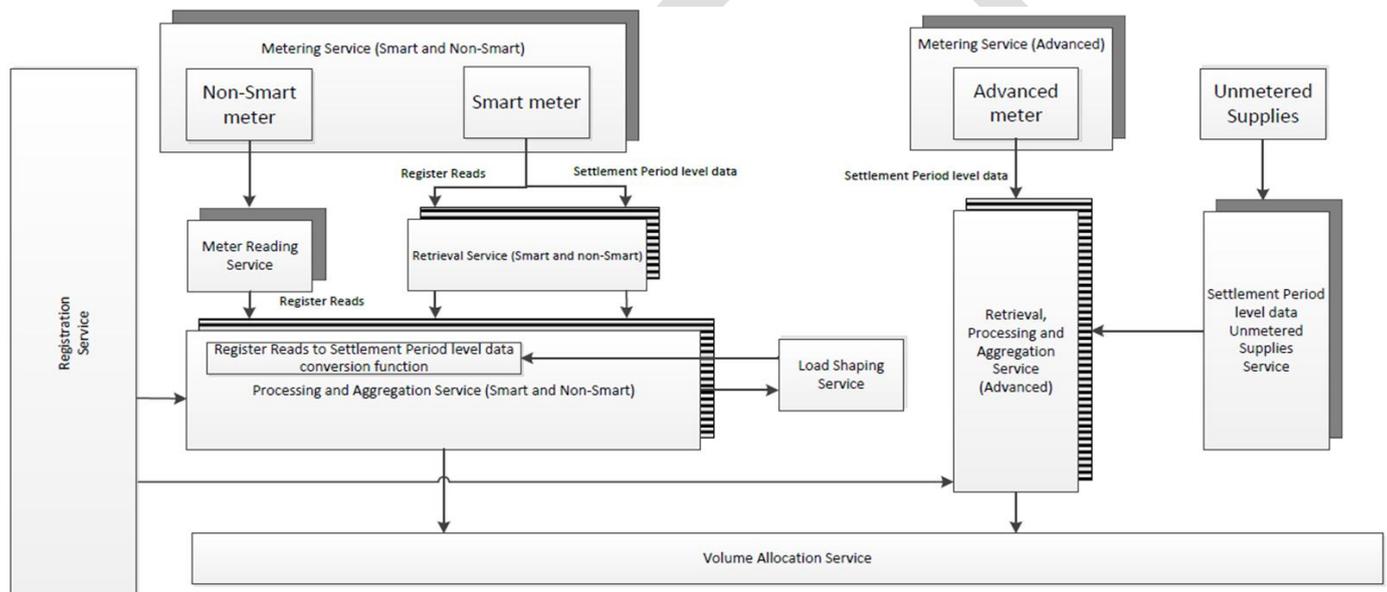
TOM B: COMBINED PROCESSING AND AGGREGATION WITH SEPARATE RETRIEVAL

Description of TOM B:

The basis of this TOM is that the Processing and Aggregation are bundled into a single service for Smart meters, with retrieval of readings via the [Data and Communications Company \(DCC\)](#) being separated out to allow more flexibility in who might deliver that service

With Aggregation done as part of Processing, it means that with multiple Processing Services operating the data will be aggregated first before reaching the Volume Allocation Service which covers the whole market. That would mean that there is no single market wide view of Meter level data should it be required for demand-side response or other activities that require access to this data. To mitigate this, a separate view of market-wide Meter level data would have to be obtained or accessed from all the Processing services operating in the market.

No significant differences in market services structure from current state barring the merging of processing and aggregation services, hence impacts may be less with by existing providers.



Key to shadows

- Competitively procured
- Competitively procured or single/multiple monopolies
- No shadow: Single or multiple monopolies

MARKET WIDE HALF-HOURLY SETTLEMENT

Key features of TOM B:

The key features of TOM B are:

- Data Processing and Data Aggregation bundled together;
- Flexibility with provision of Data Retrieval service;
- Separate process for Advanced meters due to different meter communication method and Advanced meter data not used for load shaping;
- Data Processing element converts Register Reads to Settlement Period level data;
- No central view or access to Meter level data; and
- No significant difference from the status quo.

Advantages:

- Preserves the existing [Smart Energy Code \(SEC\)](#) and Data Communication Company arrangements where the Supplier is the de facto Retrieval service, although a choice under this TOM could be to formally assign Retrieval to a market participant other than the Supplier;
- Processing services can provide Meter level data that they hold for provision to Suppliers for other activities such as marketing and forecasting (where not constrained by data access restrictions). This would be a reporting-only activity that will form part of processing and not an input to the Settlement process;
- Alternatively, a separately defined retrieval service could also allow for new providers offering a self-contained DCC solution with a scheduling service without requiring every supplier to accede to the SEC;
- A separately defined non-Supplier Retrieval service could facilitate additional data privacy and security controls.

Disadvantages:

- Supplier as the de facto Retrieval service may present challenges for data privacy, data access and security;
- Separating Retrieval and Processing across organisations would make resolving data issues more difficult as the Processor will be validating data but will need to use the Retrieval service to obtain readings; and
- Splits Processing and Aggregation into Smart and Advanced Segments by defining two distinct services even though many processes are similar. This could limit Aggregation across the segments, e.g. matching generation in the Advanced market with demand in the smart metered market.

MARKET WIDE HALF-HOURLY SETTLEMENT

TOM C: END TO END SERVICE COVERING RETRIEVAL THROUGH TO AGGREGATION

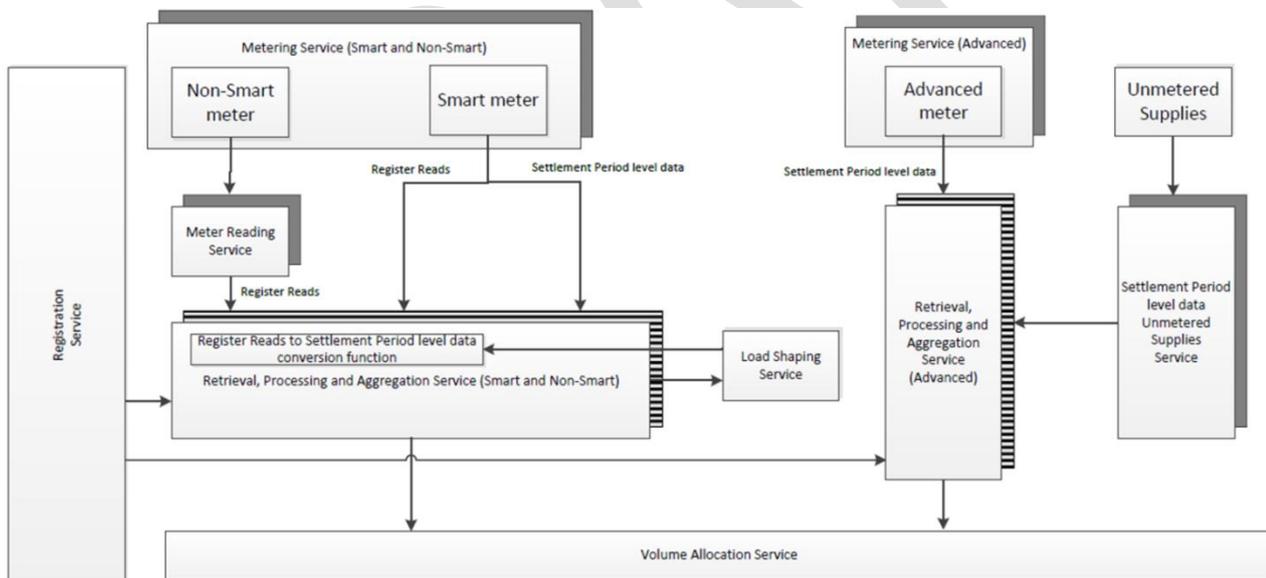
Description of TOM C:

The basis of this TOM is that Retrieval, Processing and Aggregation are bundled into a single service, one for Smart and non-smart and one for Advanced Metering Systems, reflecting the different ways of communicating with these Meters. The Smart Retrieval, Processing and Aggregation Service will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period data to the internal Aggregation Services that covers all market Segments. The Retrieval, Processing and Aggregation Services will sum up the data provided before providing access to aggregated volumes to a single Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter segments, these are defined separately because of the need to convert Register Readings into Settlement Period level data which is not required for Advanced Meters.

With Aggregation done as part of Processing, it means that with multiple Retrieval, Processing and Aggregation Services operating the data will be aggregated before reaching the Volume Allocation Service which covers the whole market. There is no single market wide view of Meter level data should it be required for demand-side response or other activities that require access to this data. To mitigate this, a separate view of market-wide Meter level data would have to be obtained or accessed from all the Retrieval, Processing and Aggregation Services operating in the market.

The key feature of this model is the reduction in hand-offs the meter level data is only accessed once is then aggregated. The aggregated data then goes straight into Settlement.



Key to shadows

- Competitively procured
- Competitively procured or single/multiple monopolies
- No shadow: Single or multiple monopolies

MARKET WIDE HALF-HOURLY SETTLEMENT

Key Features of TOM C

The key features of TOM C are:

- Retrieval, Processing and Aggregation Services are all bundled together;
- Separate process for Advanced meters due to different meter communication method and Advanced meter data not used for load shaping;
- Data Processing element converts Register Reads to Settlement Period level data; and
- No central view/access to Meter level data.

Advantages:

- As with TOM A and B, seeks to minimise the impact on existing SP processes , even though the same organisations may provide services in both Market Segements;
- Combines the formerly separate agent roles of Collection (Retrieval and Processing) and Aggregation into a single service, recognising that in the existing market these are nearly always delivered by the same organisation and is likely to be the same in future due the simple function of aggregation;
- Retrieval, Processing and Aggregation service can provide Meter level data that they hold for provision to Suppliers for other activities such as marketing and forecasting (where not constrained by data access restrictions). This would be a reporting-only activity that will form part of processing and not an input to the Settlement process; and
- Aggregation is a simplified service for Smart meters compared to the existing arrangements for customers with Register Readings for non-Smart domestic customers as it will be handling Settlement Period level data only.

Disadvantages:

- Splits Retrieval, Processing and Aggregation into Smart and Advanced Segments by defining two distinct services even though may processes are similar. This could limit Aggregation across the Segments, e.g. matching generation in the Advanced market with demand in the Smart metered domestic market; and
- Higher risk of failure for three services combined.

MARKET WIDE HALF-HOURLY SETTLEMENT

TOM D: SEPARATE SERVICES

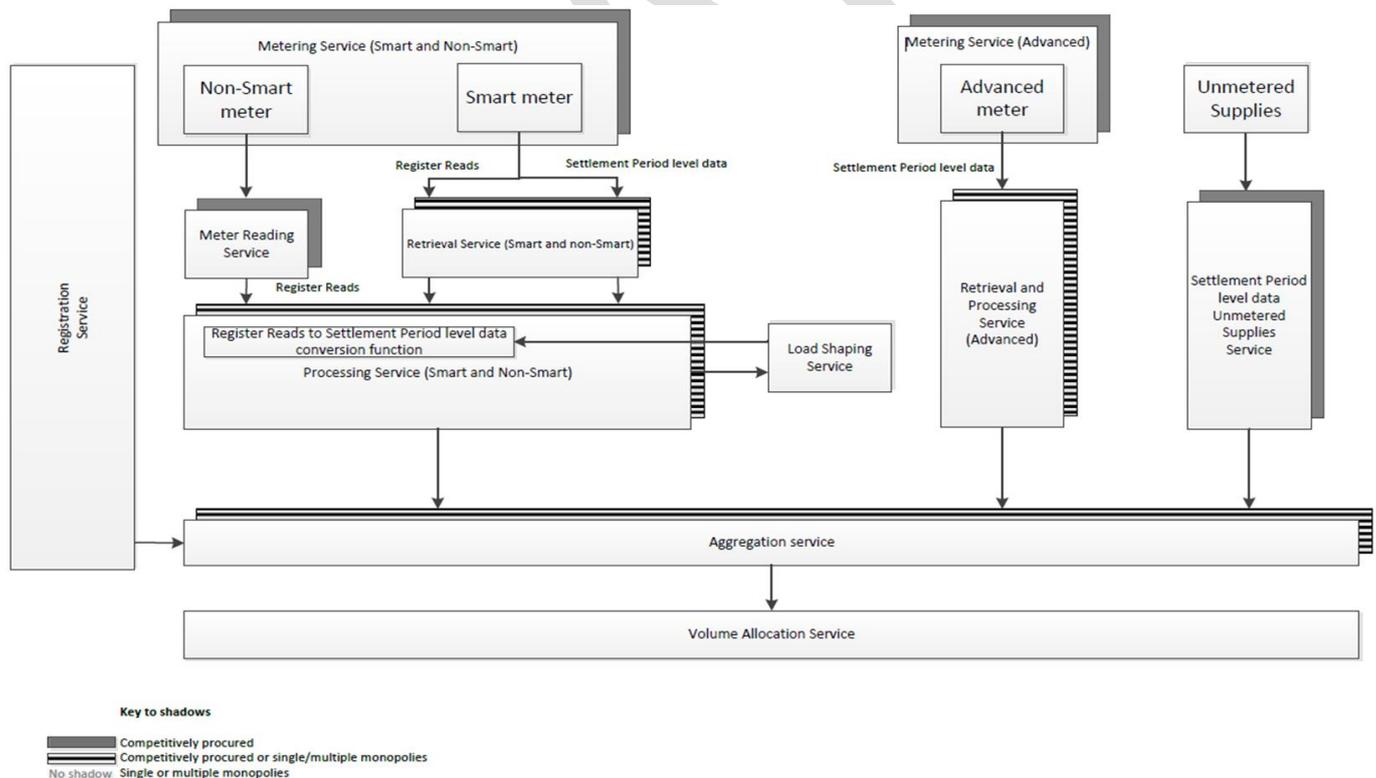
Description of TOM D:

The basis of this TOM is that Retrieval, Processing and Aggregation are kept as separate services. Smart and Advanced Metering Systems are also separated, reflecting the different ways of communicating with these Meters. The retrieval of readings via the [Data and Communications Company \(DCC\)](#) being separated out allows more flexibility in who might deliver that service.

The Smart Processing Service will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period level data to the Aggregation Service that covers all market Segments. The Aggregation Service will sum up the data provided before providing access to aggregated volumes to a single Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter segments, these are defined separately because of the need to convert Register Readings into Settlement Period level data which is not required for Advanced Meters.

If there was a single aggregation service (subject to Ofgem policy decisions), all the Settlement Period level data would be aggregated across market, thus facilitating flexibility, e.g. aggregators, demand-side response, peer-to-peer arrangements, Distribution System Operators and Meter data for new network charging arrangements



MARKET WIDE HALF-HOURLY SETTLEMENT

Key Features of TOM D

The key features of TOM D are:

- Retrieval, Processing and Aggregation Services are all separate;
- Separate process for Advanced meters due to different meter communication method and Advanced meter data not used for load shaping;
- Data Processing element converts Register Reads to Settlement Period level data; and
- Cross-market segment aggregation service – can facilitate independent aggregators (demand-side response), peer-to-peer, system operation by DNOs, data for network charging if one service.

Advantages:

- Allows maximum optionality in how market participants can organise themselves to deliver these services;
- Could make it easier for new service providers to enter the market specialising in either smart Meter Retrieval, Processing or Aggregation;
- Processing Service can provide Meter level data that they hold for provision to Suppliers for other activities such as marketing and forecasting (where not constrained by data access restrictions). This would be a reporting-only activity that will form part of processing and not an input to the Settlement process;
- Creating an Settlement Period level system will allow the Aggregation service/s to operate across all Market Segements and facilitate aggregations of specific groups of customers across Supplier portfolios for a range of purposes;
- Could allow some earlier reporting activity to be provided from Aggregation service/s instead of Volume Allocation Services; and
- Making changes to the Aggregation service system(s) could be simpler if a small number of providers are involved.

Disadvantages:

- Doesn't deliver any significant reduction in interfaces or handoffs over the current baseline, and in fact may even add some;
- Procurement of the Aggregation service could be required, depending on the preferred governance model; and
- If the Aggregation service/s is/are procured, a charging model with price controls may also be required.

MARKET WIDE HALF-HOURLY SETTLEMENT

TOM E: SINGLE CENTRAL SERVICE COVERING RETRIEVAL THROUGH TO VOLUME ALLOCATION

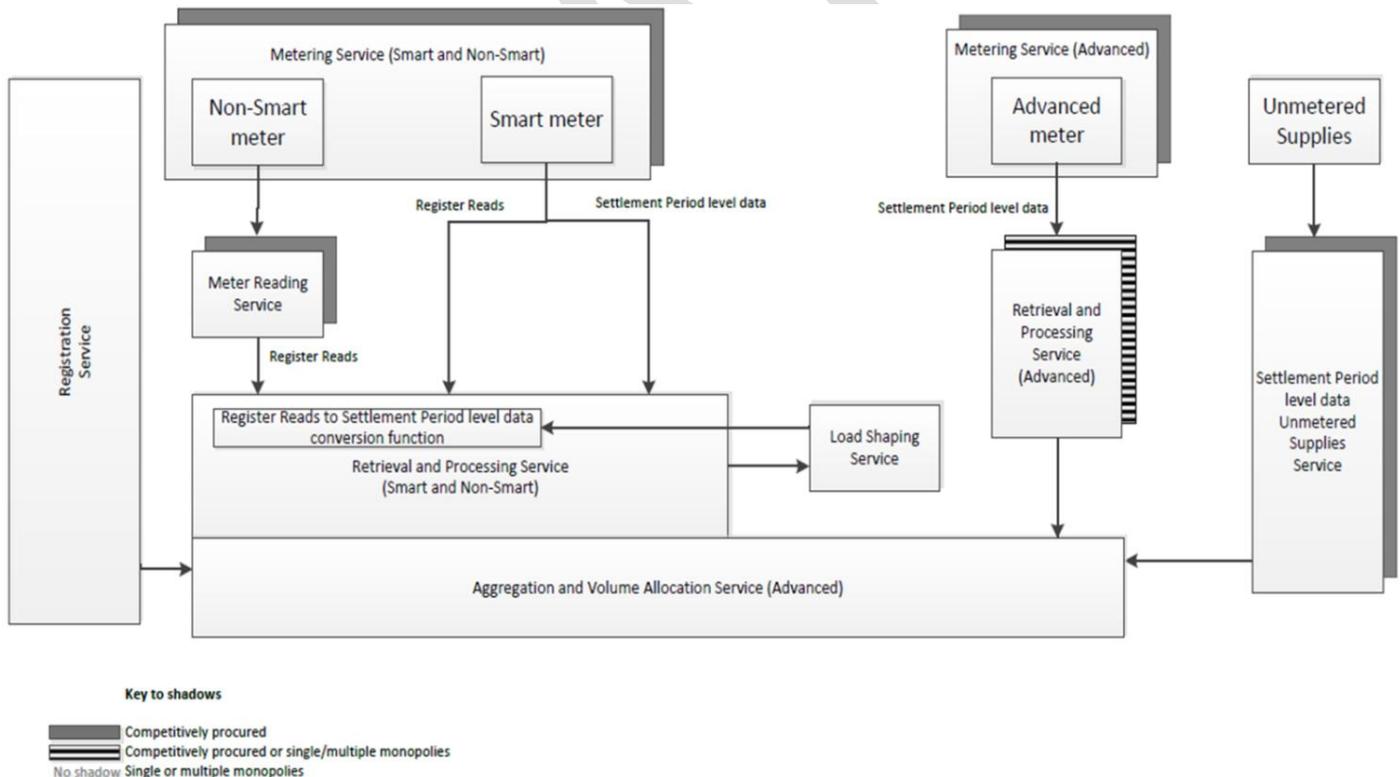
Description of TOM E:

The basis of this TOM is that Retrieval, Processing and Aggregation are all provided by centralised Services for smart and non Smart Meters. Retrieval and Processing for Advanced Metering Systems are separated, reflecting the different ways of communicating with these Meters.

The central Retrieval and Processing Service will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period level data to the internal Aggregation Service that covers all market Segments. The central Aggregation Service will sum up the data provided before providing access, to aggregated volumes, to the associated Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter Segments, these are defined separately because of the need to convert Register Readings into Settlement Period level data which is not required for Advanced Meters.

This TOM had the fewest had-offs of Meter data. The central aggregation service (subject to Ofgem policy decisions), all the Settlement Period level data would be aggregated across market, thus facilitating flexibility, e.g. aggregators, demand-side response, peer-to-peer arrangements, Distribution System Operators and Meter data for new network charging arrangements.



MARKET WIDE HALF-HOURLY SETTLEMENT

Key Features of TOM E

The key features of TOM E are:

- Retrieval, Processing and Aggregation and Volume Allocation Services are all provided centrally;
- Separate process for Advanced meters due to different meter communication method and Advanced meter data not used for load shaping;
- Data Processing element converts Register Reads to Settlement Period level data; and
- Cross-market segment aggregation service – can facilitate independent aggregators (demand-side response), peer-to-peer, system operation by DNOs, data for network charging if one service.

Advantages:

- Provides a single Aggregation service available to all market participants applying a single set of defined rules;
- Single end to end service will be able to handle register reads and Settlement Period level data for all Suppliers to maintain continuity in service provision where Settlement Period level data may not be available;
- Facilitates multiple forms of aggregation across the market as the Aggregation Service will be in a single entity;
- Could allow for more sophisticated privacy and security if only one service will be handling settlement data ; and
- Simplifies arrangements for new market entrants, so may encourage new entrants.

Disadvantages:

- Lack of choice and competition for Suppliers in choosing who can provide end to end Settlement services;
- Could reduce incentives to innovate or for the new service to offer other non-settlement services;
- Procurement of the central services would be required and a charging model with price controls would be required;
- Would require a changes to [Smart Energy Code \(SEC\)](#) (and other Codes) as the central Smart Retrieval and Processing service will be collecting consumption data from the smart Meter;
- A single instance of a service is also a single point of potential failure, so mitigation measures would be required.

MARKET WIDE HALF-HOURLY SETTLEMENT

INITIAL DWG RECOMMENDATIONS

The Design Working Group were asked to rank the TOMs in order of preference. The DWG considered that all TOMs were viable and as such, none should not be ruled out at this stage. However, the DWG split the TOMs into two groups with the focus to be made on TOMs A, C and E. The DWG's initial view is that TOMs A, C and E had fewer interfaces (hand-offs) which could lead to data errors or duplication of services holding data, than TOMs B and D. The DWG also felt that TOMs B and D could perpetuate data quality issues that exist in the current HH and NHH markets.

DWG recommended focus on TOMs:

- **A:** Combined Retrieval and Processing with Separate Aggregation
- **C:** End-to-End service covering Retrieval through to Aggregation
- **E:** Single central service covering Retrieval through to Volume Allocation

TOMs B and D less favoured:

- **B:** Separate Retrieval with Combined Processing and Aggregation
- **D:** Separate Services

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MARKET WIDE HALF-HOURLY SETTLEMENT

Appendix A: DWG TOM development work

See attachment.

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MARKET WIDE HALF-HOURLY SETTLEMENT

Appendix B. Glossary of terms

To be added

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