MULTIPLE TRADING RELATIONSHIPS & EMBEDDED NETWORKS – HIGH LEVEL DESIGN

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FINAL

Contents

1 Executive Summary

This report presents the high level design of changes to accommodate Multiple Trading Relationships (MTR) at a single customer premises and improved metering and other arrangements in Embedded Networks (EN). These changes are intended to facilitate increased competition at a site, while facilitating choice of retailers within Embedded Networks.

AEMO has been tasked by the Standing Council on Energy and Resources (SCER), in consultation with industry, to design and implement the Multiple Trading Relationships and Embedded Network (MTREN) changes.

The primary purpose of this high level design is to identify material changes to current market systems and processes to allow AEMO to estimate the level of effort and timing to implement the required changes and to provide a starting point for the development of a detailed design which will guide rule development. It is anticipated that the MTREN detailed design will be developed, in consultation with industry, by the end of April 2014.

Multiple Trading Relationships

The current arrangements for customer engagement with a retailer are based on the set of relationships at the physical connection point to the network, which include a one-to-one relationship between the connection point, customer, and the Financially Responsible Market Participant (FRMP). The intent of moving to a multiple trading relationship is to enable customers to engage with multiple parties (e.g. multiple FRMPs) at their site and to find the best solution for buying and selling electricity for different components of the customer's load and on-site generation.

The key change is to move the settlements point from the connection point to the measurement element (i.e. the most basic level of metering) so that there may be multiple settlements points per connection point. It should be possible for each settlements point to be independently disconnected. Each settlements point will have its own set of operational and trading relationships and will be associated with a National Metering Identifier (NMI). The existing NMI discovery process would provide information on all NMIs at a connection point. Participation in the MTR arrangements will be optional for a connection point. For a new connection point a single FRMP will need to be appointed to arrange the connection service. Once the service is established the customer can then opt for MTR arrangements.

The Responsible Person (RP) must ensure that appropriate metering is in place. Only one RP will be allowed across subtractive metering arrangements and where there are multiple measurement elements within a meter. More than one RP will be allowed where parallel metering arrangements exist and the settlements points are wholly/electrically separate. Allowing more RPs at a connection point increases the risk that energy consumption will be unaccounted for. New obligations may need to be developed to offset this risk.

Distribution Use of System (DUOS) fixed charges for a connection point will be associated with one of the settlements points at that connection point.

Retailer of Last Resort (RoLR) provisions will be extended to settlements points with settlements points transferring to the RoLR for the connection point in such events. The Local Retailer will continue to have an obligation to supply the customer at the connection point.

Embedded Networks

An Embedded Network is a private network connected to a distribution system (or another Embedded Network) via a parent connection point. An Embedded Network is operated by an Embedded Network Operator (ENO). Examples of Embedded Networks include airports, shopping centres or apartment blocks.

The ENO recovers its Distribution Use of System (DUOS) costs from the customers of the Embedded Network. An Embedded Network Reseller (ENR), which may be the ENO, can also sell energy to ENO Customers in the Embedded Network. Alternatively, customers can be NEM Customers and buy their energy from a retailer of their choice.

To operate an Embedded Network an ENO needs an exemption from the requirement under the NER to register as a transmission or distribution network operator, while the ENR needs a similar exemption from registering as a retailer. Both types of exemption are provided by the Australian Energy Regulator (AER). Currently, the Embedded Network arrangements exist and operate across all jurisdictions though the precise arrangements vary by jurisdiction.

All metering between connection points in an Embedded Network must operate on a 'subtractive metering arrangement', whereby the consumption at NEM Customer connection points are subtracted from the parent connection point consumption to determine the consumption of the Embedded Network Operator (which includes consumption at ENO Customers). While NEM Customer metering must comply with the NEM's requirements, currently ENO Customers are only required to have pattern approved, NEM compliant metering equipment but no ongoing obligations to maintain compliance with NEM Rules until such time that the ENO Customer becomes a NEM Customer.

The key issues with Embedded Networks today include a lack of clarity on obligations of different parties with respect to NMI allocation and metering arrangements, a lack of visibility of contestable customers within Embedded Networks, differing metering standards from the NEM, and a lack of uniformity in DUOS pass through arrangements.

The proposed design is to recognise Embedded Network Operators in the National Electricity Rules (NER) as a new type of network operator that is neither a Transmission Network Operator or a Distribution Network Operator.

The NER will provide heads of power for the AER to set charges on individual Embedded Networks or classes of Embedded Networks, and to cap other miscellaneous charges. ENOs will be required to apply DUOS charge pass through in accordance with the shadow pricing principles set out within the AER's "Electricity Network Service Provider Registration Exemption Guidelines".

The LNSP for the parent connection point for the Embedded Network will be responsible for issuing NMIs for all connection points in the network. The Detailed Design will explore whether then Embedded Network Local Retailer or ENRs should have the obligations to register the NMIs. All settlements points within an Embedded Network, even if serving ENO Customers, will be recorded in AEMO's MSATS systems and will be discoverable.

During the detailed design phase, further consideration will be given to the extent of any additional on-going meter maintenance requirements for ENO Customer meters.

The subtractive metering arrangements between connection points within Embedded Networks expose customers to disconnection if the parent connection point is disconnected. The informed consent of customers will be required when joining such an arrangement.

No additional ROLR provisions need to be determined for NEM Customers within an Embedded Network.

Implementation of Multiple Trading Relationships and Embedded Networks

The MTR proposal to introduce multiple settlements points at a connection point will allow methods currently used for tracking metering and commercial arrangements within Embedded Networks to be extended to provide for Multiple Trading Relationships. A general structure can be implemented which can handle both situations as well as MTR relationships within Embedded Networks in situations where this is accommodated in the design.

2 Introduction

The Australian Energy Market Commission's (AEMC) Power of Choice final report sets out a substantial reform package of the National Electricity Market (NEM)[1]. The package is intended to provide households, businesses and industry with more opportunities to make informed choices about the way they use electricity and manage their expenditure on electricity.

The AEMC's advice foreshadows changes to the NEM that would enable:

- Multiple trading relationships – allowing multiple relationships at a single connection point, including more than one FRMP, Responsible Person (RP), Metering Provider (MP), Metering Data Provider (MDP), or Small Generator Aggregator (SGA). This is designed to ensure that competition for provision of retail services (for buying and selling energy at their site) is offered to and available to customers; and
- Embedded networks – clarification of metering and other arrangements applicable to Embedded Networks, by ensuring arrangements do not pose a barrier to customers' ability to access offers from competing Market Participants.

On 31 July 2013, AEMO was tasked by SCER with developing the rule changes by July 2014 and implementing the changes at an appropriate point.

This high level design document will form a basis for planning and to provide a starting point for the development, in consultation with industry, of a detailed design document to be completed in April 2014.

Section 3 provides a summary of the recommendations. Section 4 presents the design assumptions which bounded those recommendations. The remainder of the body of the documentation provides discussion of the design. This document is intended to be accessible to a diverse audience and therefore aims to be clear in its terminology without using a level of technical detail beyond that required for the purpose of this paper. The appendices provide some assistance with Appendix A describing current arrangements, Appendix B discussing the distinction between the proposed parallel and subtractive metering, while Appendix C presents a glossary of terms.

3 Summary of Recommendations

3.1 Multiple Trading Relationships

The current arrangements for customer engagement with a retailer are based on the set of relationships at the physical connection point to the distribution network, and have a one-to-one relationship between the connection point, customer, and the FRMP. A discussion of the existing arrangements is presented in Appendix A.1. The intent of the Multiple Trading Relationships (MTR) change is to enable customers to engage with multiple parties at their site, to find the best solution for buying and selling electricity.

[1] *Power of Choice Review – Giving Consumers Options in the way they use Electricity. Final Report,* AEMC, 30 November 2012.

Figure 1: Multiple Trading Arrangements Concept

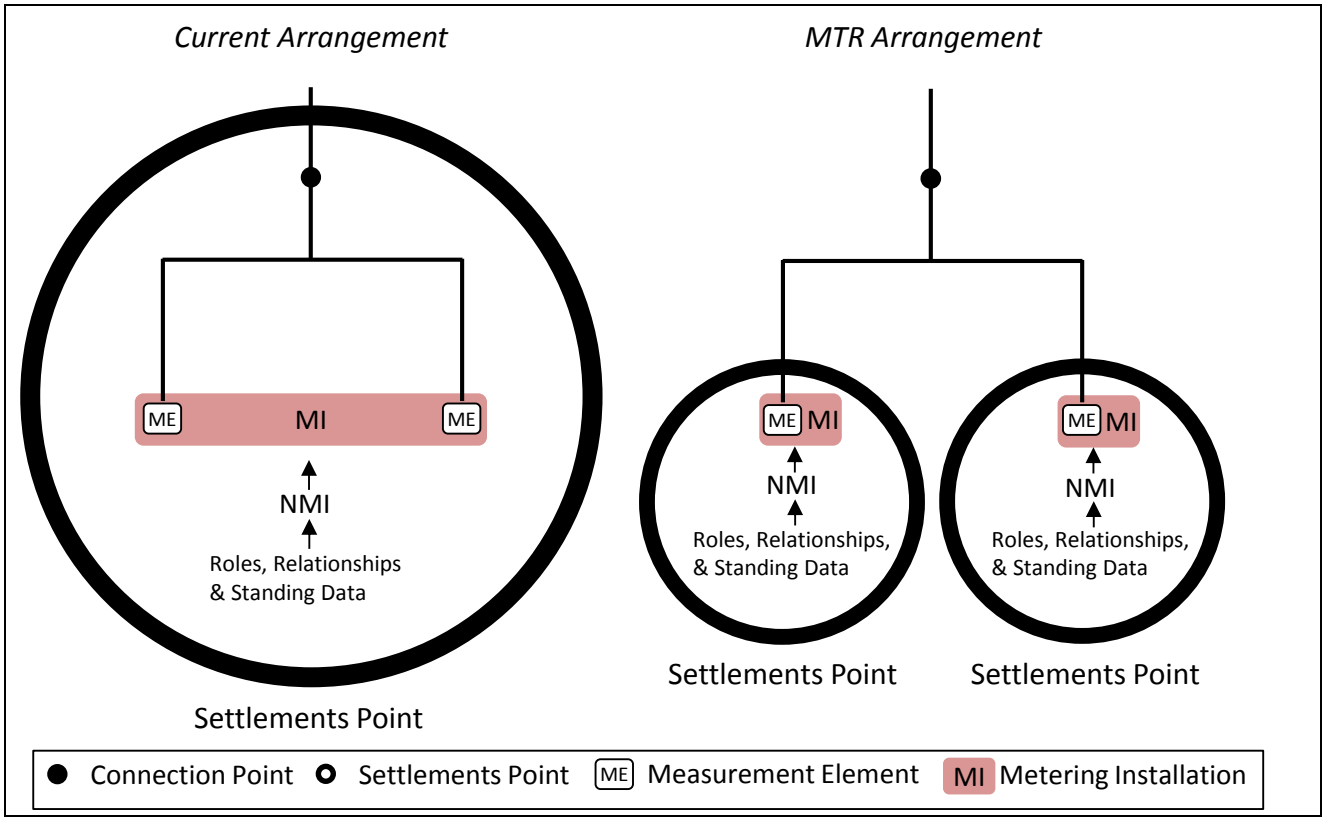
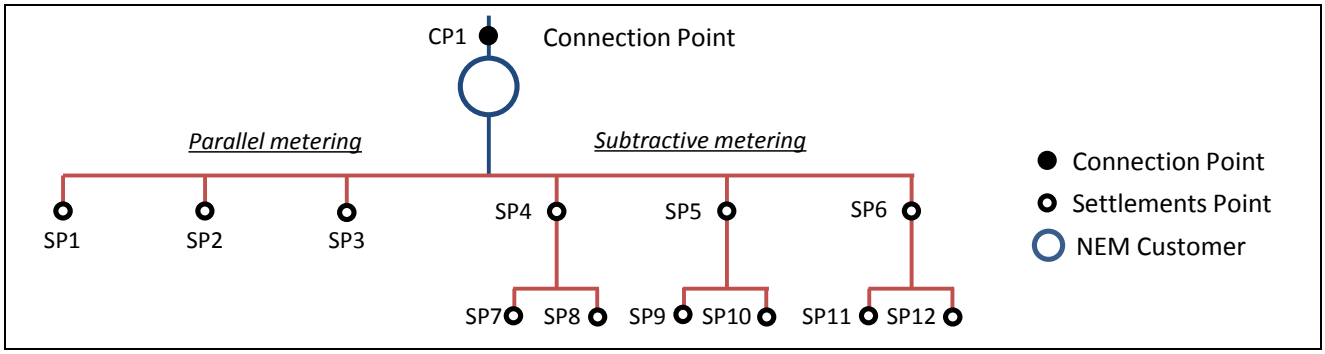


Figure 1 illustrates the key change. Under current arrangements there is a one-to-one correspondence between the connection point, the settlements point, the measurement of flow, and the National Metering Identifier (NMI) associated with that metering installation. Under MTR the settlements points are moved from the connection point to a point at (or behind) a measurement element. There is still a one-to-one relationship between the settlements point, the measurement of flow, and the NMI but there can now be a one-to-many relationship between a connection point and the associated settlements points. Each settlements point will have its own set of trading and operational relationships.

There can only be one customer at the connection point within the MTR arrangements. Figure 2 indicates the key features of the configuration of the site. Meters can be in either a parallel or subtractive arrangement (see Appendix B).

Figure 2: Implementation of Multiple Trading Relationships



The recommendations related to MTR are:

1. There can be only one customer associated with the connection point under MTR (see section 4.1).

2. It will be optional for a customer to participate in MTR arrangements (see section 4.1).[2]
3. Settlement points are associated with a metering element and a NMI but there can be multiple settlement points at a connection point (see section 5.1.1).
4. MTR will be available at the parent connection point and at NEM Customer[3] connection points within Embedded Networks (see section 4.1).
5. The preferred solution should enable all settlements points to be independently disconnected and that any exceptions to this should be determined through the detailed design phase (see section 5.1.1).
6. Where there are multiple settlements points at a single connection point, an MSATS NMI discovery query should provide a method for the identification of all NMIs (and hence settlements points) at that premises (see section 5.1.3).
7. For parallel metering arrangements there could be more than one RP and therefore, more than one set of metering service providers at a single customer's premises, providing the metering was wholly/electrically separate for each settlements point (see section 5.2.2). It is accepted that having more than one RP at a customer's premises does increase the risk of lost energy as the only common party for the total premises would be the LNSP. New obligations will need to be developed to facilitate the monitoring required to mitigate these risks (see section 5.5.1).
8. That where a subtractive metering arrangement is in place, or where there are multiple settlements points within one meter, there can only be one RP and metering service providers would be determined by that RP (see section 5.2.2).
9. DUOS fixed charges will by default apply to only one settlements point at a customer's premises unless another allocation methodology is agreed between the network service provider and the customer (see section 5.4).
10. A new connection at a "greenfield site" will need to register with a single settlements point and MTR can only be applied once a settlements point for the customer's premises is in place (see section 5.3.1).
11. Retailer of Last Resort (RoLR) provisions will be extended to settlements points with settlements points transferring to the RoLR for the connection point in such events (see section 5.2.5).
12. The Local Retailer for a connection point will continue to have an obligation to supply the customer at that connection point (see section 5.2.5)

3.2 Embedded Networks

An Embedded Network is a private network connected via a parent connection point to a distribution system (or another Embedded Network, and generally has no connection to a transmission network[4]) and exists where a connection point is supplied through that parent connection point. An Embedded Network Operator (ENO) operates the network. A discussion of the existing arrangements is presented in Appendix A.2. As shown in Figure 3 there are two types of customers at the connection points within an Embedded Network:

- NEM Customer: A customer that purchases its energy from a FRMP (not the ENO). NEM Customers are settled through the NEM.

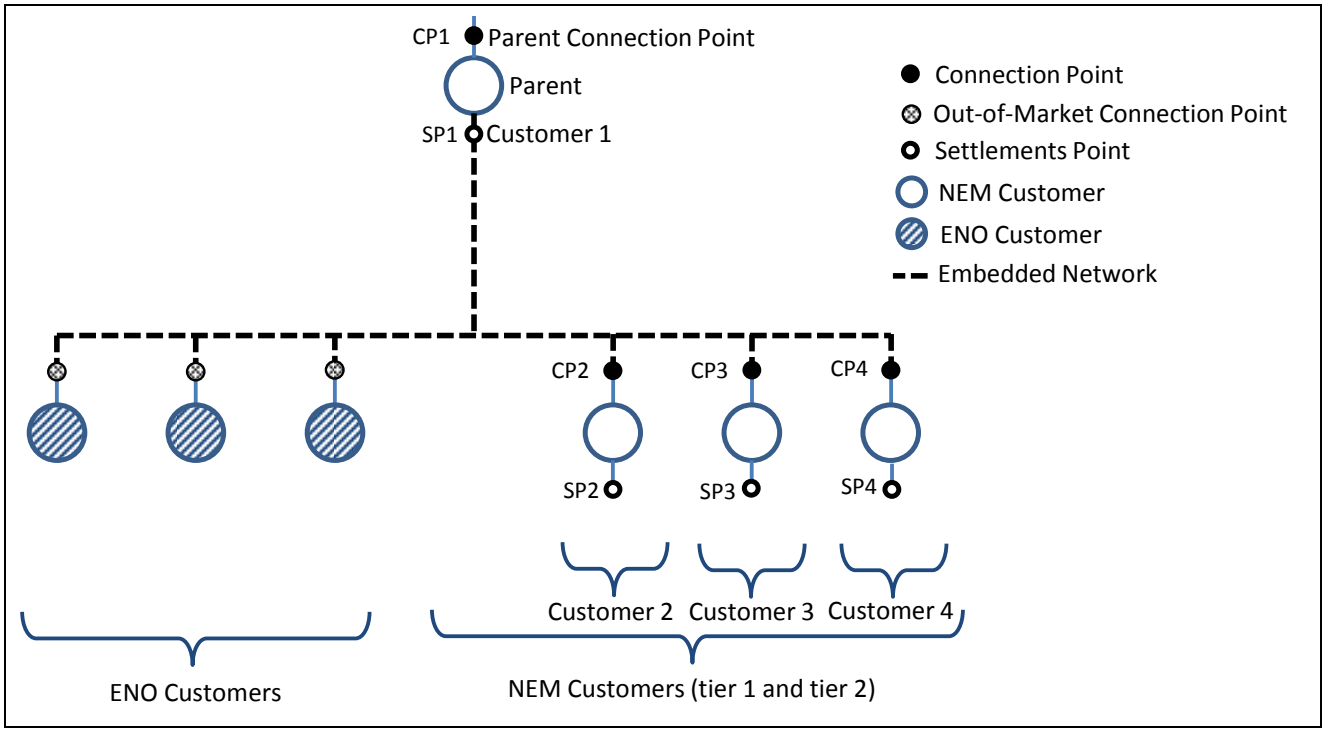
[2] Changes may be required to metering installation configuration or electrical installation arrangements at the customer's premises to comply with the requirements of MTR. Although some current metering installations would readily facilitate MTR, the design is not predicated on accommodating current metering and electrical installations.
[3] A NEM Customer is a customer within an embedded network which buys energy from an FRMP rather than from the ENR.
[4] There are a number of cases where Embedded Networks connect to a Transmission Network. In these cases the Transmission Network Operator is the LNSP. Any special provisions around these cases will be explored in the detailed design phase.

- ENO Customer: A customer that purchases its energy from the ENR. ENO Customers are not settled through the NEM.

NEM Customers and ENO Customers both purchase network access from the ENO. However, for the purpose of the NEM, the connection points of NEM Customers are deemed to be at the same location as the Parent Connect Point.

Examples of Embedded Networks include airports, shopping centres or apartment blocks.

Figure 3: An Embedded Network



Currently, the Embedded Network arrangements exist and operate (where all connection points within the network purchase energy from the parent) across all jurisdictions. These arrangements are regulated by the Australian Energy Regulator (AER), and ENOs are required to obtain exemptions from registering with AEMO as a network service provider and as a retailer.

The Power of Choice reforms seek to bring contestability to the connection points within the network and to ensure reasonable pass through of distribution costs.

There is no recognition in the National Electricity Rules (NER) of Embedded Networks, and therefore there is no NEM regulatory framework for Embedded Networks to regulate access to retail competition for connection points within Embedded Networks. These are currently catered for in jurisdictional instruments, where variances apply.

The recommendations related to Embedded Networks are:

1. It is proposed that Embedded Networks will come under the NER. A new form of network operator will be defined which will be neither a Transmission Network Operator nor a Distribution Network Operator (see section 6.2.1).
2. The LNSP is the party responsible for creating NMIs for all connection points in an Embedded Network and for allocating the NMI for the Parent Connection Point. The responsibility for assigning NMIs to ENO Customer and NEM Customer connection points will be with either the Embedded Network Local Retailer or the ENR, though the specific arrangements will be developed in the detailed design phase (see section 6.2.1).
3. All NMIs within an Embedded Network should be recorded in MSATS. For NEM Customers these NMIs will be associated with settlement points. For ENO Customers these NMIs will be associated with off-market connection points. No roles will be assigned

to NMIs for ENO Customers as the NMI is only required for the purpose of NMI discovery in such cases (see section 6.2.1).

4. ENO Customers must have pattern approved NEM compliant metering equipment. During the detailed design phase, further consideration will be given to the extent of any additional on-going maintenance and compliance requirements (see section 6.1).
5. The current subtractive metering arrangements are sufficient for settlements of Embedded Networks. However, it is considered appropriate that NEM Customers provide informed consent to their FRMP for such an arrangement given the risk that the customer could be disconnected if the parent connection point is disconnected (see section 6.3).
6. No additional RoLR provisions need to be determined for NEM Customers within an Embedded Network (see section 6.2.2).
7. DUOS pass through charging should follow the shadow pricing principles set out within the AER's "Electricity Network Service Provider Registration Exemption Guidelines" (see section 6.4).

4 Design Requirements

The proposed design must be implemented in the context of existing infrastructure and processes, changes to which can have significant impacts and implications across the industry. For this reason it is important to establish some design assumptions so as to set reasonable bounds on the degree of change contemplated. These design assumptions are derived from principles put forward in the Power of Choice documentation and reflect consultation with the MTREN working group.

4.1 MTR Design Requirements

The MTR design has been developed based on the following requirements:

1. The Multiple Trading Relationships framework is a voluntary option available to premises with a single connection point and a single customer, whether they are directly connected to a distribution network or are connected to an Embedded Network.[5]
2. A settlements point will be located at a measurement element (a single meter may have one or many measurement elements).
3. An MTR connection point can have multiple settlements points, but each settlements point can relate to only one connection point.[6]
4. A single process will be used for all customers that choose to establish multiple trading relationships, except where it can be demonstrated and justified that specific variations are required.
5. 'Parallel metering arrangements' and 'subtractive metering arrangements' can be applied in defining measures at the settlements points associated with the connection point. For the avoidance of confusion, these arrangements only involve one connection point and multiple settlements points in the context of MTR.
6. A 'subtractive metering arrangement', where one meter includes the energy flows of one or more other meters, can create dependencies between settlements points with separate FRMPs which can create some additional complexities. It is considered appropriate to

[5] The recommendations of the Power of Choice Review have MTR only applying at single premises. However, this design contemplates that the customer at the parent connection point of an embedded network could also participate in MTR for its own load. For example, a body corporate for a building may run a swimming pool on behalf of the building which could be included in an MTR arrangement.

[6] If a site has multiple connection points and energy can be moved between those connection points within the site then this may preclude that site from being eligible for MTR.

work around these complexities rather than to prohibit subtractive metering. It is assumed that:

a. There is no electrical loss between the secondary settlements point and primary settlements point (associated with the connection point involved in MTR), as the primary settlements point energy flows are determined by deducting the flows of meters at secondary settlements points so any losses (i.e. flows not metered at secondary settlements points), by default, will be in the flows of the primary settlements point.

b. The relationship between the primary settlements point and the secondary settlements points will be recorded in the market systems. This is new function for the market systems and is an extension of the similar feature currently used for Embedded Networks only.

7. All fixed network charges (not charges that vary based on energy flow) will be assigned to one FRMP at the connection point unless another allocation methodology is agreed between the network service provider and the customer.
8. The NMI(s) for all settlements points associated with the connection point will be assigned by the Local Network Service Provider (LNSP) for the connection point and NMIs should be assigned and registered with AEMO for settlements points. This approach will allow NMI discovery to be performed for all settlements points.
9. The existing data model, whereby trading and operational relationships are referenced to a location using a NMI at a settlements point, will be maintained. In other words, relationships exist at a NMI, whether the NMI and settlements point are located at a metering installation (as at present) or a measurement element (as is being proposed).
10. Multiple settlements points can be created within a single metering installation (acknowledging, the bulk of premises usually has only one connection point and metering installation).
11. Where a change of an attribute for one NMI affects multiple participants (filling multiple relationships), all of the affected participants will be notified of the change.

4.2 Embedded Network Design Requirements

The Embedded Network design has been developed based on the following requirements:

1. An Embedded Network comprises a parent connection point (i.e. to a distribution network or another Embedded Network), which may serve NEM Customer connection points or ENO Customer connection points. NEM Customer connection points are connection points within the Embedded Network which are market registered. ENO Customer connection points are not (currently) market registered.
2. A ‘subtractive metering arrangement’, where one meter includes the energy flows of one or more other meters, must be implemented between the settlements point for the parent connection point and the settlements point for the NEM Customer connection points (i.e. connection points to the Embedded Network). The consumption of the ENO Customers is captured in the parent connection point flows.

   a. There is electrical wiring between the parent connection point and the NEM Customer connection points that is provided by the ENO.

   b. As there can be different parties utilising the electrical wiring, it may be necessary to recognise electrical losses between a NEM Customer connection point and the parent connection point.

3. All fixed network charges (not charges that vary based on energy flow) will be assigned to the FRMP for the parent connection point unless another allocation methodology is agreed between the network service provider and the customer; and

4. NMI(s) for all connection points within the Embedded Network will be assigned and registered with AEMO. This approach will allow NMI discovery to be performed for all ENO Customers and NEM Customers within the Embedded Network.
5. There is no distinction between Embedded Networks and a single customer premises with regard to market systems and processes that support parallel and subtractive metering arrangements. The regulations and obligations may however differ.

5 Multiple Trading Relationships

5.1 Measurement and Settlements Points

5.1.1 Settlements Points

Settlements points can exist wherever a measurement element (in a meter in a registered metering installation) exists. Currently there needs to be at least one settlements point at an active connection point. Under MTR there can be multiple settlements points at a connection point where:

- Each settlements point will have its own set of trading relationships; and
- Each settlements point will have its own set of operational relationships

There are two metering arrangements that can be installed at a connection point involved in MTR:

- Where each settlements point is directly supplied from the connection point and is electrically separate from each other, a 'parallel metering arrangement' is formed. There is no lower level or 'secondary' settlements point in a parallel metering arrangement.
- Where settlements points are hierarchically arranged with flow from the connection point passing one settlement point before reaching another, forming a primary-secondary structure, a 'subtractive metering arrangement' is formed. This 'subtractive metering arrangement' has metering at the primary point at the top level or primary connection point and at least one meter at a secondary settlements point beyond the primary connection point.

For premises with a parallel metering arrangement, the electrical circuits beyond the settlements points must be isolated from each other.

Each settlements point must relate to a measurement element in a NEM compliant metering installation that:

- Is installed in accordance with the NER, Market Procedures and relevant jurisdictional Service and Installation Rules (SIRs).
    - In the development of the detailed design SIRs will need to be reviewed and may need amendments to cater for multiple electrical installations being installed at a single premise.
- Has at least one meter with at least one measurement element to deliver at least one data stream.
- Can measure electrical flows from and to the local network (i.e. exports or imports), which may relate to dedicated loads, a non-specific load or (micro) generating units.
    - For a subtractive arrangement, the settlements points must have interval meters (types 1, 2, 3, 4 or 5) that are of the same type and are read at the same time and frequency[7].

[7] This is an existing requirement at a single site and is required to ensure that all metering data required to settle the subtractive arrangement is available at the same time. Note that as an Embedded Network effectively contains multiple sites then this requirement only applies at each one of those sites.

- For a parallel metering arrangement, meter types can be different between settlements points.

Measurement elements should be configured so as to allow settlement points to be independently disconnected. This allows settlement points to be treated in many regards in the same fashion of connection points in the current arrangements.

Where a customer does not want MTR at their premises, the existing single trading relationship structure can prevail. Therefore, 'no change' is an option available to customers and their premises will have one connection point; one NMI and one settlements point (for each metering installation); one FRMP; one RP; one MP (though there can be one per meter); one MDP; and one electrical installation.

To the extent that the methods to associate multiple settlements points with connection points for MTR customers require the introduction of a mapping in systems then this must be implemented in a manner which requires no action from the customer or the LNSP serving that customer unless the customer participates in MTR.

Once multiple settlements points are established at a connection point then the customer can opt to have the same retailer at all of those settlements points. The NMIs for settlements points that are no longer required can be made extinct.

From a rules perspective, settlement in the NEM will occur at settlements points (not metering installations), which is why trading relationships need to be assigned at each settlements point to allow maximum choice by customers.

5.1.2 National Metering Identifier (NMI)

The NMI is central to the design of the NEM and the market systems and processes. As the unique identifier of a metering installation, it is currently used for many purposes:

- Trading relationships – these relationships affect settlement in the NEM as flows to and from the pool are valued at the NMI. Trading relationships are assigned to NMIs in the market systems in accordance with the framework established in the NER. That is, each NMI has the following trading relationships:[8]
  - Local Retailer (LR);
  - Financially responsible Market Participant (FRMP);
  - Retailer of last resort (RoLR); and
  - Small Generator Aggregator (SGA)
- Operational relationships – responsibilities for activities that ensure reliability and quality of supply and the integrity of metering data used to settle the NEM are assigned to parties for each NMI. These are:
  - Local Network Service Provider (LNSP), i.e. Distribution or Transmission Network Service Provider (DNSP or TNSP);
  - Responsible Person (RP);
  - Metering Provider (MP); and
  - Metering Data Provider (MDP).
- Energisation status – whether a metering installation is energised or not, which is a critical piece of information for many parties, is recorded against each NMI
- Metering related data[9] – the range of data relating to meters is extensive and disparate; each is recorded against the NMI, including:

[8] An additional potential future role, Demand Response Aggregator, is discussed in Section 9.1.
[9] This is stored as standing data in AEMO systems.

- Classification that dictates the type of metering to be installed (Large or Small);
- Location with reference to a transmission connection point (TNI);
- Distribution loss factor (DLF);
- Data stream identifier(s);

- Customer data[10] – as required by the National Energy Customer Framework, some details about customers are to be held at the connection point/ metering installation/ NMI level, such as the classification of the customer[11] and whether they have life support equipment. In addition, contact details for use by LNSPs to notify customers of planned interruptions (provided by FRMPs in accordance with the B2B Procedures) is generally held at the connection point/ metering installation/ NMI level.

While NMIs are allocated to metering installations, generally each connection point has one NMI. But, there is no restriction on the number of metering installations per connection point or the number of meters per metering installation. It is proposed that there be one NMI per settlements point (to allow MTR at the lowest level of detail at which settlement values can be calculated). This will allow the NMI to perform the same roles it performs today.

5.1.3 Connection Point

The MTR arrangements will mean that there will be multiple settlements points and multiple NMIs per connection point. There is currently no dedicated connection point identifier (in the settlement sense) in AEMO's metering systems. The detailed design will develop the detail of how the mappings between these are handled, such that:

- The connection point can be identified, e.g. via an address or a new identifier.
- All NMIs at a connection point can be identified via NMI discovery.
- When properties of the connection point are updated via change requests that they automatically propagate across the NMIs at that connection point. This allows all information to continue to be associated with the NMI.

Retail systems and update processes will need similar features[12], particularly with respect to ensuring that information on life support, interruptions, access and hazards (e.g. dogs) are appropriately reflected across the NMIs at a connection point.

5.2 Roles and Relationships

5.2.1 Operational Relationships

This section describes each of the operational relationships that can exist at a settlements point and therefore, allowing multiple operational relationships to simultaneously exist at a single connection point.

Under the AEMC's Multiple Trading Relationships framework, it is proposed that responsibility for metering installations can be deconstructed and assigned per meter. Under the current NER and Retail Procedures the RP can appoint an MP and an MDP per metering installation.

However, there are material doubts as to the efficacy and costs associated with such flexibility. While the effect on market and participant systems may be manageable, the mechanics of such an arrangement would require coordination across parties that could complicate simple tasks. Where there is no clear responsibility for end-to-end processes at meters for a single metering installation

[10] This data is stored in retailer systems for the most part, though AEMO systems do record the NECF classification.
[11] NECF classifications indicate the size of the consumer load at the connection point. Creating new settlements points at one connection point will not impact the NECF classifications.
[12] It is understood that some systems used in the market, though not by AEMO, associate the NMI with connection points.

or measurement elements in a meter or data streams of a measurement element, confusion may arise.

Defining responsibilities will be a critical exercise when finalising the detailed design of the Multiple Trading Relationships framework. In the meantime, the assumption is that relationships at a measurement element can differ within a metering installation (per AEMC proposal) but whether this achieves the National Electricity Objective will be tested during the detailed design development.

5.2.2 Responsible Person (RP)

The appointment of the RP will continue to be made in accordance with the NER, with the exception that it will be made for a settlements point and not for a metering installation (or, more typically, for a connection point).[13]

While the power of choice calls for the RP to be appointed at the measurement element/meter, only one RP will be allowed per metering installation. This is the most operationally efficient approach.

Similarly, only one RP will be allowed in subtractive metering arrangements.

It is proposed that there will by default be one RP per connection point. However, so as to provide some competitive pressure on that RP, the customer may opt to appoint an additional RP to introduce a new meter in parallel with that of the existing RP.

Details are presented in Section 9.2 of a current rule change proposal which could result in the RP being replaced with a Metering Coordinator (MC). The MC provides greater flexibility as to who can perform the role and gives the customer the ability to appoint the MC directly under certain conditions (currently only the FRMP or LNSP can be the RP). To avoid pre-supposing the final form of the rule and to maintain consistency with established terminology this document continues to use RP.

The MC change has the potential to simplify the issue of appointing an RP at sites where multiple FRMP's are involved. The detailed design for MTR will further consider the matter of RP appointment in light of developments on the MC rule change.

5.2.3 Metering Provider (MP) and Metering Data Provider (MDP)

A key role of the RP is to appoint the MP and MDP.

It is proposed that there will be only one MP and one MDP per metering installation. There may be competition benefits if multiple MPs and MDPs can be appointed, but there may be an increased risk of unmetered consumption with greater difficultly in detecting this.

5.2.4 Financially Responsible Market Participant (FRMP)

The key trading relationship for a settlements point is the FRMP; a FRMP settles the energy flows at a settlements point in the wholesale market and is responsible for paying network charges on behalf of their customers.

The key change to be implemented under MTR is to allow a FRMP to be appointed at the settlements point (or measurement element) level, and no longer just at the metering installation. Multiple FRMPs may therefore exist at a connection point.

Under MTR the NMI discovery should allow prospective FRMPs to be able to retrieve Type 1 NMI Standing Data[14] for all of the NMIs at (i.e. under) a connection point. Similarly, the RPs of one NMI will need to be able to identify and coordinate activities with the RPs of other settlements points at a premises.

[13] Current practices are described in Appendix A. As discussed in Section 9.2, a current rule change could see the RP replaced with a Metering Coordinator.
[14] Given basic address or meter ID data the NMI can be identified.

As discussed in Section 5.2.1 the FRMP is also entitled to appoint the RP (being the FRMP or the LNSP) who, in turn, appoints the MP and MDP and decides on the form of metering to be installed (subject to jurisdictional and national regulation).

5.2.5 Retailer of Last Resort and Obligation to Supply

Retailer of Last Resort (RoLR) provisions that currently apply to the connection point will need to be extended to include all associated settlements points. Settlements points will transfer to the RoLR for the connection point in such events

The Local Retailer for a connection point will continue to have an obligation to supply the customer at that connection point.

5.3 Customer Actions

This section explores scenarios relating to actions by the customer and identifies and recommends commensurate changes to facilitate MTR. The development of additional guidance for these scenarios will occur as part of the detailed design work.

5.3.1 Customer wants a new connection

For a new connection (e.g. a new premises) the customer will appoint a FRMP who will arrange the connection service. A customer can identify their MTR requirements before applying for a new connection; however the connection service must be arranged through one FRMP

Once the initial NMI (and hence settlements point) has been created and the customer has been connected, the customer can then apply for MTR and the creation of subsequent settlements points.

5.3.2 Addition of measurement element

Where a metering installation has a single meter with a single measurement element (i.e. settlements point) and the customer wants to add another measurement element, procedures will be needed to define the roles and responsibilities of various parties, being the customer, FRMP (may involve liaison with LNSP) and RP.

Essentially, the addition of a measurement element (i.e. settlements point) requires roles to be assigned by the customer (and RP). The processes should be the same as those for a new connection that is to be registered and energised.

A complication worth considering occurs where a subtractive metering arrangement is formed or expanded. Trading and operational relationships that span measurement elements will need to be defined and recorded in market systems to ensure settlement processes remain accurate and, where required, enable notifications to and access to data by all affected Market Participants.

5.3.3 Removal of measurement element

Where a metering installation has multiple measurement elements (i.e. multiple settlements points) and the customer wants to remove a measurement element, procedures will be needed to define the roles and responsibilities of various parties, being the customer, FRMP (may involve liaison with LNSP) and RP.

Essentially, the removal of a measurement element (i.e. NMI/settlements point) will result in the measurement element being removed from the connection point and the status of the associated NMI being changed from ‘Active’ to ‘Extinct’. This is an existing process and should be the same under MTR.

Where a measurement element is removed in a subtractive metering arrangement (i.e. NMI/settlements point), the trading and operational relationships with other measurement elements will also need to be updated.

5.3.4 Customer changes a FRMP

Where a metering installation has a single FRMP (and RP) but the customer decides to appoint another or an additional FRMP (and RP), current processes would appear to be suitable and not require change.

Guidance will be required to establish specific roles and responsibilities where there are to be multiple FRMPs (and RPs), or where the addition of a measurement element will result in multiple FRMPs (and RPs).

Of particular note will be whether there are instances where one FRMP (or RP) can restrict or limit decisions that the other FRMP (or RP) would ordinarily make entirely at their discretion. For instance, where an additional FRMP is appointed to a metering installation, they may have no choice as to the design of the metering installation or the identity of the MP or MDP, as they will have been decided by the pre-existing RP (who may be the FRMP).

5.3.5 Customer has an issue with their meter or metering data

Inquiries related to meters or metering data will be associated with a specific measurement element (i.e. settlements point). If the customer has a concern with the performance of the meter (such as accuracy or reliability), it is expected that the customer would contact the FRMP, who will be the RP or will be able to readily liaise with the LNSP if they are the RP.

Where a concern relates to a meter with multiple measurement elements, the customer should be able to contact any of the FRMPs appointed for measurement elements at the meter. Only one FRMP should be able to initiate a query about the performance of a meter, which should be deemed to be a query relating to all measurement elements within the meter. The RP for the metering installation would be contacted to investigate and address the customer's concern.

Variations will be required to existing procedures and processes to facilitate MTR, including identifying relevant measurement elements on the customer's bill.

5.3.6 De-energisations and re-energisations

Where a de-energisation is performed by removal of the service fuse, all settlements points at the connection point will be affected

As this occurs at a single connection point there is no issue of needing to inform multiple customers. However, new validation rules (for the B2B Procedures) and notifications via MSATS may be required to ensure that all the FRMPs associated with a connection point are aware of the de-energisation.

5.4 Network Charges

The MTR allows more than one FRMP per connection point and this affects how network charges, i.e. Distribution Use of System (DUOS) charges are assigned.

It is proposed that the default arrangement is that one of the settlements points (i.e. NMIs) has primacy for fixed network charges with these charges being sent to that settlements point's FRMP. The precise rules for defining this settlements point will be determined in the detailed design work.

In the absence of a special agreement between the customer and the LNSP as to the manner by which the customer's load is split between measurement elements for a single premises (i.e. NMIs/settlements points), all network charges will be charged to one settlement point at the connection point.

If the customer wants fixed network charges split across settlements points in a parallel metering arrangement, this will need to be enabled by system and process changes within the network service provider (i.e. the LNSP and the TNSP). Therefore, if the customer decides they do not want the default arrangement, that default arrangement can be overwritten only with the agreement of the customer, the LNSP and all FRMPs (to ensure the split billing arrangement can be supported by all parties).

It should be noted that any agreement to split network charges across settlements points within a connection point does not affect market systems or processes; metering data for each NMI (i.e. settlements point) will continue to be sent to the LNSP. However, the LNSP will need to maintain records as to which NMIs are at a connection point and are to share the fixed network charges for the split billing arrangement to be implemented.

Network charges associated with consumption of energy are to be allocated per settlements point.

5.5 Other Matters

5.5.1 Identifying unaccounted for energy

Under MTR, the only party who in every case has access to all metering data at a connection point (that may comprise multiple metering installations) is the LNSP; and will only be able to understand energy flows at a connection point if their system links NMIs to connection points. This differs to the current state, where a FRMP for a connection point has metering data from all meters in all metering installations at the connection point.

The implication under MTR is that no one party with a commercial interest has the metering data required to identify instances of:

- Loss of energy and energy theft, where energy flows to a connection point and is consumed beyond the connection point, but is not metered, so is not charged for by the FRMP nor network service provider;
- Energy transfer, where energy flows to be measured by a particular measurement element (such as to measure peak or off-peak consumption) are routed to another meter, so the charges levied by the FRMP and/or network service provider are less than they would otherwise be.

Loss of energy in the manner described is an existing issue, and diligence by FRMPs and LNSPs to monitor energy flows should not change. The detailed design phase will consider processes for resolving situations where one FRMP is erroneously assigned metered quantities associated with another FRMP.

However, the risk of energy transfers remaining undetected increases. The ability of and incentives for customers to alter components of their electrical installation to either their advantage or disadvantage increases. Each measurement element (i.e. settlements point) can be charged under different retail arrangements with different FRMPs. This means, for instance, rewiring a circuit so peak light and power consumption is metered as being electric vehicle consumption could occur and remain undetected as the FRMP and MDP for each settlements point/NMI is not privy to other energy flows to allow a ‘whole of premises’ analysis to be conducted.

In this situation the only party with access to all relevant metering data for the connection point is the LNSP. New obligations will need to be developed to facilitate the monitoring required to mitigate these risks.

5.5.2 Load profiling

Load profiles are created to allow accumulated metering data from Type 6 meters to be converted to metering data per trading interval for market settlement.

Load profiles are prepared by AEMO using all available interval metering data, i.e. from Type 1 to 5 and 7 metering installations. Following current practice in Embedded Networks, the subtractive metering settlements points will not be included in the Net System Load Profile. Parallel metering settlements points with interval metering should be included though. These arrangements avoid double-counting when preparing the load profile.

5.5.3 Physical Losses

It is proposed that in all single customer premises, the physical losses between a connection point and a measurement element (i.e. NMI) will default to zero per cent; the effect of this is that all losses between the primary connection point and secondary connection points will be assigned to the measurement element closest to the connection point. This is a reasonable assumption as the same customer will be responsible for the energy flows at each settlements point.

6 Embedded Networks

6.1 Measurement and Settlements Points

The current arrangements for Embedded Networks are described in Appendix A.2.

The introduction of settlements points in earlier sections of this paper are in regard to MTR and the conventions and definitions of settlement points will carry over to other market contexts. As ENO Customers are not customers in the NEM they have a connection point but do not have a settlements point.

One issue with Embedded Networks is that metering standards differ from those in the NEM.ENO Customers must have pattern approved NEM compliant metering equipment, but no ongoing obligations to maintain compliance with NEM Rules until such time that the ENO Customer becomes a NEM Customer. During the detailed design phase, further consideration will be given to the extent of any additional on-going maintenance and compliance requirements so as to ensure that meter quality standards are similar between customers in an Embedded Network.

6.2 Roles and Relationships

6.2.1 New NER Network Type

Currently, the Embedded Network arrangements exist and operate (where all connection points within the network purchase energy from the parent) across all jurisdictions. These arrangements are regulated by the Australian Energy Regulator (AER), and ENOs are required to obtain exemptions from registering with AEMO as a network service provider and as a retailer.

The key issues with roles and relationships for Embedded Networks today include a lack of clarity on obligations of different parties with respect to metering arrangements, a lack of visibility of contestable customers within Embedded Networks, and a lack of uniformity in DUOS pass through arrangements.

It is proposed that Embedded Networks will come under the National Electricity Rules (NER). A new form of network operator will be defined which will be neither a Transmission Network Operator nor a Distribution Network Operator.

The NER and subordinate documents will impose the following new obligations:

- All Embedded Network NMIs, whether for connection points serving NEM Customers or ENO Customers will be required to be registered with AEMO and will be discoverable. The data required to be recorded for ENO Customer connection points will need to be registered also.
- The NER will empower the AER to set charging arrangements in Embedded Networks for individual operators or on a class basis. This will empower the AER to require the ENO to apply DUOS network charges to NEM Customers and ENO Customers in accordance with AER's "Electricity Network Service Provider Registration Exemption Guidelines". This is expected to involve applying the same charging as a Distribution Network Operator would apply were it directly serving the customer. The NER should also allow the AER to cap other miscellaneous charges.

- After the LNSP for the Embedded Network assigns NMIs for the network the Embedded Network Local Retailer (EN LR) or the ENO will be obliged to register the NMIs and set up the initial standing data for connection points within the network. The precise arrangements will be developed during the detailed design phase. The LNSP will be granted the ability to modify more of that standing data – such as to maintain tariff codes.[15]

6.2.2 Retailer of Last Resort & Obligation to Supply

No changes are proposed for RoLR or obligation to supply arrangements for Embedded Networks.

6.3 De-energisation

Where Embedded Networks use a subtractive metering arrangement a person who becomes a NEM Customer at a connection point within an Embedded Network may not be aware that a disconnection of the parent connection point would de-energise its own connection point. This may occur if the ENO defaults on payments to its retailer. While such de-energisation is undesirable, there is not thought to be any practical means of preventing this.

Instead, it is important that prospective customers in Embedded Networks are aware of this issue and provide their informed consent to that risk. It is proposed that systems inform FRMPs when approached by a prospective customer that informed consent is required from the customer and that a requirement be imposed as to how the informed consent process works. For instance, the informed consent process should be implemented at the time of initial contact, rather than via the wording of a contract.

The processes to be followed for measurement elements in an Embedded Network will need to be defined to cover the situation where a FRMP requests a de-energisation of a measurement element where other customers will also be de-energised. New validation rules (for the B2B Procedures) and notifications via MSATS may be required to ensure that all the FRMPs associated with a connection point are aware of the de-energisation.

6.4 Network Charges

There are a number of existing issues with network charges in Embedded Networks. There is currently no legal relationship between the ENO and the LNSP for the NEM Customers within the Embedded Network while ENO Customers have no relationship with the LNSP. The ENO is allowed to recover DUOS charges from NEM Customers and ENO Customers within the Embedded Network.[16]

The AER's "Electricity Network Service Provider Registration Exemption Guidelines" define "shadow pricing" practices for the pass through of DUOS charges which are intended to ensure that the ENO Customers and NEM Customers are no worse off than if they had been connected to the LNSP's network. The ENO can pass on charges through other instruments, such as leases, which take them beyond the jurisdiction of the AER.

It is proposed that ENOs be required via the NER to pass on network charges in accordance with AER guidelines.

6.5 Other Matters

6.5.1 Physical Losses

It is proposed that NMIs may have a specific loss factor to reflect losses between the parent connection point and the measurement element (i.e. settlements point). Any measurement element-specific loss factor will need to be set using procedures that ensure its accuracy and

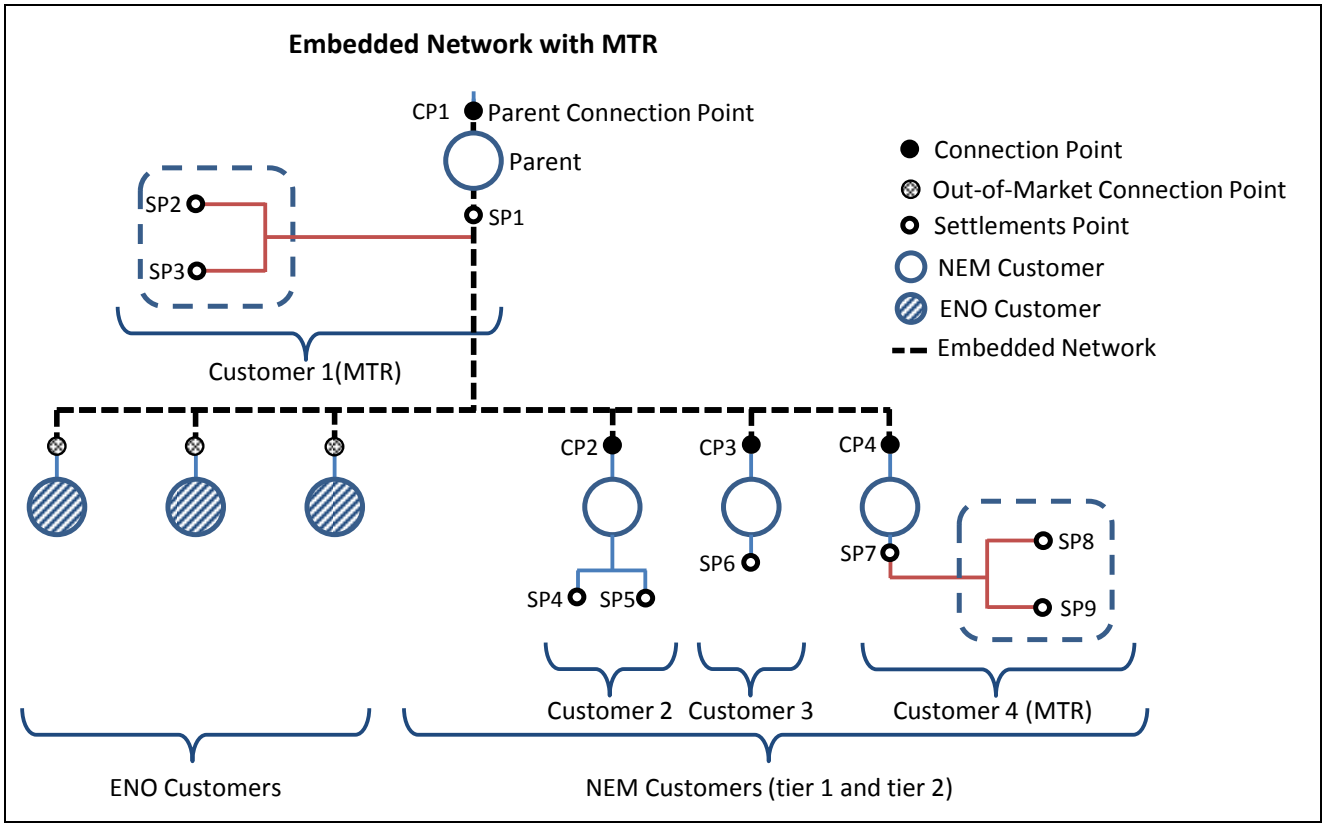
[15] Currently the CATS Procedure requires the Embedded Network operator to maintain standing data.
[16] The ENO would also be allowed to pass on DUOS charges to a NEM Customer via that customer's retailer, but the retailer is not obliged to support this.

approved by the AER. This is designed to minimise the risk that over statement of losses mean that the subtractive settlement processes routinely result in negative energy flows at a settlements point. Such loss factors should be periodically reviewed.

7 Synergies between MTR and Embedded Networks

AEMO's systems already accommodate Embedded Networks, at least for NEM Customer connection points. The introduction of settlements points means that the existing Embedded Network structures can be used to support MTR. From a metering systems view point, both an Embedded Network and an MTR arrangement at a connection point can be viewed as a tree of settlements points. Many of the operational issues associated with managing MTR also apply in an Embedded Network. It follows that a logical implementation path is to use much the same software infrastructure to support both Embedded Networks and MTR, including allowing MTR and additional Embedded Network at NEM Customer connection points within an Embedded Network. This would facilitate complicated and valid arrangements such as shown in **Error! Reference source not found.**, with an MTR arrangement associated both with the parent connection point and with connection point CP4. An Embedded Network behind a NEM Customer connection point in an Embedded Network could also be accommodated.

Figure 4: MTR and Embedded Networks



8 Implications for Settlement / Prudential Processes

The settlement and prudential framework is expected to work as it does today.

9 Relationship with Current Rule Change Proposals

Rule determinations on the following topis care expected during 2014.

9.1 Demand Response Mechanism

DRM will have a Demand Response Aggregator (DRA) associated with a NMI as a financially accountable participant but they will not be a FRMP in the current sense. A DRA does not have

any role in appointing other roles associated with a NMI and is settled based on a derived data stream.

The DRM rule determination will happen in parallel with the development of MTR design. Under the MTR proposals a FRMP will still have a one-to-one relationship with a NMI. The assumption applied in this document is that if DRM is adopted in the rules then a DRA will be introduced as an additional role at the NMI level and therefore that the adoption of DRM will not impact recommendations made here. There may, however, need to be some rule amendments relating to aligning DRM with the MTR changes where the DRM design relates to the connection point.

9.2 Metering Coordinators

This change will have the Responsible Person replaced with a Metering Coordinator. The Meter Coordinator would have the same responsibilities of a RP though provides for more options around the appointment of the role. Key changes would be:

- The term ‘responsible person’ will change to ‘Metering Coordinator’, a role which as a minimum would have the same responsibilities and liabilities as are attached to the current ‘responsible person’ role.
- Any person may perform the role of Metering Coordinator when registered with and accredited by the Australian Energy Market Operator (AEMO) for this role to ensure compliance with the NER. A FRMP or an LNSP or a Metering Provider or a Metering Data Provider may also be a Metering Coordinator.
- A customer may directly engage a Metering Coordinator.
- A FRMP would be responsible for ensuring that there is a Metering Coordinator at each of its customers’ connection points.
- A FRMP is responsible for engaging a Metering Coordinator on a customer’s behalf, unless:
    - the FRMP chooses to act as Metering Coordinator (if registered with AEMO); or
    - a Metering Coordinator is engaged directly by the customer; or
    - a jurisdiction prescribes that a Metering Coordinator, or a class of Metering Coordinators, are exclusively responsible for coordinating metering services in a particular network area.

The assumption applied in this document is that recommendations made in regard to the RP would be applied to the Meter Coordinator.

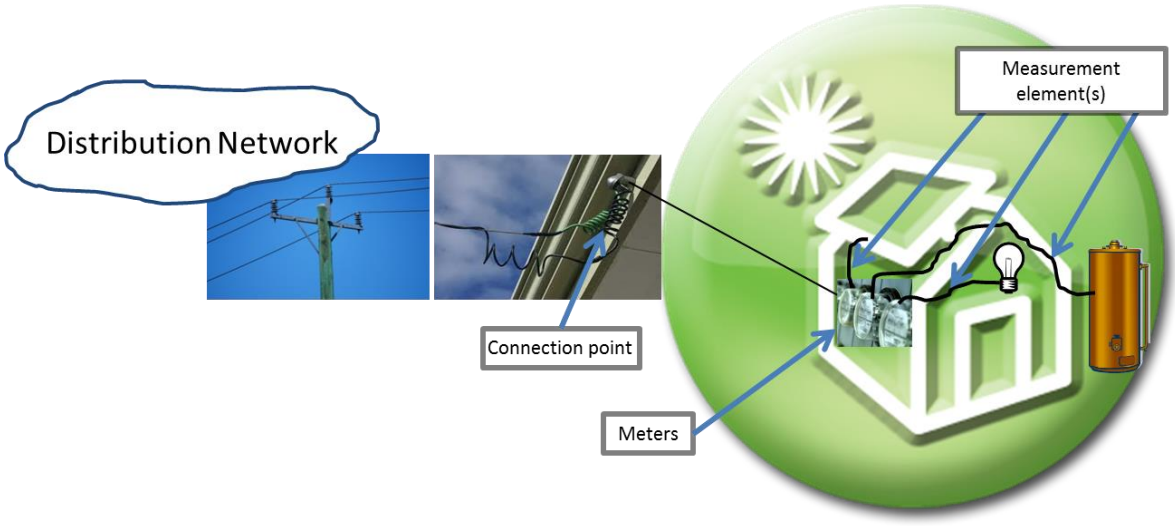
A Summary of Current Arrangements

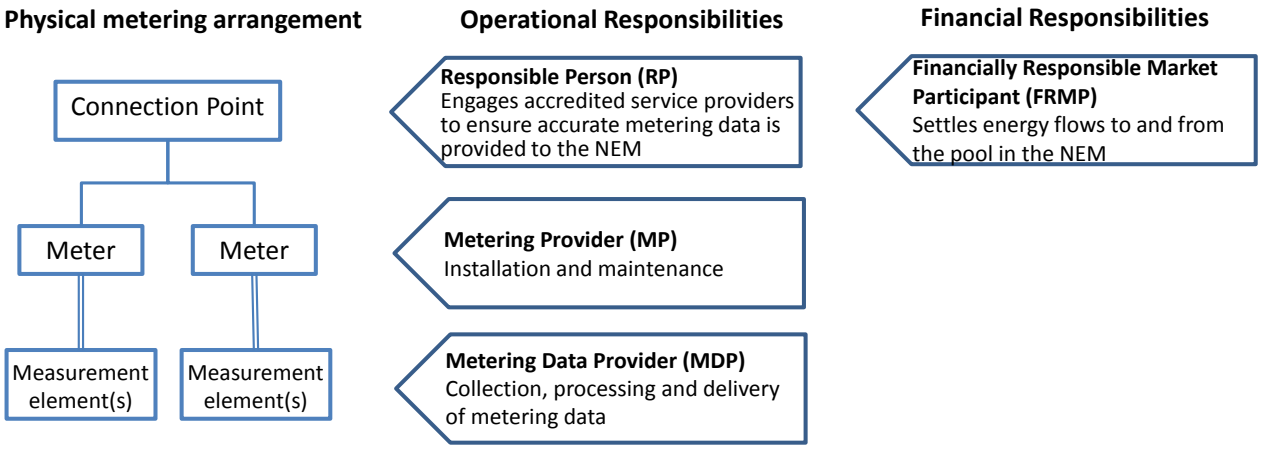
This appendix provides a brief description of current single trading relationships and Embedded Networks arrangements.

A.1 Single Premises

A.1.1 Terminology

A 'single premises' exists where a connection point does not supply another connection point, but the electricity supplied can be put to different uses.





The key terms for the diagram above are explained below:

- **Connection point:** is the point of supply between a distribution network[17] and a customer's premises.
  - Each connection point has a unique identifier, the National Metering identifier (NMI)[18].
  - A metering installation is always present at connection points (aside from unmetered connection points). It is an assembly of components that can include instrument transformers, measurement element(s), energy recording and display equipment and communications equipment that are controlled for the purpose of metrology. Many of

[17] Or, in the case of a NEM Customer connection point, an Embedded Network.
[18] While the NMI is currently used, to identify the connection point, the NER state the NMI is related to the metering installation.

these components can be contained in a meter and a metering installation may have multiple meters, each with one or multiple measurement elements.

- Settlement within the NEM is based on (directional) metering data at connection points.

- **Meter:** is an Australian Standards compliant device that measures and records consumption or generation of electrical energy. It may record energy flows in time periods (interval meter) or at a point in time (accumulation meter) and be remotely or manually read. All energy settled in the NEM flows through metering installations where it is measured, except when there is no meter and it is calculated.

  Note: meters are the key component of metering installations; but a metering installation may also comprise instrument transformers, communication interface equipment, tamper detection devices, time keeping devices, a secure surrounding, etc.

- **Measurement elements:** are energy measuring components which convert the flow of electricity in a power conductor into an electronic signal or a mechanically recorded electrical measurement. Measurement elements are the most granular level of metering and can record flows to and from premises for specific purposes, such as separate measurement of light and power and off-peak water heating consumption and photovoltaic generation (if enabled by the wiring and metering arrangements installed at the premises). A meter may have one or multiple measurement elements.

It would be ideal if each measurement element was able to be independently disconnected, allowing settlements points associated with measurement elements to be treated in many regards in the same fashion of connection points in the current arrangements. There are cases in practice, however, where the lowest granularity of disconnection at site would disconnect multiple measurement elements.

A.1.2 Operational Responsibilities

Operational responsibilities are those that involve the management of devices and data. They do not involve a direct financial outcome. The key operational responsibilities for a single premises are described in this section.

Connection point

The LNSP is responsible for ensuring a safe and reliable supply of energy to end customers' connection points. In many jurisdictions, the LNSP is also the RP for connection points classified as being 'Small' (i.e. are responsible for the metering installation and the collection of metering data); in fact, the LNSP often performs the MP and MDP roles.

The LNSP is also responsible for energisation of connection points. They initially energise, de-energise and re-energise a connection point in response to a request from the relevant FRMP.

In addition, for each connection point that supplies a customer attached to the national grid, a Market Participant (retailer or generator) must ensure that a compliant metering installation exists and it is registered with AEMO.

When the metering installation is ready to be registered in the NEM, the LNSP assigns a NMI and the connection point is recorded in the Market Settlement and Transfer Solution (MSATS).

When distribution services are required, they are requested in accordance with the B2B procedures (as provided for in the NER). The B2B procedures mandate the process and IT rules to operate between Registered Participants. The distribution services are usually requested by the FRMP for the connection point and the relevant LNSP then provides (or arranges for the provision of) the distribution service.

Metering installation

Under the NER, the FRMP must appoint an RP for its metering installations.

An RP appointed by the FRMP is responsible for the metering installation. For remotely read metering installations (types 1 to 4), the RP can be either the FRMP themselves or the LNSP (who

has an obligation to offer to be the RP). The FRMP usually appoints itself to be the RP for these metering installations.

The LNSP is the RP for types 1 to 4 meters only where the FRMP has sought and accepted an offer from the LNSP to be the RP. In accordance with the NER, the LNSP must be the RP for manually read metering installations (types 5 and 6) and unmetered metering installations (type 7).

The RP is ultimately accountable for the performance of the metering installation, being all of the equipment that eventually delivers metering data (at the measurement element level) to the NEM. The role involves the appointment of an MP and an MDP for a connection point.

Meters

The RP must engage an MP to be responsible for the provision, installation, routine testing, maintenance and audit of metering installations and their components.

If a meter fails to accurately measure or record energy flows or the communication interface that allows remote reading fails, the MP is accountable for the rectification of the issue.

The RP can only appoint MPs that are accredited and registered with AEMO.

Metering data

The RP must also engage an MDP to collect, process and deliver metering data for the metering installation. This may require services being provided locally/manually or remotely for one or multiple meters at which there could be one or multiple measurement elements. The MDP must ensure metering data (at the measurement element level) is delivered to those parties entitled to receive it, in accordance with the NER and the Metrology Procedure.

If a meter is not read, for a reason other than one that relates to the meter itself, the MDP is accountable for rectifying the issue. In any case, where metering data is not available from the meter, the MDP is to substitute the metering data to ensure that it is delivered to recipients in accordance with the NER and subordinate instruments.

A.1.3 Trading Relationships

Trading relationships with a connection point involve a financial outcome for a party. The key trading responsibilities for a single premises are described in this section.

Local Retailer

The Local Retailer (LR) is, initially, financially responsible for the all energy that flows into the LR's franchise area (which typically matches the LNSP's distribution area). The bulk of the energy flows occur at connection points between transmission and distribution networks, but they can also be at connection points between distribution networks.

While the LR has financial responsibility for all customers' connection points within the LR's area, energy flows at those that have a FRMP other than the LR (i.e. second-tier connection points) are deducted from the total flows in the LR's area. This is known a 'settlement by difference', where the second-tier consumption and generation is deducted from the LR's initial settlement account.

As the LR's settlement calculations are affected by the energy flows at all customers' connection points within the LR's area, the MDP delivers all of the relevant measurement element metering data for those connection points to the LR.

Financially Responsible Market Participant

Where a retailer other than the LR has financial responsibility for a customer's connection point, they are called a second-tier retailer (even though they can be a first-tier retailer elsewhere).

The FRMP can be either a first-tier retailer (i.e. the LR) or a second-tier retailer (i.e. not the LR) at a connection point. In either case, as the retailer's settlement calculation is affected by the energy flows at their customers' connection points; they receive all of the measurement element metering data, from the MDP, for those connection points.

FRMPs have the retail relationship with customers. As such, they use the detailed metering data (at the measurement element level) for customer billing purposes.

Retailer of Last Resort

Where a Market Participant is suspended and is unable to settle energy flows in the wholesale market, a RoLR event is declared. This will result in the LR or FRMP roles for a metering installation (i.e. NMI) being reassigned from the suspended Market Participant to an active Market Participant.

The market systems and processes that have been designed to effect such a change result in the Market Participant identifier for the LR and/or FRMP at a metering installation (i.e. NMI) being changed in the market systems. The change, effectively, transfers rights and obligations from the suspended Market Participant to the active Market Participant and is performed in accordance with the appropriate RoLR procedure[19].

Local Network Service Provider

The LNSP has a financial interest in the energy flows at all connection points in its distribution area. Consequently, the LNSP always receives metering data (at the measurement element level) from the MDP for all connection points registered with AEMO within its distribution area. This data is used, among other things, to bill network use of system charges.

Metering

The metering obligations for connection points at single premises are defined in the NER and Retail Market Procedures. Obligations as to the type of metering installation that can be installed are dependent on several matters:

- Size of load/generator: this may dictate that the metering installation is to be of a type 1, 2, 3 or 4, which are remotely read interval meters, or manually read type 5 or 6 meters.
- Jurisdictional instruments/derogations to the NER: the type of meter may be set in a jurisdiction, such as AMI meters, must be installed in certain situations.

The obligations that pertain to any one metering installation are unaffected by those of any other metering installation (which is not the case for Embedded Networks).

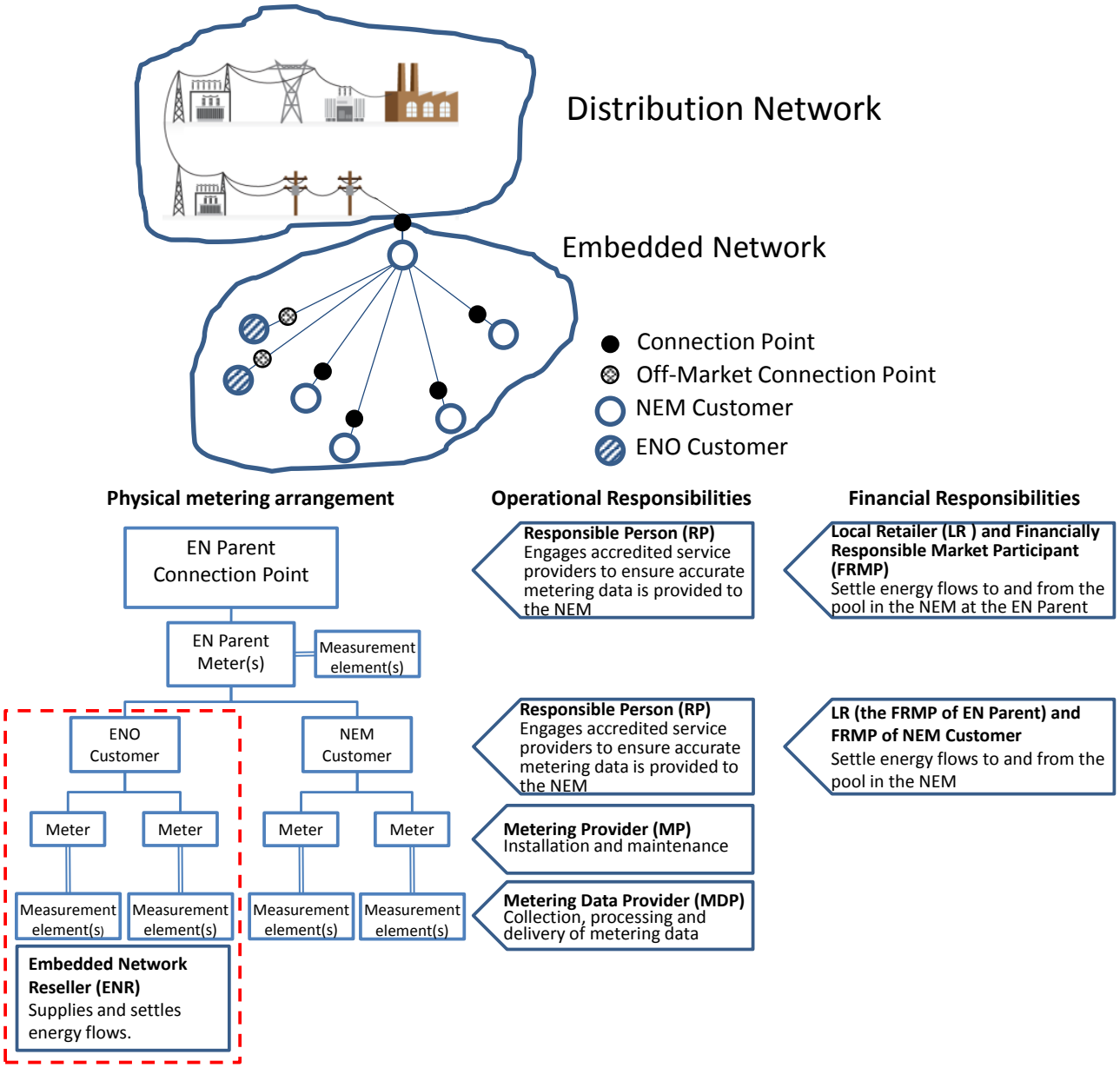
[19] See *NEM ROLR Processes* v1.2, AEMO, 1 July 2012

A.2 Embedded Networks

A.2.1 Terminology

Embedded Networks are not specifically identified in the NER, instead the provisions of the NER and Retail Market Procedures come into effect through regulations imposed by jurisdictions.

An Embedded Network exists where a connection point is supplied through another connection point:



The key terms for the Embedded Network diagram are explained below:

- **Parent Connection Point:** is the point of supply between a distribution network and an Embedded Network[20].
    - As this connection point is on the national grid, it is treated in the same way as a connection point at a single premises (and has a NMI).

[20] Or one Embedded Network and another.

- As for all connection points (aside those that are unmetered), there is a metering installation that may have one or multiple meters, each with one or multiple measurement elements.
- Settlement within the NEM is based on (flow directional) metering data at NEM customer connection points.

- **NEM Customer**: is a customer at a connection point within the Embedded Network supplied by a FRMP. This is a second-tier load. Energy flows measured at a NEM Customer connection point's meters are settled in the NEM. The responsibilities of the FRMP, RP, MP and MDP detailed in the NER and Retail Market Procedures apply. The ENO charges the NEM Customer for network access.
- **ENO Customer:** is a customer at a connection point within the Embedded Network supplied by the ENR. This is a first-tier load. The NER and Retail Market Procedures do not apply (nor to the metering installation, meters or measurement elements). That is, there is no requirement for it to have a NMI registered in NEM systems, or to have an RP or an accredited MP or MDP appointed. The ENO charges the ENO Customer for network access.
- **Parent Meter:**
  - The parent meter at an Embedded Network measures electrical flows at the parent connection point as well as to all connection points within the Embedded Network. That is, the electrical flows measured at a parent connection point include the electrical flows measured by meters associated with downstream connection points.
  - For the purposes of the NEM, the determination of the electrical flows at a parent connection point requires knowledge of the electrical flows at NEM Customer connection points.
  - This hierarchical metering arrangement is referred to as 'subtractive metering arrangements that facilitate settlements related to different customers.
- **Measurement element:** As for single premises.

A.2.2 Operational Responsibilities

The key operational responsibilities for an Embedded Network are described in this section.

Parent Connection Point

As the parent connection point is attached to a distribution network (or another Embedded Network), the parent connection point can be treated, operationally, as a connection point at a single premises.

NEM and ENO Customer Connection Points

The LNSP for the distribution network to which the Embedded Network is connected, must provide a range of NMIs to the 'LR' for the Embedded Network (this is the parent connection point's FRMP - see section 3.4.2.1), who is responsible for the creation of NMI Standing Data in MSATS for NEM customer connection points. While the LNSP is responsible for electricity supply to the parent connection point (as it is attached to the LNSP's distribution network), it is not responsible for supply to NEM Customers and ENO Customers within the network. The LNSP has no other operational responsibility within an Embedded Network.

The Embedded Network Operator (ENO), rather than the LNSP, is responsible for the provision of the following distribution services to customers within Embedded Networks:

- Customer connection and energisation/de-energisation/re-energisation;
- Maintenance and rectification of faults associated with the Embedded Network's electrical installation; and

- Maintaining the capability to safely and reliably supply electricity at the required quality to the customers (that are downstream of parent connection point).

As NEM Customer connection points are not connected to a distribution network, these distribution services cannot be requested in accordance with the B2B procedures. Therefore, the Embedded Network Operator is not subject to the obligations for transacting with other Registered Participants detailed in the B2B procedures. Where a customer or their FRMP require a distribution service to be performed, the FRMP needs to contact the Embedded Network Operator directly using practices acceptable to both parties.

A.2.3 Trading relationships in Embedded Networks

The key trading responsibilities for an Embedded Network are described in this section.

Local Retailer

The FRMP for the parent connection point is the LR for an Embedded Network and all ENO Customer connection points on an Embedded Network. In the context of an Embedded Network, they are a first-tier retailer (even though they could be a second-tier retailer at the parent connection point).

Retailers, other than the LR for the Embedded Network, that have financial responsibility for NEM Customer connection points on an Embedded Network are, in the context of the Embedded Network, second-tier retailers.

This concept is important when considering the settlement of NEM Customer connection points on Embedded Networks and differs from single premises as not only second-tier parent connection points need to be individually settled in the NEM, but the (second-tier) NEM Customer connection points also need to be individually settled in the NEM. This approach (settlement by difference) ensures that all FRMPs in the NEM (including all LRs) only settle for energy consumed by their customers (i.e. customers who they can bill).

As the LR of all NEM Customer connection points within an Embedded Network, the LR is entitled to receive metering data (at the measurement element level) for all NEM Customer connection points on the Embedded Network. Only these connection points are currently recorded in MSATS and used in NEM settlement. While NMI Standing Data is maintained in MSATS for first-tier connection points on distribution networks to facilitate NMI discovery it would currently give no visibility of ENO Customer connection points. Thus an LR, or any potential retailer, has no visibility of the ENO Customer connection points.

Financially Responsible Market Participant

The LR of an Embedded Network is financially responsible for all energy that flows into the Embedded Network. This is consistent with their financial responsibility as the FRMP of the parent connection point, but they are referred to as the first-tier retailer of the Embedded Network. This FRMP is also the LR for the ENO Customer connection points.

Where a retailer other than the Embedded Network LR has financial responsibility for a NEM Customer connection point, they are called a second-tier retailer (even though they can be a first-tier retailer elsewhere).

FRMPs of NEM Customer connection points have the retail relationship with customers. As such, they use the detailed metering data (at the measurement element level) for customer billing purposes.

Retailer of Last Resort

The outcome of a RoLR Event being declared is a change to the Market Participant assigned to the LR and/or FRMP roles at a metering installation (i.e. NMI).

The treatment of RoLR events for LRs and FRMPs at metering installations on an Embedded Network are the same as for single premises.

Embedded Network Operator

The Embedded Network Operator may have a financial interest in the energy flows at all connection points in its distribution area; this will depend on the basis by which they choose to recover their costs. Unlike LNSPs, ENOs are not covered by the NER; their billing of network use of system charges is determined by commercial agreement. They must, however, be exempted from NER registration by the AER and are subject to AER guidelines.

Consequently, as the Embedded Network Operator is not entitled to metering data under the NER, access to such data will need to be governed by a separate agreement between the Embedded Network Operator and the customer or the FRMP of the child connection point.

Embedded Network Reseller

The Embedded Network Reseller is effectively the energy supplier for ENO Customers. Unlike FRMPs, ENRs are not covered by the NER. They must, however, be exempted from NER registration by the AER and are subject to AER guidelines.

Metering

The components of metering installations at parent connection points are governed by the NER and Retail Market Procedures (especially the Metrology Procedure).

Metering installations at child connection points must also be installed and maintained in accordance with the Rules and the Metrology Procedure. However, key differences have been imposed through jurisdictional directions and RPs must ensure that they comply with the Metrology Procedure requirements specific to metering installations in Embedded Networks:

In situations where specific arrangements for metering installations at child connection points are defined, these arrangements require the metering installations at the parent connection point and all child connection points to have the same metering installation type.

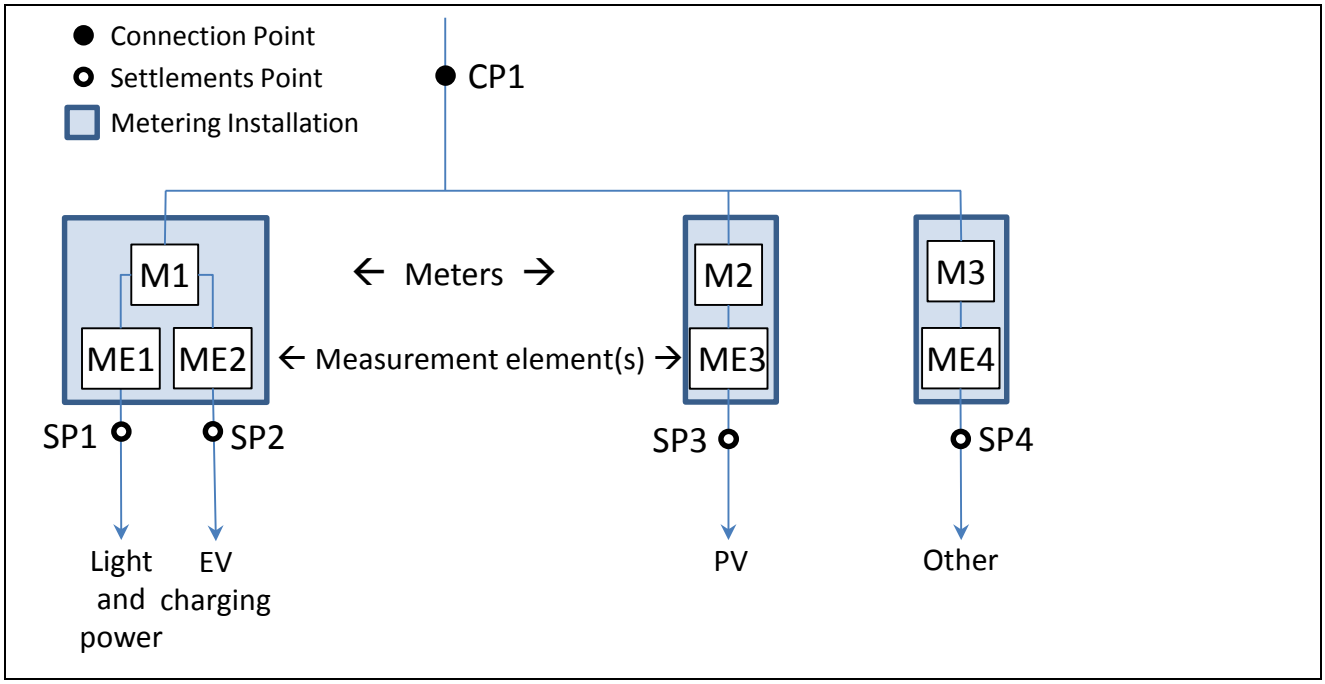
- In SA and Victoria, all meters must be interval meters; and
- In NSW, all meters must be either interval meters or accumulation meters.

B Proposed Parallel and Subtractive Metering Arrangements

This appendix describes the parallel metering arrangements, which can only be applied at a single premise, and subtractive metering arrangements, which can be applied either at a single premises or in an Embedded Network required to support the proposals in this document.

B.1 Parallel Metering Arrangement

Parallel metering results in settlements points 'in parallel' downstream from the connection point (gross metering)



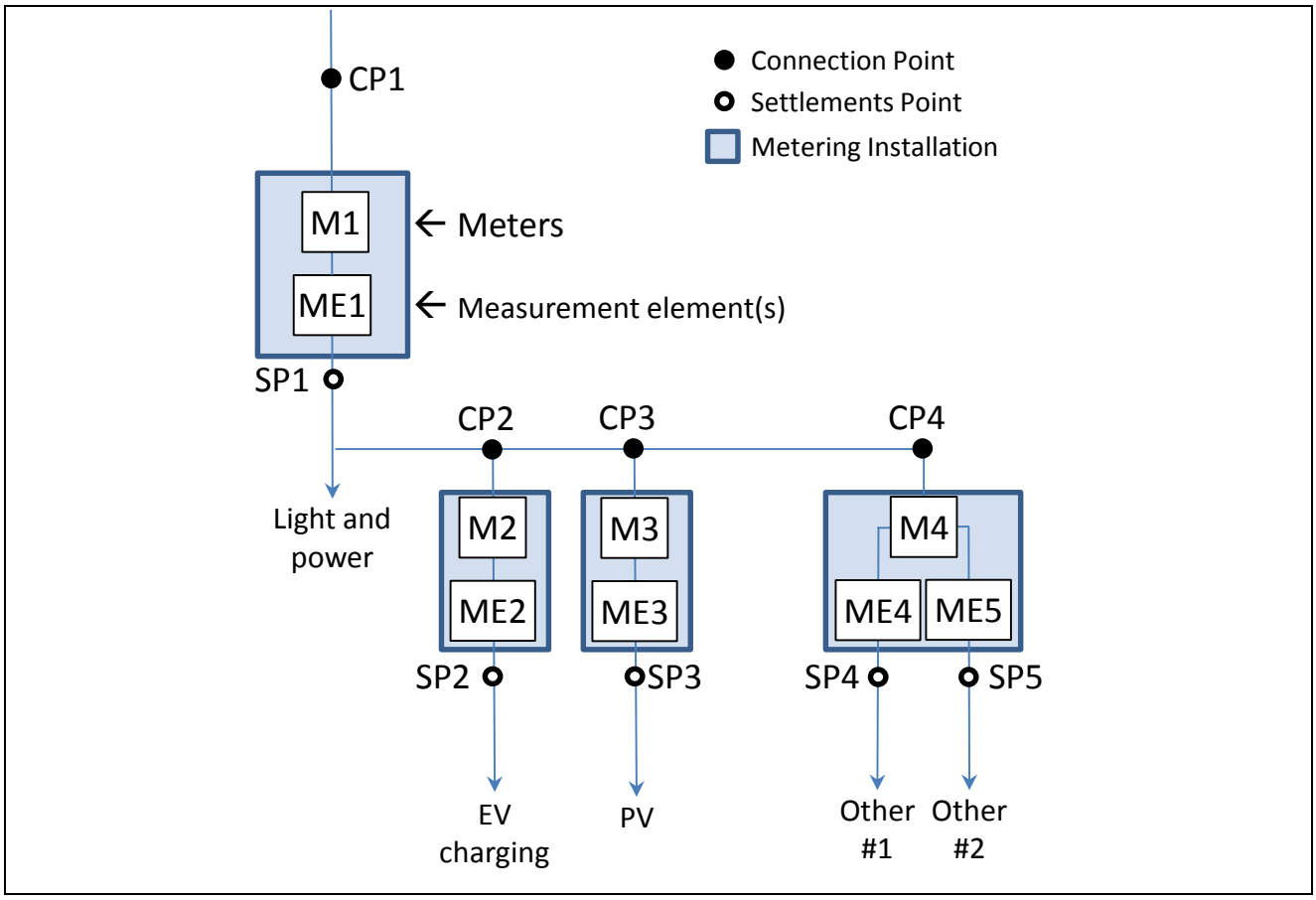
The 'parallel metering arrangement' schematic is applicable to connection points within both single premises and Embedded Networks. It represents a single connection point with:

- a single metering installation (to which a NMI will have been allocated)
- three meters (M1, M2 and M3) one of which (M1) has multiple measurement elements,
- four circuits that are separately metered, and
- four settlements points.

Under this scenario, each settlements point can be settled without affecting or being affected by any other settlements point; that is, each settlements point stands-alone.

B.2 Subtractive Metering Arrangement

Subtract metering results in settlements points with 'subtractive' metering downstream from the connection point.



This schematic will generally apply to Embedded Networks, though it could be applied equally at a single premises except that the connection points labelled CP2, CP3, and CP4 would not exist. It represents a single connection point with:

- four metering installations (to which four NMIs will be allocated),
- one of the metering installations (M1) having three metering installations beyond it;
- each of the subordinate metering installations having separate meters (M2, M3 and M4),
- one meter having multiple metering elements (M4),
- five circuits that are separately metered (ME1, ME2, ME3 and ME4), and
- five settlements points.

The measurement of flows attributable to settlements point#1 – and not the downstream settlements points – can only be settled by taking account of the energy flows at those downstream settlements points. That is, the settlement quantity of settlements point#1 will be the energy flows at M1, less those at M2, M3 and M4.

C Glossary and Abbreviations

C.1 Glossary

TERM	DEFINITION
CATS Procedure	MSATS Procedures: Consumer Administration and Transfer Solution (CATS) Procedure
connection point	The agreed point of supply established with a Network Service Provider.
customer	A consumer who has, or is proposing to have, a commercial relationship for supply by a retailer or network.
Distribution Use of System (DUOS) Charges	Charges to recover the costs of a distribution network. These charges include transmission use of system charges.
Embedded Network	A group of connection points within a private network that is connected to a distribution network or transmission network[21] operated by an LNSP. The electrical wiring that links the parent connection point and downstream connection points in an Embedded Network are owned, operated and controlled by an Embedded Network Operator.
Embedded Network Operator	A person who has gained an exemption from the AER to register as a Network Service Provider, and known as an Embedded Network Operator.
ENO Customer	A customer taking supply at a connection point within an Embedded Network who is supplied by a FRMP that is the FRMP for the parent connection point of the Embedded Network.
Embedded Network Reseller.	A person who has gained an exemption from the AER to register as a Retailer, and known as an Embedded Network Reseller (ENR). The ENR supplies energy to ENO Customers.
first-tier	The classification of a connection point and customer when their LR is their FRMP.
Market Customer	An entity registered with AEMO as a Customer and as a Market Participant, and who classifies load as market loads to be settled by AEMO.
Market Participant	An entity registered with AEMO in any category of Market Participant, including Market Generator and Market Customer.
measurement element	An energy measuring component which converts the flow of electricity in a power conductor into an electronic signal and / or a mechanically recorded electrical measurement.
National Grid	The combination of transmission networks and distribution networks in the NEM (but not Embedded Networks).

[21] There are only a very small number of Embedded Networks connected to Transmission Networks, these typically being mining sites in remote areas.

TERM	DEFINITION
NEM Customer	A customer taking supply at a connection point within an Embedded Network who is supplied by a FRMP other than the FRMP for the parent connection point of the Embedded Network.
parallel metering arrangement	A metering arrangement where there are two or more primary ('level 1') settlements points commonly connected behind the connection point. There are no secondary ('level 2') settlements points. Each settlements point is directly downstream of the connection point and is electrically separate from each other.
Parent Connection Point	The connection point between an LNSP's distribution network and an Embedded Network.
primary settlements point	Under MTR arrangements, a settlements point at which all flow through a connection point is measured in a subtractive metering arrangement.
Responsible Person	Is accountable for the provision, installation and maintenance of a metering installation and the collection, processing and delivery of metering data for the metering installation.
Retail Market Procedures	Currently comprises: the B2B procedures; the Market Settlement and Transfer Solution (MSATS) Procedures; and the metrology procedures.
Retailer	An entity registered with AEMO as a Market Customer and is approved by the AER or a jurisdictional authority to retail electricity to consumers.
second-tier	The classification of a connection point and customer when their LR is not their FRMP.
secondary settlements point	Under MTR, a settlements point in a subtractive metering arrangement which is not the primary settlements point but which is supplied via the primary settlements point.
settlements point	A point at which the NEM is settled, trading and operational relationships are assigned and metering data is available. Each connection point must have at least one settlements point, with a settlements point able to be established wherever a measurement element within a NER compliant meter exists.
subtractive metering arrangement	A metering arrangement where there is at least one meter that measures an energy flow that is also measured in at least one other meter. The metering is hierarchically arranged downstream from the connection point. A key feature is that energy flows at one meter needs to be calculated by deducting the energy flows measured in another meter.

C.2 Abbreviations

ABBREVIATION	MEANING
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CP	Connection Point
DRM	Demand Response Mechanism
DSP	Demand Side Participation
DUOS	Distribution Use of System
EN	Embedded Network
ENO	Embedded Network Operator
ENR	Embedded Network Reseller
FRMP	Financially Responsible Market Participant
LNSP	Local Network Service Provider
LR	Local Retailer
MDP	Metering Data Provider
ME	Measurement element
MP	Metering Provider
MSATS	Market Settlement and Transfer Solution
MTR	Multiple Trading Relationships
MTREN	Multiple Trading Relationships and Embedded Networks Project
NEM	National Electricity Market
NER	National Electricity Rules
NMI	National Metering Identifier
RoLR	Retailer of Last Resort
RP	Responsible Person
SP	Settlements Point
SCER	Standing Committee on Energy and Resources