AEMC

REVIEW

Australian Energy Market Commission

DRAFT REPORT

Framework for Open Access and Common Communication Standards Review

19 December 2013

Submissions due 30 January 2014
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About the AEMC

The Council of Australian Governments (COAG), through its then Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. In June 2011, COAG established the Standing Council on Energy and Resources (SCER) to replace the MCE. The AEMC has two main functions. We make and amend the national electricity, gas and energy retail rules, and we conduct independent reviews of the energy markets for the SCER.

Foreword

Advancements in smart metering technology have the potential to allow new products and services to be developed. Consumers will be provided with new choices and ways of interacting with their energy suppliers and managing their consumption. The AEMC's Power of Choice review made a number of recommendations where the overall objective was to provide that the community's demand for energy services is met by the lowest cost combination of demand and supply side options. This objective would be best met when consumers use electricity at the times when the value to them is greater than the cost of supplying that electricity.

The purpose of this review is to recommend a communication and access framework that supports smart meters, and contestability in demand side participation (DSP) and related services which are enabled by these meters. This review continues from recommendations that we made under the Power of Choice review.

This report sets out our draft findings, which are aimed at supporting commercial outcomes that provide value to customers. Our findings include clarifying the communication architecture under the National Electricity Rules (NER) and the adoption of common market communication standards (or 'protocols'). A number of issues relating to the regulatory framework have been raised, which will require further work.

There are a number of developments related to DSP services and metering contestability. This review is considering the smart meter access and communication framework. Other related issues include work being undertaken by the Standing Council of Energy and Resources (SCER) on the regulation of third party energy providers, and the metering contestability rule change request which SCER has recently submitted to the AEMC. Where relevant, this report includes explanations of the relationship between the different projects.

To assist the AEMC in this review, an advisory stakeholder working group was established. The members of the working group represents a broad spectrum of interested parties including consumer groups, retailers, distribution network operators, smart metering manufacturers and market institutions. We have met with the working group on four occasions and they have provided the AEMC with expert views and valuable insights. I extend my thanks to the members of the working group and look forward to their continuing contributions for the remainder of the review.

John Pierce
Chairman, AEMC

Summary

The Standing Council of Energy and Resources (SCER) has asked us to provide advice on a framework for open access and common communication standards to support contestability in metering and services enabled by smart meters.

In preparing this advice we have considered what is meant by 'open access' and whether adopting communication standards would provide efficient outcomes for market participants and therefore benefits for consumers. A key aspect is also assessing the extent to which regulation would be required to support the arrangements for allowing appropriate access to a smart meter. Throughout our work we have acknowledged there are, and taken account of, a number of other ongoing reforms related to this review.

The advancement of smart metering technology has the potential to allow new services and products to be developed for consumers. Existing market participants, as well as new service providers, will have the opportunity to engage customers for services enabled by the new technology. Smart metering providers may also enter the market. We are undertaking this review because a communication and regulatory framework that supports these services is required to allow these services to be provided in an efficient manner.

To assist us with this review we have established an advisory stakeholder working group to provide advice and contribute to the development of our thinking. The working group has members that represent key sectors of the industry including consumers, retailers, distribution businesses, third party service providers and smart metering manufacturers. Market bodies including the Australian Energy Market Operator (AEMO) and the Australian Energy Regulator (AER) are also represented.

Our analysis has also been developed to promote the National Electricity Objective (NEO), providing protection to consumers and promoting consumers' choices and options.

The recommendations build on existing metering and communication provisions, making additions and clarifications to take into account the new requirements of smart metering technology. Our aim is to support commercial outcomes where possible.

In the remainder of the review we will consider the necessary regulatory arrangements to support open access. This would include assessing the extent to which changes to the energy laws and market rules may be required. Our final advice will also consider the implementation requirements, taking into account the processes that may be required to make changes to the laws or rules if such changes are recommended. Opportunities to consult on these arrangements will be explored prior to finalising our advice.

Relevant concepts

In order to assess the communication architecture that could apply to smart meters and develop the appropriate access arrangement, a number of concepts were introduced during our analysis process and discussed with the advisory stakeholder working group. These concepts are explored in detail throughout this report. One of the key considerations is the access and interoperability spectrum, which attempts to provide a definition for the underlying access framework. In this case, interoperability refers to the ability of different parts of the smart metering infrastructure and communication network to work together.

Another concept is the introduction of a "Smart Metering Provider" (SMP) for the purpose of analysis. The SMP is the party that undertakes the role of managing access to a smart meter (this may not necessarily be the party that provides the physical metering infrastructure). The functions and responsibilities of the SMP are an enhancement of the currently defined roles under the National Electricity Rules (NER). These functions and responsibilities in managing access include managing security and congestion at the smart meter for access by multiple parties. Further consideration is required as to whether a new market participant of an SMP needs to be defined under the NER or whether the role of the SMP should be carried out by an existing market participant (such as the metering provider). We have also introduced the concepts of the 'point of entry', which is the point at which the SMP provides access to a smart meter, and the 'level of access' which, once entry is provided, refers to the types of functionality to which a party has access.

We would encourage submissions to be based on these concepts to allow further discussion and analysis to be carried out on a similar foundation.

Consumer protections

The introduction of smart metering technology could potentially introduce new service and products. The way in which service providers interact with consumers may also be very different from traditional arrangements, which could present new risks to consumers. There are a number of provisions already in place such as those under the Federal Privacy Act and the National Privacy Principles, as well as under the National Energy Customer Framework. In terms of our review, we will further consider whether any recommendations that are made under this review would present additional risks to consumers that are not appropriately protected under existing arrangements. We welcome any comments on this issue.

Accreditation of third party service providers and SMPs

Under the current regulatory framework, licensing and accreditation arrangements are in place such as retailer authorisation requirements under the National Energy Retail Law (NERL) and distributor licensing under jurisdictional arrangements. Metering Data Providers (MDPs) and Metering Providers (MPs) are accredited by AEMO.

The role of the SMP appears to be linked to that of the MP and therefore accreditation by AEMO may be appropriate. If such a role were to be introduced, it would be appropriate to further consider whether they should be accredited by AEMO.

Subject to the outcomes of SCER's recommendations for regulating third party service providers under the broader regulatory framework, consideration is required as to whether third party service providers should be registered market participants and/or accredited by AEMO for access to smart metering functionality.

Common market protocol

It is recommended that a common communications standard be used for the communications between the accredited parties and the 'point of entry' to the smart metering infrastructure. The communication standard for this section of the communication path has been referred to as a common market protocol. A common market protocol would significantly reduce development costs for accredited parties compared to developing systems for multiple metering providers. Also, requiring a common market protocol would allow smart meters to continue to be used in an environment of changing relationships with consumers, without the need for unnecessary meter replacement or the accredited party developing systems to accommodate multiple protocols.

The common market protocol could either be based on the internationally accepted meter protocol DLMS/COSEM,[1] or be a services based protocol specifically developed for smart meter communications in the NEM. This will be further considered in the remainder of this review.

DLMS/COSEM is an open non-proprietary meter protocol fully described by a number of published International Electrotechnical Commission (IEC) standards. It has been successfully used globally to support smart meter deployments. While most of these deployments have been in Europe it has also been deployed in Australia and is gaining strong support in several Asian energy markets. The use of IEC standards is likely to increase the ability for smart meter infrastructure to be integrated in future smart grid developments. The use of IEC standards was proposed in the Standards Australia smart grid roadmap as other Australian standards for metering and smart grids are also based on equivalent IEC standards.[2]

A possible disadvantage of using a metering protocol as the common market protocol is that the accredited parties would primarily be interested in the services and it may be more useful to accredited parties that the protocol defines the communications in terms of the high functions that accredited parties would use. We note that one

1 Device Language Message Specification (DLMS) is a generalised protocol based on existing IEC standards. Companion Specification for Energy Metering (COSEM) is sets the rules, based on existing standards, for data exchange with energy meters. Further information is available at http://www.dlms.com/index2.php.

2 The Standards Australia roadmap for smart grids is available at http://www.standards.org.au/Documents/120904%20Smart%20Grids%20Standards%20Road%20Map%20Report.pdf.

possible approach to developing a services based smart meter market protocol would be to extend the existing business to business (B2B) communications system that is operated by AEMO and allows participants to perform a defined set of business to business transactions.

Managing the development and maintenance of the market protocol

Over time the common protocols used for smart meter communications need to be maintained to accommodate new functionality and changes to the associated communications standards. The development and ongoing maintenance of the common market protocol should be undertaken by an independent entity such as AEMO.

AEMO would be well placed to maintain the protocol as its activities are governed by the NER, including the rules consultation procedures[3] for developing its procedures. AEMO already manages the metrology procedures, which sets out the obligations in relation to metering installations for market participants, and would be responsible for maintaining the smart meter functional specification under the recent rule change request for competitive meter provision. If DLMS/COSEM is adopted as the common market protocol then AEMO would need to maintain the companion specification. If a services based market protocol is adapted from the existing B2B arrangements then AEMO may not be regarded as sufficiently independent to maintain the protocol. We welcome any comments on whether AEMO is the appropriate body to maintain any common communication protocols, or whether an alternative entity is more appropriate.

Another aspect of maintaining the common market protocol is whether new functionality needs to be specified in the protocol before it is used. Allowing new functions to be developed on a trial basis would provide more innovation in the short term, but may reduce the ability of different parties and applications to work together in the longer term if multiple versions of similar functions cannot be rationalised for inclusion in the common market protocol. We are, therefore, also seeking stakeholder's views on whether new functions should be defined in the companion specification before they can be implemented.

Meter protocol

Communications between the point of entry and the smart meter does not necessarily need to use the common market protocol. Metering providers could use a proprietary protocol to communicate with their smart meters provided they maintain a protocol translator. Allowing vendors to use their own proprietary protocols means that they can offer smart meter infrastructure that is already deployed in other markets and this may reduce initial investment costs, although it would necessitate the SMP developing and maintaining a protocol translator. Also, protocol translation could be used in Victoria if different protocols are used in the remainder of the NEM.

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3 The rules consultation procedures are defined in rule 8.9 of the NER. Consulting parties are required to apply the rules consultation procedures when it is a requirement under the NER.

However, allowing protocol translators may increase the costs of implementing new functions as additional functionality will need to be added to the protocol translator, as well as the smart meter and accredited party's systems. Allowing protocol translators also increases the risk of meter churn if a metering provider exits the market or no longer supports a proprietary protocol.

It is envisaged that having a market protocol that is based on DLMS/COSEM would be a strong incentive for metering providers to also base their meter communications on DLMS/COSEM. This would reduce the need for protocol translation and provide a high degree of interoperability for accredited parties. Metering providers that use other communication standards may risk their investments being stranded when smart meter infrastructure is integrated into future smart grid solutions.

We welcome comments on whether a DLMS/COSEM should be adopted as a common meter protocol, or whether metering providers should be free to deploy proprietary protocols. We note that protocol translation would be required for existing smart metering infrastructure.

Regulating access

Regulation would impose a cost and should only be considered in cases where problems impacting the efficient operation of the market have been identified. We will undertake further analysis and assessment of whether there is a need to regulate the right of access to smart metering infrastructure and the prices that may be paid for this access. In this report we have raised a number of issues for comment and welcome your views on these matters.

Transitional arrangements for Victoria

Our review is considering the development of a national framework for access to smart meters and common communication standards. That is, our recommendations are expected to apply in all jurisdictions in the NEM. However, we recognise that Victoria has already implemented smart metering infrastructure under its own arrangements. We expect that Victoria would transition to the national arrangements over time to the extent that this is efficient to do so. The transitional requirements require further consideration. We welcome any comments on this matter.

Next steps

Our draft report and the recommendations outlined are open for consultation. We have identified specific issues on which we are seeking comments and require further development. In addition, we welcome submissions on any other aspect of this draft report.

We will continue to meet with the advisory stakeholder working group and plan on holding a public forum in February 2014.

Our final advice will be submitted to the SCER at the end of March 2014 and then published within two weeks thereafter.

Contents

1 Introduction

This review is to provide advice to the Standing Council on Energy and Resources (SCER) on the requirements for a framework for open access and common communication standards required to support communication in demand side participation (DSP) and other end user energy services enabled by smart meters. Our final advice is to include an implementation plan that identifies necessary market and regulatory changes and, if necessary, a draft rule change request.

We have interpreted open access to mean allowing accredited parties to have access to required data and functionality to support metering contestability and DSP and related services.

The report sets out our draft recommendations and findings, on which we are seeking stakeholder comments.

Stakeholders are invited to provide written submissions by no later than 5pm on Thursday, 30 January 2014. Section 1.5 outlines how submissions may be lodged.

1.1 Request for advice

The Australian Energy Market Commission (AEMC) received the terms of reference from SCER on 25 July 2013, which relates to one of the recommendations in the Power of Choice Review.[4] The terms of reference require that the following topics are considered under the review:

- the requirements and arrangements (including requirements under the National Electricity Rules (NER)) for open access including appropriate, effective and efficient access security arrangements;
- whether international developments in smart meter communications standards have converged sufficiently to recommend the adoption of common standards or, if convergence is not sufficiently well developed, recommend a framework for adopting common communication standards when it is appropriate; and
- how DSP energy services enabled by smart meters (i.e. the access arrangements) should be regulated.

As required by the terms of reference, also within the project scope is the consideration of an implementation plan for any recommendations, which is to include consideration of how the arrangements for regulating access could apply to the existing smart meter rollout in Victoria or to other existing smart meter installations.

As further required by the terms of reference, in developing this review, we are to have regard to:

4 AEMC, *Power of choice review - giving consumers options in the way they use electricity*, 30 November 2012, p. 68

- the National Electricity Objective (NEO);
- supporting competitive neutrality;
- ensuring consumer protections;
- proposing changes which are proportionate to the issues identified; and
- related work including:
  - our Power of Choice final report, including associated consultant reports and submissions;
  - SCER's Energy Market Reform Working Group smart meter consumer protection and safety review work program; and
  - various reports prepared by the National Stakeholder Steering Committee of the National Smart Metering program.[5]

1.2 Scope of the review

There are three key components within the scope of the review, and there is likely to be interdependencies between each of the components. These components are as follows:

- establishing the framework for open access to smart meters;
- determining the elements of the framework that should be subject to regulation; and
- determining whether common communication standards should be adopted and, if so, the framework or process for the adoption or development of the standards.

The following topics are outside of the scope of this review:

- the development of the actual common communications standards to support open access; and
- consideration of the framework for competition in metering and data services for residential and small business consumers.

1.3 The Advisory Stakeholder Working Group

We have established an advisory stakeholder working group, as required under the terms of reference, that we have been consulting with throughout the review.[6] The

5 SCER, *Terms of Reference: Australian Energy Market Commission (AEMC) Open access and common communication standards to support contestability in demand side participation (DSP) end user services enabled by smart meters,* 25 July 2013, p.5.

group includes members from all relevant sectors of the energy market including government, market bodies, businesses and end use consumers. The members of the advisory stakeholder working group are listed in Appendix A.

The advisory stakeholder working group has contributed substantially to this review and we will continue to engage with them in preparing our final advice.

1.4 Structure of the report

This report is structured as follows:

- Chapter 2 outlines the background to the review;
- Chapter 3 sets out the principles and assessment framework that we are using for this review;
- Chapter 4 presents the core communication concepts relevant to this review;
- Chapter 5 outlines a detailed analysis of the smart meter communication architectures and protocols; and
- Chapter 6 outlines the factors for consideration for the regulatory framework.

1.5 Lodging submissions

Written submissions from stakeholders and interested parties in response to this draft review must be lodged with the AEMC by no later than 5pm, 30 January 2014.

Submissions should refer to the project number "EMO0028" and be sent electronically through the our online lodgement facility at www.aemc.gov.au.

All submissions received during the course of the review will be published on our website.

While we will have full regard to all submissions lodged within the specified time period, late submissions may not be afforded the same level of consideration. To ensure that we are able to fully consider all submissions, we request that stakeholders lodge their submissions by no later than the due date.

6 SCER, *Terms of Reference: Australian Energy Market Commission (AEMC) Open access and common communication standards to support contestability in demand side participation (DSP) end user services enabled by smart meters,* 25 July 2013, p.5

2 Background

In December 2012, the Council of Australian Governments (COAG) and SCER agreed to a broad energy reform package to support investment and market outcomes, which included consideration of DSP in the market. As a part of these reforms, SCER agreed to progress a number of the Commission's recommendations from the Power of Choice review. Undertaking this review was one of those recommendations.

2.1 The Power of Choice review

The Power of Choice review was completed by the AEMC on 30 November 2012. The purpose of the review was to identify market and regulatory arrangements that would allow the community's demand for energy services to be met by the lowest cost combination of demand and supply side options. This would bet be achieved when consumers are using electricity at the times when the value to them is greater than the cost of supplying that electricity.

Under the Power of Choice review, we recommended that there should be a competitive approach for metering and data services for the residential and small business sector. To support competition, we recommended that:

- a framework is introduced in the NER that provides for competition in metering and data services for residential and small business consumers; and
- a framework is established for open access and common communication standards to support competition in DSP end user services enabled by smart meters.

We note that the first recommendation outlined above in relation to introducing a framework to provide for competition in metering will be considered through a rule change request, which has been received from SCER. The second recommendation will be addressed through this review, as it seeks to establish a framework for open access and common communication standards to support DSP.

2.2 Scope of the review

For consumers to obtain services enabled by smart meters, such as flexible pricing or load management, parties offering these services would need to have access to the smart meter. These parties, such as retailers or a new energy provider, would need to communicate with the smart meter installed at a consumer's premises in order to carry out the required functions. This review is examining whether communication standards should be adopted to allow the communication with the smart meter to be carried out more efficiently. It is also examining the regulatory framework required to allow authorised parties access to smart meters. The following table summarises the scope of this review.

Table 2.1

Issue	Description	In/out of scope
Communication standards		
International developments	Whether international developments in smart meter communication standards have converged	Within scope
Standards for the NEM	Whether smart meter communication standards should be adopted for the NEM	Within scope
Types of standard(s)	If communication standards should be adopted for the NEM, what types of standards (e.g. a market standard or meter standards - see additional discussions in Chapter 4)	Within scope
Custodian of standard(s)	Who should be the custodian of standards for the NEM.	Within scope
Framework for adopting standard(s)	What would be the appropriate process for the development and/or adoption of standards for the NEM.	Within scope
Developing standard(s)	Carrying out development of standard(s)	Out of scope - it is expected that, should it be recommended under this review, the development of standards would occur under a separate process by industry.
Regulatory framework		
Authorised or accredited parties	Determining the parties that may need access to smart meters; whether these parties should be accredited	Within scope (see below regarding energy service companies and third party service providers)
Security and prioritisation	Determining the extent to which security and prioritisation requirements should be regulated	Within scope
Services being provided	Assessing the types of services that may be enabled by smart metering technology and the extent of regulation that should apply to these services (not the functions of smart meters)	Within scope
Rights of access	Whether rights to access smart meters should be enforced under the NER	Within scope

Issue	Description	In/out of scope
Price for access	Whether prices for access should be subject to regulation	Within scope
Regulation of third party service providers and energy service providers	Regulation of these parties under the National Electricity Law and/or the National Energy Retail Law	Out of scope - being considered by SCER

2.3 Related projects

There are a number of ongoing projects which relate to promoting efficient investment in smart meters and increasing choices available to consumers in managing their electricity consumption. These projects are examining the role of third party service providers and metering contestability, and will propose arrangements that support new services and products enabled by smart meters. We have, and will continue to, take these other related projects into account throughout the review. The table below outlines the list of related projects.

Table 2.2 List of related projects

Issue	Description	Status	Relevance to the review
Metering contestability	Rule change (to the NER) to introduce metering contestability	SCER official's rule change request has been submitted to the AEMC.	We have noted that the rule change request proposes the introduction of metering contestability and the Metering Coordinator (MC) role. (Any recommendations on the adoption of common communication standards would likely apply whether or not there is metering contestability.)
Minimum functionality of smart meters	Defining the smart meter minimum functionality specification.	This is included in the metering contestability rule change request.	We have noted that the rule change request proposes that AEMO maintains the minimum functionality specification for smart meters and that the specification could vary by jursidiction.
Third party service provider access to data.	Clarifying third party access to energy data under the NER.	SCER official's rule change request has been submitted to the AEMC.	This rule change is to consider expanding the current provisions to clarify the rights of access to data for consumers and their agents.

Issue	Description	Status	Relevance to the review
Regulation of third parties.	The extent of regulation required for services other than the sale of electricity under the National Electricity Law (NEL) and/or the National Energy Retail Law (NERL).	SCER is undertaking work in this area.	SCER's recommendations may affect accreditation arrangements for third party service providers with respect to accessing smart meter functionality.
National smart meter consumer protection and safety review	SCER has completed this review examining the NEL and NERL in relation to the provision of smart metering services.	A number of amendments are to be made to the NEL, NERL and the National Energy Retail Rules (NERR).	We have taken into account the changes to be made and will further assess whether any recommendations under this review will require additional consumer protection measures.
Multiple meters at a consumer's premises	Multiple meters at a consumers residence could mean that there are multiple Financially Responsible Market Participants (FRMPs) at one residence. A recommendation in the Energy Market Arrangements for Electric and Natural Gas Vehicles review proposed that multiple meters should be allowed at a consumer's premises.[7] This would also allow a consumer to have multiple FRMPs.	SCER requested that the Australian Energy Market Operator (AEMO) develop a detailed rule change request which addresses this issue. AEMO is currently progressing this work.	In assessing access and communication standard requirements, we will take into account any impacts of a consumer potentially having multiple FRMPs.

7 AEMC, *Energy market arrangements for electric and natural gas vehicles*, 11 December 2012, pp.80-81.

3 Principles and assessment framework

The principles and assumptions outlined in this chapter outline the framework that we are using to develop our recommendations.

3.1 Key principles

The proposed framework for open access and communication standards will need to promote the NEO. The following principles give effect to the NEO and will guide our assessments and analysis:

- Competition in DSP and related services, and competitive neutrality – the framework should promote and encourage the development and innovation of DSP services in the market, either with or without the use of a smart meter.
- Innovation of DSP and related services - the framework should seek to ensure that innovation in the market is not stifled.
- Consumer protection - the framework should have regard to appropriate consumer protections.
- Proportionality – the framework should provide a level of regulation that is proportional to the market's requirements.

3.2 Assumptions

There are a number of related projects currently underway which will have an impact on the review, and the development of these projects will need to be taken into consideration throughout the review process. Given that, a number of assumptions have been made in order to assist us to determine our recommendations:

- The minimum functionality specification of smart meters determined by SCER applies. Under the review, we are assessing the degree of regulation required for those functions.
- The framework for the regulation of third parties is to be determined by SCER. To the extent necessary and appropriate, third parties and their roles will be considered under the review.
- Where relevant to the analysis, any impacts on the role of the MC will be considered.
- All participants will continue to have access to metering data and the associated functions that they have under the existing rules.
- Charges may apply to access data and functions of smart meters, other than the current arrangements for metering data. The framework for whether the charges

should be regulated and whether certain data or functions should be free to certain parties are to be determined under this review.

4 Core communication concepts

4.1 Introduction

The main attributes of modern smart meter infrastructure are that it provides intelligence in the smart meter at a consumer's premises; that the smart meters can be accessed remotely via two-way communications networks; and requires a smart meter application in the accredited party's computer system.[8] That is:

- the individual smart meters can perform functions that are significantly more advanced than a traditional accumulation meter; and
- the smart meter communications network allows parties that are accredited to access the smart meter functions (accredited parties), the ability to send instructions to the smart meter and retrieve data from the smart meter remotely from the consumer's premises.

Therefore, it is important that the framework for providing smart meter communications can effectively enable the use of the smart meter functionality in order to support competition in end user energy services.

To realise all the potential benefits of deploying smart meter infrastructure will involve providing multiple parties access to the smart meter's functionality including: the customer, the retailer, the distribution business and third party DSP and energy service providers, in addition to the metering data providers that currently have access to the consumption data. It is also important that the smart meter communications network provides this support on an ongoing basis beyond the initial smart meter deployment.

The smart meter infrastructure deployed in the NEM, including in any given distribution network, may be deployed by several different smart meter service providers offering different technology solutions.[9] This could have the potential to reduce the ability for some accredited parties to communicate with some meters if no standards are applied.

In the context of multiple smart meter service providers and multiple accredited parties, some of which may change during the life of metering assets, careful consideration needs to be made as to how to standardise smart meter communications.

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8 An accredited party is any entity that is entitle to access the smart meter's data and functions. This would include the consumer's retailer, the associated network business, the MDP, MP and third party energy services companies

9 The framework for the competitive provision of metering being established through the rule change request "Introducing a new framework in the National Electricity Rules that provides for increased competition in metering and related services", which was submitted to the AEMC by the SCER officials in October 2013. This rule change request also proposes that AEMO establish, maintain and publish a smart meter functionality specification. Each jurisdiction would have the ability to require new and replacement meters in its jurisdiction to include some or all of this functionality as a minimum. The AEMC will separately process this rule change request.

That is whether to require specific standards and protocols to be used in the smart meter communications network to satisfy the long term interests of consumers.

4.1.1 Assistance from Phacelift

Due to the specialised nature of the matters being considered, we engaged Phacelift to assist with the review. In particular, Phacelift facilitated the discussions on smart meter communication network architectures and associated concepts at our advisory stakeholder working group meetings. The content of Chapters 4 and 5 of this draft report takes into account of Phacelift's presentations and issues raised by stakeholders in the working group meetings.[10]

4.2 Criteria for assessment of smart meter communications networks

To assess what framework would effectively provide ongoing access to the smart meter functionality, it is necessary to establish criteria to analyse the associated issues and stakeholder perspectives. This is particularly so in the case of smart meter communications as there is such a diverse range of stakeholders with interests in different aspects of the provision and use of smart meter infrastructure.

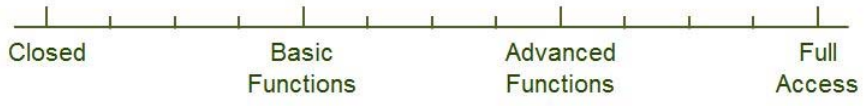
The two criteria chosen to analyse the operation of the smart meter communications are the access arrangements and interoperability.

4.2.1 Introduction to access

The level of access can be defined in terms of which of the smart meter functions can be accessed by a given individual accredited party or group of accredited parties. Access can range from "no access", where an accredited party has no access to the meter functionality, to "full access" where all the functionality of the meter is available. No access would deliver no benefits, while full access[11] could potentially be a risk to system security and privacy if access to the meter's functions is not restricted in some way. The appropriate level of access would fall between these two extremes.

Therefore, the level of access to the smart meter functions can be characterised as access to basic functions only, access to basic and advanced functions, or full access to the all the functionality of a smart meter. This can be represented on the following access spectrum.

Figure 4.1 Access spectrum



10 Phacelift's presentations are available on the AEMC's website.

11 In early ASWG meetings "full access" was also referred to as "open access".

For the purposes of this advice, the smart meter functions have been placed in the following classifications:

- basic functions[12] - this includes existing metrology functions, as currently defined in the rules for type 1 to 4 metering installations,[13] plus metering support functions for maintaining the smart metering system;
- advanced functions - the other functions that are fully defined in the smart meter functionality specification, which is a document that details and defines the functions of smart meters;[14] and
- new functions - are functions that are not specified in the smart meter functionality specification but may be developed by one or more stakeholders.

Note that under the rule change request for the competitive provision of metering,[15] it is proposed that each jurisdiction would be able to specify which of the basic and advanced functions would make up the minimum smart meter functionality for new and replacement meters in that jurisdiction. That is, some of the advanced functions may be fully specified in the smart meter functional specification but not implemented in each smart meter.

4.2.2 Introduction to interoperability

A smart meter communications network can also be characterised by the level of interoperability. Interoperability is the ability for different parts of an integrated system to operate together. In the case of smart meter infrastructure, interoperability is a measure of how difficult it is for different accredited parties to communicate with a range of smart meters from different vendors. That is, whether the accredited parties would need to install separate applications in their computer systems for each of the different models of consumer meter.

Interoperability differs to access in that interoperability refers to the simplicity by which the communication path (between an accredited party and a meter) is established, while access refers to whether the accredited party is allowed to use that path to operate the smart meter's functions. Interchangeable refers to communication paths that are easy to use, whereas Not Interoperable refers to no communication path. The discussion on Interoperability is to be undertaken with the introduction of an intermediate party who can interface between the accredited parties and each smart meter.

12 In the first two Advisory Stakeholder meetings this was referred to a metrology functions.

13 Type 1-4 metering installation contain interval meters that can be remotely read, as defined in the NER.

14 Under the rule change for the competitive provision of metering AEMO would maintain the smart meter functionality specification and it would include all smart meter functions where there is a specified manner for their implementation.

The communications path and, therefore, the level of interoperability can be characterised by the selection of protocols,[16] the nature of any intermediary, and the architecture of the smart meter communications network. The level of interoperability can be represented on the following spectrum.

Figure 4.2 Interoperability spectrum

Like access, interoperability can be represented on a spectrum. The spectrum used in this analysis ranges from:

- not interoperable - where each Metering Provider (MP) chooses different protocols and then requires accredited parties to develop unique software solutions to suit those protocols;
- protocol translation - where individual meters contain their own proprietary protocol that is translated into a selected market protocol by an intermediary. Each intermediary negotiates a protocol for use by each accredited party. This will result in multiple software applications interacting with a customer's smart meter;[17]
- common protocol - where individual meters contain a common protocol (a common meter protocol) and all intermediaries[18] offer all accredited parties a common protocol (common market protocol); and
- interchangeable - where one meter could be swapped for another without any protocol impacts for all accredited parties seeking access to the meter.

The actual level of interoperability will vary along the spectrum depending on the architecture and the selected protocols.

4.2.3 Access and interoperability combined

The access and interoperability spectrums can be combined to provide a 2-dimensional view of the access and interoperability criteria. This 2-dimensional view can be used to

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15 Under the rule change request, no entity would have the exclusive right to provide metering services. Rather, meters would be installed when additional meter functionality is required to support the services being offered to a consumer.

16 In this context, the term 'protocol' means technology rules (as distinct from administration rules) that are established by vendor software at specified interfaces along the communication path.

17 This is essentially the arrangements for the New Zealand deployment of meters where predominantly only one accredited party communicates with the meter.

18 In architectures where there is no intermediary, the common protocol would be used by each accredited party.

provide an indicative depiction of the levels of access and interoperability for a given smart meter communications network architecture.

4.3 Key smart meter communication network concepts

Before applying the access and interoperability 2-dimensional view it is also necessary to consider some key features of computer systems that are applicable to communications with smart meter infrastructure.

4.3.1 Role of smart meter provider

The deployment of smart meters with multi-party access places increased importance on the management of access, security and congestion (within the communications network), which is not as applicable for meters that only offer the metrology function. The duties associated with this increased emphasis are not currently assigned to any party under the NER.

Therefore, for the purposes of our analysis, the additional responsibility of managing the point of access to a smart meter has been assigned to the smart meter provider (SMP), who is a virtual entity for the purpose of establishing access and interoperability principles. The SMP's would provide and manage the point-of-entry used by accredited parties to operate the meter's functionality. In particular, the SMP would be responsible for managing matters such as:

- the level of access;
- data security arrangements;
- congestion on the smart meter communications network; and
- the validation of messages sent between the accredited parties and the smart meters.

The SMP would predominantly incur operating costs to manage the point of entry and the use of the communications network between its interface and the smart meter.

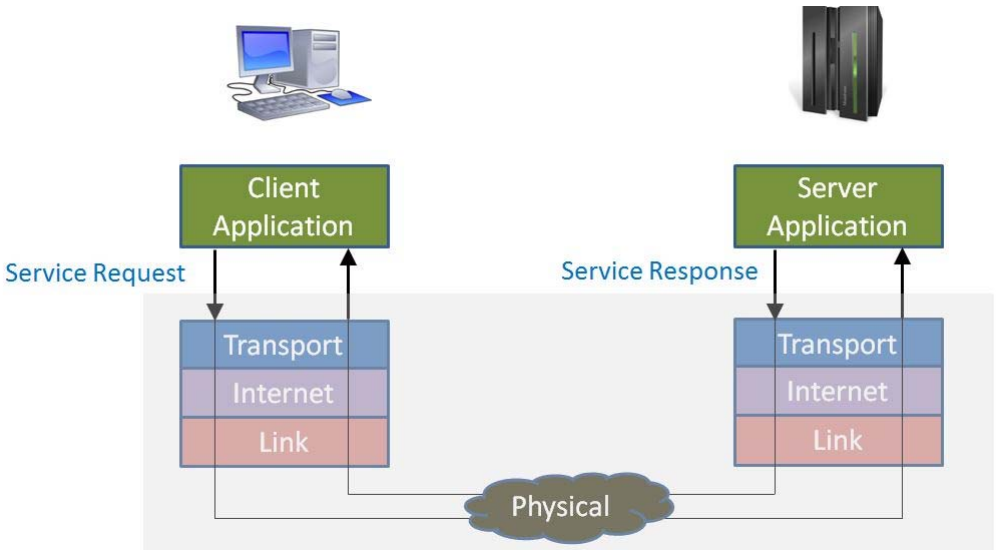
The responsibilities of the SMP contrasts with that of the MP, who is responsible for configuring its meters for metrology settings and to manage congestion for metrology data. This is predominantly a capital intensive business to cover the costs of the installed meters, communications modems and, if necessary, private communications networks.

The responsibilities (and possible role) of the SMP is considered further in Chapter 5.

4.3.2 Internet layers model for computer communications

The design of modern smart meters communication networks are based on the internet layers model. Under this model the complexity of the actual communications at the lower levels is hidden from the information exchange between the applications. A five layer representation of the internet layers model is shown in the following figure.[19]

Figure 4.3 Internet layers model for computer communications

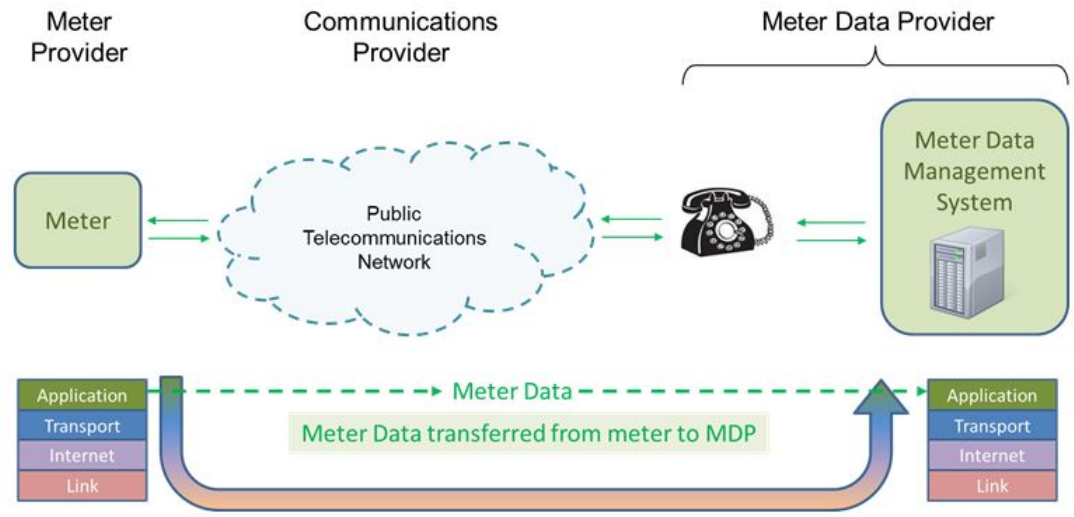


Under the internet layers model, an application in one computer communicates with an application[20] in another computer. In the case of smart meter infrastructure, an application in an accredited party's computer system communicates with either an application in the smart meter at the consumer's premises, or with a SMP's application. The following figure provides the example of the communications path to read a remote type 1 to 4 metering installation.

19 The five layer internet modal is a simplified version of the seven layer open system interconnection (OSI) internet communications model. An introduction to the OSI model is available at http://www.infotransec.com/sites/infotransec.com/files/OSIModel.pdf.

20 Computer applications are pieces of software that operate within a computer to implement a given function

Figure 4.4 Example of internet layers model - reading type 1-4 metering installation



4.3.3 Application layer communications protocols

The development and operation of the application level software requires very little knowledge of the operation of the lower layers. This allows smart meter applications to be developed independently of the communications media, such as mesh radio, 3G, 4G/LTE or the public internet. To makes this work, the format for the communications between the internet layers is defined by the chosen protocol at each interface in the communications path.

An example of an internationally accepted protocol for communications for smart meter applications is DLMS/COSEM. DLMS/COSEM is an open non-proprietary meter protocol fully described by a number of published IEC standards. It has been successfully used globally to support smart meter deployments. While most of these deployments have been in Europe it has also been deployed in Australia and is gaining strong support in several Asian energy markets. It is noted that DLMS/COSEM is included in the smart grids roadmap prepared by Standards Australia in 2012.[21]

The Victorian smart meter deployment selected communications solutions developed in the USA. These systems tend to employ the common American meter protocol described in the ANSI C12 series of metering standards.

In the absence of a common meter protocol meter vendors in Australia have offered a range of proprietary meter protocols. These proprietary protocols can be used for remote communications, for example types 1 to 4 metering installations. When using a range of proprietary protocols the Metering Data Provider must employ suitable

21 The Standards Australia roadmap for smart grids is available at http://www.standards.org.au/Documents/120904%20Smart%20Grids%20Standards%20Road%20Map%20Report.pdf

protocol translators to convert the proprietary data into a common format (as described above in the interoperability spectrum).

In addition to DLMS/COSEM and ANSI C12 protocols, several proprietary smart meter communications protocols have been developed by specific manufacturers.

There are no standard market protocols available to an intermediary. There are no internationally recognised protocols. Attempts have been made to use international common information models to describe market protocols, these models are typically based on the meter protocol. Identifying an open non-proprietary protocol for use as the market protocol is more difficult. The Common Information Model described in IEC-61970 has been extended via IEC 61968 to include Meter Reading and Control. It is noted that these standards provide a high level description ('schema') of a market protocol, with work required to develop the actual protocol. Completing the details in the schema would be easier if the market protocol is based on the meter protocol. Other choices would be based on vendor offers that could be used in an 'open' manner.

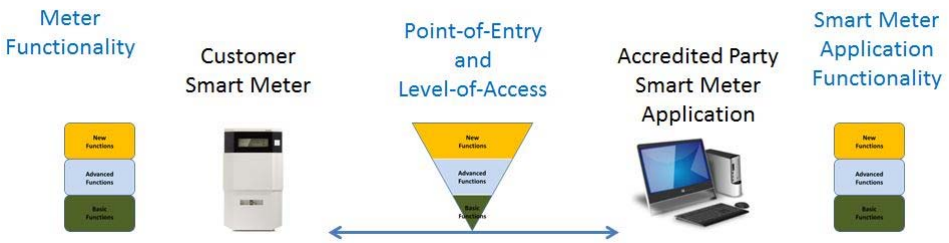
The protocol or protocols used for the deployment of smart meters in the NEM will have a significant impact on the level of interoperability that can be achieved.

4.3.4 Point-of-entry and level of access

The point of entry is where an accredited party's access to the smart meter infrastructure (and whether the ability to use a specific smart meter function) may be restricted. The location of the point of entry in the smart meter infrastructure has implications for the management of access and the level of interoperability.

The point of entry can be used to place restrictions on which parties can operate the smart meter functionality, and the extent of that functionality available to that party. It can also be used to control which data sets a given accredited party can access. This defines that party's level of access. The following figure illustrates these concepts. The level of access is shown in terms of basic, advanced and new functionality at the smart meter and at the accredited party. The point of entry and the level of access is shown as the triangle.

Figure 4.5 Point of entry between a smart meter and the accredited party



The security of the smart meter infrastructure is managed at the point of entry. If the point of entry is at the meter then security must be managed with a system of

passwords. If the point of entry is remote from the meter then security will be managed by the SMP.

The level of access defines which smart meter functions that an accredited party can access. This will depend on their relationship with the consumer and their role in the market. The level of access can be defined in terms of the ability to access just the basic functions, basic plus advanced functions or full access including new functions.

In addition to restricting access to the smart meter's functionality at the point of entry, accredited parties may also incur charges for using the meter's functions from the point of entry. The potential need to regulate charges for accessing smart meter infrastructure is discussed in Chapter 5.

The current Rules support two points of entry to access the metering data in a type 1 to 4 metering installation. These are:

- direct access to the meter where the point of entry is at the meter; and
- market entry point where the point of entry is remote from the meter.

These are depicted in the following figures.

Figure 4.6 Point of entry at the meter

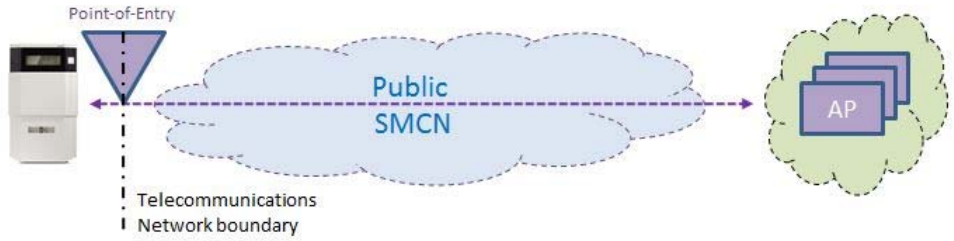
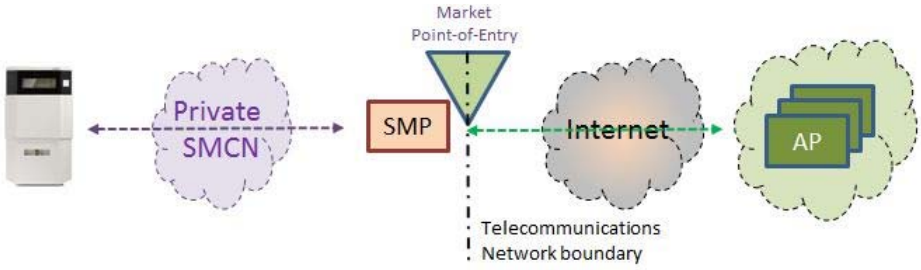


Figure 4.7 Market point of entry



SMCN is the smart meter communications network, SMP is the smart meter provider and AP is the accredited party.

The implications of different locations for the point of entry for a smart meter communications network are discussed in Chapter 5.

4.3.5 SMP's smart meter application

The SMP uses a smart meter application to interact with the smart meters they manage. However, their application differs to those used by accredited parties since they are also required to manage access, data security and communications congestion in addition to providing message validation.

When the point of entry is at the meter the SMP is essentially providing password management. When an accredited party establishes a relationship with a customer the SMP configures the meter and assign a new password to the accredited party. Should the customer chose a new accredited party, the SMP will delete the old password from the meter and assign a new password to the new accredited party.

When using a market point of entry, the SMP directly manages all accredited parties access to the smart meter infrastructure. As introduced in the interoperability spectrum it is also possible for the SMP to offer a protocol translator. In this case the SMP smart meter application receives messages from accredited parties using a market protocol and translates them into a meter protocol before forwarding to the meter.

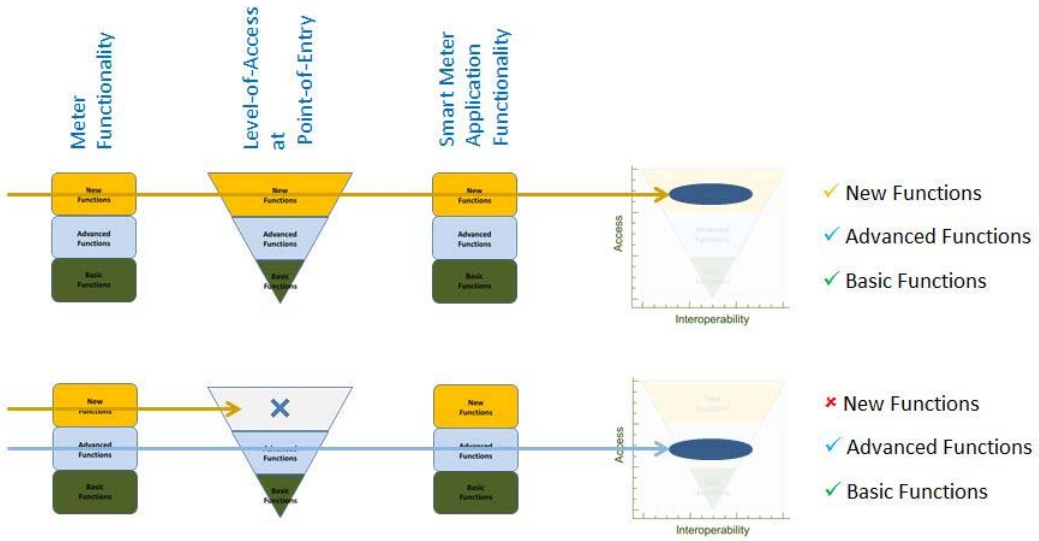
4.3.6 End to end connectivity

End to end connectivity refers to the ability of an accredited party to access a function within the smart meter at a consumer's premises.

For an accredited party to access and use a specific function it is necessary for the applications in the smart meter and the applications in the accredited parties own systems to include the function. In addition, it is necessary for the smart meter protocol and the Accredited Parties 'head end system' protocol to be matched, either directly or via the SMP's Protocol Translator.

In the case of the point of entry being at the meter, the communications network would simply pass the communication message directly to the meter, provided the function was included in the meter protocol. However, in the case of the point of entry being remote from the meter the SMP also needs to support the function and allow the accredited party appropriate access to the function.

Figure 4.8 End to end connectivity



A market point of entry introduces a further complication due to the smart meter application used by the SMP. In addition to the protocol(s) needing to describe the functionality, the SMP smart meter application may also need to include specific functionality. This is particularly relevant when the SMP application is translating market protocols into a meter protocol. If the protocol translator does not support the functionality then accredited parties will be unable to access the functionality in the meter.

4.3.7 Level of security

It is important that there is a low risk of unauthorised access to the smart meter's functionality, including:

- limiting access to accredited parties that have a relationship with the associated consumer; and
- restricting the access of these accredited parties to only those functions they have a legitimate reason to access.

Failure to adequately limit unauthorised access to the smart meter's functions could:

- allow access to consumer's confidential data, including consumption data and any tariff information stored in the smart meter;
- allow uncontrolled connection or disconnection of a consumer, or at least its appliances under direct load control; and
- compromise the secure and reliable operation of the electricity system.

Thus the level of security can be defined in terms of the systems in place to restrict unauthorised access to the smart meter's functionality.

4.3.8 Network congestion management and prioritising of communications

A modern smart meter communication network is significantly more sophisticated than the communications for existing type 1 to 4 metering installations. This is due to the requirement for multiple accredited parties to access the smart meter's functionality and the increased volume of communications required for the additional smart meter functionality.

This increased volume of communications means that there is the potential for delays in the execution of some functions at time of high usage of the smart meter communications network. Such delays are referred to as congestion and mean that the execution of urgent functions may compromise the reliability and security of the distribution network.

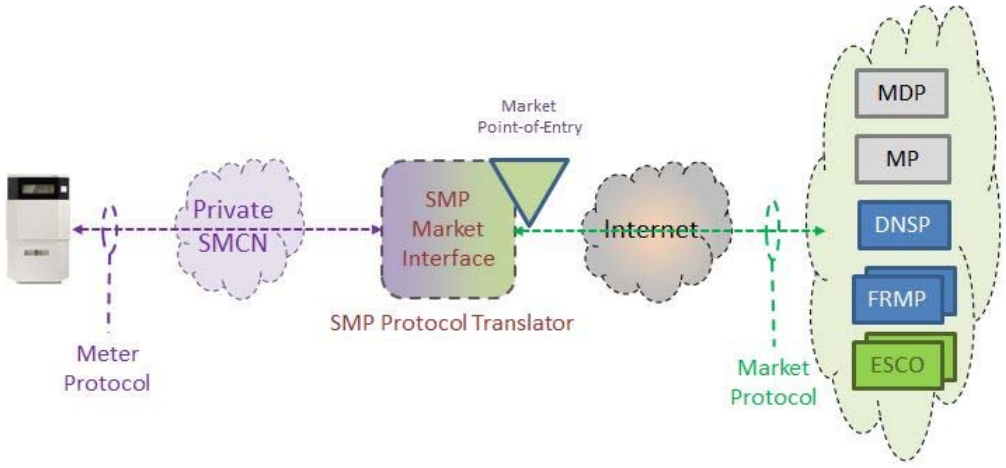
Therefore, the smart meter communications network needs a congestion management system to allow some accredited parties to have priority access to the smart meter's functionality during times of system emergency.

4.3.9 Meter and market protocols

The level of interoperability of the smart meter infrastructure depends greatly on the protocols used and can also depend on the location of the point of entry.

The meter protocol defines the interface standards between the applications in a smart meter and the applications in the SMP. Similarly, the market protocol defines the interface standards between an accredited party's applications and the SMP's application. This is demonstrated in the following diagram.

Figure 4.9 Location of the meter and market protocols



SMCN is the smart meter communications network and SMP is the smart meter provider.

5 Initial recommendations for smart meter communications architectures

This Chapter sets out the considerations of the smart meter communications requirements required to support competition in DSP and other end user energy services enabled by smart meters. In particular, the Chapter explains the reasoning and the factors we took into consideration in assessing the requirements for smart meter open access and communications standards that provide:

- an efficient level of interoperability of the smart meter infrastructure; and
- appropriate levels of access to the smart meter functionality, while allowing effective management of data security, congestion management and message validation

Our initial recommendations do not consider what communications technologies[22] should be deployed, allowing the selection of the communications media to be determined by the provider of the smart metering infrastructure. Rather the initial recommendations address specific communication interfaces in the end-to-end connection between an accredited party and the smart meter.

5.1 Initial recommendations

5.1.1 Interoperability

We recommend that a common market protocol be used for smart meter communications. This is likely to promote efficient communications between the multiple accredited parties and the multiple SMPs.

The common market protocol could either:

- be based on the internationally accepted meter protocol DLMS/COSEM; or
- be a services based protocol specifically developed for smart meter communications in the NEM.

We recommend that the development and ongoing maintenance of the common market protocol be undertaken by an independent entity such as AEMO. We welcome any comments on whether these are appropriate parties.

We also need to consider whether a common meter protocol should be adopted, or whether SMPs should be able to use proprietary meter protocols and employ protocol

22 Common communications technologies for smart meter infrastructure include mesh radio, 3G, 4G/LTE or the public internet. The selection of the most economically communications technologies will depend on the relative density of the deployment and the availability of each alternative.

translators as an interface to the common market protocol. We are seeking comment on the following options:

- adopting a common meter protocol based on the internationally accepted DLMS/COSEM protocol;
- adopting a common protocol based on DLMS/COSEM, except in Victoria where protocol translation could accommodate existing metering investment; and
- no common meter protocol is adopted and protocol translation is allowed throughout the NEM.

5.1.2 "Open access" architecture

The NER currently support the provision of two different points of entry for meter communications networks, one at the meter and one at a remote point from the meter (the market point of entry). This would allow the SMPs to develop the necessary systems to manage access to the meter functions, including managing the level of access, level of security, congestion and message validation. No further consideration to changes to the end-to-end connection architecture needs to be introduced to manage access to smart meter functionality.[23]

We have created the role of SMP for the purposes of this analysis. We are seeking comment on whether the SMP's responsibilities should be retained in a separate role, or whether these responsibilities should be added to an existing role such as the MP or the MDP. Consideration of whether it could be part of the MC role would be required if that rule is implemented following the Commission's considerations of the competitive metering rule change request.

5.2 Common market protocol

As discussed in Chapter 4, the market protocol is the protocol used for the communications between the accredited parties and the point of entry controlled by the SMP.

Adopting a common market protocol would provide a number of benefits:

- increase the ease of communicating with multiple parties and reduce the requirement for, and cost of, developing applications;
- reduce the need to replace smart meters due to an inability to communicate with them;
- promote competition in the provision of metering services and energy services; and

- reduce barriers to entry for DSP and related services.

Consideration of each of these issues is provided below.

The accredited parties need to be able to communicate with smart meters for every consumer with whom they have a relationship. This means developing applications to communicate with each associated SMP's point of entry, for which there may be many. If SMPs use different market protocols, then this would represent a significant amount of application development, and potentially costs, for each of the multiple accredited parties as they would need to develop many different applications. This is particularly true if, over time, the consumer associated with one SMP changes its relationships to include new accredited parties.

Thus a common market protocol would provide efficient communications between all the accredited parties and all the SMPs, as all relevant parties would have existing applications to communicate with the smart meter and/or the SMP. That is, a common market protocol would allow accredited parties to build one application that could communicate with all other SMPs with minimal further work. It would allow consumers to change retailers and form new relationships with energy service providers, while reducing the need for the smart meter to be replaced or to develop new applications to communicate via a different market protocol.

The reduced need to replace meters or to avoid the development of new smart meter applications would be likely to promote competition in the provision of DSP and related services as the consumer's ability to choose retailers or energy service providers would not be restricted by whether an energy service provider can communicate with the installed smart meter. This would promote the NEO through a likely lower cost of providing metering services in the longer term. This is because a common market protocol would reduce the costs of changing retailer or other energy service providers, as well as reducing barriers to new entrants as they would only need to develop smart meter applications for one market protocol. New entrants would more easily be able to develop the required communication applications and would only need one main application to communicate with a number of different parties and providers.

Therefore, we recommend that a common market protocol is adopted for the NEM. We are seeking stakeholder views on whether a common market protocol would be required to encourage the competitive provision of DSP and related services, and therefore, support the long term interests of consumers.

5.3 Selection of a common market protocol

If a common market protocol were adopted for the NEM smart meter infrastructure then there may be significant advantages basing the protocol on an internationally

23 While a market point of entry is likely to be required for smart meter deployment, point of entry at the meter should be retained in the NER as it is the architecture generally used for existing type 1-4 metering installations.

recognised standard. Alternatively, the NEM could develop its own services based protocol. This section considers some of the advantages of these two options.

5.3.1 Smart grid interoperability

In the future it is likely that increasingly sophisticated smart grid systems will be deployed in the NEM. This will involve the integration of smart meter infrastructure with other related systems including distributed generation, distributed storage, electric vehicles and increased levels of grid monitoring and control equipment.

To deliver all the potential benefits of deploying smart grid systems it will be necessary for all the components of the smart grid to operate effectively together. This is most likely to occur if the design standards and communications protocols are taken from an integrated suite of smart meter and smart grid standards, such as those from the International Electrotechnical Commission (IEC) or National Institute of Standards and Technology (NIST).[24]

5.3.2 DLMS/COSEM

DLMS/COSEM[25] is an entire suite of protocols that together define a common protocol and methods for communicating with a range of meters in an unambiguous manner. The protocol defines many more features than are required to meet the Australian deployment of smart meter infrastructure. DLMS/COSEM is being used in several European smart meter rollouts including Spain, Germany and the UK.

The DLMS User Association maintains the DLMS protocol. There are now over 270 members from over 50 countries. The protocol is comprehensive and includes certification testing of devices for compliance. Members of the DLMS User Association are able to request protocol enhancements to support new functionality. The DLMS User Association coordinates discussion of new functionality and updates to the relevant standards and certification requirements on behalf of its members.

DLMS/COSEM protocol is made up of a number of individual IEC standards for data exchange and communications between the various internet layers.

There is an existing close relationship between the IEC and Standards Australia, with many Australian Standards heavily based on existing European standards. For example meter accuracy tests specified in Australian metering standards are largely re-badged versions of the equivalent IEC standards. This simplifies the adoption of DLMS/COSEM in Australia.

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24 In 2012 Standards Australia published a smart grid roadmap that is available at http://www.standards.org.au/Documents/120904%20Smart%20Grids%20Standards%20Road%20Map%20Report.pdf. This roadmap considers similar roadmaps for IEC and NIST.

25 Further information available in the Phacelift International comparison is available on the AEMC website.

Other benefits of adopting an internationally accepted protocol like DLMS/COSEM include:

- the existing protocol is likely to already support all the metrology and advanced functions, as well as specifying the communications requirements for many new functions;
- the availability of standard programs to interact with products using the protocol;
- the availability of consultants with knowledge of the protocol that can assist accredited parties to develop smart meter applications; and
- the ability for Australian consultants to acquire skills that can be sold into other markets that adopt the same protocol.

5.3.3 Developing a services based market protocol

A possible disadvantage of using a metering based protocol as the market protocol is that the accredited parties would primarily be interested in the services that the smart meter provides, rather than the functionality described by an international protocol like DLMS/COSEM. Therefore, it may be more useful to accredited parties that the protocol defines the communications in terms of the services that accredited parties would use.

The development of a DLMS/COSEM Companion Specification starts with Use Cases converting required services into functionality. In the Australian context Use Cases would convert required services into functionality which is then described in the smart metering infrastructure specification. The smart metering infrastructure specification would describe how an accredited party would use the service via the common market services protocol.

We also note that the NEM participants already have the AEMO provided Business-to-Business (B2B) gateway protocol for metering and other business communications.[26]Therefore, one possible approach to developing a services based smart meter market protocol would be to extend the existing B2B arrangements.

5.3.4 Areas for comment

We are seeking stakeholder views on the appropriate selections of a common market protocol. In particular:

- should an internationally accepted meter protocol form the foundation of the NEM common market protocol?

26 The B2B is a business to business communications system that allows participants to perform a defined set of business to business transactions. The B2B procedures are developed by the

- is DLMS/COSEM sufficiently well developed to be used as the foundation for a market protocol, given the potentially synergies that exist with smart grid interoperability and other meter standards?
- would the costs of developing an Australian specific services based common market protocol be likely to deliver sufficient benefits compared to using an internationally accepted metering protocol?
- would extensions to the B2B gateway present a viable option for the development of a services based common market protocol?

5.4 Maintaining the common market protocol

5.4.1 Entity responsible for maintaining the common market protocol

Over time the common protocols used for smart meter communications will need to be maintained to accommodate new functionality and enhancements to the associated communications standards. Such new functionality can arise from a number of sources including additional:

- advanced functions being added to the smart meter functionality specification and thus needing to be incorporated into the communications protocol;
- new functions being developed by individual accredited parties and MPs that have sufficient market acceptance for their recognition in the protocol; and
- data security and congestion management functionality being further developed, either by an Australian entity or through the international entity responsible for maintaining the standards.

In each case, an Australian entity would be required to develop and maintain the documentation for implementing the common market protocol.[27]

The advantages of AEMO maintaining the common market protocol include:

- AEMO's activities are governed by the NER;
- AEMO is currently the entity under the NER that maintains the existing metrology procedures;
- AEMO could be required to apply the existing rule consultation procedures when changes are considered; and

Information Exchange Committee, which is an industry based committee established by AEMO under the NER.

27 In the case of DLMS/COSEM the companion specification that would document the Australian implementation would need to be developed and maintained.

- The ability for AEMO to jointly coordinate the development of the smart meter functionality specification and the associated communications protocols.

We are seeking stakeholder views on the appropriate entity to maintain the documentation for a common market protocol. In particular:

- would AEMO be the most appropriate entity to develop and maintain the common market protocol?
- is there the potential for the responsible entity to adversely impact on the competitive provision of DSP and related services?
- would AEMO be regarded as sufficiently neutral, should the common market protocol be based on the existing B2B arrangements, as the B2B procedures are maintained by the Information Exchange Committee, established by AEMO?

5.4.2 Adding new functions to the common market protocol

The common market protocol would fully define all the basic and advanced functions, but by their nature new functions would not necessarily be well specified. Rather new functions may not currently exist and are likely to be developed on a trial basis by individual accredited parties and MPs. This raises the question:

> "should accredited parties and MPs be able to develop new functionality in isolation, or should new functions need to be identified and described in the SMI functionality specification before the functions are used?"

Allowing new functionality to be developed in isolation to the remainder of the market is likely to promote innovation in the short-term as individual accredited parties and MPs may be able to obtain a first mover advantage when a new function is developed.

However, over time it is likely that different implementations of essentially the same function could be developed by different businesses. If this happens it may be difficult to agree an enhancement to the common market protocol. In the longer-term reduce the level of interoperability of the smart meter infrastructure.

The difficulty of standardising on a common implementation of new functions would be significantly reduced if DLMS/COSEM were adopted as the foundation of the common market protocol. This is because DLMS/COSEM includes specifications to support many more functions than are currently envisaged in the NEM, and will be updated with additional functionality developed by the DLMS User Association.

Also, a requirement for new functions under development to be initially included in the functional specification and, at a later date, in the common market protocol may not be a significant barrier to innovation as much of the competitive advantage that could be gained from new functionality lies in the innovative use of the functions in the provision of consumer services, rather than in the functions themselves.

We are seeking stakeholder's views on whether the accredited parties and MPs should be required to define new functions in the smart meter functionality specification[28] before they can be implemented. In particular:

- would requiring new functions to be fully documented before they are used stifle innovation and reduce competition in the provision of DSP and related services?
- would not requiring new function to be documented be likely to lead to reduced levels of interoperability, and hence reduce competition in the provision of DSP and related services in the longer term?

5.5 Common meter protocol

As discussed above, there is a case for a common market protocol to provide efficient communications for accredited parties at the market point of entry. However, where access is managed using a market point of entry, there is the option to allow the SMP to use a protocol translator to convert to a proprietary protocol.

A potential advantage of allowing vendors to use their own proprietary protocols is the ability to offer smart meter infrastructure that is already deployed in other markets. This may reduce initial investment costs but would necessitate the SMP developing and maintaining a protocol translator to the common market protocol. Also, protocol translation could be used in Victoria to support the common market protocol by their existing advanced metering infrastructure (AMI) meters.

However, having multiple meter protocols with protocol translators has several disadvantages including:

- the protocol translator needs to be updated when new functions are developed, which may cause implementation delays and additional costs;
- the proprietary protocol may not support new functions without the need for further development; and
- any installed meters would need to be replaced if the vendor exits the market or no longer supports its older smart meters.

This may reduce innovation and increase the need for meter replacement in the longer term. Therefore, competition in DSP and related services may be best promoted by adopting a common meter protocol. Also, if a common meter protocol were adopted, it would be very desirable that the market protocol be based on this meter protocol in order to reduce processing of the messages by the SMP at its point of entry.

We are seeking stakeholder's views on whether a common meter protocol should be adopted, or whether SMPs should be able to use protocol translators. In particular:

28 It is noted that the smart meter infrastructure functionality specification is being used as the Companion Specification. This is discussed in Phacelift's Review and assessment of International Communications Standards, available on the AEMC website.

- should there be a common meter protocol?
- if a common meter protocol is required, should it use the internationally accepted DLMS/COSEM protocol as its foundation?
- if a common meter protocol is required, should existing Victorian smart meter operators be required to offer a protocol translation to the new common meter protocol?
- without a common meter protocol do proprietary meter protocols (and protocol translations) be more likely to support competition in DSP and related services?

5.6 Consideration of existing meter communication architectures

As discussed in Chapter 4, the NER currently allow two architectures for communicating with existing types 1 to 4 metering installations. It is necessary to consider whether these architectures would be suitable for a smart meter deployment. In particular, would the architectures allow the SMP to manage access, security, congestion and message validation in accordance with requirements of the smart meter functionality specification?[29]

5.6.1 Direct access to the meter

Allowing direct access to the meter using a common market protocol, which would also be a common meter protocol, would give the smart meter infrastructure a high degree of interoperability.

This arrangement would also allow accredited parties to develop new functions using the common protocol without the need to update a protocol translator. However, all access and security of the communications would need to be managed at the smart meter. In addition, the SMP would not be easily able to manage congestion of the communications network or to validate messages to the smart meter from the accredited parties.

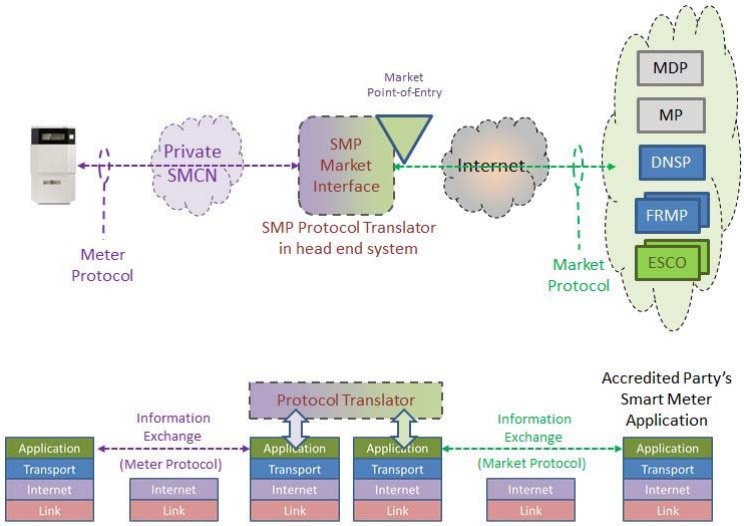
5.6.2 Market point of entry

Having a market point of entry improves the ability of the SMP to manage security of access to the smart meter's functionality. This architecture also allows the SMP to implement congestion management by prioritising of communications with the smart meter and to validate messages sent to the smart meter.

In addition, having a market point of entry allows for the possibility of the meter protocol being different to the market protocol. This would be achieved by the use of a protocol translator.

29 Under the competitive metering rule change request from the SCER officials, AEMO would establish, maintain and publish a smart meter functionality specification. This specification would include the requirements for access, security, congestion and message validation.

Figure 5.1 Protocol translation at the market point of entry

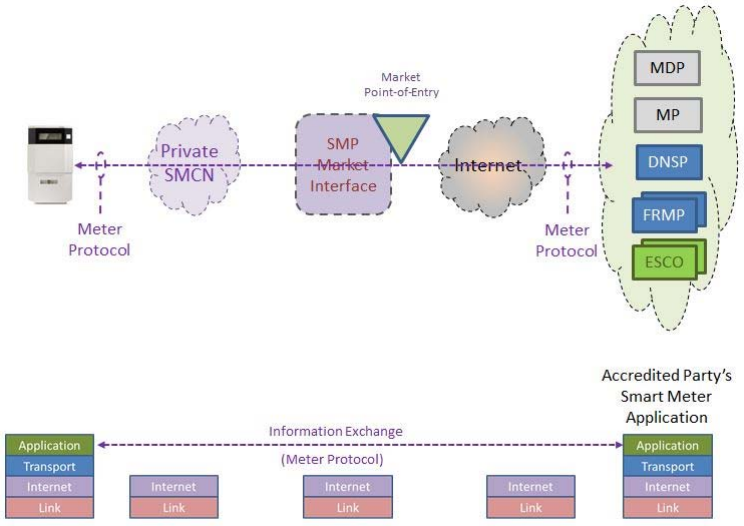


SMCN is smart meter communications network, DNSP is distribution network service provider, FRMP is financially responsible person and ESCO is energy services company

5.6.3 Market point of entry – single common meter protocol

While a market point of entry offers the possibility of using protocol translators, the interoperability of the infrastructure would be increased if a common meter protocol is used. This architecture allows the SMP to effectively manage access to the smart meter infrastructure through the market point of entry.

Figure 5.2 Common meter and market protocol



SMCN is smart meter communications network, DNSP is distribution network service provider, FRMP is financially responsible person and ESCO is energy services company

This architecture will operate most effectively if the market protocol is based on the common meter protocol as this removes the need for any complex translation of the protocol by the SMP at the market point of entry.

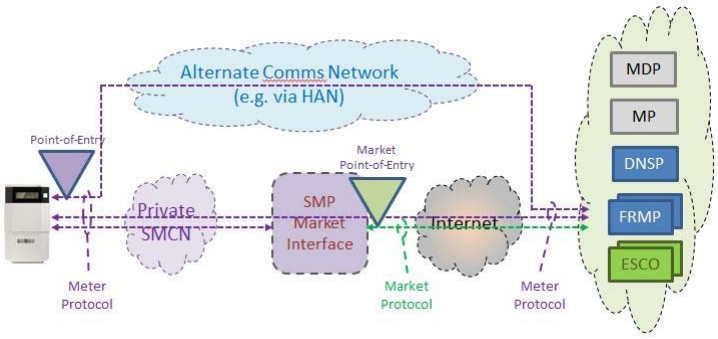
A key advantage of this approach is that it allows accredited parties to access all the functionality of the smart meter, unless the functionality is restricted by the SMP. That is, the communication path to the meter does not rely on a protocol translation and can, therefore, more easily accommodate new functions.

We are seeking stakeholder's views on whether the protocols at the meter point of entry and the market point of entry support access to new functionality without the need to make any modifications to the SMP software.

5.6.4 Proposed smart meter communication architecture

The following proposed architecture combines the benefits of the two architectures that are currently allowed in the NER for metering.

Figure 5.3 Proposed smart meter architecture



HAN is home area network, SMCN is smart meter communications network, DNSP is distribution network service provider, FRMP is financially responsible person and ESCO is energy services company

This architecture allows the accredited parties to communicate with the meter using either the meter protocol or the market protocol.[30] This would allow an accredited party to access new functions in the smart meter, using the meter protocol, while accessing basic and advanced functions using the fully supported market protocol. In both cases the SMP would still be able to manage the access, and associated security and congestion issues, at the market point of entry.

The architecture also provides for an alternative point of access to the meter, for example via a home area network (HAN). Communication via the HAN would need to be performed using the meter protocol. The SMP could not be responsible for managing access via the HAN as its system would be bypassed. Therefore, the level of

30 It may be necessary for the SMP to provide separate entry points for the common market protocol and the meter protocol.

access, security and message validation for communications via the HAN would need to be managed in the meter.

We are seeking stakeholder's views on the proposed architectures above. In particular, should the proposed architecture of:

- a protocol translation at the point of entry (Figure 5.1) be supported in the NEM?
- a common meter and market protocol (Figure 5.2) be supported in the NEM?
- the proposed protocol that allows communication via either the meter protocol or the market protocol (Figure 5.3) be supported in the NEM?

In addition, we are seeking stakeholder's views on whether changes to the NER would be required to allow the SMP to manage access, security, congestion and message validation required for smart meter deployments?

5.7 Allocation of the SMP role

We have created the role of SMP for the purposes of analysis and understanding the additional responsibilities required under the deployment of smart meter infrastructure. Possible options for the SMP include:

- a separate SMP role to increase the flexibility of the commercial arrangements available to the MC[31];
- assigning the SMP's responsibilities to either the MP or MDP; or
- sharing the SMP's responsibilities between the MP and MDP.

Consideration of whether it could be part of the MC role would be required if that rule is implemented following the Commission's considerations of the competitive metering rule change request.

We note that separate SMP role would not preclude any one entity engaging in one or more of the MC, MP, MDP and SMP roles. In addition, it would be expected that access to the smart meter infrastructure's point of entry would be negotiated with MC.

We are seeking comment on whether the SMP's responsibilities should be retained in a separate role, or whether these responsibilities should be assigned to an existing entity.

31 Under the SCER competitive metering rule change proposal, the metering coordinator role replaces the existing responsible person role in the NER

6 Open access regulatory arrangements

Under contestable arrangements, market forces should be allowed to operate without any regulatory intervention. However, regulation may be desirable if there were a monopoly service provider or if there were other inefficiencies in the market. We will further consider whether regulation should be required for access to smart metering infrastructure, including whether any access charges should be regulated, in the remainder of the review. A number of issues for consideration and development are outlined in this chapter. We welcome comments on the issues raised.

6.1 Whether to regulate rights of access

Generally, owners of infrastructure have the right to decide to whom they would provide access. In cases where infrastructure may provide essential services to effect competition in upstream or downstream markets, there may be a reason to examine whether access should be enforced by regulation.

In considering whether access to smart metering infrastructure should be enforced, we would need to further assess the impacts if this access was denied. This would include potential impacts in the electricity retail market as well as in the market for the provision of DSP and DSP-related services. There may also be impacts on the ability of distribution network service providers (DNSPs) to carry out their role as the network operator.

The expected contractual relationships between parties participating in the market, including third party service providers, also require further consideration to assess how access to smart metering infrastructure could be provided and the potential for any issues to arise.

We note that the NER sets out rights and obligations for metering data. These provisions are to be maintained.[32] The considerations of this review relate to impacts of the introduction of smart metering infrastructure.

We welcome comments on:

- whether the right of access to smart meters should be enforced under the NER and, if so, to what degree (e.g. should right of access apply to all smart meter functions or in relation to providing certain services);
- what are the contractual arrangements that are expected to be in place and to what extent these contractual relationships are to be supported by rights under the NER;

32 The entitlement of consumers and their agents to metering data will be considered under the 'access to data' rule change arising from the Power of Choice review.

- how the market (the NEM as a whole or the retail energy market) would be impacted if participants are denied access to smart meters; how would different participants be impacted; and

- how the existing rights and obligations relating to the use of metering infrastructure and metering data would impacted by smart meters.

6.2 Nature of services provided

Throughout the review so far, we have considered smart metering infrastructure in terms of the 'functionality' that is provided. From a regulatory framework perspective, further consideration is required to assess or define the services that are offered by smart meters.

Simply, the service provided by smart meters could be separated into 'metrology services' and 'other services'. The metrology services would be the energy measurement services, which are also currently provided by 'basic meters'. The measurement services could be considered essential to the NEM as they are required to allow settlement and billing to occur. Whereas further consideration is required of how to define other potential services that may be enabled by smart metering technology.

The types of services that are being provided, and whether there would be alternative means of providing these services, would impact the extent (and type) of access regulation that may be required.

We welcome comments on:

- how the services that could be enabled by smart meters be defined and should these services be subject to regulation;

- whether there would there be alternative means of providing these services other than through a smart meter.

6.3 Whether to regulate charges for access

Where possible, market forces should be allowed to operate without the need for price regulation. Regulation may be required if there were inefficient outcomes or if there were a monopoly service provider. However, all regulation comes at a cost. If a problem existed, we would need to assess whether the potential benefits of regulation would outweigh the costs to implement that regulatory regime.

It is likely that owners of smart meters would want to charge people to access their smart meters. The price for this access could be based on commercial arrangements. Among other factors, whether consumers of these services have alternative suppliers to choose from, and whether there are barriers to suppliers entering the market, would impact the potential pricing outcomes.

We consider whether access charges should be regulated warrants further consideration. We will assess the extent to which potential inefficiencies exist.

If a problem is identified, we would then need to assess how the problem could be addressed. This will require considering the options for price regulation within the current regulatory framework and having regard to potential developments such as SCER's work on the regulation of third party energy service providers and the metering contestability rule change request. We would need to be cognisant that any regulation needs to be proportional to the problem we are attempting to address.

We welcome comments on:

- under a contestable market for the provision of services enabled by smart meters, could we be confident that efficient pricing outcomes for access charges would be likely to emerge; and
- whether there would be risks to efficient pricing outcomes and, if so, how the risks may they be addressed.

6.4 Consumer protection requirements

An important aspect of the regulatory framework is consumer protection mechanisms. SCER and its working groups have completed detail reviews of the consumer protection mechanisms in relation to smart meters and services that are enabled by smart meters. A number of changes will be made by the South Australian Minister to the National Energy Retail Rules (NERR) including provisions related to: the ability of distributors or retailers to undertake supply capacity control; charging and billing; provision of marketing information through in-house displays; and remote de-energisation of premises and control of appliances.

Our focus for the remainder of this review is considering whether any of our recommendations under this review will pose new risks to consumers and what these risks may be. If new risks could be introduced, we will assess whether the existing consumer protection mechanisms would provide sufficient protection or whether new measures may be required. We welcome comments on these issues.

6.5 Other issues

A number of other issues relating to the regulatory framework and provisions under the NER require consideration. Two of these issues are discussed below.

6.5.1 Accreditation of parties

Under existing arrangements, the NERL, for example, requires retailers to obtain authorisations from the AER prior to being allowed to participate in the NEM. The authorisation process, among other things, examines whether a party has the necessary financial resources, and the organisational and technical capacity to operate as a

retailer. Distributors are subject to similar licensing requirements under jurisdictional provisions.

The NER also requires AEMO to accredit MDPs and MPs. AEMO's accreditation process is to check that the parties are appropriately qualified in order to provide some assurance to AEMO and other registered participants that the MPs and MDPs are able to fulfil their rules obligations. Given the role of MPs and MDPs in providing data to allow market settlement to occur, an inability for them to meet their obligations could have detrimental impacts on the other market participants, consumers and the NEM in general. AEMO's accreditation process provides assurance that the required information would be provided on an accurate, reliable and timely basis.[33]

Third party service providers and SMPs

Third party service provides and the SMPs, if such a role is introduced, are not a part of the existing regulatory framework for licensing or accreditation. The role of the SMP appears to be linked to that of the MP and therefore accreditation by AEMO may appear appropriate. Third party service providers on the other hand, would undertake roles in the market that could be relatively different from existing market participants.

If third party service providers are to have obligations under the NER, consideration is required as to whether they need to be defined as market participants and register with AEMO. Whether they need to accredited by AEMO for access to smart meter functionality also requires further consideration. We welcome comments on these issues.

However, we acknowledge that SCER is considering the requirements for regulating third party service providers under the broader regulatory framework. Whether third party service providers should be registered market participants and be accredited will depend on the outcomes of SCER's decisions for the broader regulatory framework.

6.5.2 Smart metering standing data

To support metering contestability and contestability in the provision of DSP related products and services, retailers and other service providers may need to know whether a meter installed at a premises is 'smart'. The types of functionality that is supported by a meter may also be of importance. For the purposes of discussion, such information about the meter is referred to as 'smart meter standing data'.

Supporting discovery of smart metering standing data requires further assessment. There are mechanisms under the NER that provide for 'NMI discovery'.[34] These provisions could be expanded to provide for the discovery of smart metering standing

33 AEMO is responsible for accrediting MPs and MDPs. Procedures and requirements are published on AEMO's website.

34 NMI discovery allows parties entitled under the NER to obtain NMI Standing Data by accessing AEMO's IT systems. NMI Standing Data contains information about a connection point such as the address and the distributor. The data does not include consumption information. In this case, NMI stands for National Metering Identifier.

data. However, clarifications would be required on who would be accessing smart metering standing data and under what circumstances.

Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AMI	advanced metering infrastructure
AP	accredited party
B2B	Business-to-Business
COAG	Council of Australian Governments
DNSP	distribution network service provider
DSP	demand side participation
ESCO	Energy Services Company
FRMP	Financially Responsible Market Participant
HAN	home area network
IEC	International Electrotechnical Commission
MC	Metering Coordinator
MDP	Metering Data Provider
MP	Metering Provider
NEO	National Electricity Objective
NEO	National Electricity Objective
NEL	National Electricity Law
NERL	National Electricity Retail Law
NERR	National Energy Retail Rules
NIST	National Institute of Standards and Technology
OSI	open systems interconnection

Private SMCN	Private Smart Meter Communications Network
Public SMCN	Public Smart Meter Communications Network
SCER	Standing Council on Energy and Resources
SMP	smart meter provider

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B Glossary

Access

Being able to 'access' a smart meter means having the ability to use one or more of the smart meter's functions. Access can range from “no access”, where an accredited party has no access to the meter functionality, to “full access” where all the functionality of the meter is available.

Advanced functions

Smart meters typically have a number of ‘functions’, which are features that would enable different services to be provided. The functions of smart meters can be categorised as ‘advanced functions’ or ‘basic functions’. Advanced functions are functions, other than basic functions, that are fully defined in the smart meter functionality specification.

AP - Accredited party

A party that can be allowed access to one or more of a smart meter's functions if it is authorised or accredited to do so.

Application

Applications are software that operate within a computer to implement a given smart meter function.

AMI - Advanced Metering Infrastructure

AMI is made up of systems required to support advanced metering. Includes smart metering and other services such as controlled load circuit and managed load services.

Basic functions

Basic functions include existing metrology functions, as currently defined in the rules for type 1 to 4 metering installations, plus metering support functions for maintaining the smart metering system.

Common meter protocol

See ‘Protocol’.

Common market protocol

See ‘Protocol’.

DLC – direct load control

DLC is a service that remotely turns power to a load or appliance on or off. Such a service could also be used to control the amount of power that a load can consume.

DLMS/-COSEM - Device Language Message Specification Companion Specification for Energy Metering

DLMS/-COSEM is a suite of protocols that together defines protocols and methods for communicating with a range of meters in an unambiguous manner.

DSP - Demand side participation

DSP occurs when consumers make decisions regarding the quantity and timing of their electricity consumption in line with the value they place on using electricity services.

End to end connectivity

End to end connectivity is having the ability to access a function within a smart meter because all the required software applications along the communication network are compatible and able to communicate with each other.

HAN – Home Area Network

HAN is a premises-based communications network. In the context of advanced metering services it relates to a HAN which is able to support smart meters and enable energy services through smart meters.

Head-end system

A head-end system is hardware and software that receives the stream of meter information brought back to the smart meter provider through the smart meter communications network.

In-home display

This is a display that is located inside a consumer's premises and supplies information to that consumer about their electricity consumption and energy services.

Interoperability

Interoperability is the ability of two or more networks, systems, devices, applications, or components to share and readily use information securely and effectively with little or no inconvenience to the user.

Interval meter

A meter which provides half hourly readings of electricity consumed and surplus electricity produced which is fed back into the grid.

Level of access

The level of access refers to the number or types of smart meter functions that can be accessed by a given accredited party or group of accredited parties.

Level of security

The level of security refers to the degree of security applied to restrict unauthorised access to the smart meter's functionality.

Market Participant

A person who is registered by AEMO as a Market Generator, Market Customer, Market Small Generation Aggregator or Market Network Service Provider under the provisions of the NER.

Market protocol

See 'Protocol'.

MC – Metering Coordinator

Under the rule change request for the competitive provision of metering services, submitted by SCER, this role will replace the existing 'responsible person'. Currently under the NER, the responsible person is the person responsible for the provision, installation and maintenance of a metering installation, and the handling of metering data from each metering installation for which it is responsible.

MDP - Metering Data Provider

A Metering Data Provider needs to meet the requirements listed in schedule 7.6 of the NER and is accredited and registered by AEMO, and is the only person authorised to:

- collect metering data from a metering installation;
- validate, substitute and estimate metering data;
- archive the data; and
- deliver that metering data to Registered Participants and AEMO for the purpose of NEM settlements, retail billing and DNSP billing.

Meter protocol

See 'Protocol'.

MP – Meter Provider

A Metering Provider is responsible for installing metering equipment, as described in schedule 7.4 of the NER and has been accredited by and registered by AEMO as a Metering Provider.

MSATS – Market Settlement and Transfer Solutions

MSATS is an IT system developed and maintained by AEMO for the recording of financial responsibility for energy flows at a connection point, the transfer of that

responsibility between Market Participants and the recording of energy flows at a connection point.

NMI Standing Data

This is the information related to a connection point at which supply of electricity for consumption occurs. It includes, but is not limited to: applicable network tariff, consumption threshold bands, loss factors, physical location and other data related to the physical properties of the metering installation. NMI standing data does not contain consumption data from consumers' metering installations.

NMI Discovery

NMI Discovery is the process where a retailer queries MSATS to find the NMI for a consumer's connection point (where it is not known or cannot be provided by the consumer). Once a NMI is identified, the prospective retailer is able to obtain the standing data.

New functions

New functions are functions that are not listed in the smart meter functionality specification but may be developed by one or more stakeholders.

Point of Entry

This is the point along the communication path where the ability to access a smart meter's functionality is managed or restricted.

PoC – Power of Choice

This was a review completed by the AEMC in November 2012, which identified market and regulatory arrangements that would enable the participation of both supply and demand side options in achieving an economically efficient demand/supply balance in the electricity market.

Protocol

The software used at either end of the communication path between the authorised parties and the smart meter. Other related terms are:

- **Common market protocol –** a common communications standard to be used between the accredited parties and the 'point of entry' to the smart metering infrastructure.
- **Common meter protocol –** a common set of interface standards between the application in the smart meter and the smart meter communications network (SMCN).
- **Market protocol** - the software used for the communications between the accredited parties and the point of entry controlled by the SMP.

- **Meter protocol** - The meter protocol defines the interface standards between the application in the smart meter and the SMCN.

- **Protocol translator** - the smart meter application receives messages from accredited parties using a market protocol and translates them into a meter protocol before forwarding to the meter.

Protocol translator

See 'Protocol'.

SCC – Supply Capacity Control

This is the use, other than the emergency use, of the smart meter to temporarily interrupt electricity supply to a customer.

Smart Meter

A meter which at a minimum measures electricity consumption on an interval basis and provides additional functions that can be used to provide services to the consumer and accredited parties. In addition, smart meters are integrated into the smart meter communications network that is managed by the SMP.

Smart meter functionality

Smart meter functionality refers to the functions within the smart meter.

SMP – Smart Meter Provider

The term SMP is not currently used in the NEM. It has been created for the purpose of analysis under this review. The SMP manages the point of access to ensure (among other things) that only those who are authorised are able to gain access and that messages are able to get through to the smart meter within a reasonable time frame.

Two-way communication

Two way communication refers to the capability of a meter to communicate between the metering system and the relevant system providers.