MSATS PROCEDURES

NATIONAL METERING IDENTIFIER PROCEDURE

PREPARED BY:	AEMO Markets ~~Development~~
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VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
~~V001~~	~~12/2/1998~~	~~This document is a direct copy of the "Working Group Report for Nomenclature, Guidelines and Procedures v1.1" released in October 1997.~~ ~~With the following changes:~~ ~~• Table 2 has been modified to remove the "Y" subcode . The codes incorrectly had both an import and export NET kvarh. The subcode "G" has also been added for sending powerfactor information. The subcode "H" has been added for Qh for Q Metering, and the subcode "M" has been added for parh for Par metering.~~ ~~• Section on "Energy Direction Flows" added.~~ ~~This version was used for the NEM in December 1998.~~
~~V002~~	~~22/10/1999~~	~~The basic definition of the NMI has been not been changed. Additional diagrams added (examples 3-9,14).~~ ~~Section 1.9 – Market Startup Issues Removed.~~ ~~Minor typographical errors and general updating of wording.~~ ~~Additional Subset characters "Y", "W" "Z" added.~~ ~~Reformat document, renumbered. Section 3 – inclusion of type 4 meters~~ ~~Addition "c" definition and addition to example 1, 2, 10.~~ ~~Example 3, 7 changed.~~
~~V003~~	~~6/8/2001~~	~~Review of all text and diagrams. NMI Checksum algorithm added. Comments on numeric NMIs added.~~ ~~Reference to type 7 metering installations added. Added data stream suffix for Consumption Energy. Added NMI examples for Consumption Energy. Added references to FRC and MSATS.~~
~~V004~~	~~27/7/2004~~	~~Document updated to reflect the requirement to register individual data streams. This change was consulted as part of the MSATS Procedures: CATS Procedures Part 1 Principles and Obligations Version 2.4.~~ ~~11.2 updated with a pictorial example.~~ ~~Pictorial example from 11.7 moved to below the second paragraph of 11.6.~~ ~~11.7 refers to the pictorial example at 11.6.~~ ~~13.1 statement "A NMI may be inactive if <FRMP = Host Retailer>" removed from the fourth paragraph.~~ ~~Minor typographical errors and general updating of wording.~~
~~V00~~5	16/07/2006	Added changes agreed as part of the CATS 2.4 MSATS Procedures: CATS Procedures Part 1 Principles and Obligations Version 2.4 that were missed from version 4. This includes the removal of the zero first character row from the consumption energy Data Suffix table. Added Amps to the Volts row of Table 1. Updated diagrams to a consistent format. Added diagrams of twin element interval meters at sections 12.4 and 12.5. Removed diagram of accumulation and interval metering at a site. Amendments to reflect changes developed as part of the Metrology Harmonisation project, including the development of the NEM Metrology Procedure. Relocated version history. Minor typographical amendments and corrections.
~~V00~~5.1	August 2009	Update to AEMO format
~~V5.2~~6~~65.2~~	01 Dec 2017	Updated to incorporate changes resulting from: • National Electricity Amendment (Expanding competition in metering and related services) Rule 2015. No.12; • National Electricity Amendment (Embedded Networks) Rule 2015 No. 15; and • National Electricity Amendment (Meter Replacement Processes) Rule 2016 No. 2.

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1. INTRODUCTION

~~1.~~1.1. Purpose and Scope

This ~~document~~ National Metering Identifier Procedure (**Procedure**) is an MSATS Procedure. It sets out the structure for ~~National Metering Identifiers (~~*NMIs*~~)~~ to be used in the ~~National Electricity Market (~~*NEM*~~)~~ and details ~~metering~~ Ddata streams for each category of *metering installation* and addresses the matters contemplated in clauses 7.8.2(d)(2), and 7.8.2(ea) (eb) & (ec) of the NER. ~~It does not attempt to address Market Settlement and Transfer Solution (MSATS) issues in relation to network tariffs and billing data streams.~~

The successful operation of the ~~National Electricity Market~~*NEM* ~~is reliant~~relies on:

- Positive identification of *connection points* ~~within the registration process~~;
- A verifiable linkage between *connection points* and ~~relevant~~ *metering data*; and
- An audit trail for *metering data* collection and processing ~~operations~~.

The ~~National Metering Identifier (~~*NMI*~~)~~ ~~provides~~ is a unique identifier for each *connection point* ~~within the National Electricity Market. It provides~~, an index against which other essential data can be managed and is crucial to the accurate management of ~~customer~~ End User registration~~, customer~~ and transfer, c*onnection point* change control and data aggregation and transfer.

1.2. Definitions and Interpretation

The Retail Electricity Market Procedures – Glossary and Framework:

(a) is incorporated into and forms part of this document; and

(b) should be read with this Procedure.

1.3. Related AEMO Documents

Title	Location
Retail Electricity Market Procedures – Glossary and Framework	http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Glossary-and-Framework
MSATS Procedures	http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Market-Settlement-and-Transfer-Solutions
Metrology Procedure Part A	http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering
NMI Allocation List	http://aemo.com.au/-/media/Files/PDF/NMI-Allocation-List-v8-December-2014.ashx

~~2. RELATED DOCUMENTS~~

~~"Standing Data for MSATS", Document No: MT_MA1785.~~

~~MSATS Procedures: CATS Procedures Part 1 Principles and Obligations, Document No. MT_RT1700~~

~~These documents are available from the AEMO website at:~~

~~www.AEMO.com.au~~

2. ALLOCATION AND ISSUE OF NMIS

2.1. NMI Allocation by AEMO

(a) *NMIs* are allocated by AEMO for issue by LNSPs (for *connection points*) or ENMs (for *child connection points*) in accordance with this Procedure.

(b) Blocks of available *NMIs* are allocated to LNSPs and ENMs by AEMO in accordance with the NMI Allocation List.

(c) AEMO may allocate blocks of *NMIs* to LNSPs and ENMs from any unused range.

(d) The range 5 XXX XXX XXX has been reserved for use ~~with~~in the gas industry. To avoid the risk of confusion, AEMO has agreed not to issue *NMIs* commencing with 5.

(e) The range 9 XXX XXX XXX has been reserved as a "break-out" if it becomes necessary to move to an 11 character *NMI*.

2.2. Issue of NMIs by LNSPs and ENMs

(a) For each new *connection point*, or *child connection point* (as applicable):

(i) The FRMP must apply to the relevant LNSP for a *NMI* prior to assuming responsibility for the *connection point* and the LNSP must issue a *NMI* to the FRMP for that *connection point* from the LNSP's allocated list.

(ii) The ENM must apply to AEMO for *NMI* prior to assuming responsibility for the *child connection point*. AEMO will either issue a *NMI* to the ENM for that *child connection point* from the ENM's allocated list or a unique *NMI* from an available range.

(b) The LNSP~~FRMP~~ or ENM (as applicable) must register the *NMI* for the *connection point* or *child connection point* (as applicable) in MSATS in accordance with the CATS and WIGS Procedures.

3. NMI STRUCTURE

~~The NMI is a ten (10) character identifier assigned by Local Network Service Providers (LNSPs) or Embedded Network Managers (ENMs) in the case of child in accordance with this Procedure. The publication of this procedure and assignment of NMIs is authorised by the National Electricity Rules at clause 7.8.23.1(d) (1) and (2), and 7.8.2(ea) (eb)(ec). (da), and (db).~~

~~The NMI may be used in conjunction with other identifiers or suffixes. These include:~~

- ~~The NMI Cchecksum, a single numeral used to assist with data validation when the NMI is manually entered into a computer system.~~
- ~~The NMI Ddata stream suffix used to identify a particular Ddata stream associated with a connection point.~~

(a) Generally, the *NMI* is an all numeric, ~~a~~ ten (10) character identifier. ~~; the limited circumstances under which alpha characters may be used are listed later in this Procedure.~~ The key attributes of ~~the~~ a *NMI* are:

- (i) The *NMI* must embody only numeric characters, except as explicitly provided ~~with~~in this ~~document~~Procedure, and must not contain spaces.
- (ii) Character letters "O" and "I" are not permitted in order to avoid confusion with numbers 0 and 1.
- (iii) "W" is a reserved character to be used as the fifth character~~digit~~ of the allocated identifier for wholesale *transmission connection metering points* only. It may only be used if the *NMI* is allocated from an alphanumeric block.
- (iv) Embedded characters or meanings must~~should~~ not be used in allocating *NMIs*.
- (v) Where AEMO has allocated a block of *NMIs* to an LNSP or an ENM, the LNSP or the ENM (as applicable) must only use numeric characters in the allocated *NMIs* ~~allocated to the market~~ unless AEMO has directed the block to be alphanumeric.

(vi) Where AEMO has allocated a block of *NMIs* to an LNSP or an ENM, and directed the block to be alphanumeric, the LNSP or the ENM (as applicable) may use ~~all-~~numeric or alphanumeric characters in the *NMIs* allocated to the market.

~~The NMI Allocation List is *published* by AEMO at "http://aemo.com.au/-/media/Files/PDF/NMI-Allocation-List-v8-December-2014.ashx"~~

(b) The *NMI* may be used in conjunction with other identifiers or suffixes. These include:

(i) The NMI Checksum, a single numeral used to assist with data validation when the *NMI* is manually entered into a computer system.

(ii) The NMI Datastream suffix used to identify a particular Datastream associated with a *connection point*.

~~Registered NSPsNetwork Service Providers and ENMsEmbedded Network Managers must maintain a register of all allocated NMIs. released. AEMO maintains a Register of all „on-market" NMIs within AEMO"s market systems.~~

The base *NMI* is ten characters. In some circumstances the NMI C~~c~~hecksum is appended to the *NMI* to form an eleven-character *NMI*, or the two-character NMI D~~d~~ata-stream suffix may be appended to form a twelve-character *NMI*. The NMI C~~c~~hecksum is not used with the D~~d~~ata stream suffix because the D~~d~~ata-stream suffix is intended for use only with electronic data transfer.

(c)

~~In the initial allocation of alphanumeric NMIs the first character was a jurisdiction indicator. Jurisdiction indicators were abolished in October.~~

~~(a) AEMO may allocate blocks of NMIs to LNSPs and ENMs from any unused range.~~

~~(a) The range 5 XXX XXX XXX has been reserved for use within the gas industry. To avoid the risk of confusion, AEMO has agreed not to issue NMIs commencing with 5.~~

~~(a) The range 9 XXX XXX XXX has been reserved as a "break-out" if it becomes necessary to move to an 11 character NMI.~~

~~**4.** All-numeric NMIs~~

~~In anticipation of the opening of full retail competition (FRC) in the *NEM*ational Electricity Market and in accordance with decisions made by NEMSAT (decision142 – 31 October 2000 & decision 144 – 14 November 2000), A~~all *NMIs* issued for *connection points* which become contestable after 1 January 2001 are required to be all numeric.

(d)

The all-numeric requirement applies to the basic ten character *NMI*, and not to other suffixes used with the identifier.

(e)

(f) *Connection points* that were contestable prior to 1 January 2001 were allocated with an alphanumeric *NMI*.

~~*CConnection points* which were contestable prior to 1 January 2001 and for which the LNSP had allocated an alphanumeric *NMI* weremay be allocatedregistered in the market with an alphanumeric *NMI*.~~

(g) ~~Transmission Network Service Providers~~TNSPs may continue to allocate alphanumeric *NMIs* from *NMI* blocks supplied to them prior to 1 January 2001. Wholesale *connection points* (LR = POOL-) will continue to have alphanumeric *NMIs* issued.

4. NMI REGISTERS

NSPs and ENMs must maintain a register of *NMIs* assigned by them to *connection points* of *child connection points*.

5. NMI CHECKSUM

(a) To reduce the occurrence of incorrect transfers attributable to *NMI* data entry errors, a one digit NMI Checksum has been implemented.

(b) The NMI Cchecksum is a mandatory field whenever a Change Request is submitted to MSATS. by batch or through the browser*NMI* is manually entered into MSATS.

(c) Sample java code for an implementation of the NMI Checksum is provided in Appendix A1. A general form of the algorithm used to create the NMI Cchecksum is:

(i) 1. Double the ASCII value of alternate digits within the NMI beginning with the right-most digit.

(ii) 2. Add the individual digits comprising the products obtained in step 1 sub-paragraph (i)(i) to each of the unaffected ASCII value digits in the original number.

3. Find the next highest multiple of 10.

(iii)

(iv) 4. The check digit is the value obtained in sub-paragraph (ii)(ii) step 2 subtracted from the value obtained in sub-paragraph (iii) (iii)step 3. If the result of this subtraction is 10, then the check digit is 0.

(d) Appendix B2 provides a worked example of the algorithm and, while Appendix C3 provides a list of thirty *NMIs* with NMI Checksums calculated by the AEMO implementation of the algorithm.

(e) The NMI Cchecksum is always a numeric character.

(f) The NMI Cchecksum is not mandatory when transferring *NMI* identified data electronically between Participants and service providers. The checksumIt is focussed on applications where data entry occurs and there is a risk of character transposition, for example, from paper to electronic systems or through an interactive telephone service.

(g) When publishing a *NMI* for End- Users, customers the *NMI* will appear in its 11-character format, and the NMI Checksum will be the final character of the *NMI*.

6. DATA-STREAM SUFFIX

(a) *Settlement*s of the National Electricity Market is reliantes on the collection and delivery of large volumes of *metering data*. For any particular *connection point* there may could be multiple *energy* measurement elements and data recorders with multiple channels. Accurate identification of Ddata-streams is essential. The Ddata-stream suffix provides identification at the measurement element level for all Ddata-streams comprising from the *connection point* identified by the *NMI*.

(b) The Ddata-stream suffix is a two-character identifier used in conjunction with a *NMI* to identify a particular Ddata-stream associated with a NMI. The Ddata stream suffixIt allows differentiation of measurement quantities at a *metering point*, and differentiation of quantities between different measurement elements or registers at a *connection point*.

(c) A twelve-character *NMI* identifies the *connection point* (first ten characters) and associated Ddata-stream (Ddata-stream suffix as the last two characters).

(d) The Ddata-stream suffix has retained alpha-numeric characters, even when both characters are numerals, because an all numeric structure could not accommodate the variety of data types or number of *meters* which that could may be required for a *connection point*.

(e) The Ddata-stream suffix is only used between Participants and service providers within the National Electricity Market, and therefore it is not used in conjunction with the NMI Cchecksum. The Ddata-stream suffix allows Participants and service providers to identify data at a sub-*connection point* level and to identify the individual sources of *meter*ing *data* to maintain necessary data audit trails.

The following two sections and tables detail the usage of the characters comprising the Ddata stream suffix.

7. DATA STREAM SUFFIX FOR INTERVAL METERING DATA

(a) *Interval Mmetering Ddata is metering data in TIstrading intervals or sub-intervals of TIstrading intervals. It* may be sourced from *metering installations* type 1 to 5 or 7. *Metering data* from a type 6 *metering installation* which that has been transformed through a profiling algorithm into TIstrading intervals is also identified as *interval metering data*.

(b) *Interval metering data* is identified in the Ddata stream suffix by a first character that is alpha [A to H, J to N, P to Z].

(c) Identifiers in the 'Master' column in Table 1 are those normally used within the *NEM*National Electricity Market. Where a *check meter*ing is required (type 1 & 2 *metering installations*), identifiers from the 'Check' column are used for the *check installation*meter. Where the data from the 'Master' and 'Check' *metering installations* has been averaged in accordance with the National Electricity RulesNER, then the 'Ave' column identifiers are used. Where only the difference between import and export is required, the 'Net' column identifiers are used.

Net Data Will Be Accepted. Net is N = (E-B).

Table 1 Data Sstream Suffixces for Interval Meteredding Data

	First character				Second character
	Ave	**Master**	**Check**	**Net**	
IMPORT kWh	A	B	C	N	Meter nNumbers or measuring elements are to be 1-9 then A-H, J-N, P-Z
EXPORT kWh	D	E	F		
IMPORT kvarh	J	K	L	X	
EXPORT kvarh	P	Q	R		
KVAh	S	T	U		
Power Factor pF		G			
Q Metering Qh		H	Y		
Par Metering parh		M	W		
VOLTS (or V^2h) or Amps (A^2h)		V	z		

(d) Where a *meter* has multiple measurement elements, the convention for the population of the second character of the Data Sstream Suffix is:

- (i) Increment the second character by one if the first character is the same. For example, use E1 and E2 if both elements are export kWh, and B1 and B2 if they are both import kWh.
- (ii) Use the same second character if the first character is different. For example, use E1 and B1 if they are export kWh and import kWh respectively.

Examples:

2727000011 E2 relates to Export kWh data from either meter no.2 (single element) or element 2 of meter no.1 (twin element) pertaining to the *connection point* having with the assigned *NMI* of 2727000011. Refer 113.4 and 113.5 for diagrammatic examples.

TTTTW00015 B1 relates to Import kWh *interval metering data* from meter no.1 pertaining to a wholesale *connection point* with the *NMI* of TTTTW00015.

7.1. Data Sstream Suffix for Accumulated MeteringConsumption Energy Data

(a) If the first character of the Ddata stream suffix is numeric [1 to 9] the attached data is *accumulated*consumption *metering*energy *data* from a type 6 *metering installation*.

(b) The Ddata streams identified by characters 1 to 6 are active energy (kWh). Data streams identified with 7, 8, or 9 are as defined by the LNSP or the ENM (as applicable).

Table 2 Data ~~S~~stream Suffixes for Accumulated Metering~~consumption energy~~ Data

First Character		Second Character
1	First ~~register~~Datastream	Meter numbers are to be 1-9~~2~~ then A-H, J-N, P-Z.
2	Second ~~register~~Datastream	
3	Third ~~register~~Datastream	
4	First controlled load ~~register~~Datastream	
5	Second controlled load ~~register~~Datastream	
6	Third controlled load ~~register~~Datastream	
7	First LNSP/ENM defined ~~register~~Datastream	
8	Second LNSP/ENM defined ~~register~~Datastream	
9	Third LNSP/ENM defined ~~register~~Datastream	

Examples:

8877886644 1A relates to consumption energy data from meter A (the 10th meter at the *metering installation*), register 1 applicable to a *connection point* with the *NMI* of 8877886644.

8866448877 43 relates to consumption energy data from a controlled circuit register in the 3rd meter at the installation, the data pertaining to a *connection point* with the *NMI* of 8866448877.

7.2. Wholesale Connection Points

(a) A wholesale *connection point* is a *connection point* where:

<~~Local Retailer~~LR = POOL* > The "*" is a wildcard for the ~~settlement~~ *region*.

(b) For wholesale *connection point~~sites,~~* a *NMI* must be assigned to each individual physical or logical metering point ~~which~~ that contributes to the wholesale *connection point*. This requirement is to facilitate a drill down to D~~d~~ata ~~-~~streams where AEMO is obliged to audit or otherwise investigate *energy* ~~data~~ flows for a wholesale *connection point*.

(c) AEMO assigns the *NMIs* for *regulated interconnectors*.

(d) When the *metering point* doesn't align with the physical *connection point*, the *NMI* for the *connection point* is used to identify a logical *metering point*. Each *metering point* ~~which~~ that contributes to the logical *metering point* must be assigned a separate *NMI*. The ~~Responsible Person~~ TNSP is responsible for determining the algorithm used to relate the logical *metering point* for a physical connection to the *metering point(s)* ~~which~~ that contribute data for the physical connection. ~~Refer section 11~~3.17 ~~for an example~~

~~.~~

(e) Any Participant intending to apply a logical *meter* to a *connection point* must contact AEMO's Registration Desk to seek approval prior to entering any data into MSATS.

~~Per clause 9 of the NEM Metering Data Substitution Estimation and Validation Procedure (Document No. MT_MA1680), AEMO appoints the Metering Data Agent responsible for the data collection and validation of Metering Data from wholesale metering points.~~

8. CONNECTION POINTS WITH TYPE 1 METERING

(a) For *connection points* ~~at which energy flows exceed 1000 GWh per year the NERNational Electricity Rules require a~~with a type 1 *metering installation*~~. In this case a~~, the *NMI* must be assigned to every averaged *energy* flow pertaining to each ~~customer~~ *connection point*.

(b) A type 1 *metering installation* requires a duplication of metering, voltage and current sources in accordance with the NER~~National Electricity Rules~~. The D~~d~~ata ~~-~~streams from one *meter*ing

installation are designated 'Master' and from the other *meter*ing *installation* are designated 'Check'.[1]

(c) When both Dddata-streams are from measurement systems of identical accuracy standards, the NERNational Electricity Rules require that the *energy* Dddata-stream submitted for *settlements* be the average of the values from the master *meter* and *check meters*. In this case the Dddata stream suffixes will have an initial character A (import) or D (export) or N (net).

(d) If the *check meter*ing is of a lower accuracy standard than the master *metering installation* only the 'Master'[1] Dddata-stream is submitted, in which case the Dddata-stream suffixes will have an initial character B (import) or E (export) or N (net).

9. CONNECTION POINTS WITH TYPE 2 METERING

At a connection point where energy flows exceed 100 GWh per year up to 1000 GWh per year the NERNational Electricity Rules requires a type 2 metering installation.

The NERNational Electricity Rules requires that a type 2 *metering installation* hasve partial *check metering*. The obligations for partial *check metering* can be met by a *check meter*, in which case the Dddata-streams will be identified as for a type 1 *metering installation*.

(a)

(b) Alternatively, the arrangement of a partial *check metering* may be as agreed between AEMO and the Responsible PersonMC. In a partial *check metering* scheme each Data-stream used needs to be separately identified. It is possible that a number of *NMIs* will be used in a partial *check metering* scheme to identify logical metering points, and a particular meter and instrument transformer combination may be a component of more than one partial *check meter*ing installation. The actual arrangements will be part of the scheme submitted by the Responsible Person MC to AEMO for approval.

10. NMI RULES

Rule 1. Having the *NMI* in all functions of the *market* system reduces any ambiguity of *metering point installation* identification and fulfils the requirement of for an auditable history trail.

All *NMIs* mustshall be allocated to customer End User *connection points* by the respective Local Network Service Providers (LNSPs) or the respective Embedded Network managers (ENMs) (as applicable). The LNSP is required to verify the *NMI* is associated with the correct transmission node identity (TNI) in AEMO's customer transfer system (MSATS system). The ENM is required to verify that the *NMI* is associated with the correct *embedded network* and the correct Parent NMI, and have the same TNI Code as the Parent NMI in AEMO's customer transfer system (MSATS system).

It is recognised that the LNSP is the only party who has the required detailed knowledge of the "local" system to correctly identify the relationship between the respective customeran End User *connection point* and a Transmission NodeTNI. It is AEMO's responsibility to issue the *NMIs* in a "block release" form to the LNSP and the ENM and to maintain a register of the issued *NMIs*.

2. Information should not be embedded within the allocated NMIs by LNSPs or ENMs.

Rule 2. 3. A *NMI* cannot be changed or reallocatedassigned to another *connection point*.

It is NOT acceptable to change or reallocate *NMIs* cannot be changed or reallocated to accommodate changes to Participant IT systems, changes to assumed associations, changes to Network Tariffs, and charges, changes to LNSP network boundaries or ENM changes or because the an LNSP's or ENM's allocation system has changed. *NMIs* can not be changed for situations where a Child NMI becomes a directly connected to the registereda *distribution network* andor vice versareverts to an *embedded network* connection.

While an customer End User may change their elected FRMP, the *NMI* for a *connection point* remains constant throughout its *market* life. If a *connection point* is abolished, the *NMI* becomes extinct, and, hence, each *NMI* has a start date as well as an end date and associated

[1] Refer to Table 1.

change control. ~~Where~~ If an End User ~~customer~~ changes the physical location of the *connection point*, a new *NMI* must be allocated to the new *connection point*. ~~unless except when an existing *connection point* becomes a *child connection point* .~~ The "old" *NMI* ~~is~~ will be recorded as de-commissioned on ~~AEMO's~~ *metering register* and the "new" *NMI* ~~commissioned~~ will be allocated~~ssigned~~ accordingly.

If an End User changes or End User details change, the *NMI* will not be changed.

If an existing connection point becomes a *child connection point* the *NMI* will not be changed.

If the *connection point* changes from the LV to the HV side of the service *transformer* there must be a change of *NMI*.

If there is a consolidation of *meter*s*~~ing~~* (eg. 3 meters → 2 meters) or a relocation of the *meter* box without changes to the location of the measurement *transformers* the *NMI* will remain unchanged.

A reconstruction of the ~~customer~~ End User service connection (eg. overhead → underground) in which the two services are not concurrently operational, and without a change of the *connection point* ~~to the network~~, does not require a change of *NMI*.

When a *NMI* is allocated to a builder's temporary supply, the same *NMI* may be re-used on the permanent supply to the completed building provided:

(a) the final *supply* arrangements have the same effective connection arrangement to the local network; ~~,~~ and

(b) the temporary *supply* is abolished when the permanent *supply* connection is energised.

~~Rule 3. 4. The *NMI* is does not changed with following a change of consumer~~End User, consumer ~~End User details or registration of *connection point* details.~~

Rule 3~~4~~. ~~5.~~ All communications ~~to and from~~ with Participants ~~and Metering Service Providers inclusive of Financially Responsible Market Participant~~FRMP ~~accounts~~ must~~shall~~ include the *NMI* ~~identifier~~.

All Participants must be aware that the *NMI* is the only identifier to be used for defining specific *connection points* or *metering points*. All formal confirmation notices between Participants, such as official notices of *connection point* transfer between FRMPs and data substitutions, must be clearly identified by inclusion of the *NMI*.

Re-registrations of *connection points* involving status changes, communications, and ~~/or~~ *meter* changes, must include the *NMI* on all communications ~~between affected parties~~.

~~RULE 56. AEMO'S THE METERING REGISTER MUST HAVE NMIS ATTACHED RECORDED AGAINST TO ALL CONNECTION POINT RECORDS AND BE THE PRIMARY DATABASE SEARCH KEY FOR PROCESSING PURPOSES.~~

~~AEMO'S THE METERING REGISTER (INCLUDING SUBSIDIARY METERING REGISTERS MANAGED BY SERVICE PROVIDERS) MUST ALSO HAVE AN ATTACHED RECORD DETAILING THE TNIRESPECTIVE TRANSMISSION NODE IDENTITY FOR EACH NMI REGISTERED.~~

~~RULE 67. TRANSFER OF ALL DATA TO AEMO SHALL BE IN AN AGREED FORMAT THAT INCLUDES NMI IDENTIFICATION.~~

11. UTILISATION OF NMI FOR AEMO DATA

~~10.1.~~11.1. Data Delivery to AEMO (MSATS System)

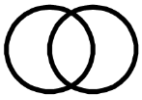
(a) *Metering data* is always provided on an individual *NMI* D~~d~~ata stream basis. ~~The *metering data* is to be provided as individual Ddata streams.~~

(b) *Metering data* is always provided as net *energy* flow to MSATS.[2]

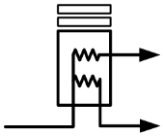
~~11.~~12. EXAMPLES OF NMI APPLICATION – INTERVAL METERING DATA

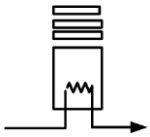
Key to symbols used in sections 12~~13~~ and 13~~24~~.:

Connection Point


Transformer


Meter


Twin element meter, each having its own register


Three register meter with single measuring element

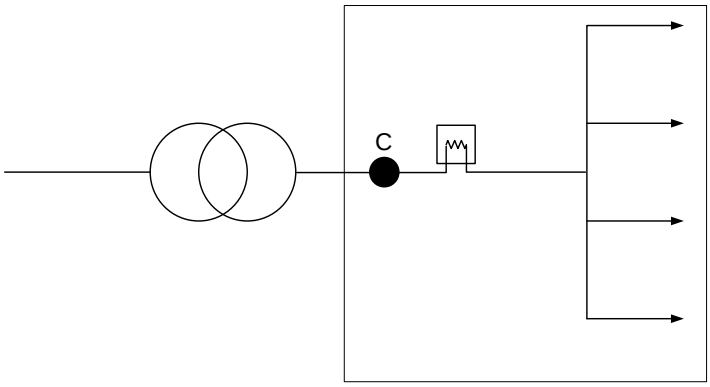

Switch


Circuit breaker

[2] See section 13 for details of the conventions for the direction of *energy* flows.

~~11.1.~~12.1. One End User metered on the secondary~~lower voltage~~ side of transformer

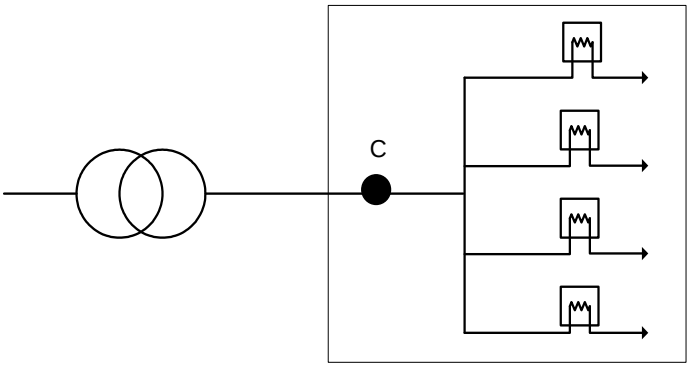
- One *connection point*
- One ~~customer~~End User
- One *meter* ~~/~~ measurement element
- One *NMI*



- Allocated NMI: 2424242424
- Identity of interrogated *meter*ing *data*: 2424242424 E1

~~11.2.~~12.2. One End User~~Contestable Customer~~, multiple metered on the secondary~~lower voltage~~ side of transformer

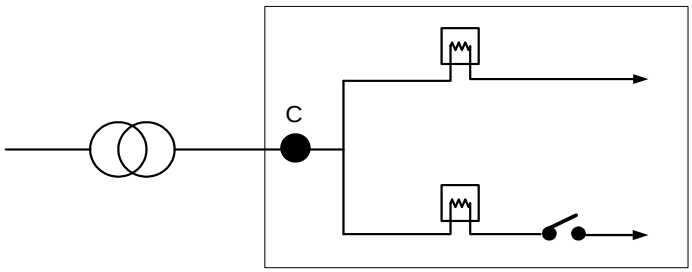
- One *connection point*
- One End User~~customer~~
- Four *meters* ~~/~~ measurement elements
- One *NMI*



- Allocated *NMI*: 3131313131
- Identity of individual interrogated *meter*ing *data*: 3131313131 E1
3131313131 E2
3131313131 E3
3131313131 E4

~~11.3.~~12.3. One End User~~Contestable Customer~~, previously two tariff metering, eg general supply &~~+~~ off-peak on secondary~~low voltage~~ side of transformer

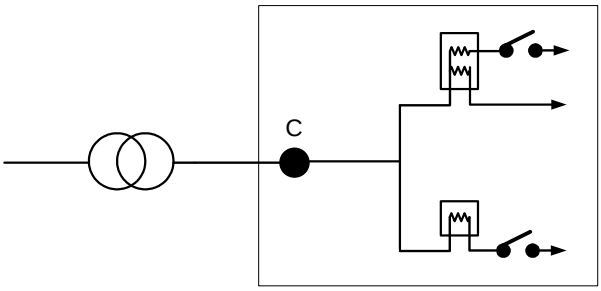
- One *connection point*
- One End User~~customer~~
- Two *meters* ~~/~~ measurement elements
- One *meter* with a load control device
- One *NMI*



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *metering data*: 5656565656 E1
  5656565656 E2

~~11.4.~~12.4. One End User, two controlled loads, one twin element meter

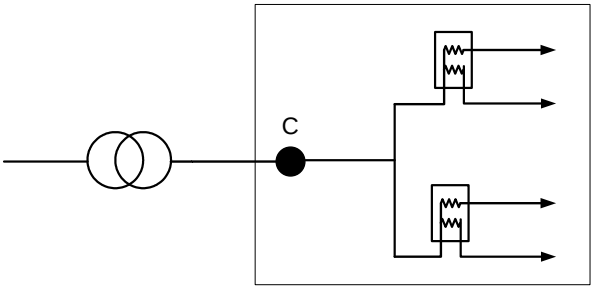
- One *connection point*
- One End User~~customer~~
- Two *meters*: one twin element with a Controlled Load and one single element with a Controlled Load
- One *NMI*



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *metering data*: 5656565656 E1
  5656565656 E2
  5656565656 E3

~~11.5.~~12.5. One End User, two twin element meters

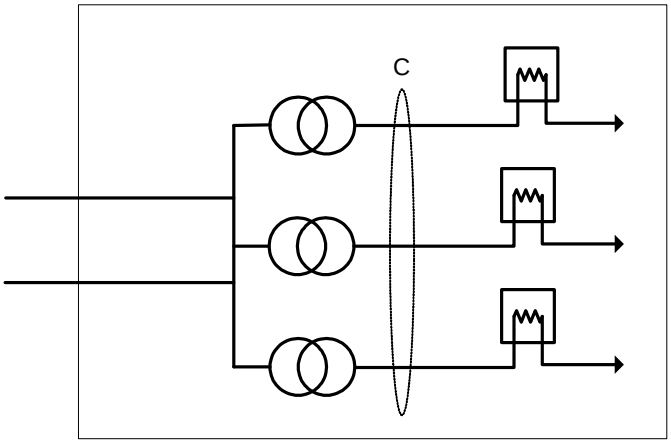
- One *connection point*
- One End User~~customer~~
- Two twin element *meters*
- One *NMI*



- Allocated *NMI*: 5656565659
- Identity of individual interrogated *metering data*: 5656565659 E1
  5656565659 E2
  5656565659 E3
  5656565659 E4

~~11.6.~~12.6. One End User, multiple meters on secondary~~low voltage~~ side of multiple transformers in the same substation building an LV switchboard in common switchroom

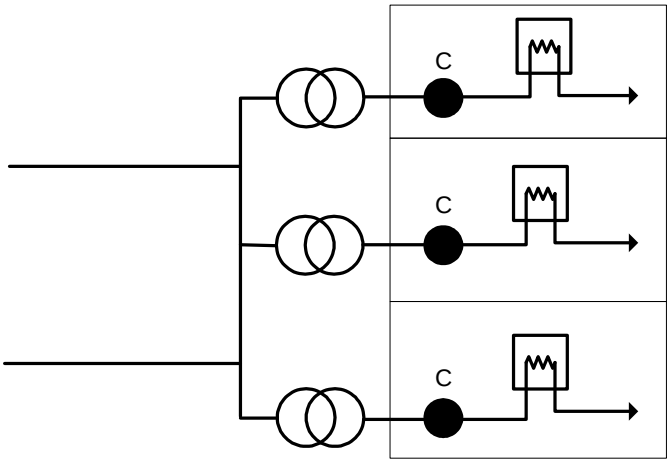
- One *connection point*
- One End User~~customer~~
- Three *meters*-/-measurement elements
- One *NMI*



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *metering data*: 5656565656 E1
  5656565656 E2
  5656565656 E3

~~11.7.~~12.7. Three ~~Contestable Customers~~End Users, metered on secondary~~low voltage~~ side of multiple transformers in the same substation building

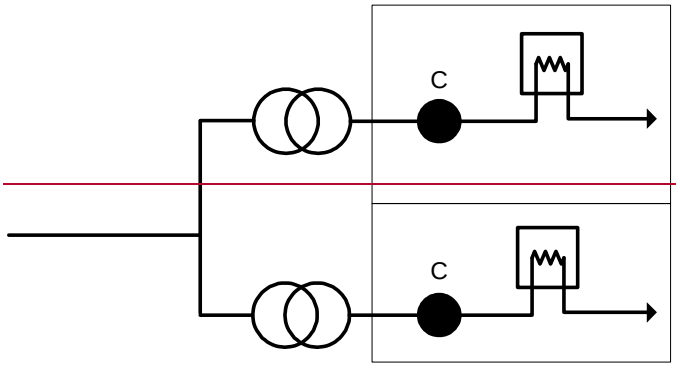
- Three *connection points*
- Three End Users~~customers~~
- One *meter* ~~/~~ measurement element per connection point
- Three *NMIs*

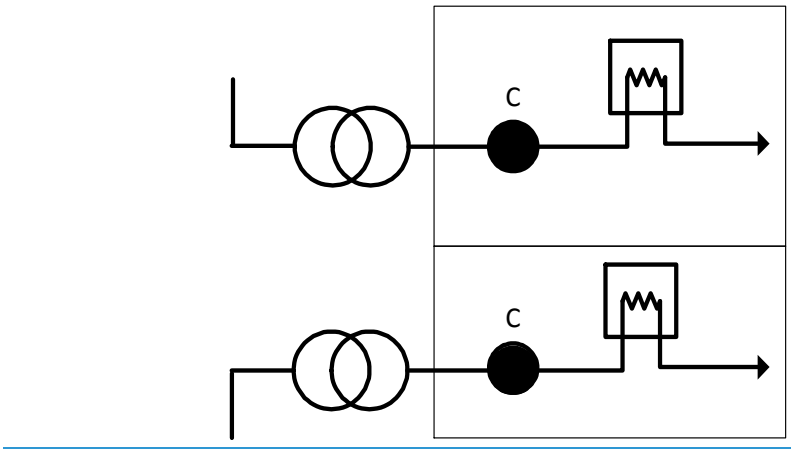


- Allocated *NMIs*: 5656565656
  5656565657
  5656565658
- Identity of individual interrogated *metering data*: 5656565656 E1
  5656565657 E1
  5656565658 E1

~~11.8.~~12.8. One End User, two separate HV supplies to two separate substations, both metered on secondary side of the transformers~~LV side~~

- Two ~~contestable~~ LV *connection points*
- One End User~~customer~~
- One *meter* ~~/~~ measurement element per *connection point*
- Two *NMIs*

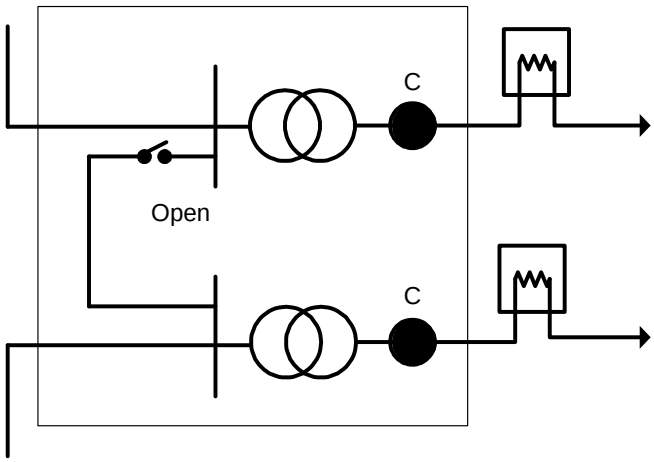




- Allocated *NMIs*: 5656565656
  5656565657
- Identity of individual interrogated *meter*ing *data*: 5656565656 E1
  5656565657 E1

~~11.9.~~12.9. One ~~Contestable Customer~~End User, two separate substations adjacent to each other or one single substation with two separate transformers in a single substation, with a "normally open" point separating the HV~~high voltage~~ supplies into two sources

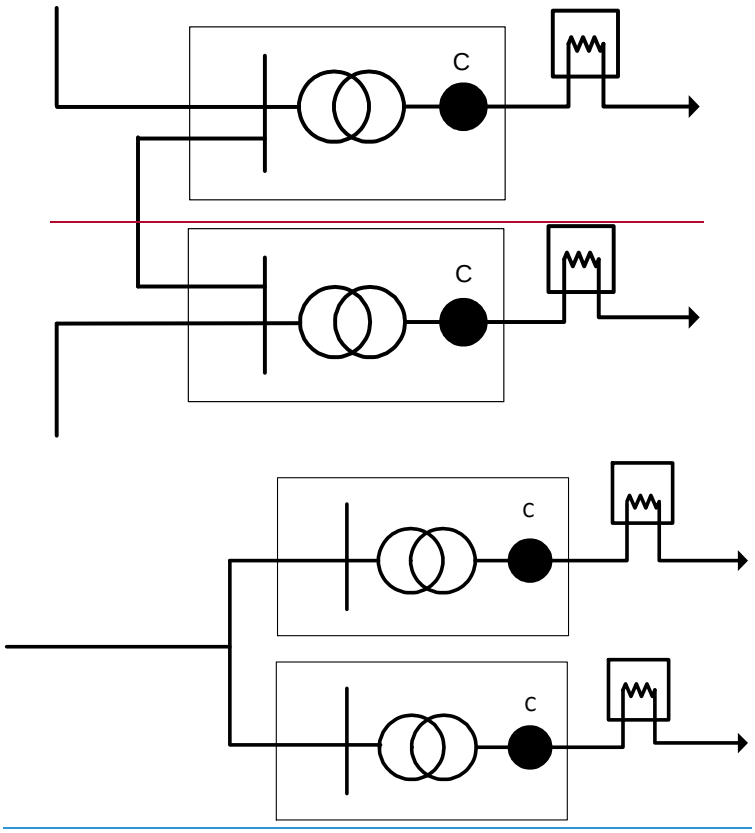
- Two *connection points*
- One End User~~customer~~
- One meter~~-~~/~~-~~measurement element per *connection point*
- Two *NMIs*



- Allocated *NMIs*: 5656565656
  5656565657
- Identity of individual interrogated *meter*ing *data*: 5656565656 E1
  5656565657 E1

~~11.10.~~12.10. One ~~Contestable Customer~~End User, two separate substations adjacent to each other or one single substation with two separate transformers, with the HV~~high voltage~~ supply originating from a single source ~~and LV switchboard in common switch room~~

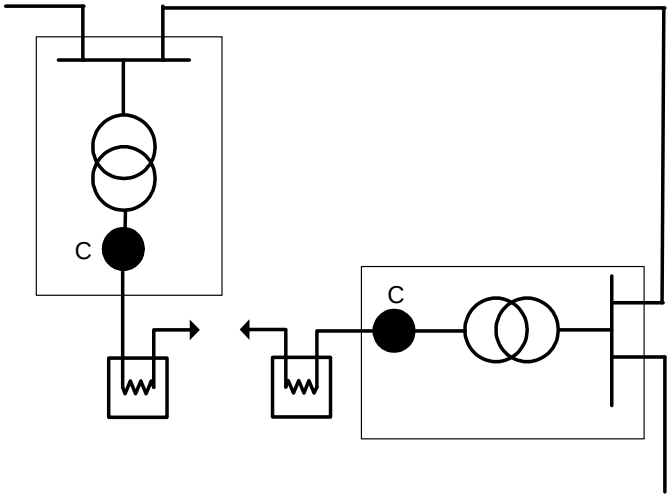
- Two *connection points*
- One End User~~customer~~
- One *meter* ~~/~~ measurement element per *connection point*
- Two *NMIs*



- Allocated *NMIs*: 5656565656
  5656565657
- Identity of individual interrogated *metering data*: 5656565656 E1
  5656565657 E1

~~11.11.~~12.11. One End User, two separate substations not adjacent to each other but on same premises

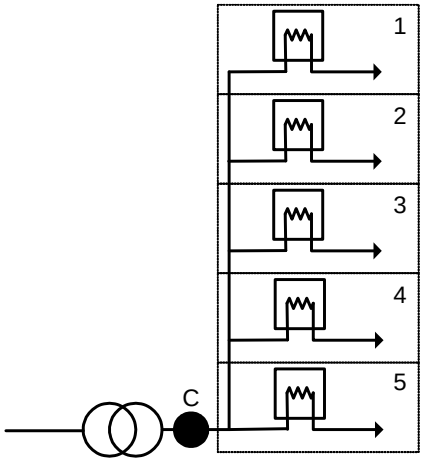
- Two *connection points*
- One End User~~customer~~
- One *meter* ~~/~~ measurement element per *connection point*
- Two *NMIs*



- Allocated *NMIs*: 5656565656
  5656565657
- Identity of individual interrogated *metering data*: 5656565656 E1
  5656565657 E1

~~11.12.~~12.12. Multiple ~~Contestable Customers~~End Users, High rise building

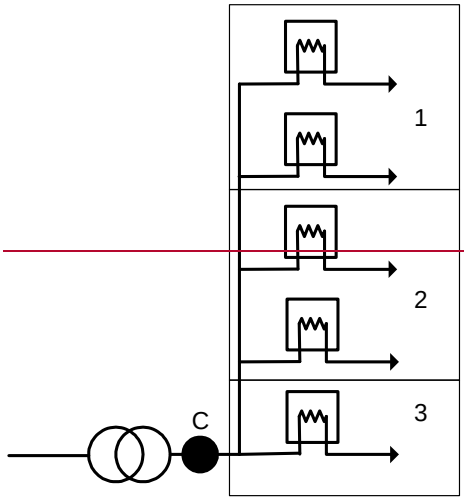
- Multiple physical *connection points*, with all deemed to be at point c in the diagram~~customer connection points referencing the same point~~.
- Five individually metered End Users~~customers~~
- One *meter* ~~/~~ measurement element per *connection point*
- Five *NMIs*



- Allocated *NMIs*: PPPP567801
  PPQQ987652
  PRRR000043
  PRRR000044
  PRRR000045
- Identity of individual interrogated *metering data*: PPPP567801 E1
  PPQQ987652 E1
  PRRR000043 E1
  PRRR000044 E1
  PRRR000045 E1

~~11.13. Multiple Contestable CustomersEnd Users, high rise building~~

- ~~Multiple physical *connection points*, with all deemed to be at point c in the diagram.customer *connection points* reference the same *point*.~~
- ~~Three End Userscustomers~~
- ~~Multiple *meters* / measurement elements per End Usercustomer~~
- ~~Three *NMIs*~~

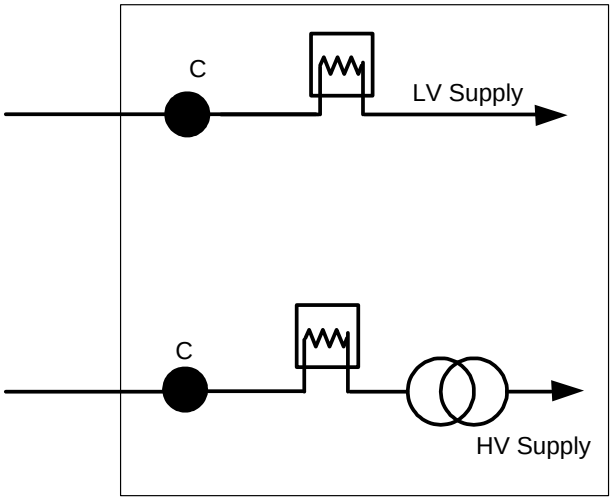


- ~~Allocated *NMIs*:~~
  - ~~Customer 1 NNN3456789~~
  - ~~Customer 2 NNN8976548~~
  - ~~Customer 3 NNN0576839~~
- ~~Identity of interrogated *metering data*:~~
  - ~~Customer 1 NNN3456789 E1, NNN3456789 E2~~
  - ~~Customer 2 NNN8976548 E1, NNN8976548 E2~~
  - ~~Customer 3 NNN0576839 E1~~

~~LNSPs should take a pragmatic approach to allocating *NMIs* at a multi- storey sites such as this. If it is expected that regular changes in tenancies may will occur, it may might be more efficient to allocate separate *NMIs* per floor (or other tenanted area).~~

~~11.14.~~12.13. One ~~Contestable Customer~~End User with multiple supply points

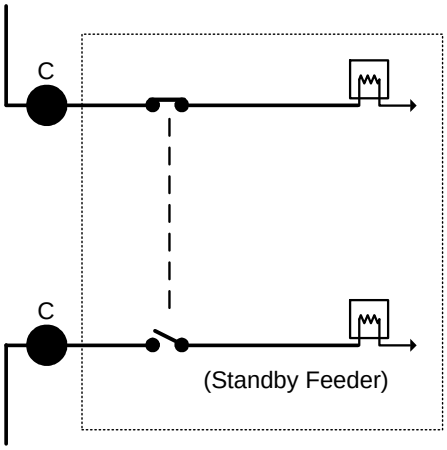
- Two *connection points*
- One End User~~customer~~
- One *meter* ~~/~~ measurement element per *connection point*
- Two *NMIs*. The *NMI* for the LV *supply* was allocated after the introduction of numeric *NMIs*.
- There are two separate *connection points*, therefore, two separate *NMIs* irrespective of whether the DLFs and supplying ~~Transmission Nodes~~TNIs are the same.



- Allocated *NMIs*: 8899778999
  NTTT123456
- Identity of interrogated *metering data*: 8899778999 E1
  NTTT123456 E1

~~11.15.~~12.14. One ~~Contestable Customer~~End User with Standby Supply

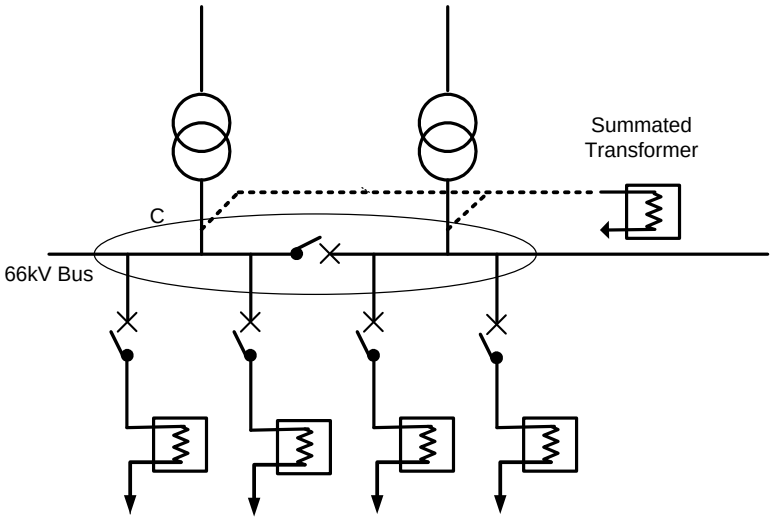
- Two *connection points*
- One End User~~customer~~
- One *meter* ~~/~~ measurement element per *connection point*
- Two *NMIs*
- There are two separate *connection points*, therefore, two separate *NMIs* irrespective of whether the DLFs and supplying ~~Transmission Nodes~~TNIs are the same.



- Allocated *NMIs*: SHHH333322
  SHHH444441
- Identity of interrogated *metering data* is: SHHH333322 E1
  SHHH444441 E1

~~11.16.~~12.15. One End User or Participant, Wholesale Metering at Transmission Node

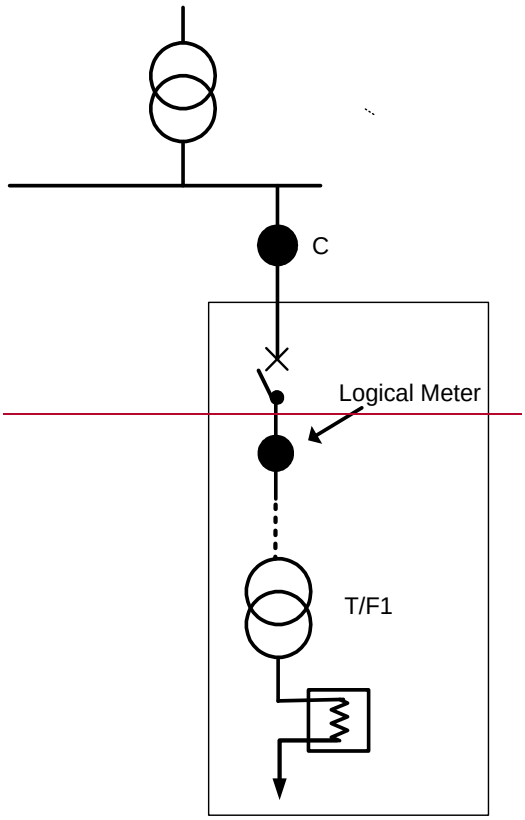
- One *connection point*
- One End User ~~customer~~ or Participant
- Five *meters* (one *meter* ~~-~~/measurement element per *metering point*, with summated *transformer check metering*). Four of the *meters* are official billing *meters*, the other *meter* is for data checking and validation purposes.
- Five *NMIs*

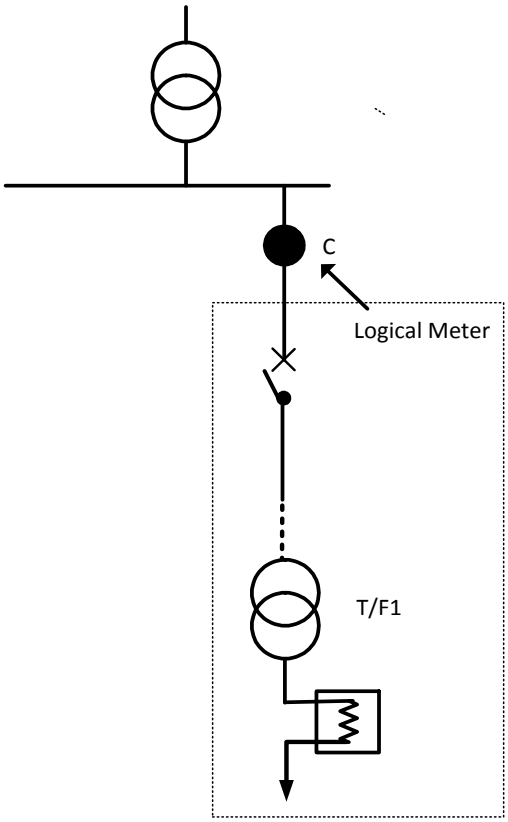


- Allocated *NMIs*: VVVVW00001
  VVVVW00002
  VVVVW00003
  VVVVW00004
  VVVVW00005
- Identity of individual interrogated *meter*ing *data*: VVVVW00001 E1
  VVVVW00002 E1
  VVVVW00003 E1
  VVVVW00004 E1
  VVVVW00005 F1

~~11.17.~~12.16. One End User or~~f~~ Participant, Wholesale Metering at Transmission Node

- One *connection point*
- One End User ~~customer~~ or Participant
- One physical *meter* ~~/~~ measurement element installed at different location to the wholesale boundary *connection point*.
- One logical *meter* ~~/~~ measurement element. The logical *meter* corrects the physical *meter* for *transmission line* and *transformer* (T/F1) losses.
- Two *NMIs*. Only the logical *meter* is recorded against the *connection point* in MSATS.~~registered in the market.~~





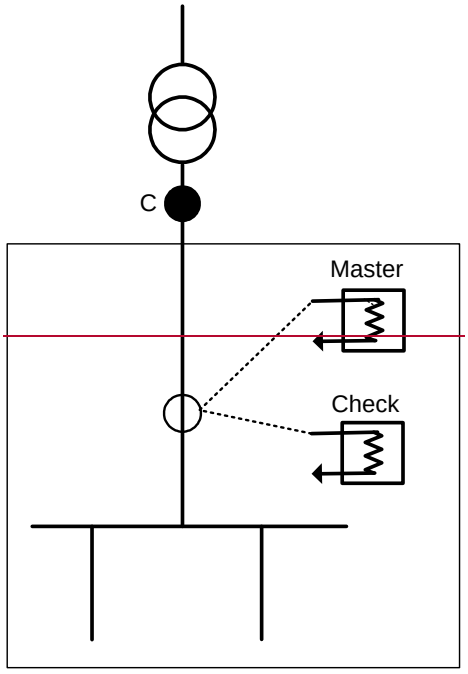
- Allocated *NMIs*: TTTTW00001
  TTTTWL0002
- Identity of individual interrogated *meter*[ing] *data*: TTTTW00001 E1
  TTTTWL0002 E1

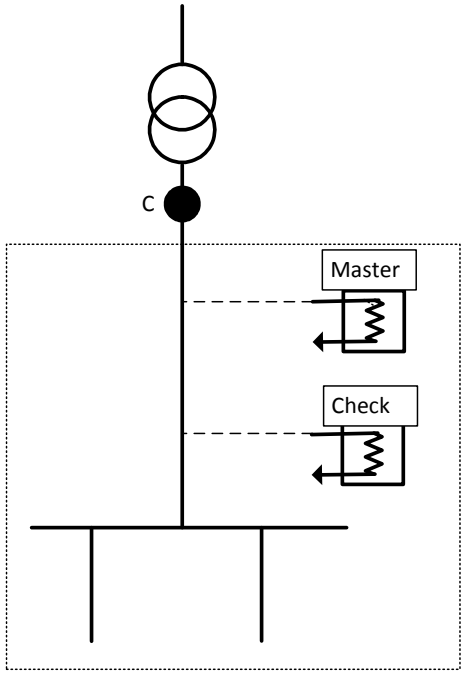
The audit trail of the logical *meter* is maintained through the algorithm and its reference to ~~the~~ [*metering*]*data* from the physical *meter*.

[Any Participant intending to apply a logical *meter* to a *connection point* must contact AEMO's Registration Desk to seek approval prior to entering any data into MSATS.]~~This configuration is subject to acceptance by AEMO through the registration process. The revenue *metering point* must be located as close as practicable to the *connection point* (refer Rules 7.[8.7]3.2(a)(1)).~~

~~11.18.~~12.17. One End User, Wholesale Metering at Transmission Node

- One *connection point*. This is a type1 *metering installation* at a wholesale boundary point.
- One End User~~customer~~
- Two *meters* ~~/~~ measurement elements
- One *NMI*. The *NMI* is assigned to the *metering point*.

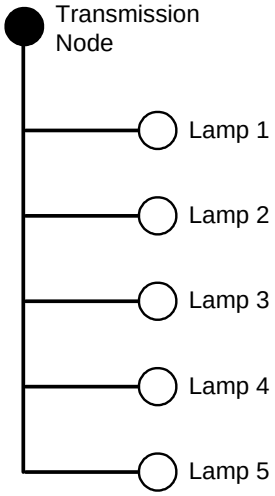




- Allocated *NMI*: TTDDW00015
- Identity of individual interrogated *metering data*:
  - Master *meter* (Import) TTDDW00015 B1
  - *Check meter* (Import) TTDDW00015 C1

~~11.19.~~12.18. Street Lighting (Type 7 Metering Installation)

- Multiple unmetered ~~physical~~ connections, one *market connection point*.
- One End User~~customer~~.
- One type 7 *metering installation*.
- One *NMI*.
- All lamps are supplied from a single *transmission* node.
- ~~All lamps have the same Host *retailer*.~~
- All lamps have the same ~~Distribution Loss factor~~DLF, FRMP and LNSP.
- ~~All lamps have the same Financially Responsible Market Participant.~~
- ~~All lamps have the same LNSP.~~

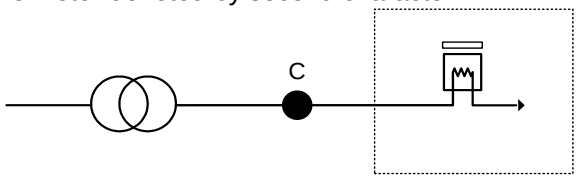


- Allocated *NMI*: 5555565656
- Identity of individual interrogated *meter*ing *data*: 5555565656 E1

~~12.~~13. EXAMPLES OF NMI APPLICATION – ACCUMULATED~~CONSUMPTION~~ ENERGY DATA

~~12.1.~~13.1. Single Meter with Single Datastream~~Register~~

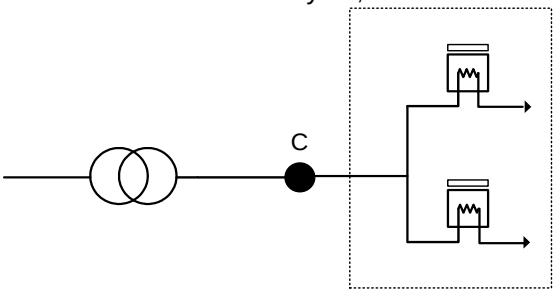
- Only one Data-stream available, identified by 11. Only one Datastream~~register~~, denoted by first character 1, and only one *meter* denoted by second character 1.



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *meter*ing *data*: 5656565656 11

~~12.2.~~13.2. Two Meters each with Single Datastream~~Register~~

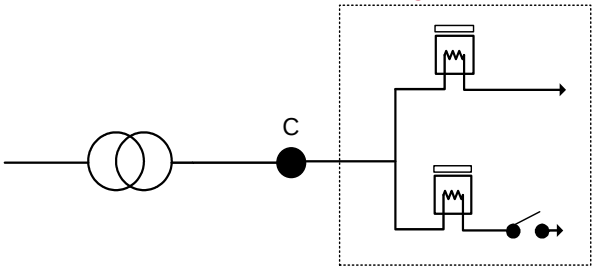
- The Data-stream from the first *meter* is identified by 11, and from the second *meter* by 12.



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *meter*ing *data*: 5656565656 11
  5656565656 12

~~12.3.~~13.3. Two Meter Installation, One Meter Recording Consumption for a Controlled Load

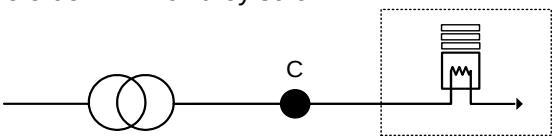
- The data for *meter* one is from the first ~~register~~Datastream, hence suffix 11.
- The data for *meter* two is from the first Controlled Load ~~register~~Datastream, hence suffix 42.



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *meter*ing *data*: 5656565656 11
  5656565656 42

~~12.4.~~13.4. Three Datastream~~Register~~ Meter with Single Measurement Element

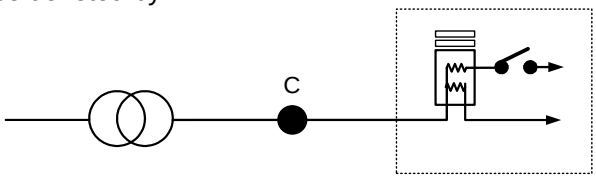
- The *meter* has a three-rate Datastream~~register~~ (high, shoulder, and low rates). As there is only one *meter*, each of the suffixes will have the final character set to 1 to denote that the *metering data* has originated from the same *meter*.
- Each ~~register~~ Datastream is numbered as the reader loads *metering data* from them – for a mechanical three- ~~-~~rate ~~register~~Datastream, from top to bottom, or left to right, and for an electronic ~~register~~ Datastream in the order in which they scroll.



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *metering data*: 5656565656 11
  5656565656 21
  5656565656 31

~~12.5.~~13.5. Multi-function Meter

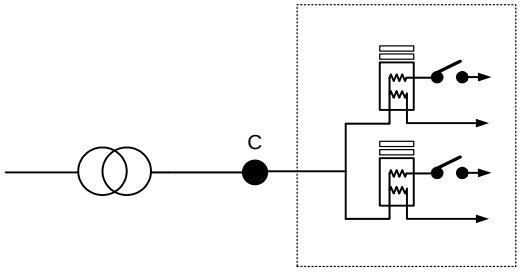
- Multi-function *meter* with two measurement elements.
- Each measurement element~~s~~ has a single *energy* Datastream~~register~~, which requires two data suffixes. As there is only one *meter*, each of the suffixes will have the final character set to 1 to denote that the *metering data* has originated from the same *meter*. The Controlled Load data will be denoted by a 41 as originating from the first Controlled Load Datastream~~register~~, and the continuous circuit will be denoted by 11.



- Allocated *NMI*: 5656565656
- Identity of individual interrogated *metering data*: 5656565656 11
  5656565656 41

~~12.6.~~13.6. Two Multi-function Meters

- ~~Two multi-function *meters* where the controlled circuits have the same switching control. (Timeclock or AF relay) .~~



-

- Allocated *NMI*: 5656565656
- Identity of individual interrogated *metering data* (*meter* 1): 5656565656 11
  5656565656 41
- Identity of individual interrogated *metering data* (meter 2): 5656565656 12
  5656565656 42

~~13.~~14. ENERGY DIRECTION FLOWS

The following conventions are used in the ~~National Electricity *Market*~~*NEM*:

(a) ~~(a)~~ All flows are ~~in relation~~specified by reference to ~~to~~ their direction to or ~~/~~from the ~~*pool*~~*market*. Hence:

(i) ~~1.~~ All *energy* from the ~~pool~~ *market* is considered export (i.e. *energy* consumed by an ~~customer~~ End User is export) (**Export**).

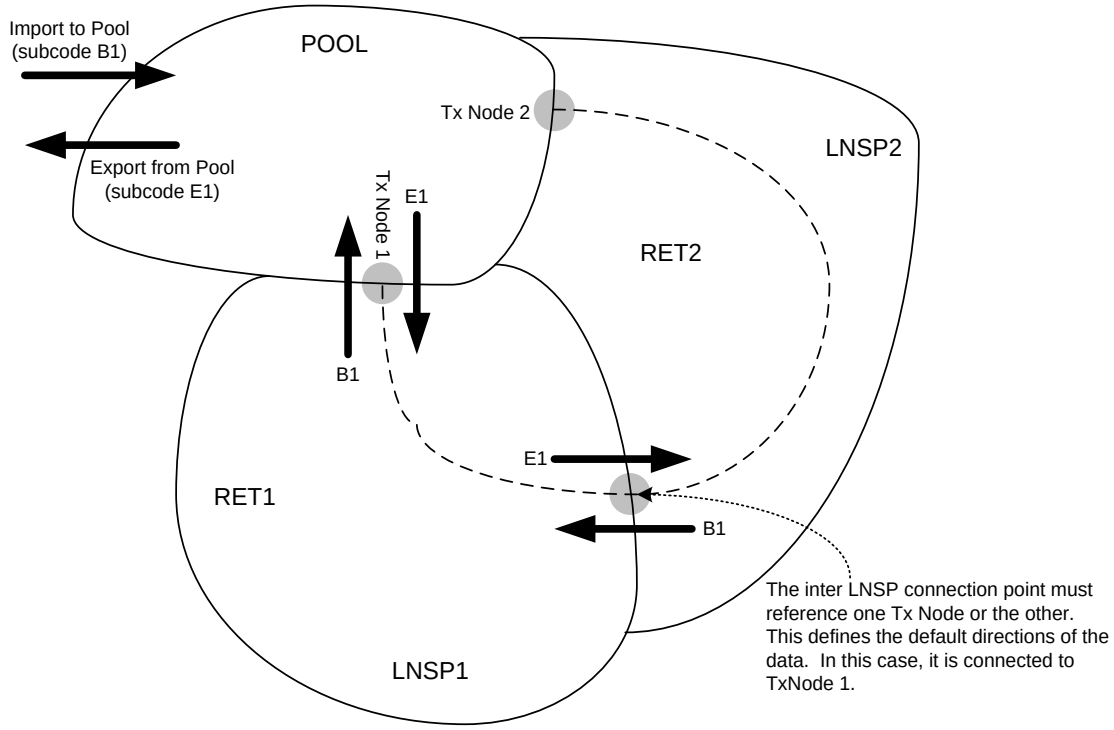
(ii) ~~2.~~ All *energy* into the ~~pool~~ *market* is considered import (i.e. the *energy generated* into the ~~pool~~ *market* is import) (**Import**).

(b) ~~(b) For *interconnector* flows,~~ AEMO shall define the import and export *energy* flows for *interconnectors* on a case-by-case basis.

(c) ~~(c)~~ For the purposes of MSATS, 'Net' *energy* is derived as: Net = Export - Import

Hence, the net *energy* for *generation* ~~energy~~ is negative (in a net quantity) and an ~~customer~~ "End User's *energy* is positive (in a net quantity).

~~Placeholder: f~~For ~~Basic~~Accumulation Meter Datastreams, this means that the *energy* values for import (*generation*) must be negative.



The same convention is used for kvarh~~'s~~, i.e.:

kvarh~~'s~~ supplied to an ~~customer~~ End User are export kvarh~~'s~~; and

kvarh~~'s~~ received from an ~~customer~~ End User are import kvarh's.

~~14.~~15. ALLOCATION OF NMIS FOR TYPE 7 METERING INSTALLATIONS

Schedule 7.~~4~~2 of the NER~~National Electricity Rules~~ and section 12 of Metrology Procedure: Part B establish~~es~~ the framework for type 7 *metering installations*. ~~The requirements for a type 7 *metering installation* are:~~

~~(a) The Metrology Coordinator and AEMO must agree that a *metering installation* does not require a meter to measure the flow of electricity in a power conductor before that installation may be classified as a type 7; and~~

~~(b) The market load that is supplied with electricity has a load pattern which is the same as or similar to one of four specified arrangements.~~

~~14.1.~~15.1. Common Requirements ~~Common~~ across the ~~National Electricity Market~~NEM

(a) Each type 7 *metering installation* ~~comprises~~ applies to a ~~set of the entire unmetered load with a~~ unique combination of FRMP, End ~~-~~User ~~customer~~, TNI, DLF, and LNSP.

(b) The *NMI* may contain different agreed *market loads* ~~and/~~or ~~different~~ Unmetered Device types. One *NMI* is required for each type 7 *metering installation*. Individual loads may be added to and removed from~~to~~ the *NMI* without the need to change *NMIs*.

(c) For each TNI there will be one or more *NMIs* representing municipal lighting *loads*, and ~~then~~ several other *NMIs* ~~which~~ represent~~ing~~ the various utilities ~~(gas, telephone, roads, water, etc)~~ who have unmetered *loads* ~~serving~~ in th~~at~~e geographic~~al~~ area serviced by the TNI. ~~An exception to this approach is when an unmetered load is included in the *NMI* for a related metered load, where the number of devices is small, for example when security lighting (known as watchman or night watch in some jurisdictions), the energy consumption of those devices is immaterial relative to the total energy consumption for that *NMI*, and the FinanciallyResponsible Market ParticipantFRMP, end-use customer, LNSP, Marginal loss factor (or TNI) and Distribution loss factorDLF are the same.~~

~~(a)~~(d) New *NMIs* must~~should~~ only be created where one or more unmetered *loads* with a unique and previously unregistered set of attributes (FRMP, End~~-~~ User ~~customer~~, TNI, DLF, LNSP) are to be put into service.

~~(b)~~(e) A *NMI* may be abolished if the *load* is removed (eg. street turned into park, and lighting removed) or the *load* is transferred to another *NMI*. (eg. due to network re~~-~~arrangements).

~~(c)~~(f) A change of one attribute (FRMP, TNI, DLF, LNSP), or a change of End~~-~~ User ~~customer~~, ~~would~~ will not of its own ~~result in~~require an abolition of the *NMI*.

~~(d)~~(g) The NER~~National Electricity Rules~~ and ~~the~~ Metrology Procedure[3]: Part B provide for the allocation of *NMIs* to broad classes of unmetered *connection points* provided that certain attributes required for *settlements* remain unique. ~~In assigning an individual unmetered *connection point* to a *NMI*, the LNSP must exercise judgement regarding the scope and materiality of any uncertainty in the allocation of a *NMI* for an unmetered *load*.~~

~~For example,~~ AEMO expects that each LNSP has a procedure for the allocation of *NMIs* for unmetered supplies, ~~and that procedure is available~~which will be available for review by the Jurisdiction or AEMO ~~as required~~on request.

~~(e)~~(h) A procedure for the ~~initial~~ allocation of *NMIs* for street and public lighting across a geographic area must include~~might follow~~ the following ~~basic~~ steps:

(i) ~~(i)~~ Define the geographic area supplied from a *transmission* node.

~~•~~

~~•~~ ~~(ii)~~ Sub~~-~~divide the unmetered supplies within this geographic area according to End ~~-~~User~~s customers~~.

[3] ~~During 2006 it is expected that the jurisdictional Metrology Procedures will be replaced by the NEM Metrology Procedure. Pending this change, references to the Metrology Procedure mean the relevant applicable Metrology Procedure (jurisdictional or NEM~~

(ii) If necessary, sub-d~~d~~ivide these unmetered supplies to take account of variations of ~~distribution loss factor~~DLF ~~which~~ that ~~may~~ apply across the area.

(iii) If necessary, sub-~~-~~divide these unmetered supplies according to FRMP.

~~(f)~~(i) ~~In~~ When considering materiality, the LNSP may allocate streetlights by geographic area~~mapping cell~~, or postcode, or by some other available grouping where the majority of that *load* is supplied from a single *transmission* node.

~~(g)~~(j) Where *distribution* feeders are commonly supplied from one *transmission* node, but are regularly moved to another ~~nearby~~ *transmission* node for maintenance or seasonal reasons, ~~AEMO will accept registration at~~ the *NMI* can be recorded in MSATS against the ~~-~~*transmission* node through which the majority of the *energy* is ~~traded~~delivered. This approach is supported by the fact that the calculation of ~~Transmission Loss Factors (TLFs)~~*marginal loss factors* takes account of seasonal flows at *transmission* nodes, and that the *marginal loss factors* ~~TLFs~~ for adjacent TNIs where *load* sharing is possible are unlikely to be significantly different.

14.2. Individual Jurisdiction Requirements

(a) The National Electricity Rules requires AEMO and the Metrology Coordinator for each jurisdiction to reach agreement on the generic load types which may be traded through type 7 metering installations. The types of load which have been considered include:

- Street lighting, traffic lights, telephone box illumination, illuminated street and advertising signs, tram/bus shelter lights, ice warning lamps, and security lights.
- Noise monitoring station, electronic parking meter, ticket dispensing machine, microcells for cellular phone networks, power outlets for X-ray and outside broadcast vans, sprinkler control systems, cathode protection units, flow monitoring equipment, telemetry stations, traffic counter stations, weather stations, and cable amplifiers.

(b) The actual loads approved for type 7 metering installations may vary between jurisdictions.

APPENDIX A. SAMPLE JAVA CODE FOR NMI CHECKSUM

```
/**
 * Calculates a LUHN-10.
 * <PRE>
 * 1. Double the value of alternate digits beginning with the rightmost digit
 * 2. Add the individual digits comprising the products obtained in step 1 to
 *    each of the unaffected digits in the original number.
 * 3. Find the next highest multiple of 10
 * 4. The check digit is the value obtained in step 2 subtracted from the value
 *    obtained in step 3.
 * 5. END
 * </PRE>
*/
public class LUHN10
{
  /**
   * Value to indicate we have not calculated the luhn yet.
   */
  private static final int NULL_VALUE = -1;

  /**
   * Buffer holding the sequence of digits to use in the calculation.
   */
  private StringBuffer _buffer;

  /**
   * The cached value for the luhn.
   */
  private int _luhn;

  /**
   * Constructor.
   */
  public LUHN10()
  {
    reset();
  }

  /**
   * Resets the calculator to its initial values.
   */
  public void reset()
  {
    _buffer = new StringBuffer();
    _luhn = NULL_VALUE;
  }

  /**
   * Updates the LUHN-10 with specified digit.
   */
  public void update(char d)
  {
    // Append the character
    _buffer.append(d);

    // And, reset the cached luhn
```

```
    _luhn = NULL_VALUE;
  }

  /**
   * Returns the current LUHN-10 value.
   */
  public int getValue()
  {
    if (_luhn == NULL_VALUE)
    {
      int v = 0;
      boolean multiply = true;
      for (int i = _buffer.length(); i > 0; i--)
      {
        int d = (int)_buffer.charAt(i - 1);

        if (multiply)
        {
          d *= 2;
        }
        multiply = !multiply;

        while (d > 0)
        {
          v += d % 10;
          d /= 10;
        }
      }
      _luhn = (10 - (v % 10)) % 10;
    }
    return _luhn;
  }

  public static void main(String[] args)
  {
    if (args.length == 0)
    {
      System.out.println("USAGE: LUHN10 nmi");
    }
    else
    {
      LUHN10 luhn = new LUHN10();

      String nmi = args[0];

      for (int j = 0; j < nmi.length(); j++)
      {
        luhn.update(Character.toUpperCase(nmi.charAt(j)));
      }

      System.out.println(nmi + "/" + luhn.getValue());
    }
  }
}
```

APPENDIX B. ~~WORKED~~ EXAMPLES ~~FOR NMI CHECKSUM~~

This Appendix contains a worked example of the NMI Checksum calculation. An alphanumeric *NMI* is used in the example to illustrate the algorithm~~'~~s ability to handle all characters that have an ASCII equivalent.

The logic of the algorithm can be summarised as:

Process each character in the *NMI* individually, starting with the right most. For each character:

- (a) Convert the character to its ASCII value
- (b) For the right most character and every second~~ach alternate~~ character reading left, double the ASCII value obtained in Step (a)~~3. above.~~
- (c) Add the individual digits of the ASCII value to a register holding the total added value for the NMI Checksum.

Subtract the total added value register from the next highest multiple of 10. If the result is 10, the checksum is 0, otherwise the result is the NMI Checksum.

The *NMI* for the following worked example is: 1234C6789A

Step 1. Initialise variables used by the process.

Double_This_Char
is a boolean that indicates whether the character currently being processed should be doubled.

Char
is the character currently being processed~~,~~ as it appears in the *NMI*.

ASCII_Char
is the ASCII value of Char

Total
is the running sum of the digits generated by the algorithm.

NMI Checksum
is the final result. At the start of the process:

Double_This_Char = True
because the right most character, and then every second~~alternate~~ character, is doubled by the algorithm.

Total = 0

Checksum = NULL

Step 2. Read the *NMI* character by character, starting with the right most character.

Char = A

Step 3. Convert the character to its ASCII value.

ASCII_Char = 65

Step 4. Double the ASCII value if the character is the right most of the *NMI* or an alternate.

ASCII_Char = 130

Double_This_Char = Not Double_This_Char

Step 5. Add the individual digits of the ASCII value to the Total After.

Total = Total + 1 + 3 + 0 (i.e. Total = 4)

Performing steps 2 ~~through~~ to 5 for each character in our example *NMI* gives the following results:

Table 3 Example NMI Results

Character	Total Before	ASCII Value	Double?	Doubled Value	Total After
A	0	65	Y	130	4 (0+1+3+0)
9	4	57	N	57	16 (4+5+7)
8	16	56	Y	112	20 (16+1+1+2)
7	20	55	N	55	30 (20+5+5)
6	30	54	Y	108	39 (30+1+0+8)
C	39	67	N	67	52 (39+6+7)
4	52	52	Y	104	57 (52+1+0+4)
3	57	51	N	51	63 (57+5+1)
2	63	50	Y	100	64 (63+1+0+0)
1	64	49	N	49	77 (64+4+9)

The value of 'Total After' processing the ~~entire~~ *NMI* is 77.

The next highest multiple of 10 is 80.

Checksum = 80 –77 = 3.

~~S~~

Further examples: NMIs and Associated Checksums

The following thirty NMI Checksums were calculated by AEMO from the ~~listed~~ *NMIs* listed in Table 4. The *NMIs* and NMI Checksums are provided to assist Participants in checking their implementation of the NMI Checksum algorithm.

Table 4 NMIs~~S~~ and NMI Checksums

NMI	NMI Checksum	NMI	NMI Checksum
2001985732	8	QAAAVZZZZZ	3
2001985733	6	QCDWW00010	2
3075621875	8	SMVEW00085	8
3075621876	6	VAAA000065	7
4316854005	9	VAAA000066	5
4316854006	7	VAAA000067	2
6305888444	6	VAAASTY576	8
6350888444	2	VCCCX00009	1
7001888333	8	VEEEX00009	1
7102000001	7	VKTS786150	2
NAAAMYS582	6	VKTS867150	5
NBBBX11110	0	VKTS871650	7
NBBBX11111	8	VKTS876105	7
NCCC519495	5	VKTS876150	3
NGGG000055	4	VKTS876510	8

~~End of document.~~