National Metering Identifier Procedure

PREPARED BY: Market Development

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Version Control

VERSION	DATE	DETAILS
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.
V005	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.

VERSION	DATE	DETAILS
		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.
V005.1	August 2009	Update to AEMO format

Table of Contents

1. Introduction

This document sets out the structure for National Metering Identifiers (NMIs) to be used in National Electricity Market (NEM) and details metering data streams for each category of installation. 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 is reliant on:

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

The National Metering Identifier (NMI) provides 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 registration, customer transfer, connection point change control and data aggregation and transfer.

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

3. NMI Structure

The NMI is a ten (10) character identifier assigned by Local Network Service Providers (LNSPs) in accordance with this procedure. The publication of this procedure and assignment of NMIs is authorised by the National Electricity Rules at clause 7.3.1(d), (da), and (db).

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

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

Generally the NMI is an all numeric identifier; the limited circumstances under which alpha characters may be used are listed later in this procedure.

The key attributes of the NMI are:

- The NMI must embody only numeric characters, except as explicitly provided within this document, and must not contain spaces.
- Character letters 'O' and 'I' are not permitted in order to avoid confusion with numbers 0 and 1.
- 'W' is a reserved character to be used as the fifth 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.
- Embedded characters or meanings should not be used in allocating NMIs.
- Where AEMO has allocated a block of NMIs to an LNSP, the LNSP must only use numeric characters in the NMIs allocated to the market unless AEMO has directed the block to be *alphanumeric.*
- Where AEMO has allocated a block of NMIs to an LNSP, and directed the block to be *alphanumeric*, the LNSP may use *all-numeric* or *alphanumeric* characters in the NMIs allocated to the market.

Network Service Providers must maintain a register of all 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 checksum is appended to the NMI to form an eleven-character NMI, or the two character NMI data stream suffix may be appended to form a twelve-character NMI. NMI checksum is not used with the data stream suffix because the data stream suffix is intended for use only with electronic data transfer.

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

AEMO may allocate blocks of NMIs to LNSPs from any unused range.

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.

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 National Electricity Market and in accordance with decisions made by NEMSAT (decision 142 – 31 October 2000 & decision 144 – 14 November 2000), all NMIs issued for connection points which become contestable after 1 January 2001 are required to be all numeric.

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

Connection points which were contestable prior to 1 January 2001 and for which the LNSP had allocated an alphanumeric NMI may be registered in the market with an alphanumeric NMI.

Transmission Network Service Providers 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.

5. NMI Checksum

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

The NMI checksum is a mandatory field whenever a NMI is manually entered into MSATS.

Sample java code for an implementation of the checksum is provided in Appendix 1. A general form of the algorithm used to create the NMI checksum is:

1. Double the ASCII value of alternate digits within the NMI beginning with the right-most digit.
2. Add the individual digits comprising the products obtained in step 1 to each of the unaffected ASCII value 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. If the result of this subtraction is 10 then the check digit is 0.

Appendix 2 provides a worked example of the algorithm, while Appendix 3 provides a list of thirty NMIs with checksums calculated by the AEMO implementation of the algorithm.

The NMI checksum is always a numeric character.

The NMI checksum is not mandatory when transferring NMI identified data electronically between Participants and service providers. The checksum 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.

When publishing a NMI for end-use customers the NMI will appear in its 11-character format, and the checksum will be the final character of the NMI.

6. Data Stream Suffix

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

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

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

The data 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 may be required for a connection point.

The data 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 checksum. The data stream suffix allows Participants and service providers to identify data at a sub-connection point level and to identify the individual sources of meter data to maintain necessary data audit trails.

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

7. Data Stream Suffix for Interval Metering Data

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

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

Identifiers in the **MASTER** column are those normally used within the National Electricity Market. Where check metering is required (type 1 & 2 installations), identifiers from the **CHECK** column are used for the check installation. Where the data from the **MASTER** and **CHECK** installations has been averaged in accordance with the National Electricity Rules, 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 steam suffices for interval metered data

	FIRST CHARACTER				SECOND CHARACTER
	AVE	MASTER	CHECK	NET	
IMPORT kWh	A	B	C	N	Meter Numbers or measuring elements are to be 1 – 9 then A-H, J-N, P-Z.
EXPORT kWh	D	E	F		
IMPORT kvar	J	K	L	X	
EXPORT kvar	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		

Where a meter has multiple measurement elements, the convention for the population of the second character of the Data Stream Suffix is:

- 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.
- 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 the assigned NMI of 2727000011. Refer 13.4 and 13.5 for diagrammatic examples.

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

8.1 Data Stream Suffix for Consumption Energy Data

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

The data 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.

Table 2: Data Stream suffixes for consumption energy data

fIRST cHARACTER		SECOND CHARACTER
1	First register	Meter numbers are to be 1-2 then A-H, J-N, P-Z.
2	Second register	
3	Third register	
4	First controlled load register	
5	Second controlled load register	
6	Third controlled load register	
7	First LNSP defined register	
8	Second LNSP defined register	
9	Third LNSP defined register	

Examples:

8877886644 1A relates to consumption energy data from meter A (the 10th meter at the 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.

8.2 Wholesale Connection Points

A wholesale connection point is a connection point where:
<Local Retailer = POOL∗ > The "∗" is a wildcard for the settlement region.

For wholesale sites, a NMI must be assigned to each individual physical or logical metering point which contributes to the wholesale connection point. This requirement is to facilitate a drill down to data streams where AEMO is obliged to audit or otherwise investigate data flows for a wholesale connection.

AEMO assigns the NMIs for regulated interconnectors.

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 contributes to the logical metering point must be assigned a separate NMI. The Responsible Person is responsible for determining the algorithm used to relate the logical metering point for a physical connection to the metering point(s) which contribute data for the physical connection. Refer section 13.17 for an example.

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.

9. Connection Points with Type 1 Metering

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

A type 1 metering installation requires a duplication of metering, voltage and current sources in accordance with the National Electricity Rules. The data streams from one meter are designated **MASTER** and from the other meter are designated **CHECK**.

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

If the check metering is of a lower accuracy standard than the master metering only the **MASTER** data stream is submitted, in which case the data stream suffixes will have an initial character B (import) or E (export) or N (net).

10. 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 National Electricity Rules requires a type 2 metering installation.

The National Electricity Rules requires that a type 2 metering installation have partial check metering. The obligations for partial check metering can be met by check metering, in which case the data streams will be identified as for a type 1 metering installation.

Alternatively, the arrangement of partial check metering may be as agreed between AEMO and the Responsible Person. 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 metering installation. The actual arrangements will be part of the scheme submitted by the Responsible Person to AEMO for approval.

11. NMI RULES

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

All NMIs shall be allocated to customer connection points by the respective Local Network Service Providers (LNSPs). The LNSP is required to verify the NMI is associated with the correct transmission node identity (TNI) in AEMO's customer transfer system (MSATS).

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 customer connection point and Transmission Node. It is AEMO's responsibility to issue the NMIs in a 'block release' form to the LNSP and to maintain a register of the issued NMIs.

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

3. A NMI cannot be reassigned to another connection point.

It is NOT acceptable to reallocate NMIs to accommodate changes to IT systems, changes to assumed associations, changes to network tariffs and charges, changes to LNSP boundaries or because the LNSPs allocation system has changed.

While a customer 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 change control. Where a customer changes the physical location of the connection point a new NMI must be allocated. The 'old' NMI is de-commissioned on AEMO's Metering Register and the 'new' NMI commissioned accordingly.

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 metering (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 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:

- The final supply arrangements have the same effective connection arrangement to the local network, **AND**
- The temporary supply is abolished when the permanent supply connection is energised.

4. **The NMI is not changed with a change of consumer, consumer details or registration details.**

5. **All communications to and from Participants and Metering Service Providers inclusive of Financially Responsible Market Participant accounts shall include the NMI identifier.**

All Participants must be aware that the NMI is the only identifier to be used for defining specific connection 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, communication and/or meter changes must include the NMI on all communications between affected parties.

6. **AEMO's Metering Register must have NMIs attached to all connection point records and be the primary database search key for processing purposes.**

AEMO's Metering Register (including subsidiary metering registers managed by service providers) must also have an attached record detailing the respective Transmission Node Identity for each NMI registered.

7. **Transfer of all data to AEMO shall be in an agreed format that includes NMI identification.**

12. Utilisation of NMI for AEMO Data

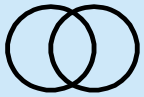
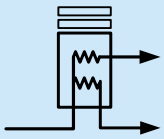
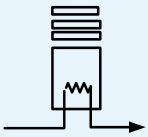
12.1 Data Delivery to AEMO (MSATS System)

Metering data is always provided on a NMI data stream basis. The metering data is to be provided as individual data streams.

Metering data is always provided as net energy flow to MSATS. Reference should be made to section 15 for details of the conventions for direction of energy flows.

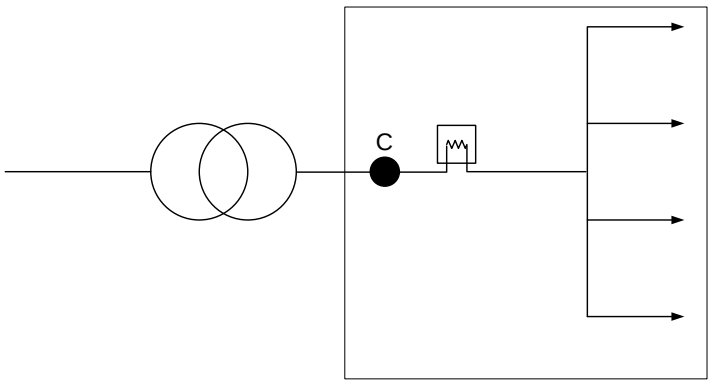
13. Examples of NMI Application – Interval Data

Key to symbols used in sections 13 and 14.

	Connection Point.
	Transformer.
	Meter
	Twin element meter, each element having its own register.
	Three register meter with single measuring element
	Switch.
	Circuit breaker.

13.1 Contestable Customer, metered on the lower voltage side of transformer

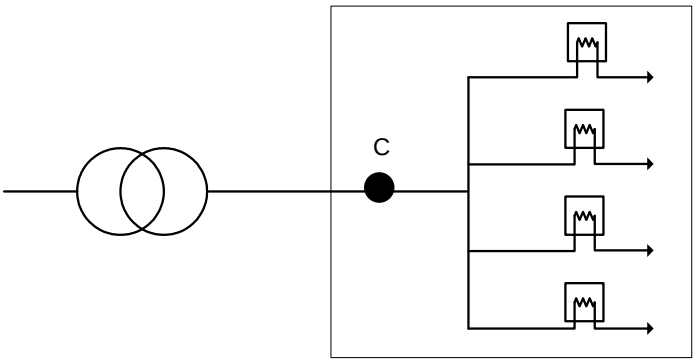
- One connection point
- One customer
- One meter / measurement element
- One NMI



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

13.2 Contestable Customer, multiple metered on the lower voltage side of transformer

- One connection point
- One customer
- Four meters / measurement elements
- One NMI

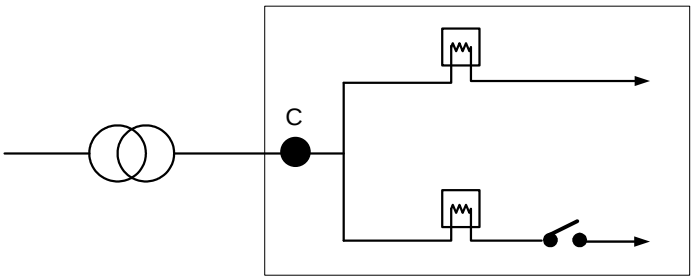


- Allocated NMI: 3131313131
- Identity of individual interrogated meter data:

3131313131 E1
3131313131 E2
3131313131 E3
3131313131 E4

13.3 Contestable Customer, previously two tariff metering, eg general supply + off-peak on low voltage side of transformer

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

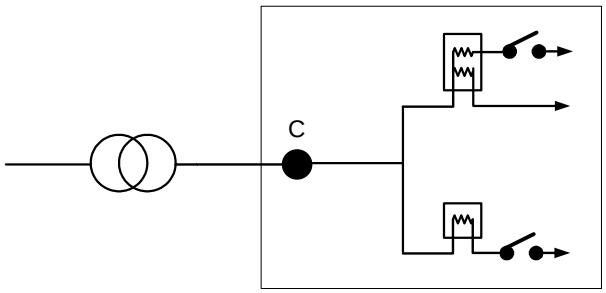


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

5656565656 E1
5656565656 E2

13.4 Contestable Customer, two controlled loads, one twin element meter

- One connection point
- One customer
- Two meters: one twin element with a controlled load and one single element with a controlled load
- One NMI

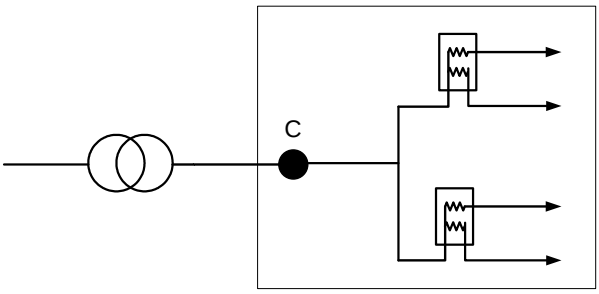


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

5656565656 E1
5656565656 E2
5656565656 E3

13.5 Contestable Customer, two twin element meters

- One connection point
- One customer
- Two twin element meters
- One NMI

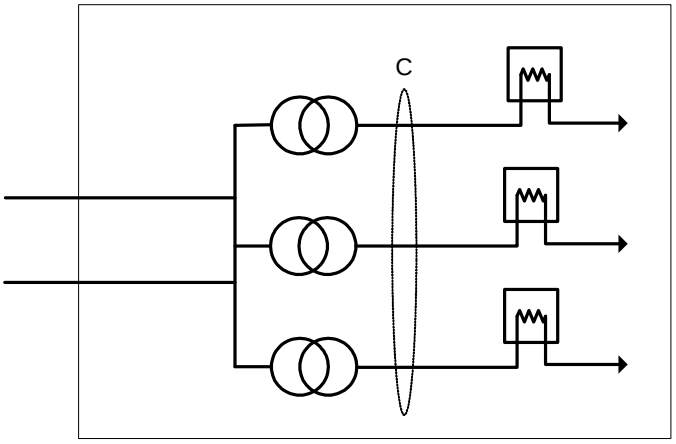


- Allocated NMI: 5656565659
- Identity of individual interrogated meter data:

5656565659 E1
5656565659 E2
5656565659 E3
5656565659 E4

13.6 Contestable Customer, multiple meters on low voltage side of multiple transformers in the same substation building

- One connection point
- One customer
- Three meters / measurement elements
- One NMI

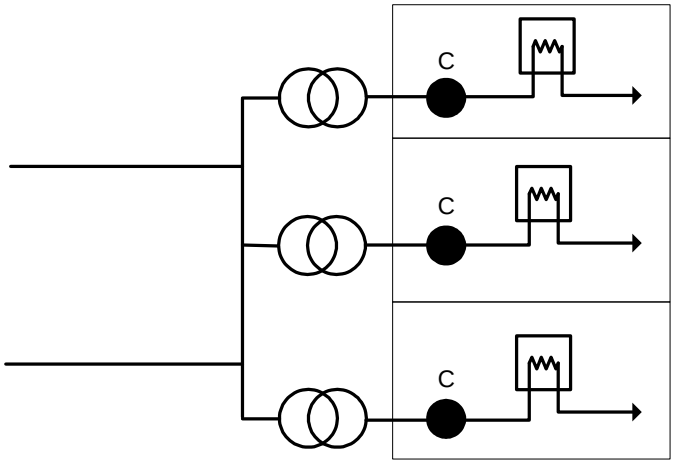


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

5656565656 E1
5656565656 E2
5656565656 E3

13.7 Three Contestable Customers, metered on low voltage side of multiple transformers in the same substation building

- Three connection points
- Three customers
- One meter / measurement element per connection point
- Three NMIs



- Allocated NMIs:

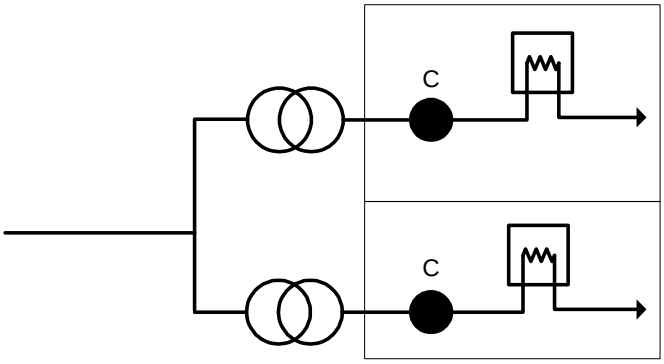
  5656565656
  5656565657
  5656565658

- Identity of individual interrogated meter data:

  5656565656 E1
  5656565657 E1
  5656565658 E1

13.8 Contestable Customer, two separate HV supplies to two separate substations, both metered on LV side

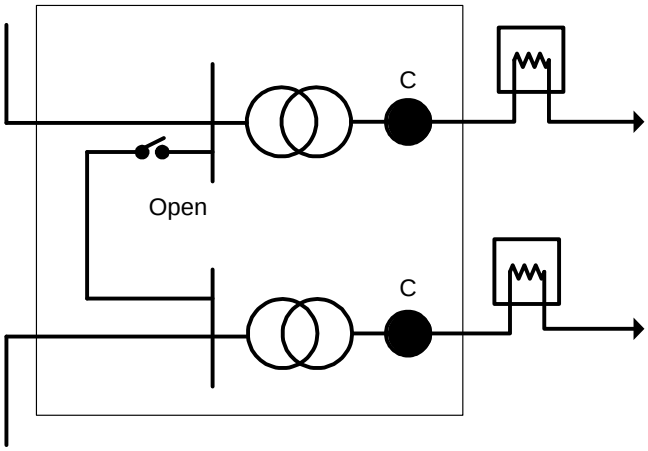
- Two contestable LV connection points
- One customer
- One meter / measurement element per connection point
- Two NMIs



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

13.9 Contestable Customer, 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 high voltage supplies into two sources

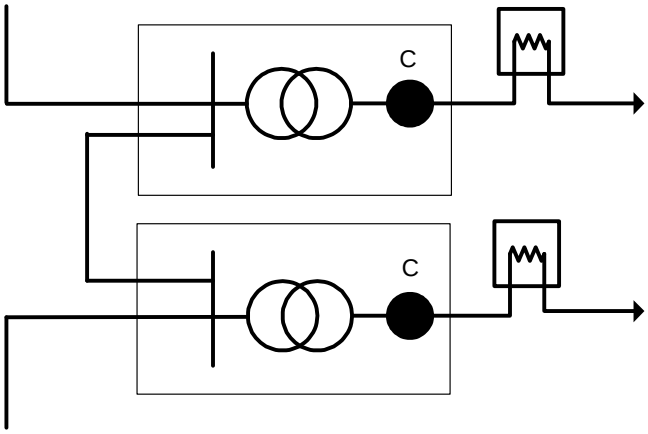
- Two connection points
- One customer
- One meter / measurement element per connection point
- Two NMIs



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

13.10 Contestable Customer, two separate substations adjacent to each other or one single substation with two separate transformers, with the high voltage supply originating from a single source and LV switchboard in common switch room

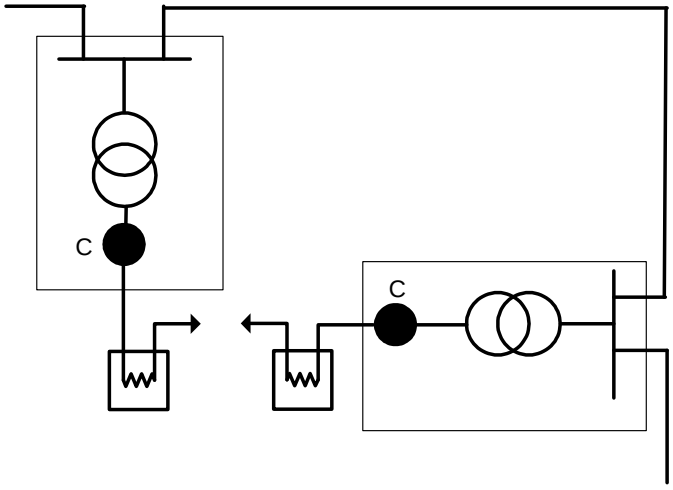
- Two connection points
- One customer
- One meter / measurement element per connection point
- Two NMIs



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

13.11 Contestable Customer, two separate substations not adjacent to each other but on same premise

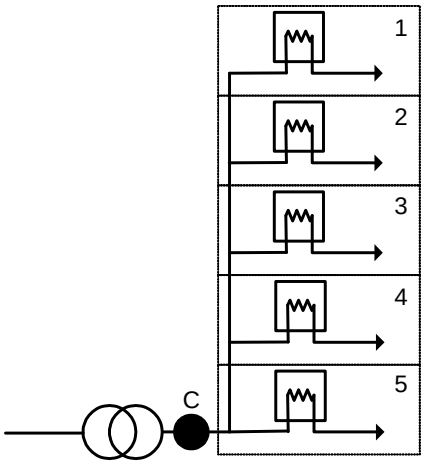
- Two connection points
- One customer
- One meter / measurement element per connection point
- Two NMIs



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

13.12 Multiple Contestable Customers, High rise building

- Multiple connection points, with all customer connection points reference the same point.
- Five individually metered customers
- One meter / measurement element per connection point
- Five NMIs



- Allocated NMIs:

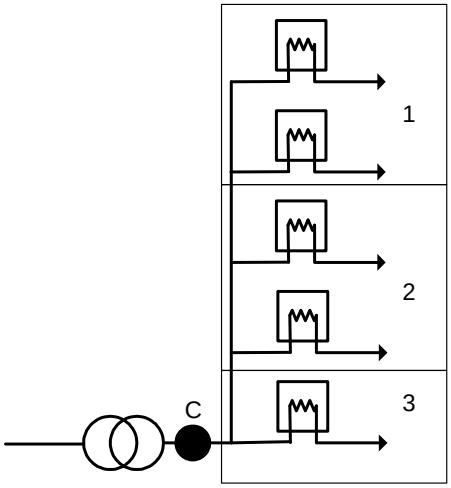
PPPP567801
PPQQ987652
PRRR000043
PRRR000044
PRRR000045

- Identity of individual interrogated meter data:

PPPP567801 E1
PPQQ987652 E1
PRRR000043 E1
PRRR000044 E1
PRRR000045 E1

13.13 Multiple Contestable Customers, High rise building

- Multiple connection points, with all customer connection points reference the same point.
- Three customers
- Multiple meters / measurement elements per customer
- Three NMIs



- Allocated NMIs:

Customer 1	NNN3456789
Customer 2	NNN8976548
Customer 3	NNN0576839

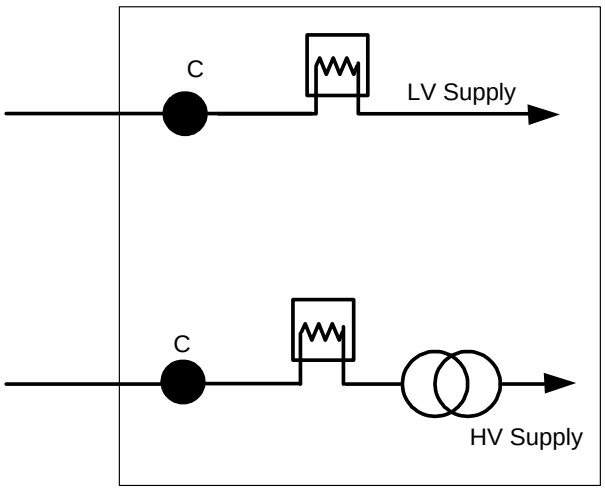
- Identity of interrogated meter data:

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 occur, it may be more efficient to allocate separate NMIs per floor (or other tenanted area).

13.14 Contestable Customer with multiple supply points

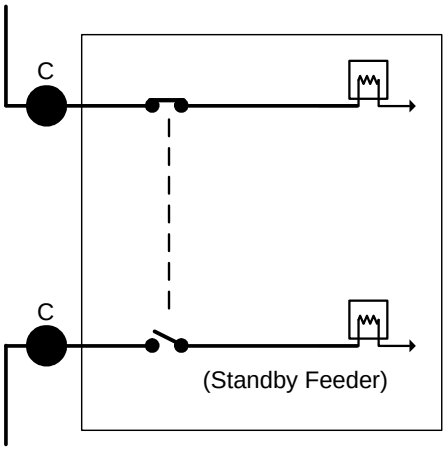
- Two connection points
- One customer
- One meter / measurement element per connection point
- Two NMIs. The NMI for the LV supply was allocated after the introduction of numeric NMIs.
- There are two separate connection points, therefore two separate NMIs irrespective of whether the DLFs and supplying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



- Allocated NMIs: 8899778999
  NTTT123456
- Identity of interrogated meter data: 8899778999 E1
  NTTT123456 E1

13.15 Contestable Customer with Standby Supply

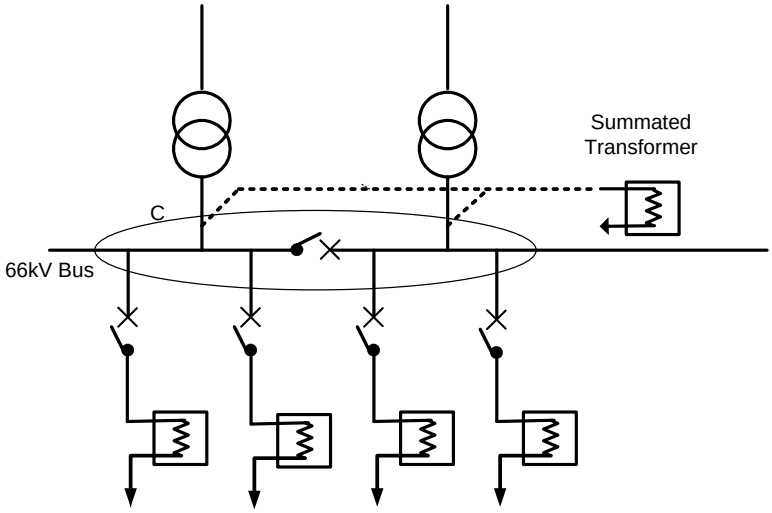
- Two connection points
- One customer
- One meter / measurement element per connection point
- Two NMIs
- There are two separate connection points therefore two separate NMIs irrespective of whether the DLFs and supplying Transmission Nodes are the same.



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

13.16 Wholesale Metering at Transmission Node

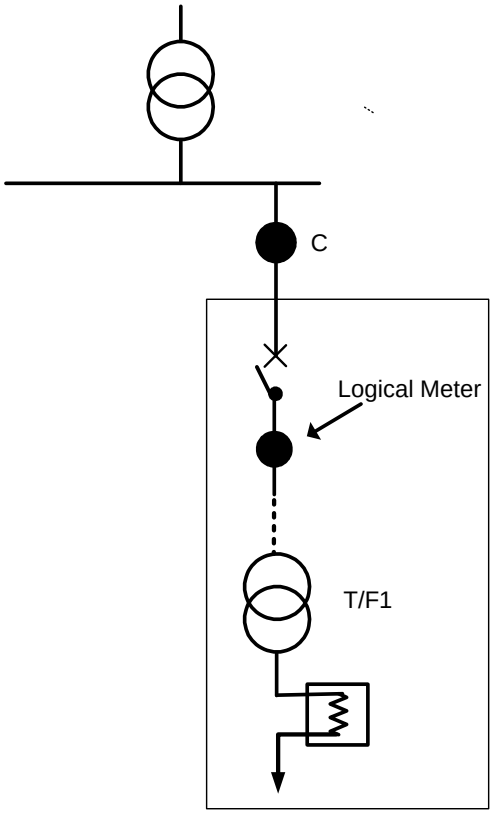
- One connection point
- One customer or Participant
- Five meters (one meter /measurement element per metering point, with summated transformer check metering). Four of the meters are official billing meters, the other meter is for data checking and validation purposes.
- Five NMIs



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

13.17 Wholesale metering at Transmission Node

- One connection point
- One 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 registered in the market.



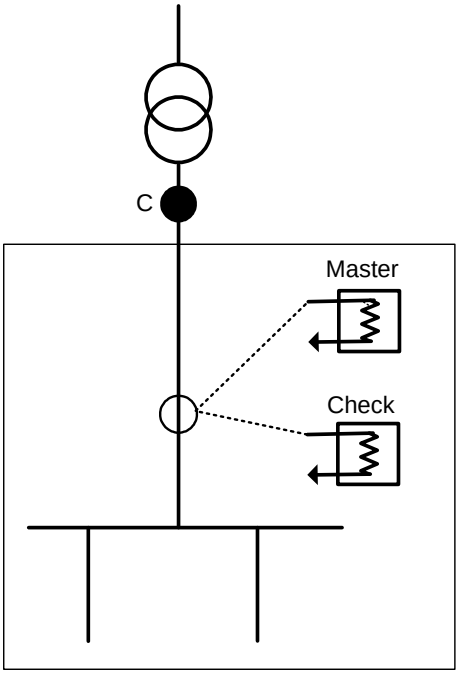
- Allocated NMIs: TTTTW00001
  TTTTWL0002
- Identity of individual interrogated meter data:
  TTTTW00001 E1
  TTTTWL0002 E1

  The audit trail of the logical meter is maintained through the algorithm and its reference to the data from the physical meter.

  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 7.3.2(a)(1)).

13.18 Wholesale Metering at Transmission Node

- One connection point. This is a Type1 installation at a Wholesale boundary point.
- One customer
- Two meters / measurement elements
- One NMI. The NMI is assigned to the Metering point.

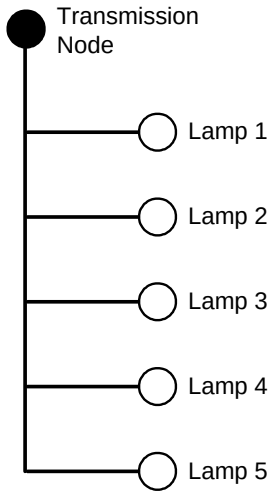


- Allocated NMI: TTDDW00015
- Identity of individual interrogated meter data:

Master (Import)	TTDDW00015 B1
Check (Import)	TTDDW00015 C1

13.19 Street Lighting (Type 7 Metering Installation)

- Multiple unmetered physical connections, one market connection point.
- One 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.
- All lamps have the same Financially Responsible Market Participant.
- All lamps have the same LNSP.

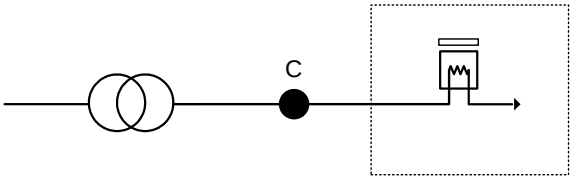


- Allocated NMI: 5555565656
- Identity of individual interrogated meter data:
  5555565656 E1

14. Examples of NMI Application – Consumption Energy Data

14.1 Single Meter with Single Register

- Only one data stream available, identified by 11. Only one register, denoted by first character 1, and only one meter denoted by second character 1.

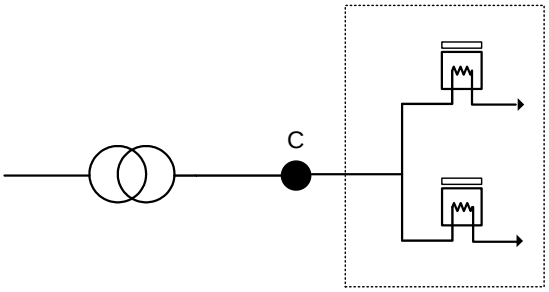


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

  5656565656 11

14.2 Two Meters each with Single Register

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

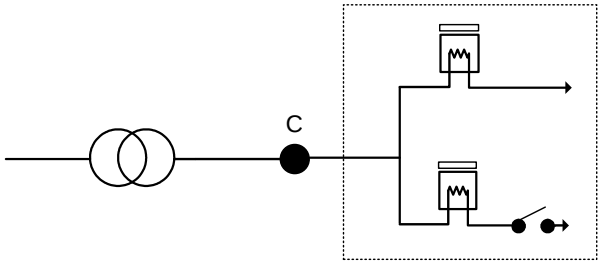


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

  5656565656 11
  5656565656 12

14.3 Two Meter Installation, One Meter Recording Consumption for a Controlled Load

- The data for meter one is from the first register, hence suffix 11.
- The data for meter two is from the first controlled load register, hence suffix 42.

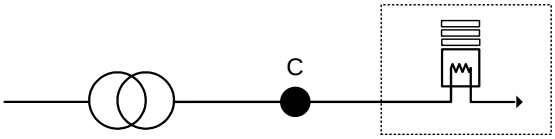


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

5656565656 11
5656565656 42

14.4 Three Register Meter with Single Measurement Element

- The meter has a three-rate 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 the data has originated from the same meter.
- Each register is numbered as the reader loads data from them – for a mechanical three rate register, from top to bottom, or left to right, and for an electronic register in the order in which they scroll.

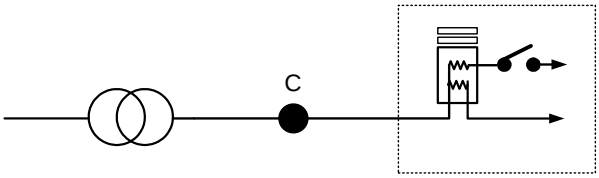


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

5656565656 11
5656565656 21
5656565656 31

14.5 Multi-function Meter

- Multi-function meter with two measurement elements.
- Each measurement elements has a single energy 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 the data has originated from the same meter. The controlled load data will be denoted by a 41 as originating from the first controlled load register, and the continuous circuit will be denoted by 11.

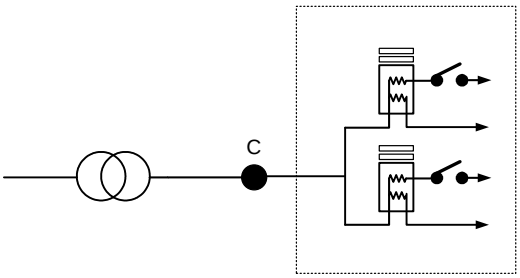


- Allocated NMI: 5656565656
- Identity of individual interrogated meter data:

  5656565656 11
  5656565656 41

14.6 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 meter data (meter 1):

  5656565656 11
  5656565656 41
- Identity of individual interrogated meter data (meter 2):

  5656565656 12
  5656565656 42

15. Energy Direction Flows

The following conventions are used in the National Electricity Market:

(a) All flows are in relation to their direction to/from the pool. Hence:

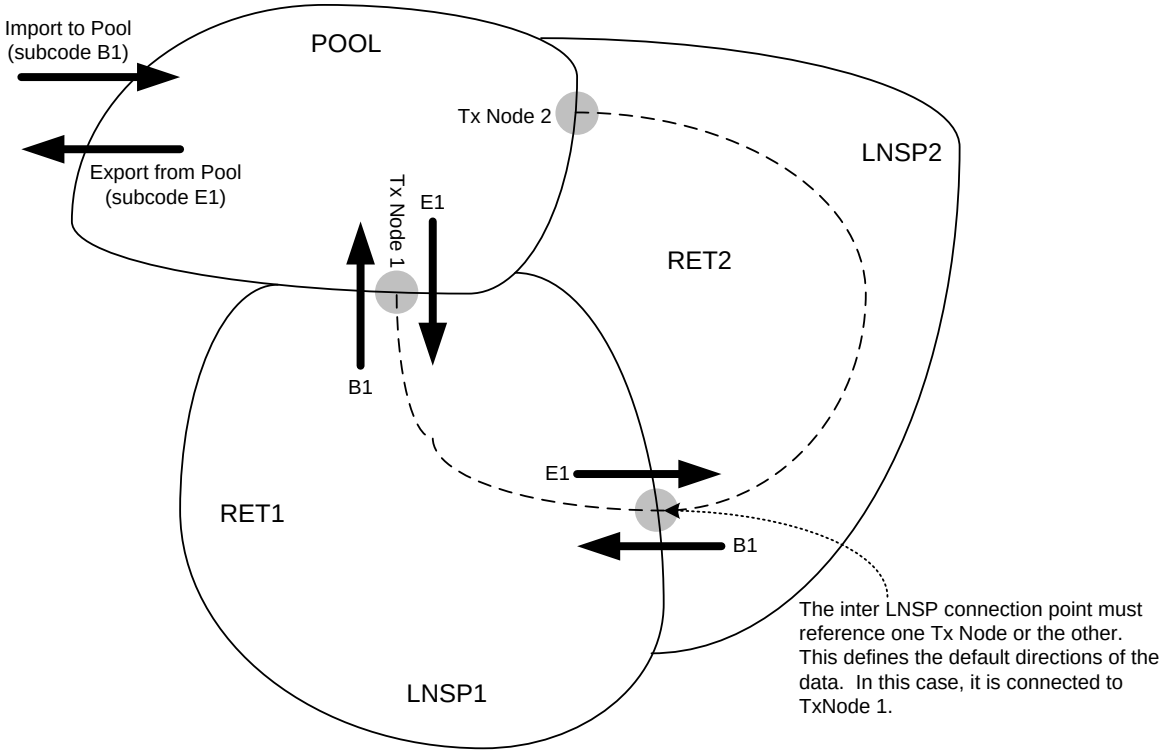
1. All energy from the pool is considered ***export*** (i.e. energy consumed by a customer is export).
2. All energy into the pool is ***import*** (i.e. the energy generated into the pool is import).

(b) For Interconnector flows, AEMO shall define the Import and Export energy flows on a case-by-case basis.

(c) For MSATS, net energy is derived as:

Net = Export - Import

Hence the net energy for generation energy is negative (in a ***net*** quantity) and a customer's energy is positive (in a ***net*** quantity).



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

- kvarh's supplied to a customer are export kvarh's; and
- kvarh's received from a customer are import kvarh's.

16. Allocation of NMIs for Type 7 Metering Installations

Schedule 7.2 of the National Electricity Rules establishes 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.

16.1 Requirements Common Across the National Electricity Market

Each type 7 metering installation comprises a set of the entire unmetered load with a unique combination of FRMP, end-use customer, TNI, DLF, and LNSP. The NMI may contain different agreed market loads and/or different device types. One NMI is required for each type 7 metering installation. Individual loads may be added and removed to the NMI without the need to change NMIs.

For each TNI there will be one or more NMIs representing municipal lighting loads, and then several other NMIs which represent the various utilities (gas, telephone, roads, water, etc) who have unmetered loads serving that geographical area. 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 Financially Responsible Market Participant, end-use customer, LNSP, Marginal loss factor (or TNI) and Distribution loss factor are the same.

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

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).

A change of one attribute (FRMP, TNI, DLF, LNSP), or a change of end-use customer, would not of its own result in abolition of the NMI.

The National Electricity Rules and the Metrology Procedure[1] provide for the allocation of NMIs to broad classes of unmetered connection points provided that certain attributes required for settlement 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.

1 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).

For example, AEMO expects that each LNSP has a procedure for the allocation of NMIs for unmetered supplies, and that procedure is available for review by the jurisdiction or AEMO as required.

A procedure for the initial allocation of NMIs for street and public lighting across a geographic area might follow the following basic steps:

- Define the geographic area supplied from a transmission node.
- Sub-divide the unmetered supplies within this geographic area according to end-use customers.
- If necessary, sub-divide these unmetered supplies to take account of variations of distribution loss factor which may apply across the area.

In considering materiality, the LNSP may allocate streetlights by mapping cell, or postcode, or by some other available grouping where the majority of that load is supplied from a single transmission node.

Where distribution feeders are commonly supplied from one transmission node, but are regularly moved to a nearby transmission node for maintenance or seasonal reasons, AEMO will accept registration at the transmission node through which the majority of the energy is traded. This approach is supported by the fact that the calculation of Transmission Loss Factors (TLFs) takes account of seasonal flows at transmission nodes, and that the TLFs for adjacent TNIs where load sharing is possible are unlikely to be significantly different.

16.2 Individual Jurisdiction Requirements

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.

The actual loads approved for type 7 installations may vary between jurisdictions.

Appendix 1: 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 2: Worked Example 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:

Convert the character to its ASCII value

For the right most character and each alternate character reading left, double the ASCII value obtained in Step 3 above.

Add the individual digits of the ASCII value to a register holding the total added value for the 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 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.
Checksum is the final result.
At the start of the process:
Double_This_Char = True because the right most character, and then every 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.

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

Performing steps 2 through 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.

Appendix 3: Sample NMIs and Associated Checksums

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

Table 4: nmis and checksum

NMI	CHECKSUM	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

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