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This document is STABILISED. The technical content in this document is not expected to change because the document covers: *(Tick applicable motivation)*

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1. Introduction

This document describes Eskom's Transmission & Distribution IEC61850 protocol implementation for the purposes of substation automation.

2. Supporting clauses

2.1 Scope

The PID specifies the server information and service models within an IED for building a substation view of the typical protection scheme and associated primary plant components encountered in the Eskom Transmission environment for substation automation purposes. The data models identified in this document can be used for vertical (typically used for SCADA) communications and horizontal communications (typically used for protection inter-tripping) as per the users implementation needs. This PID only covers the data model at the Station Level and excludes the Data Model at the Process Level.

2.1.1 Purpose

This protocol implementation description document covers Eskom Transmissions requirements from the "common information model" of the IEC 61850 standard relating to its primary and secondary plant architecture. This document is to be used by IED and RTU suppliers to avail the necessary components of the "common information model" to the end user for modeling at all hierarchical levels.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] ISO 9001 Quality Management Systems.

[2] IEC 61850-7-1 - First Edition 2003-7: Communication networks and systems in substations – Part 7-1: Basic communication structure for feeder and substation equipment – Principles and Models

[3] IEC 61850-7-2 - First Edition 2003-5 Communication networks and systems in substations – Part 7-2: Basic communication structure for feeder and substation equipment – Abstract Communication Service Interface (ACSI)

[4] IEC 61850-7-3 - First Edition 2003-5: Communication networks and systems in substations – Part 7-3: Basic communication structure for feeder and substation equipment – Common Data Classes

[5] IEC 61850-7-4 - First Edition 2003-5: Communication networks and systems in substations – Part 7-4: Basic communication structure for feeder and substation equipment – Compatible Logical Node Classes and Data Classes

[6] IEC 61850-5 - First Edition 2003-07: Communication networks and systems in substations – Part 5: Communication requirements for functions and device models

[7] IEC 61850-6 - First Edition 2004-03: Communication networks and systems in substations – Part 6: Configuration Description Language for Communication in Electrical Substations related to IEDs

2.2.2 Informative

[8] 32-9: Definition of Eskom documents

[9] 32-644: Eskom documentation management standard

[10] 474-65: Operating manual of the Steering Committee of Technologies (SCOT)

2.3 Definitions

2.3.1 General

None

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
ACD	Activation with Direction.
ACT	Activation.
APC	Controllable Analogue Set Point.
BCR	Binary Counter Reading.
BRCB	Buffered Report Control Block.
BSC	Controllable Binary Step Position.
Bay Model	A model identifying an IEC 61850 IED within a panel or protection scheme.
Bay Level RTU	An RTU contained within a protection scheme and dedicated to that protection schemes supervisory requirements
CF	Configuration. A Functional Constraint indicator.
CO	Control. A Functional Constraint indicator.
CT	Current Transformer.
Client	A device that initiates communications and requests services from a server device.
Common Information Model	Information that has been agreed by users and vendors to be required for exchange between IED's for the purposes of substation automation.
Data	Meaningful information contained in an automation device.
Data Attributes	A subset of data that indicates value.

Abbreviation	Description
Data Model	The data required from IEC 61850 IED's for building a substation signal database.
DC	Description Configuration. A Functional Constraint indicator.
dchg	Data Change. A trigger option for reporting data.
DPC	Controllable Double Point.
DPL	Device Name Plate.
dupd	Data Update. A trigger option for reporting data.
FC	Functional Constraint. A property of Data Attributes that indicate what services are operated on.
Horizontal Communications	Peer-to-peer data communications between IED's across protection bays.
IEC	International Electrotechnical Committee.
IED	Intelligent Electronic Device.
INC	Controllable Integer Status.
INS	Integer Status.
INT32	32 Bit Integer.
INT32U	32 Bit Unsigned Integer.
INT8U	8 Bit Unsigned Integer.
INT128	128 Bit Integer.
LAN	Local Area Network.
LN	Logical Node. A function contained within a Logical Device.
Logical Device	A collection of Logical Nodes within a physical device.
Logical Device Model	A model identifying an IEC 61850 Logical Node within a physical IEC 61850 capable IED.
Logical Node	A function contained within a Logical Device.
LPL	Logical Node Name Plate.
MCAA	Multicast Application Association.
M/O/C	Mandatory/Optional/Conditional. Data presence.

Abbreviation	Description
MV	Measured Value. A Functional Constraint indicator.
MX	Measurement. A Functional Constraint indicator.
Physical Device	In the context of IEC 61850 this relates to a physical IED.
qchg	Quality Change. A trigger option for reporting data.
RTU	Remote Terminal Unit.
SCADA	Supervisory Control And Data Acquisition.
SEC	Security.
Server	A device that serves data and /or services to a client.
SPC	Controllable Single Point.
SPS	Single Point Status.
ST	Status. A Functional Constraint indicator.
SV	Substitute Value. A Functional Constraint indicator.
TPAA	Two Party Application Association.
TrgOp	Trigger Option. Options for creating reports.
Vertical Communications	Hierarchical data communications between bay and substation data manager.
VT	Voltage Transformer.
WYE	Phase to ground measurements in a three phase system. A type of Common Data Class.

2.5 Roles and responsibilities

The Technology division (Engineering, PTM&C) shall use this document to development and implement substation automation. All intelligent electronic devices shall comply with the requirements within this document.

2.6 Process for monitoring

The protection technology & support manager, substation automation manager and the custodians will monitor the compliance to this standard.

2.7 Related/supporting documents

None.

3. One Line Diagram and Data Naming Structure

The substation environment consists of objects and data that need to be uniquely identified for safe monitoring and control. In order to uniquely identify these objects and data they are decomposed into elements and various combinations of these elements constitute a unique identifier. These elements are typically,

- Voltage Levels
- Bays
- Primary Plant Objects
- IEDs
- Functions
- Data and Attributes

3.1 One-Line Diagram Naming

A typical One-Line diagram will use the following elements to identify the different primary plant objects for building the substation yard.

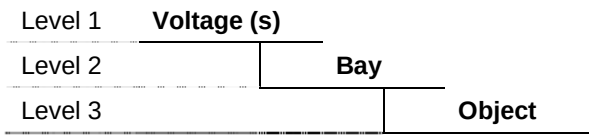

Figure 1: One-Line Diagram Naming Structure

- The Voltage indicates the voltage the Bay is attached to. In the case of devices (such as transformers) that span two different voltage levels both HV and MV voltages will be identified.
- The Bay indicates the Bay number.
- The Object indicates the primary plant object.

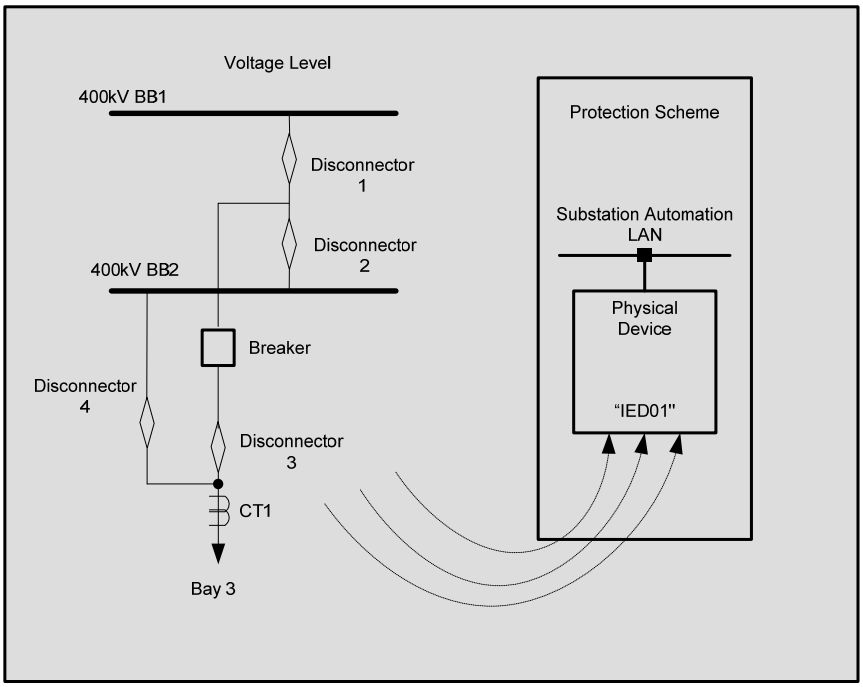

Figure 2: One-Line Diagram Naming

A typical naming structure for the primary plant objects on a one-line diagram relating to Bay 3 in Figure 2 would be:

- 400KV.BAY3.DIS1
- 400KV.BAY3.DIS2
- 400KV.BAY3.BKR
- 400KV.BAY3.DIS3
- 400KV.BAY3.DIS4
- 400KV.BAY3.CT1

3.2 Generic IED Data Reference

For the purposes of a data acquisition from IED's that receive inputs from the primary plant and perform functions for the purposes of substation automation, the data reference will utilize the elements identified in Figure 3.

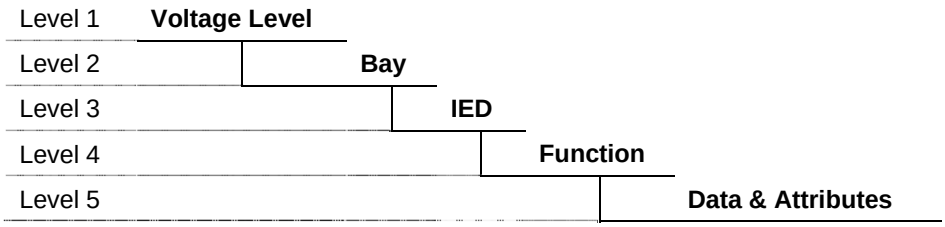

Figure 3: Generic IED Data Naming Structure

A typical naming structure for data originating from an IED relating to Bay 3 in Figure 2 would be:

- 400KV.BAY3.IED01.IDMT1.True
- 400KV.BAY3.IED01.PIOC1.True
- 400KV.BAY3.IED01.PTOC3.True

4. Logical Device Model

The following diagram depicts Eskom Transmission's Logical Device Model for vertical and horizontal data communications from IEC 61850 IED's for the purposes of substation automation within a substation.

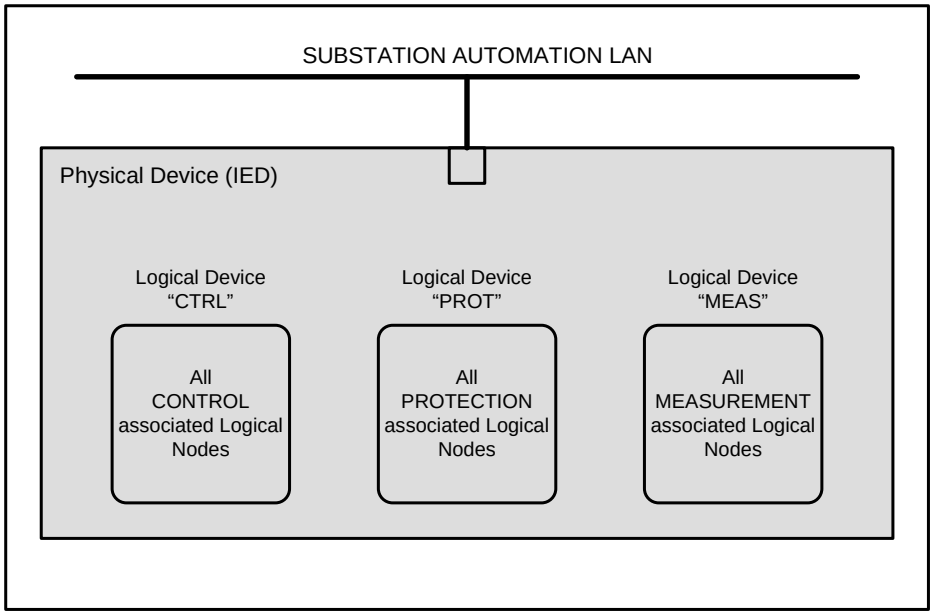

Figure 4: Logical Device Model

- The PROT Logical Device specifically refers to all PROTECTION Logical Nodes (P) and Protection Related Logical Nodes (R).
- The MEAS Logical Device specifically refers to all MEASUREMENT Logical Nodes (M).
- The CTRL Logical Device refers to all SCADA Logical Nodes excluding measurements.

4.1 IEC 61850 Data Reference

The Logical Device reference shall constitute levels identified in Figure 5. Since this data originates from an IED, the IED name will also be captured in the reference. In addition IEC 61850 uses the concept of Logical Devices that are a collection of Logical Nodes (functions). Hence the Data Reference within the IEC 61850 context will constitute the following:

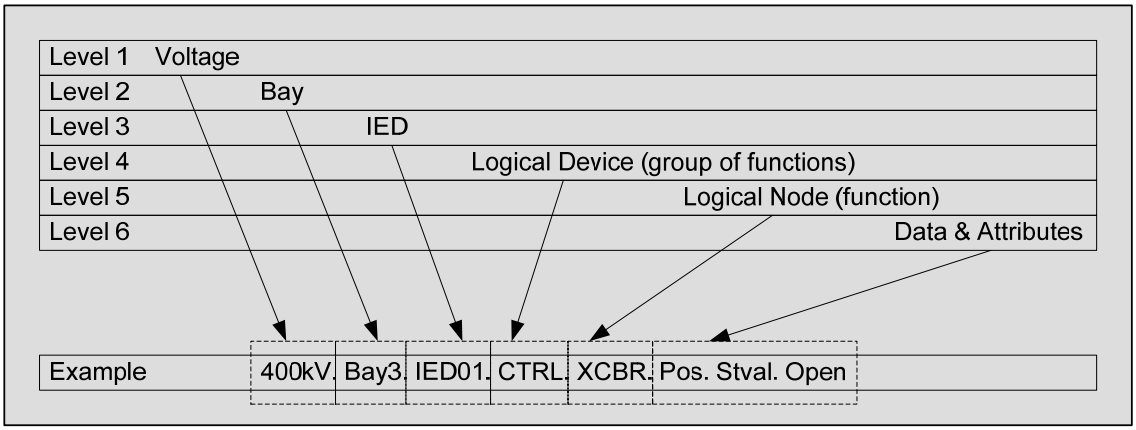

Figure 5: IEC 61850 IED Data Reference

5. Substation Automation Implementation Models

Eskom Transmission's typical substation automation architecture will consist of two distinct types of IEC 61850 capable IED's as depicted in the figure below.

- An IED that solely caters for legacy hardwired RTU type interfaces dedicated to SCADA needs and,
- A multifunction IED with hardwired CT and VT connections and hardwired plant interfaces facilitating SCADA, measurement and protection functionality.

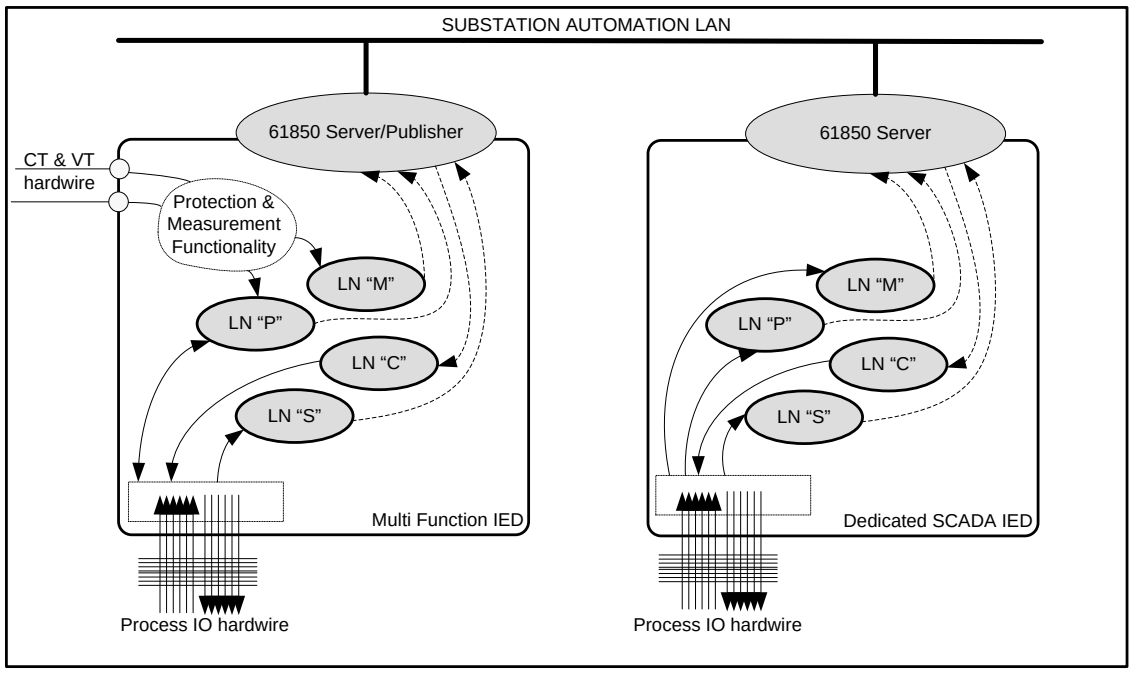

Figure 6: Typical IEC 61850 IED's.

5.1 Dedicated SCADA IED

The dedicated SCADA IED is affectively an RTU with the capability to serve up IEC 61850 data from protection schemes that have been designed with discrete and serial interfaces for SCADA. The IEC 61850 application will be exclusively used for vertical communications between a server and client on the substation LAN. This device will be sourced from standard Transmission Substation Control System equipment.

5.2 Multifunction IED

The Multifunction IED will contain some form of protection and measurement functionality together with SCADA functionality and will always be contained within a protection scheme. The IEC 61850 application will be used for vertical and horizontal communications to clients and subscribers respectively on the substation LAN.

6. Logical Nodes and Data used for System Modelling

6.1 Logical Node and Data Instances

Logical Node naming shall enable the system configurator to define a minimum of 6 alphanumeric character prefix and a single integer suffix for creating various instances of Logical Nodes. Instances of data shall also be possible with a single integer suffix attached to data, such as HpTmp1, 2, 3…and PPV1, 2, 3…etc.

A Typical example of Logical Node naming function is as follows,

Logical Node Prefix	IEC 61850 Logical Node Name	Logical Node Suffix
AxHVM1	PDIF	9
AxHVM1PDIF9		

A Typical example of the Data naming function is as follows,

Logical Node Name	IEC 61850 Data Attribute Name	Attribute Suffix
YPTR	HpTmpTr	2
YPTR.HpTmpTr2		

6.2 6.2System Logical Nodes

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling issues such as physical description, physical health, communications, and power supply.

6.2.1 Logical Physical Device Information - LPHD

The following information shall relate to the physical IEC 61850 capable IED.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
PhyNam	DPL	Physical Device Name Plate.	M	Required
PhyHealth	INS	Physical Device Health.	M	Required
Proxy	SPS	Indicates if this LN is a proxy.	M	Required

All other optional data shall be as per the supplier's product capability.

LPHD – Data Attribute *"PhyNam"*

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
vendor	Visible String 255	DC	Vendor name	M	Required
hwRev	Visible String 255	DC	Hardware revision	O	Required
swRev	Visible String 255	DC	Software revision	O	Required
serNum	Visible String 255	DC	Serial number	O	Optional
model	Visible String 255	DC	Model name/number	O	Optional
location	Visible String 255	DC	Location	O	Optional

All other optional data shall be as per the supplier's product capability.

LPHD – Data Attribute *"PhyHealth"*

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	Integer	M	Required
q	Quality	ST	Quality	M	Required
t	TimeStamp	ST	Timestamp	M	Required

All other optional data shall be as per the supplier's product capability.

LPHD – Data Attribute *"Proxy"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability

6.2.2 Common Logical Node Information

The following Information shall relate to all logical nodes including LLN0.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Mod	INC	Mode	M	Required
Beh	INS	Behavior	M	Required
Health	INS	Health	M	Required
NamPlt	LPL	Name Plate	M	Required
Loc	SPS	Local operation	O	Required

All other optional data shall be as per the supplier's product capability.

Common Logical Node Information – *"Mod"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	INT32	CO	-		M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	INT32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Optional

All other optional data shall be as per the supplier's product capability.

Common Logical Node Information – *"Beh"*

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	Integer	M	Required
q	Quality	ST	Quality	M	Required
t	TimeStamp	ST	Timestamp	M	Required

All other optional data shall be as per the supplier's product capability.

Common Logical Node Information – *"Health"*

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	Integer	M	Required
q	Quality	ST	Quality	M	Required
t	TimeStamp	ST	Timestamp	M	Required

All other optional data shall be as per the supplier's product capability.

Common Logical Node Information – *"NamPlt"*

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
vendor	Visible String 255	DC	LN vendor description	M	Required
swRev	Visible String 255	DC	LN software revision	M	Required
d	Visible String 255	DC	LN description	M	Required

All other optional data shall be as per the supplier's product capability.

Common Logical Node Information – *"Loc"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.2.3 Logical Node Zero – LLN0

The following Information shall relate to common issues regarding all Logical Nodes contained within a Logical Device.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
		All Common Logical Node Information shall be inherited.	M	Required
Loc	SPS	Local operation for the complete logical device	O	Required

All other optional data shall be as per the supplier's product capability.

Logical Node Zero Information – *"Loc"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3 Protection Logical Nodes (P)

- The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling local functions and/or remote process I/O relative to the IED concerned.
- Multiple instances of the same Logical Node class shall be used for issues such as multi zone relays, different relay or IED settings and different measurement principles of the same domain specific protection function.
- Multiple instances of data within the Logical Node shall be possible.

6.3.1 Differential - PDIF

This Logical Node shall be used for differential protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	O	Required
Op	ACT	Operate	M	Required
DifAClc	WYE	Differential Current	O	Required
RstA	WYE	Restraint Current	O	Required

All other optional data shall be as per the supplier's product capability.

PDIF Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PDIF Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "DifAClc" (phaseA(diff), phaseB(diff), phaseC(diff), res(restraint quantity)

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "RstA" (phaseA(diff), phaseB(diff), phaseC(diff), res(restraint quantity)

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

6.3.2 Direction Comparison - PDIR

This Logical Node shall be used for directional fault protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start (first occurrence)	O	Required
Op	ACT	Operate (combined decision from all related sensors)	M	Required

All other optional data shall be as per the supplier's product capability.

PDIR Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PDIR Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

Name for each data attribute: e.g ZONE1_RED_PHASE_TRIP

6.3.3 Distance - PDIS

This Logical Node shall be used for all distance protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PDIS Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PDIS Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.4 Rate of Change of Frequency - PFRC

This Logical Node shall be used for all rate of change of frequency protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PFRC Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PFRC Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.5 Harmonic Restraint - PHAR

This Logical Node shall be used for all harmonic restraint functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start (active when restraint needed)	M	Required

All other optional data shall be as per the supplier's product capability.

PHAR Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.6 Ground Detector - PHIZ

This Logical Node shall be used for high impedance fault protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PHIZ Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PHIZ Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.7 Instantaneous Overcurrent - PIOC

This Logical Node shall be used for instantaneous over-current fault protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start		Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PIOC Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown | forward | backward | both	M	Required
dirPhsA	BOOLEAN	ST	dchg	Unknown | forward | backward	GC_2 (1)	Required
dirPhsB	BOOLEAN	ST	dchg	Unknown | forward | backward	GC_2 (2)	Required
dirPhsC	BOOLEAN	ST	dchg	Unknown | forward | backward	GC_2 (3)	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability

PIOC Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability

6.3.8 Phase Angle Measuring - PPAM

This Logical Node shall be used for "out of step" protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PPAM Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PPAM Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.9 Protection Scheme - PSCH

This Logical Node shall be used to model Tele-protection functions and conditions for line protection schemes.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
ProTx	SPS	Teleprotection signal transmitted.	M	Required
ProRx	SPS	Teleprotection signal received.	M	Required
Str	ACD	Carrier send.	M	Required
Op	ACT	Operate.	M	Required
LosOfGrd	SPS	Loss of guard.	O	Required
Echo	ACT	Echo signal from weak end infeed function.	O	Required
WeiOp	ACT	Operate signal from weak end infeed function.	O	Required
RvABlk	ACT	Block signal from current reversal function.	O	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – *"ProTx"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – *"ProRx"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward|Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – *"LosOfGrd"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – "Echo"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – "WeiOp"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSCH Information – "RvABlk"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.10 Sensitive Directional Earthfault - PSDE

This Logical Node shall be used for directional earthfault protection in compensated and non-compensated networks.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	O	Required

All other optional data shall be as per the supplier's product capability.

PSDE Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PSDE Information – "Op"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.11 Time Overcurrent - PTOC

This Logical Node shall be used to model directional and definite time over-current protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PTOC Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTOC Information – "Op"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.12 Overvoltage - PTOV

This Logical Node shall be used to model over voltage protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	O	Required

All other optional data shall be as per the supplier's product capability.

PTOV Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	M	Required
phsB	BOOLEAN	ST	dchg	True|False	M	Required
phsC	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward|Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTOV Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.13 Protection Trip Conditioning – PTRC

This Logical Node shall be used to condition the common "trip" function of the circuit breaker from "operate" outputs received from multiple protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Op	ACT	Operate (combination operate)	C	Required

All other optional data shall be as per the supplier's product capability.

PTRC Information – "Op" **(IEC61850-7- 3, 7.3.5)**

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.14 6.3.14 Thermal Overload - PTTR

This Logical Node shall be used for thermal overload functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Op	ACT	Operate	M	Required
AlmThm	ACT	Thermal Alarm	O	Required

All other optional data shall be as per the supplier's product capability.

PTTR Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTTR Information – *"AlmThm"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.15 Undervoltage - PTUV

This Logical Node shall be used for under-voltage protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PTUV Information – *"Str"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTUV Information – "Op"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.16 Underframequency - PTUF

This Logical Node shall be used for under-frequency protection functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required
BlkV	SPS	Blocked because of voltage	O	Required

All other optional data shall be as per the supplier's product capability.

PTUF Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTUF Information – "Op"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTUF Information – "BlkV"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.3.17 Undercurrent – PTUC – detail added

This Logical Node shall be used for under-current protection functions. Different instances shall be used for phase and ground.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

PTUC Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

PTUC Information – "Op"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4 Protection Related Logical Nodes (R)

- The following Logical Nodes shall be used for functions related to the Protection functions identified in section 9.3
- The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling local functions and/or remote process I/O relative to the IED concerned.

- Multiple instances of the same LN class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.4.1 Disturbance Recorder Function - RDRE

This Logical Node shall be used for Disturbance Recorder functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
RcdMade	SPS	Record made	M	Required
FltNum	INS	Fault Number	M	Required
GriFltNum	INS	Grid fault number	O	Required
RcdStr	SPS	Record started	O	Required
MemUsed	INS	Memory used in %	O	Required

All other optional data shall be as per the supplier's product capability.

RDRE Information – "RcdMade"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RDRE Information – "FltNum"

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	Integer	M	Required
q	Quality	ST	Quality	M	Required
t	TimeStamp	ST	Timestamp	M	Required

All other optional data shall be as per the supplier's product capability.

RDRE Information – "GriFltNum"

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	Integer	M	Required
q	Quality	ST	Quality	M	Required
t	TimeStamp	ST	Timestamp	M	Required

All other optional data shall be as per the supplier's product capability.

RDRE Information – "RcdStr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RDRE Information – "MemUsed"

Attribute Name	Attribute Type	FC	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	Integer	M	Required
q	Quality	ST	Quality	M	Required
t	TimeStamp	ST	Timestamp	M	Required

All other optional data shall be as per the supplier's product capability.

6.4.2 Disturbance Recorder Channel Analogue - RADR

This Logical Node shall be used for Disturbance Recorder Analogue Channels. More than one instance shall be possible based on the analogue channels needed by the user.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
ChTrg	SPS	Channel triggered	M	Required

All other optional data shall be as per the supplier's product capability.

RADR Information – "ChTrg"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4.3 Disturbance Recorder Channel Binary - RBDR

This Logical Node shall be used for Disturbance Recorder Binary Channels. More than one instance shall be possible based on the binary channels needed by the user.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
ChTrg	SPS	Channel triggered	M	Required

All other optional data shall be as per the supplier's product capability.

RBDR Information – *"ChTrg"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4.4 Disturbance Recorder Handling - RDRS

This Logical Node shall be used for the acquisition of Disturbance Recorder Files.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
AutoUpLod	SPC	Automatic Upload	O	Required

All other optional data shall be as per the supplier's product capability.

RDRS Control – *"AutoUpLod"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

6.4.5 Breaker Failure – RBRF

This Logical Node shall be used for Breaker Failure functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
OpEx	ACT	Breaker failure due to external trip	C	Required

All other optional data shall be as per the supplier's product capability.

Condition: At least one data element shall be available depending on the protection function supported.

RBRF Information – "OpEx"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4.6 Fault locator - RFLO

This Logical Node shall be used for fault location calculation.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
FltZ	CMV	Fault Impedance	M	Required
FltDiskm	MV	Fault Distance in km	M	Required

All other optional data shall be as per the supplier's product capability.

RFLO Information – *"CMV"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
instCVal	Vector	MX			O	Required
cVal	Vector	MX	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RFLO Information – "MV"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
instMag	AnalogueValue	MX			O	Required
mag	AnalogueValue	MX	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4.7 Power Swing Detection/Blocking - RPSB

This Logical Node shall be used for Power Swing functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Str	ACD	Start (Power swing detected)	C1	Required
BlkZn	SPS	Blocking of the respective zone	C1	Required
Op	ACT	Operate (Out of step trip)	C2	Required

All other optional data shall be as per the supplier's product capability.

Condition: C1 Mandatory if used for power swing blocking. C2 Mandatory if used for out of step tripping.

RPSB Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward| Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RPSB Information – *"BlkZn"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
subEna	BOOLEAN	SV			O	Required
subVal	BOOLEAN	SV			O	Required
subQ	Quality	SV			O	Required

All other optional data shall be as per the supplier's product capability.

RPSB Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4.8 Autoreclosing - RREC

This Logical Node shall be used for all Auto-reclosing functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
BlkRec	SPC	Block Reclosing	O	Required
Status Information				
Op	ACT	Operate (Close XCBR)	M	Required
AutoRecSt	INS	Auto Reclosing Status	M	Required

All other optional data shall be as per the supplier's product capability.

RREC Control – *"BlkRec"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

RREC Information – *"Op"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RREC Information – "AutoRecSt"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg	32 Bit Integer	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.4.9 Synchronism Check - RSYN

This Logical Node shall be used for Synchronizing check functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Rel	SPS	Release	M	Required
Vlnd	SPS	Voltage Difference Indicator	O	Required
Anglnd	SPS	Angle Difference Indicator	O	Required
Hzlnd	SPS	Frequency Difference Indicator	O	Required
SynPrg	SPS	Synchronizing in progress	O	Required
DifAngClc	MV	Calculated Difference in Voltage	O	Required
DifHzClc	MV	Calculated Difference in Frequency	O	Required
DifVClc	MV	Calculated Difference of Phase Angle	O	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – *"Rel"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "Vind"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "AngInd"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "HzInd"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "SynPrg"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "DifAngClc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	Vector	MX	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "DifHzClc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	Vector	MX	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "DifVClc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	Vector	MX	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

RSYN Information – "Vector"

Attribute Name	Attribute Type	Value/Value Range	M/O/C	Eskom Note
mag	AnalogueValue		M	Required

6.5 Logical Nodes for Control (C)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling local functions and/or remote process I/O relative to the IED concerned

- Logical Node CSWI will always be available for control modeling.
- Logical Node CILO will be available for modeling if the need for interlocking is present.
- Logical Node CALH will be available for modeling if grouped data is present.
- Multiple instances of the same LN class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.5.1 Alarm Handling - CALH

This Logical Node shall be used for all group warnings/alarms when the individual alarms are to be found across two or more logical nodes. If the individual alarms are found in a single logical node than an instance of that logical node shall be used to identify the group alarm. The latter will enable more detail of the group alarm to be conveyed in the syntax.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
GrAlm	SPS	Group Alarm	M	Required
GrWrn	SPS	Group Warning	O	Required

All other optional data shall be as per the supplier's product capability.

CALH Information – "GrAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CALH Information – *"GrWrn"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.5.2 Cooling Group Control - CCGR

This Logical Node shall be used to supervise cooling equipment.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
Auto	SPS	Automatic or Manual	O	Required
FanOvCur	SPS	Fan overcurrent trip	O	Required
PmpOvCur	SPS	Pump overcurrent trip	O	Required
PmpAlm	SPS	Loss of pump	O	Required

All other optional data shall be as per the supplier's product capability.

CCGR Information – "Auto"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CCGR Information – "FanOvCur"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CCGR Information – *"PmpOvCur"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CCGR Information – "PmpAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.5.3 Interlocking - CILO

This Logical Node shall be used to allow/stop switching depending on interlocking conditions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
EnaOpn	SPS	Enable Open	M	Required
EnaCls	SPS	Enable Close	M	Required

All other optional data shall be as per the supplier's product capability.

CILO Information – "EnaOpn"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CILO Information – *"EnaCls"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.5.4 Point-On-Wave Switching - CPOW

This Logical Node shall be used to perform point on wave switching. OpOpn and OpCls shall be subscribed from CSWI.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
TmExc	SPS	Maximum allowed time exceeded	M	Required
StrPOW	SPS	CPOW started	O	Required
OpOpn	ACT	Open switch	O	Required
OpCls	ACT	Close switch	O	Required

All other optional data shall be as per the supplier's product capability.

CPOW Information – "TmExc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CPOW Information – "StrPOW"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CPOW Information – *"OpOpn"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CPOW Information – "OpCls"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.5.5 Switch Controller - CSWI

This Logical Node shall be used to control **all** switchgear switching from the SCADA client. This Logical Node shall be able to subscribe information from CILO if necessary.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
Loc	SPS	Local Operation	O	Required
Pos	DPC	Switch	M	Required
OpOpn	ACT	Open Operation	O	Required
OpCls	ACT	Close Operation	O	Required

All other optional data shall be as per the supplier's product capability.

CSWI Information – "Loc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CSWI Information – "Pos"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctlVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	CODED ENUM	ST	dchg	intermediate|off|on|bad	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

CSWI Information – "OpOpn"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

CSWI Information – "OpCls"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.6 Logical Nodes for Generic Reference (G)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling functions and/or remote process I/O that is not catered for by a predefined domain specific Logical Node.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical shall be possible.

6.6.1 Generic Automatic Process Control - GAPC

This Logical Node shall be used to model generic automation functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
SPCSO	SPC	Single Point Controllable Status Output	O	Required
DPCSO	DPC	Double Point Controllable Status Output	O	Required
ISCSO	INC	Integer Status Controllable Status Output	O	Required
Status Information				
Auto	SPS	Automatic Operation	O	Required
Str	ACD	Start	M	Required
Op	ACT	Operate	M	Required

All other optional data shall be as per the supplier's product capability.

GAPC Information – "SPCSO"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GAPC Information – *"DPCSO"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	CODED ENUM	ST	dchg	intermediate|off|on|bad	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GAPC Information – "ISCSO"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	INT32	CO	-		M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	INT32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GAPC Information – "Auto"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

GAPC Information – "Str"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
dirGeneral	ENUMERATED	ST	dchg	Unknown|Forward|Backward|Both	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

GAPC Information – "Op"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
general	BOOLEAN	ST	dchg	True|False	M	Required
phsA	BOOLEAN	ST	dchg	True|False	O	Required
phsB	BOOLEAN	ST	dchg	True|False	O	Required
phsC	BOOLEAN	ST	dchg	True|False	O	Required
neut	BOOLEAN	ST	dchg	True|False	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.6.2 Generic Process IO - GGIO

This Logical Node shall be used to model all process IO.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Measured Values				
AnIn	MV	Analogue Input	O	Required
Controls				
SPCSO	SPC	Single Point Controllable Status Output	O	Required
DPCSO	DPC	Double Point Controllable Status Output	O	Required
ISCSO	INC	Integer Status Controllable Status Output	O	Required
Status Information				
IntIn	INS	Integer Status Input	O	Required
Alm	SPS	General Alarm	O	Required
Ind	SPS	General Indication	O	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – "AnIn"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	AnalogueValue	MX	dchg	Process Value	M	Required
range	ENUMERATED	MX	dchg	normal|high|low high-high|…	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
db	INT32	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – "SPCSO"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – "DPCSO"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	CODED ENUM	ST	dchg	intermediate|off|on|bad	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – *"ISCSO"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	INT32	CO	-		M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	INT32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – "IntIn"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
subEna	BOOLEAN	SV			O	Required
subVal	INT32	SV			O	Required
subQ	Quality	SV			O	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – *"Alm"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

GGIO Information – "Ind"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.6.3 Generic Security Application - GSAL

This Logical Node shall be used to monitor security authorization violations.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
NumCntRs	INC	Number of counter resets	M	Required
Status Information				
AuthFail	SEC	Authorisation Failures	M	Required
AcsCtFail	SEC	Access control failures detected	M	Required
SvcViol	SEC	Service privilege violations	M	Required
Ina	SEC	Inactive associations	M	Required

All other optional data shall be as per the supplier's product capability.

GSAL Information – "NumCntRs"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	INT32	CO			M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	INT32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

GSAL Information – "AuthFail"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cnt	INT32U	ST	dchg		M	Required
sev	ENUMERATED	ST		unknown|critical| major|monir|warning	M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

GSAL Information – *"AcsCtlFail"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cnt	INT32U	ST	dchg		M	Required
sev	ENUMERATED	ST		unknown|critical| major|monir|warning	M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

GSAL Information – "SvcViol"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cnt	INT32U	ST	dchg		M	Required
sev	ENUMERATED	ST		unknown|critical| major|monir|warning	M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

GSAL Information – "Ina"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cnt	INT32U	ST	dchg		M	Required
sev	ENUMERATED	ST		unknown|critical| major|monir|warning	M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.7 Logical Nodes for Interfacing and Archiving (I)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Interfacing and Archiving functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data shall be possible within the Logical Node.

6.7.1 Archiving - IARC

This Logical Node shall be used to monitor security authorization violations.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
OpCntRs	INC	Number of counter resets	M	Required
Status Information				
MemOv	SPS	Memory overflow	M	Required

All other optional data shall be as per the supplier's product capability.

IARC Information – "OpCntRs"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	INT32	CO	-		M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	INT32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

IARC Information – "MemOv"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.7.2 Human Machine Interface - IHMI

This Logical Node shall be available as an interface to a station HMI or bay level HMI panel if present and required by the Eskom System Configurator.

6.7.3 Telecontrol Interface - ITCI

This Logical Node shall be available as an interface to a station level data concentrator for Telecontrol purposes.

6.8 Logical Nodes for Automatic Control (A)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Automatic Control functions relative to the functions and/or process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.8.1 Reactive Power Control - ARCO

This Logical Node shall be used to monitor security authorization violations.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
TapChg	BSC	Change reactive power	M	Required
Status Information				
Auto	SPS	Automatic operation	O	Required
VOvSt	SPS	Voltage override status	O	Required
NeutAlm	SPS	Neutral alarm	O	Required
DschBlk	SPS	Bank switch close blocked due to discharge	O	Required

All other optional data shall be as per the supplier's product capability.

ARCO Information – "TapChg"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	CODED ENUM	CO		stop|lower| higher|reserved	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
ValWTr	ValwithTrans	ST	dchg		O	Required
q	Quality	ST	qchg		O	Required
t	TimeStamp	ST			O	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

ARCO Information – "Auto"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

ARCO Information – "VOvSt"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

ARCO Information – "NeutAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

ARCO Information – "DschBlk"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.8.2 Automatic Tap Changer Control - ATCC

This Logical Node shall be used for automatic tap change control functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
TapChg	BSC	Change tap position (higher/lower)	C	Required
ParOp	DPC	Parallel, independent operation	M	Required
LTCBlk	SPC	Block automatic tap change control	O	Required
Status Information				
Auto	SPS	Automatic/Manual operation	O	Required

All other optional data shall be as per the supplier's product capability.

ATCC

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	CODED ENUM	CO		stop|lower| higher|reserved	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
ValWTr	ValwithTrans	ST	dchg		O	Required
q	Quality	ST	qchg		O	Required
t	TimeStamp	ST			O	Required
stSeld	BOOLEAN	ST	dchg		O	Required

Information – "TapChg"

All other optional data shall be as per the supplier's product capability.

AATC Information – "ParOp"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	CODED ENUM	ST	dchg	intermediate|off| on|bad	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

AATC Information – "LTCBlk"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO	-	off (False)|on (True)	M	Required
operTm	TimeStamp	CO	-		O	Required
origin	Originator	CO	-		O	Required
ctlNum	INT8U	CO	-	0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

AATC Information – "Auto"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.8.3 Voltage Control - AVCO

This Logical Node shall be used for automatic voltage control functions.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Controls				
TapChg	BSC	Change tap position (higher/lower)	C	Required
Status Information				
Auto	SPS	Automatic/Manual operation	O	Required

All other optional data shall be as per the supplier's product capability.

AVCO Information – "TapChg"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	CODED ENUM	CO		stop|lower| higher|reserved	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
ValWTr	ValwithTrans	ST	dchg		O	Required
q	Quality	ST	qchg		O	Required
t	TimeStamp	ST			O	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

AVCO Information – *"Auto"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.9 Logical Nodes for Metering and Measurements (M)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Metering and Measurement functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.9.1 Metering - MMTR

This Logical Node shall be used for calculation of energy within a three phase system and would typically reside at generation sites.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Measured Values				
TotWh	BCR	Net real energy since last reset.	O	Required
TotVArh	BCR	Net reactive energy since last reset.	O	Required

All other optional data shall be as per the supplier's product capability.

MMTR Information – "TotWh"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
frVal	INT128	ST	dupd		O	Required
frTm	TimeStamp	ST	dupd		O	Required
q	Quality	ST	qchg		M	Required

All other optional data shall be as per the supplier's product capability.

MMTR Information – "TotVArh"

All other optional data shall be as per the supplier's product capability.

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
frVal	INT128	ST	dupd		O	Required
frTm	TimeStamp	ST	dupd		O	Required
q	Quality	ST	qchg		M	Required

6.9.2 Measurement - MMXU

This Logical Node shall be used for measurement functions within a three phase system.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Measured Values				
TotW	MV	Total active power	O	Required
TotVar	MV	Total reactive power	O	Required
TotVA	MV	Total apparent power	O	Required
TotPF	MV	Average power factor	O	Required
Hz	MV	Frequency	O	Required
PhV	WYE	Phase to ground voltage	O	Required
PPV	DEL	Phase to phase voltages	O	Required
A	WYE	Phase current	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "TotW"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	normal|high|low high-high|…	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
db	INT32	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – *"TotVar"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	normal|high|low high-high|…	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
db	INT32	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "TotVA"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	AnalogueValue	MX	dchg	Process Value	M	Required
range	ENUMERATED	MX	dchg	normal|high|low high-high|…	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
db	INT32	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "TotPF"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	AnalogueValue	MX	dchg	Process Value	M	Required
range	ENUMERATED	MX	dchg	normal|high|low high-high|…	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
db	INT32	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – *"TotHz"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
Mag	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	normal|high|low high-high|…	O	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
db	INT32	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "PhV" (phaseA, phaseB, phaseC, neut)

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "PPV" (phaseAB, phaseBC, phaseCA)

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "A" (phaseA, phaseB, phaseC)

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MMXU Information – "Vector"

Attribute Name	Attribute Type	Value/Value Range	M/O/C	Eskom Note
mag	AnalogueValue		M	Required

6.9.3 Sequence and Imbalance - MSQI

This Logical Node shall be used for measurement imbalance indications within a three phase system.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Measured Values				
ImbA	WYE	Imbalance current	O	Required
ImbV	WYE	Imbalance voltage	O	Required

All other optional data shall be as per the supplier's product capability.

MSQI Information – "ImbA" (phaseA, phaseB, phaseC, neut)

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

MSQI Information – *"ImbV" (phaseA, phaseB, phaseC, neut)*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
cVal	Vector	MX	dchg		M	Required
range	ENUMERATED	MX	dchg	norm|high|low…	O	Required
q	Quality	MX	qchg		M	Required
t	TimeStamp	MX			M	Required
db	INT32U	CF		0…100 000	O	Required

All other optional data shall be as per the supplier's product capability.

6.10 Logical Nodes for Sensing and Monitoring (S)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Sensors and Monitoring functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.10.1 Insulation Medium Supervision (Gas) – SIMG

This Logical Node shall be used for supervising gaseous insulation mediums.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
InsAlm	SPS	Insulation gas critical (refill)	M	Required
InsBlk	SPS	Insulation gas not safe (block operation)	O	Required
InsTr	SPS	Insulation gas dangerous (trip)	O	Required
PresAlm	SPS	Isolation gas pressure alarm	O	Required
DenAlm	SPS	Isolation gas density alarm	O	Required
TmpAlm	SPS	Isolation gas temperature alarm	O	Required
InsLevMax	SPS	Insulation gas level maximum	O	Required
InsLevMin	SPS	Insulation gas level minimum	O	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "InsAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "InsBlk"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "InsTr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "PresAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "DenAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "TmpAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – "InsLevMax"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIMG Information – *"InsLevMin"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.10.2 Insulation Medium Supervision (Liquid) – SIML

This Logical Node shall be used for supervising insulation mediums that utilize liquid. Bucholz supervision shall be modeled with this Logical Node.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
InsAlm	SPS	Insulation liquid critical (refill device)	M	Required
InsBlk	SPS	Insulation liquid not safe (block device operation)	O	Required
InsTr	SPS	Insulation liquid dangerous (trip device)	O	Required
TmpAlm	SPS	Insulation liquid temperature alarm	O	Required
PresTr	SPS	Insulation liquid pressure trip	O	Required
PresAlm	SPS	Insulation liquid pressure alarm	O	Required
GasInsAlm	SPS	Gas in insulation liquid alarm	O	Required
GasInsTr	SPS	Gas in insulation liquid trip	O	Required
GasFlwTr	SPS	Insulation liquid flow trip due to gas	O	Required
InsLevMax	SPS	Insulation gas level maximum	O	Required
InsLevMin	SPS	Insulation gas level minimum	O	Required
H2Alm	SPS	H2 alarm	O	Required
MstAlm	SPS	Moisture sensor alarm	O	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "InsAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "InsBlk"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "InsTr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – *"TmpAlm"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "PresTr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "PresAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "GasInsAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "GasInsTr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "GasFlwTr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – *"InsLevMax"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "InsLevMin"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "H2Alm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

SIML Information – "MstAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.10.3 Supervision of the position of a device – SPOS

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Switchgear functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

This logical node represents a generic position supervision system that can provide alarm and trip signals. In an application, the LN shall be instantiated with one device being measured.

Logical Node SPOS shall be used to represent devices that supervise the position of major plant objects. It provides alarm and trip/shutdown functions. If more than one sensor (LN TPOS) is connected, the LN SPOS shall be instantiated for each sensor.

When prefix and/or instantiation of data are used, this data shall be defined in the private namespace.

Pref (pref) shall, if used be either Hi or Lo to indicate if action is taken at decreasing or increasing values. Instantiation shall, if used, be indicated by numbers “1” to “9”.

SPOS class				
Data Object Name	**Common Data Class**	**Explanation**	**T**	**M/O**
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2 clause 19		
Data Objects				
LocKey	SPS	Local or remote key		O
LocSta	SPC	Remote control blocked		O
Loc	SPS	Local control behaviour		O
OpCntRs	INC	Resetable operation counter		O
Status information				
{Pref}Activ{Inst}	SPS	{Pref} Start action when activation threshold passed {Inst}		O
{Pref}DeActiv{Inst}	SPS	{Pref} Stop action when activation threshold passed {Inst}		O
{Pref}Ind{Inst}	SPS	{Pref} Indication level reached {Inst}		O
{Pref}Alm{Inst}	SPS	{Pref} alarm level reached {Inst}		O
{Pref}Trip{Inst}	SPS	{Pref} trip level reached {Inst}		O
Settings				
{Pref}ActivSet{Inst}	SPS	{Pref} Start action when activation threshold passed setpoint{Inst}		O
{Pref}DeActSet{Inst}	SPS	{Pref} Stop action when activation threshold passed setpoint {Inst}		O
{Pref}IndSet{Inst}	ASG	{Pref} Indication alarm level setpoint {Inst}		O
{Pref}AlmVal{Inst}	ASG	{Pref} alarm level setpoint {Inst}		O
{Pref}TripVal{Inst}	ASG	{Pref} trip level setting{Inst}		O
{Pref}IndDlTmm{Inst}	ING	{Pref} delay time for indication (m) {Inst}		O
{Pref}AlmDlTmm{Inst}	ING	{Pref} delay time for alarm (time given by application) {Inst}		O
{Pref}TrDlTm{Inst}	ING	{Pref} delay time for trip (m) {Inst}		O
{Pref}GrdNeg{Inst}	ASG	Limit gradient in negative direction{Inst}		O
{Pref}GrdPos{Inst}	ASG	Limit gradient in positive direction{Inst}		O
Measured values				
PosPc	MV	Position (% of full movement)		O

6.10.4 Supervision media pressure – SPRS

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Switchgear functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

Logical Node SPRS shall be used to represent devices that supervise the pressure in a major plant object (e.g a tank). It provides alarm and trip/shutdown functions. If more than one sensor (LN TPRS) is connected, the LN SPRS shall be instantiated for each sensor (e.g. pressure relief).

When prefix and/or instantiation of data is used, this data 598 shall be defined in the private namespace.

Pref (pref) shall, if used be either Hi or Lo to indicate if action is taken at decreasing or increasing values. Instantiation shall, if used, be indicated by numbers “1” to “9”.

SPRS class				
Data Object Name	**Common Data Class**	**Explanation**	**T**	**M/O**
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2 clause 19		
Data Objects				
LocKey	SPS	Local or remote key		O
LocSta	SPC	Remote control blocked		O
Loc	SPS	Local control behaviour		O
OpCntRs	INC	Resetable operation counter		O
Status information				
{Pref}Activ{Inst}	SPS	{Pref} Start action when activation threshold passed {Inst}		O
{Pref}DeActiv{Inst}	SPS	{Pref} Stop action when activation threshold passed {Inst}		O
{Pref}Ind{Inst}	SPS	{Pref} Indication level reached {Inst}		O
{Pref}Alm{Inst}	SPS	{Pref} alarm level reached {Inst}		O
{Pref}Trip{Inst}	SPS	{Pref} trip level reached {Inst}		O
Settings				
Media	ENS	Type of media being measured 1 Water 2 Oil 3 Air 4 Hydrogen 5 Nitrogen 6 Fuel 7 Steam 8 Gas (unspecified) 9 Liquid (unspecified)		O
{Pref}ActivSet{Inst}	SPS	{Pref} Start action when activation threshold passed setpoint{Inst}		O
{Pref}DeActSet{Inst}	SPS	{Pref} Stop action when activation threshold passed setpoint {Inst}		O
{Pref}IndSet{Inst}	ASG	{Pref} Indication alarm level setpoint {Inst}		O
{Pref}AlmVal{Inst}	ASG	{Pref} alarm level setpoint {Inst}		O
{Pref}TripVal{Inst}	ASG	{Pref} trip level setting{Inst}		O
{Pref}IndDlTmm{Inst}	ING	{Pref} delay time for indication (m) {Inst}		O

{Pref}AlmDlTmm{Inst}	ING	{Pref} delay time for alarm (time given by application) {Inst}		O
{Pref}TrDlTm{Inst}	ING	{Pref} delay time for trip (m) {Inst}		O
Measured values				
Pres	MV	Pressure [Pa]		O

6.11 Logical Nodes for Switchgear (X)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Switchgear functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.11.1 Circuit Breaker – XCBR

This Logical Node shall be used for modeling switchgear with short circuit breaking capability.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Common Logical Node Information				
Loc	SPS	Local operation (without SA)	M	Required
OpCnt	INS	Operation counter	M	Required
Controls				
Pos	DPC	Switch position	M	Required
BlkOpn	SPC	Block opening	M	Required
BlkCls	SPC	Block closing	M	Required
Status Information				
CBOpCap	INS	Operating capability	M	Required
POWCap	INS	POW switching capability	O	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – "Loc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – *"OpCnt"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg	32 Bit Integer	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – "Pos"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO		off (False)|on (True)	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	CODED ENUM	ST	dchg	intermediate|off| on|bad	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – *"BlkOpn"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO		off (False)|on (True)	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – *"BlkCls"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO		off (False)|on (True)	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – "CBOpCap"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

XCBR Information – "POWCap"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg		M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.11.2 Circuit Switch – XSWI

This Logical Node shall be used for modeling switchgear without short circuit breaking capability.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Common Logical Node Information				
Loc	SPS	Local operation (without SA)	M	Required
OpCnt	INS	Operation counter	M	Required
Controls				
Pos	DPC	Switch position	M	Required
BlkOpn	SPC	Block opening	M	Required
BlkCls	SPC	Block closing	M	Required
Status Information				
SwTyp	INS	Operating capability	M	Required
SwOpCap	INS	Operating capability	O	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – "Loc"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – "OpCnt"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg	32 Bit Integer	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – *"Pos"*

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO		off (False)|on (True)	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	CODED ENUM	ST	dchg	intermediate|off|on|bad	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – "BlkOpn"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO		off (False)|on (True)	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – "BlkCls"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
ctVal	BOOLEAN	CO		off (False)|on (True)	M	Required
operTm	TimeStamp	CO			O	Required
origin	Originator	CO			O	Required
ctlNum	INT8U	CO		0…255	O	Required
stVal	BOOLEAN	ST	dchg	False|True	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required
stSeld	BOOLEAN	ST	dchg		O	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – "SwTyp"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg	32 Bit Integer	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

XSWI Information – "SwOpCap"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	INT 32	ST	dchg	32 Bit Integer	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.12 Logical Nodes for Instrument Transformers (T)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Instrument Transformer functions relative to the functions and/or remote process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.12.1 Current Transformer – TCTR

No SCADA related status information is available from the TCTR Logical Node. This node shall be exclusively used for the transmission of current sampled values to the appropriate subscribers.

6.12.2 Voltage Transformer – TVTR

This logical Node shall be used for voltage sensing. Instances of data shall be possible for three phase sensing.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
FuFail	SPS	Fuse Fail	O	Required

All other optional data shall be as per the supplier's product capability.

TVTR Information – "FuFail"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.13 Logical Nodes for Power Transformers (Y)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Power Transformer functions relative to the functions and/or process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.13.1 Power Transformer – YPTR

This Logical Node shall be used for modeling power auto transformers. Instances of data shall be possible for HV, LV and auxiliary windings.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
HPTmpAlm	SPS	Winding hot point temperature alarm	O	Required
HPTmpTr	SPS	Winding hot point temperature trip	O	Required

All other optional data shall be as per the supplier's product capability.

YPTR Information – "HPTmpAlm"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

YPTR Information – "HPTmpTr"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.13.2 Tap Changer – YLTC

This Logical Node shall be used for modeling power auto transformers. Instances of data shall be possible for HV, LV and auxiliary windings.

6.14 Logical Nodes for Further Power System Development (Z)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Further Power System functions not previously defined and are relative to the functions and/or process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.14.1 Battery – ZBAT

This Logical Node shall be used for battery supervision.

Attribute Name	Attribute Type	Explanation	M/O/C	Eskom Note
Status Information				
BatHi	SPS	Battery high (voltage or charge)	O	Required
BatLo	SPS	Battery low (voltage or charge)	O	Required

All other optional data shall be as per the supplier's product capability.

ZBAT Information – "BatHi"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

ZBAT Information – "BatLo"

Attribute Name	Attribute Type	FC	TrgOp	Explanation	M/O/C	Eskom Note
stVal	BOOLEAN	ST	dchg	True|False	M	Required
q	Quality	ST	qchg		M	Required
t	TimeStamp	ST			M	Required

All other optional data shall be as per the supplier's product capability.

6.15 Logical Nodes for mechanical and non-electric primary equipment (K)

The following Logical Nodes and Data Attributes shall be available to the Eskom System Configurator for modeling Further Power System functions not previously defined and are relative to the functions and/or process I/O provided by the IED concerned.

- Multiple instances of the same Logical Node class shall be possible.
- Multiple instances of data within the Logical Node shall be possible.

6.15.1 Heater, cubicle heater – KHTR

This Logical Node shall be used to represent a heater.

7. The Control Model

The following control model specifies the how commands are to function within the IEC 61850 system.

At minimum the following control related data classes will be used in Transmission:

- SPC. Controllable Single Point. Typically used for mode control.
- DPC. Controllable Double Point. Typically used for switchgear control.
- BSC. Binary Controlled Step Position Information. Typically used for Tap Position control.
- APC. Controllable Analogue Set Point. Typically used for Set Point control.

At minimum the above data classes will adhere to the **Select Before Operate** (SBO) with **normal security**, allowing for operate once and operate many functionality.

- The select request shall firstly determine if the client has access rights to the device and there are no other active controls.
- The select request shall then identify if the control object is already selected by another user. If the select operation is not valid then a negative response shall be communicated to the requesting client. If the select request is valid then a positive response shall be communicated to the requesting client. A deselect timer shall commence either local to the IEC 61850 server or external, ensuring that the control select function is not held indefinitely by a single client.
- If the deselect timer is internal to the IEC 61850 server and it expires before the operate request is received, then the control object shall be deselected and, the operation process cancelled and the requesting client notified. If the deselect timer is external to the IEC 61850 server then this shall be handled by the external device.
- On receipt of the operate request before the deselect timer timeout, the control object shall check control validation then only activate the operate request and notify the requesting client with the appropriate successful or unsuccessful response.

At minimum the following service parameters shall be applied to all controls:

- Control Object Reference. The data reference that is controlled.
- Value. The values relating to the control value and originator category.
- Control Time Stamp. The time when the control request is received fro the client.
- Check. Interlock check.
- Add Cause. Identify the reason for a negative control service response.

Control isolation on the IEC 61850 device facilitating supervisory controls shall be affected via a Local/Remote switch and shall provide the capability to isolate all controls from station level and bay level. The Local/Remote switch shall be annunciated locally and remotely.

Controls shall be capable on the IEC 61850 IED from the following sources:

- From the remote control centers. Controls from this source shall be possible, provided the IED is in remote mode and there is no blocking function and interlocks.
- From the station HMI. Controls from this source shall be possible, provided the IED is in remote mode and there is no blocking function and interlocks.
- From the bay HMI (typically incorporated into the IEC 61850 IED). Controls from this source shall be possible provided the IED is in local mode and there is no blocking function and interlocks.
- From the panel. Controls from this source will always be active. Controls from this source shall be possible provided there is no blocking function.

8. The Dataset and Report Model

Data-Sets containing one or more Data-Set members shall be used to reference data to clients and subscribers on the Station LAN. The Data-Sets shall be capable of referencing all IEC 61850 data and data attributes that is contained in a Logical Node or across Logical Nodes within an IED acting as a server or publisher. Data Set members shall consist of functionally constrained data and/or data attributes.

Persistent and non-persistent Data-Sets shall be supported. Pre-configured and persistent Data-Sets will typically be used to reference data to clients on the network. These Data-Sets shall be available to all clients on the network. The name and members of a Data-Set shall be configurable by the user. All syntax and configuration constraints concerning the Data-Set shall be made known to the user.

Data referenced in a Data-Set shall be report configurable using the following trigger options:

- **dchg:** Data change
- **qchg:** Data quality change
- **dupd:** Data value update
- **integrity:** Expiry of an integrity period set by the client
- **general-interrogation:** General Interrogation of data initiated by a client

Reporting of information excluding measured quantities will always utilize the BRCB (Buffered Report Control Block).

All reporting events relating to the data change, quality-change, data-update and integrity during a loss of association shall be buffered by the BRCB. On re-association between client and server the buffered events shall be reported to the client with the appropriate sequence numbers

Buffer capacity shall be quantified in amount of events capable of being stored during a two party application association loss. At minimum up to 512 events shall be stored in non-volatile RAM within a cyclic FILO buffer. The BCRB time shall be configurable in 1ms increments.

The following optional fields shall be supported in the BRCB Class,

Description	Eskom Note
sequence-number	Required
report-time-stamp	Required
reason-for-inclusion	Required
buffer-overflow	Required

At minimum, 2 clients shall be supported with the same report functionality and buffer functionality as identified above.

9. Application Association and Access Control Model

The following application association models will be supported,

- **Two Party Application Associations (TPAA)**. Only SCADA shall use the TPAA between clients and servers on the Station LAN facilitating hierarchical bi-directional communications. Access control to a server shall be provided such that only configured clients within the Substation Configuration Description (SCD) file shall be capable to view data and write data.

- **Multicast Application Associations (MCAA)**. This association shall be predominantly used for protection operate functions from publishers on the Station LAN facilitating peer-to-peer unidirectional communications. This association shall only be utilized by SCADA when interlocking functions are to be implemented for the convenience of the client.

10. Data Quality Attributes

One or more of the following data attributes concerning the quality of data shall be supported across the different Common Data Classes.

Attribute Name	Attribute Type	Value	Eskom Note
validity	CODED ENUM	good|invalid|reserved|questionable	Required
detailQual			
-overflow	BOOLEAN	True|False	Required
-outOfRange	BOOLEAN	True|False	Required
-badReference	BOOLEAN	True|False	Required
-oscillatory	BOOLEAN	True|False	Required*
-failure	BOOLEAN	True|False	Required
-oldData	BOOLEAN	True|False	Required
-inconsistent	BOOLEAN	True|False	Required
-inaccurate	BOOLEAN	True|False	Required
source	CODED ENUM	process|substituted	Required
test	BOOLEAN	True|False	Required
operatorBlocked	BOOLEAN	True|False	Required

* If this is a local issue the device concerned must communicate this attribute for notification to the client(s).

11. The Generic Substation Event Model

Generic Substation Events shall be used to distribute critical substations events to multiple devices on the substation network using the multicast network service based on the publisher/subscriber information exchange mechanism.

At minimum the dedicated SCADA IED shall support the GSSE model whereas the Multifunction (Protection) IED shall support GOOSE messages.

The publisher and subscriber buffers shall be quantified based on the maximum amount of Data Set Members it can hold. A communication loss indication shall be used to indicate to the subscriber when the publisher has not updated the receiving buffer within a cyclic period.

At minimum GSSE and GOOSE messages when detected by the publishing device shall be transmitted onto the network wires within 4ms of detection. The long cycle time for no change detection and the fast cycle time for change detection shall be quantified on the publishing device.

12. Authorization

This document has been seen and accepted by:

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13. Revisions

Date	Rev.	Compiler	Remarks
April 2014	1	T Bower	Document number changed to 240-42066934 Logical nodes added and existing logical nodes revised
Sept 2011	0	T Bower	First issue

14. Development team

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