NOTE 2 IEC 61850-6 does not model bus bar sections or junctions as identified equipment, but simply as connectivity nodes.

In some cases, it is possible to use other information from the SCL in addition to the type code to define a more complex mapping to the appropriate CIM class. For example, if one of the terminals for a SCL switch is connected to a SCL connectivity node called “grounded”, then the CIM switch type is a “GroundDisconnector”.

Within SCL, DC lines can be modelled with equipment of type LIN/GIL/CAB within (or connected to) a voltage level with nominal frequency 0. However, for control centre applications, there are fundamental differences between AC and DC equipment. The CIM therefore uses different sets of classes for AC lines and for DC lines

The SCL is intended to describe the power system such that the primary equipment type does not depend on the associated logical nodes. However, if logical node information is available it may allow the CIM model to be refined. This additional information could simply be the logical node class type as listed in Table 13, or it could be the configured value for a data object within the logical node. For example, the XSWI logical node has a data object that defines the sub-type of the associated switch equipment. See Table 22.

IEC 61850 has no special modelling for temporary equipment which will be installed to provide safety during maintenance or erection work. Temporary equipment must be pre-defined in the SCL in the same way as permanent equipment.

IEC 61850-6 allows private type codes. To allow compatibility with future enhancements of the standard, they shall start with the character E, contain only capital letters, and have at least three letters. The mapping of private type codes requires local mapping rules.

5.6.3 Recommendation for harmonization: SCL Equipment Type codes

5.6.3.1 New and deprecated type codes

Recommendation R2: The list of device type codes in IEC 61850-6 should be extended to correspond better with the IEC 61970 / IEC 61968 Common Information Model, particularly to support applications related to distribution networks. This would allow the Substation section to be used to more fully describe the power system equipment and its connectivity without needing any details of Logical Nodes. The aim is that the type code indicates the fundamental nature of the physical equipment, not necessarily its usage within a particular software application.

Details:

1) Add new type codes for Busbar section and Junction. Conducting Equipment of these types would be defined within Bays together with their associated Terminal and ConnectivityNode.
2) Add new type codes to distinguish types of switch. DIS is ambiguous as it can be mapped to several different sub-types of CIM Switch.
3) It is confusing to have type codes for capacitor device types with a variable number of terminals. Add new type codes to distinguish series and shunt capacitors.
4) It is confusing to have type codes for reactor device types with a variable number of terminals. Add new type codes to distinguish series and shunt reactors.
5) It is not clear what the difference is between type code CON “converter” compared with the SCR “rectifier” and TCF “frequency converter”. The type code CON should be deprecated.
6) Add a new type code for Composite Switches i.e. a set of individual Switches normally enclosed within the same cabinet or cubicle, possibly with interlocks that restrict the combination of switch positions. These are typically found in medium voltage distribution networks or high-voltage gas insulated switchgear. The purpose is to allow the cabinet or

cubicle to be represented as equipment with its own identity and status, in addition to its constituent switches.

7) The IFL type code should not be used for new designs. The differentiation with between outgoing and infeeding lines is not relevant in many transmission networks and is becoming artificial in distribution grids with high level of dispersed generation. The power flow direction may change in a few seconds. Allow LIN and CAB to be modelled with one terminal when they cross the substation or system border, and modelled with two terminals if the SCL models a full line.

8) For CIM applications, there are fundamental differences between AC and DC equipment. It is complex to distinguish AC lines and DC lines based on the association with a voltage level that has a frequency attribute with value zero. Add new type codes DLN and DCA.

These recommendations are summarized in Tables 4 and 5.

Table 4 – Equipment type codes – proposed modified descriptions

Type Code	Meaning	Number of terminals	CIM class
DIS	Disconnector or earthing switch (generic) Deprecated – use SDC or SES	2	
CAP	Capacitor bank (generic) Deprecated – use CSE or CSH	1 or 2	ShuntCompensator if number of terminals =1 SeriesCompensator if number of terminals =2
REA	Reactor (generic) Deprecated – use RSE or RSH	1 or 2	ShuntCompensator if number of terminals =1 SeriesCompensator if number of terminals =2
CON	Converter (generic). Deprecated – use TCF or SCR as applicable	1 or 2	
IFL	Infeed line Deprecated – use CAB, LIN or GIL		

Table 5 – Equipment type codes – proposed additional codes

Type Code	Meaning	Number of terminals	CIM class
BUS	Busbar section – a low impedance conductor to which several instances of conduction equipment can be separately connected	1	BusbarSection
BJN	Junction – connection between two or more instances of conduction equipment	1	Junction
CSE	Capacitor bank – series	2	SeriesCompensator
CSH	Capacitor bank – shunt	1	ShuntCompensator
DLN	DC Line	2	DCLineSegment
DCA	DC Cable	2	DCLineSegment
RSE	Reactor – series	2	SeriesCompensator
RSH	Reactor – shunt	1	ShuntCompensator
CSW	Composite Switch (set of individual Switches normally enclosed within the same cabinet and possibly with interlocks that restrict the combination of switch positions) See example in Figure 8		CompositeSwitch
SWI	Switch – generic	2	Switch
SLB	Switch – Load break switch	2	LoadBreakSwitch
SDC	Switch – Disconnector	2	Disconnector
SES	Switch – Earthing switch	2	EarthingSwitch
SHS	Switch – High speed earthing switch	2	EarthingSwitch
SFS	Switch – Fuse	2	Fuse
SJP	Switch – Jumper	2	Jumper

Figure 8 shows a Ring Main Unit modelled as a composite switch containing several individual switches.

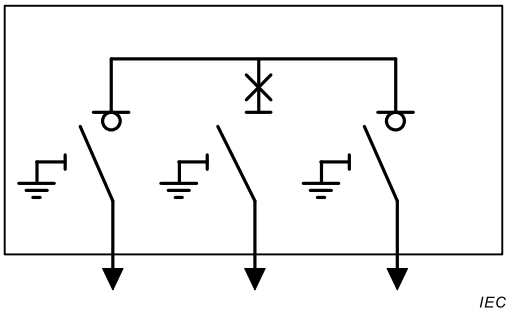

Figure 8 – Composite Switch example.

5.6.4 Recommendation for harmonization: SCL PSRType

In the CIM, instances of power system resources may be associated with zero or one instances of PSRType. This is used for “classifying instances of the same class, e.g. overhead and underground ACLineSegments. This classification mechanism is intended to provide flexibility outside the scope of this standard, i.e. provide customisation that is non-standard.”

This custom classification is particularly useful for modelling distribution network equipment, as a way of defining individual instances with reference to template or catalogue objects that contain sets of reference parameters.