



# *Substation Configuration Language*

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Summary

August 2006



# CONFIGURATION *SCL Format*



TC57

- Defined in IEC 61850 Part 6
- Four different file types
  - **System Specification Description (SSD)** – power system functions
  - **Substation Configuration Description (SCD)** – complete substation
  - **IED Capability Description (ICD)** – the data reported by a type of IED
  - **Configured IED Description(CID)** – the configuration of a specific IED
- Five sections per file
  - **Header** – Identifies the configuration file
  - **Substation** – Identifies electrical connections and functions
  - **Communications** – Identifies addresses and subnetworks
  - **IED** – Identifies functions and configuration of devices
  - **Data Type Templates** – Used to build the other sections

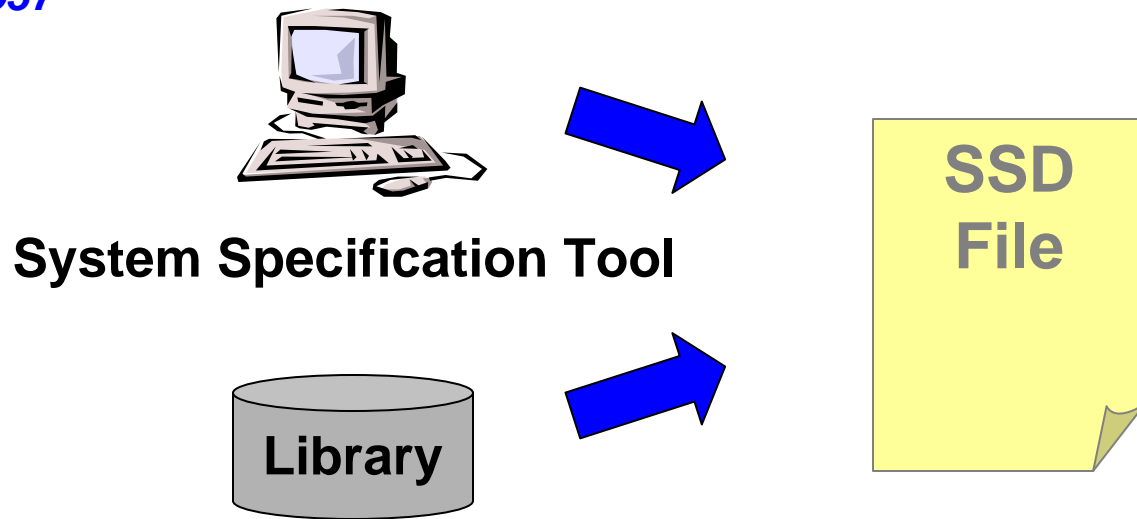


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# System Specification Description

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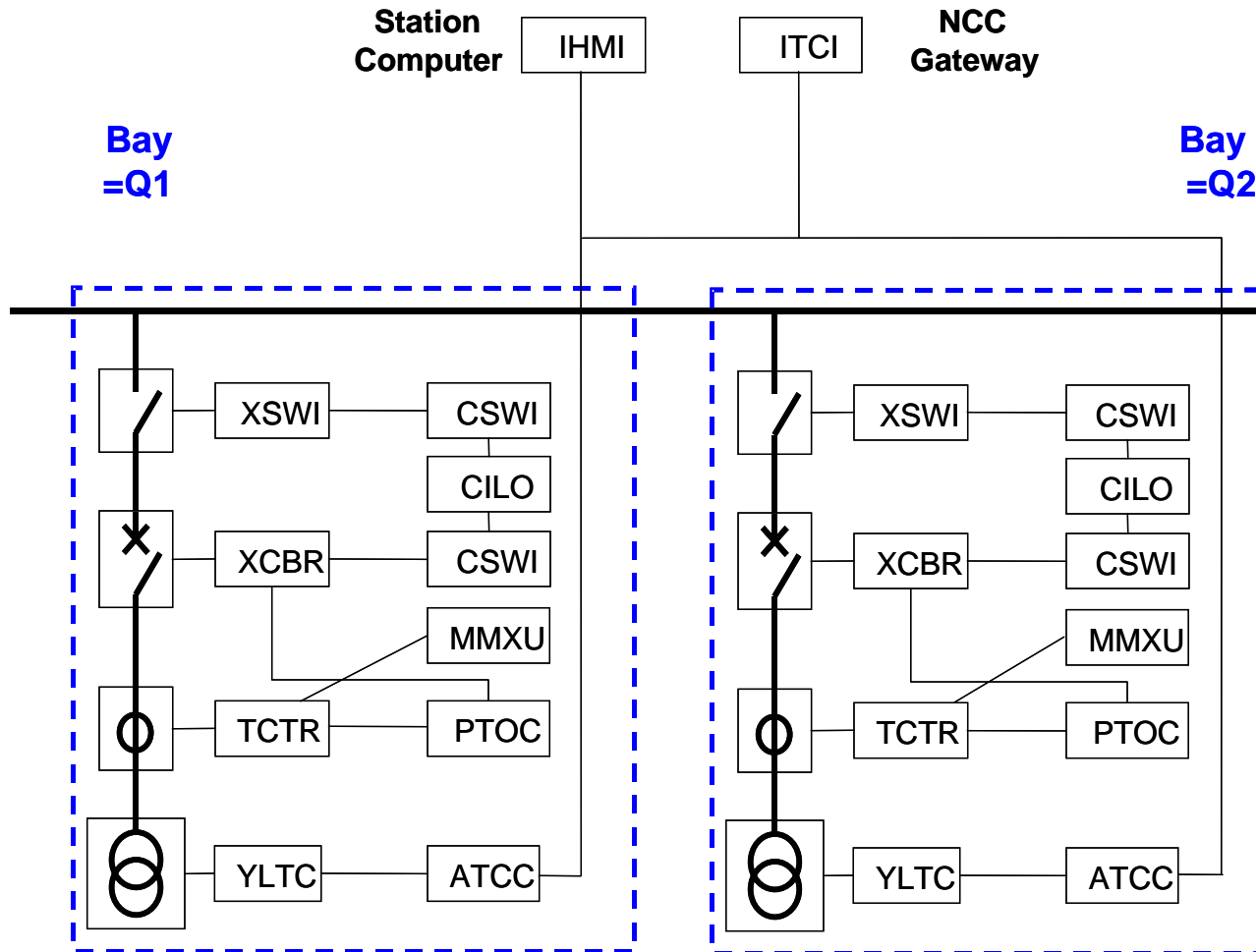
- The **system specification description file** (.ssd) describes the single line diagram and the substation automation functionality using the associated logical nodes
  - single line diagram connections
  - logical nodes, logical node types



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# SSD: One-Line and Functions

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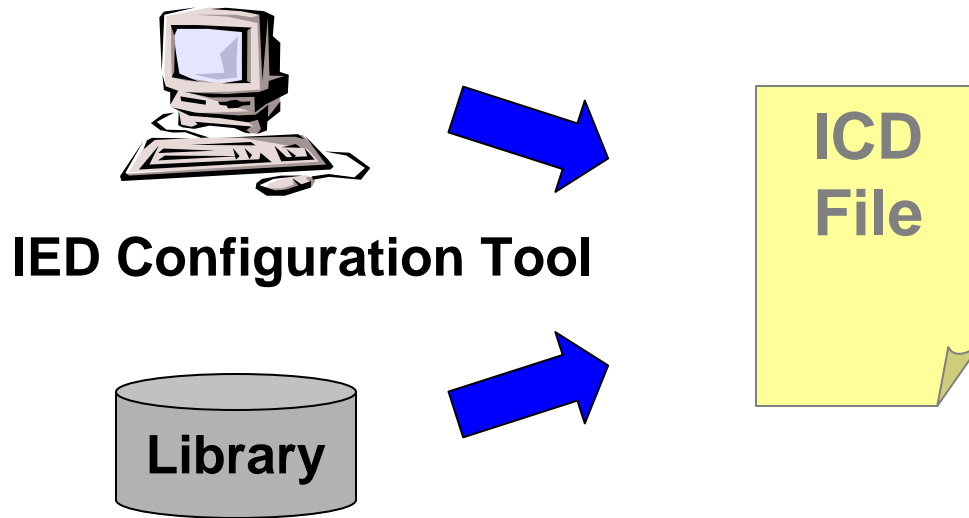


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# *IED Capability Description*

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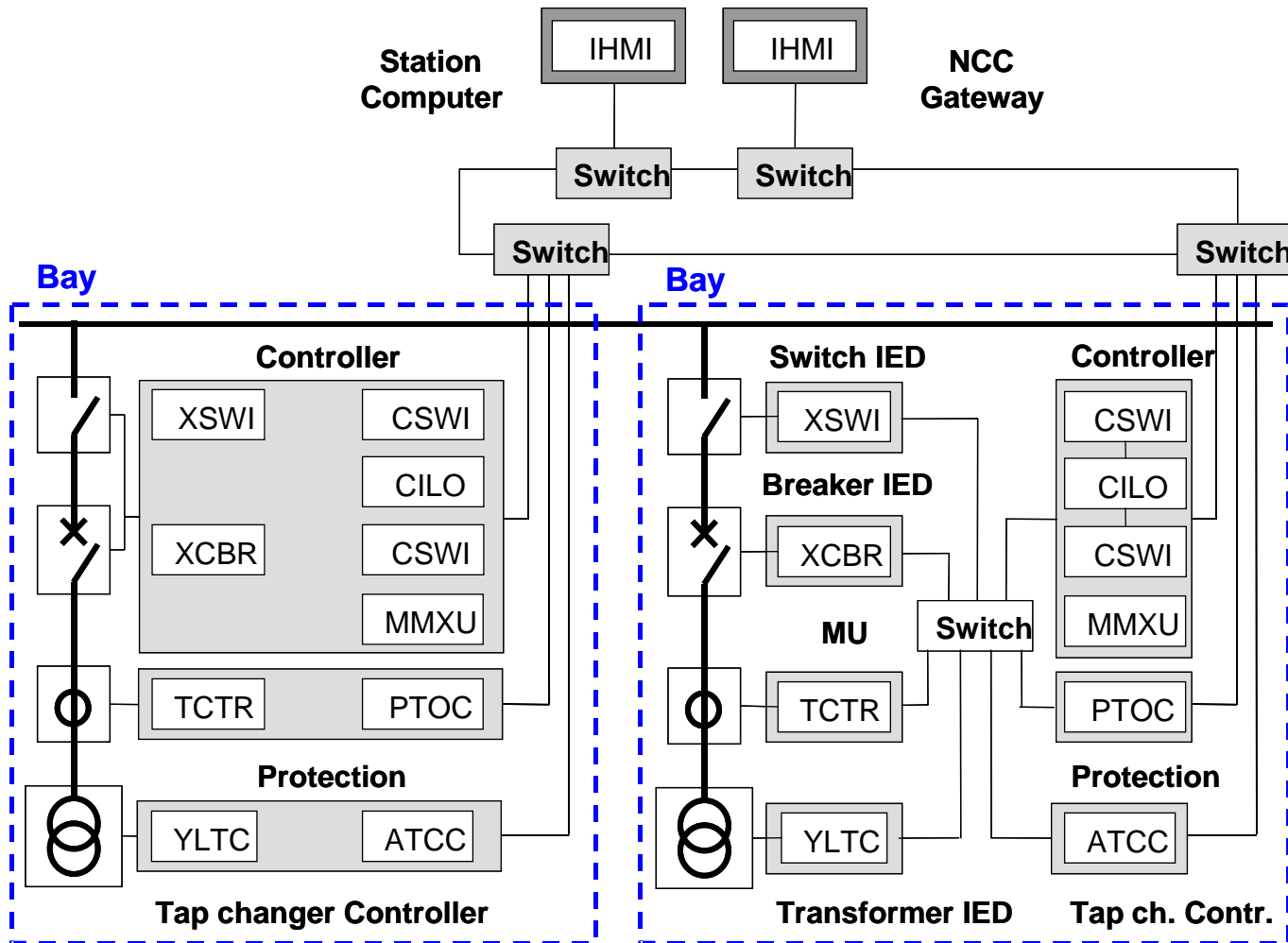
- The **IED capability description file** (.icd) describes the capabilities and (optionally) the preconfigured data model of the IED
  - logical devices, logical nodes, logical node types
  - data sets
  - control blocks – not populated
- Think of it as an “IED Template”



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## ICD: Map IEDs to logical devices

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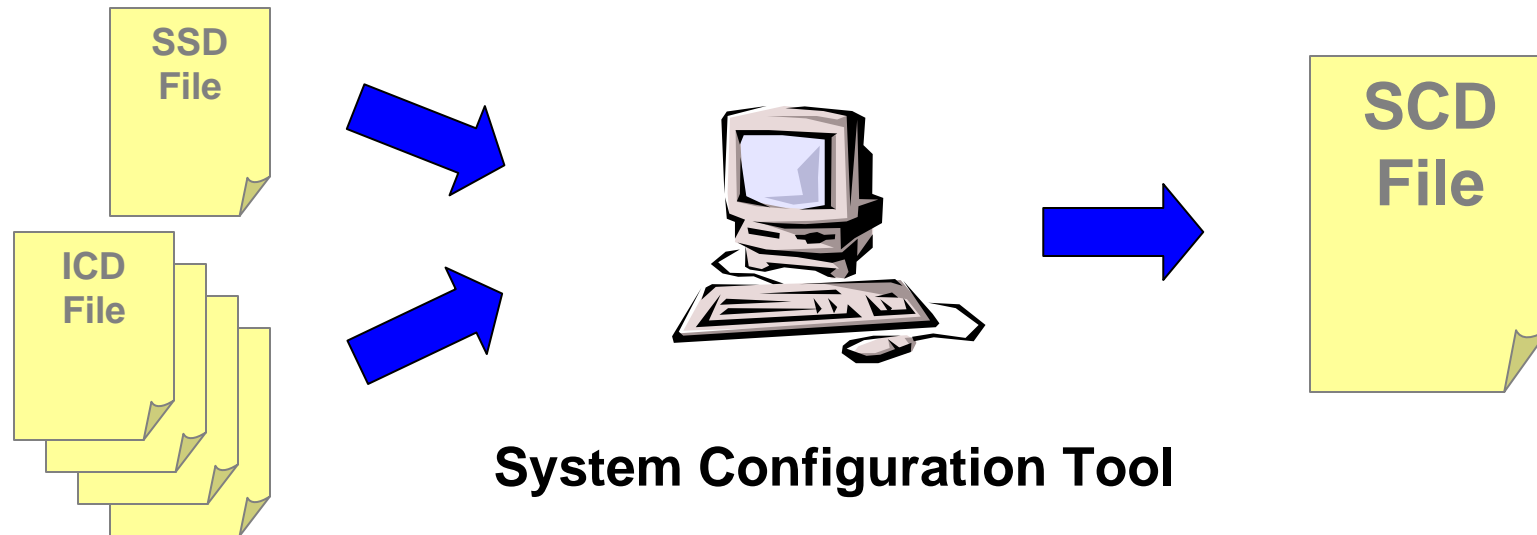




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# System Configuration Description

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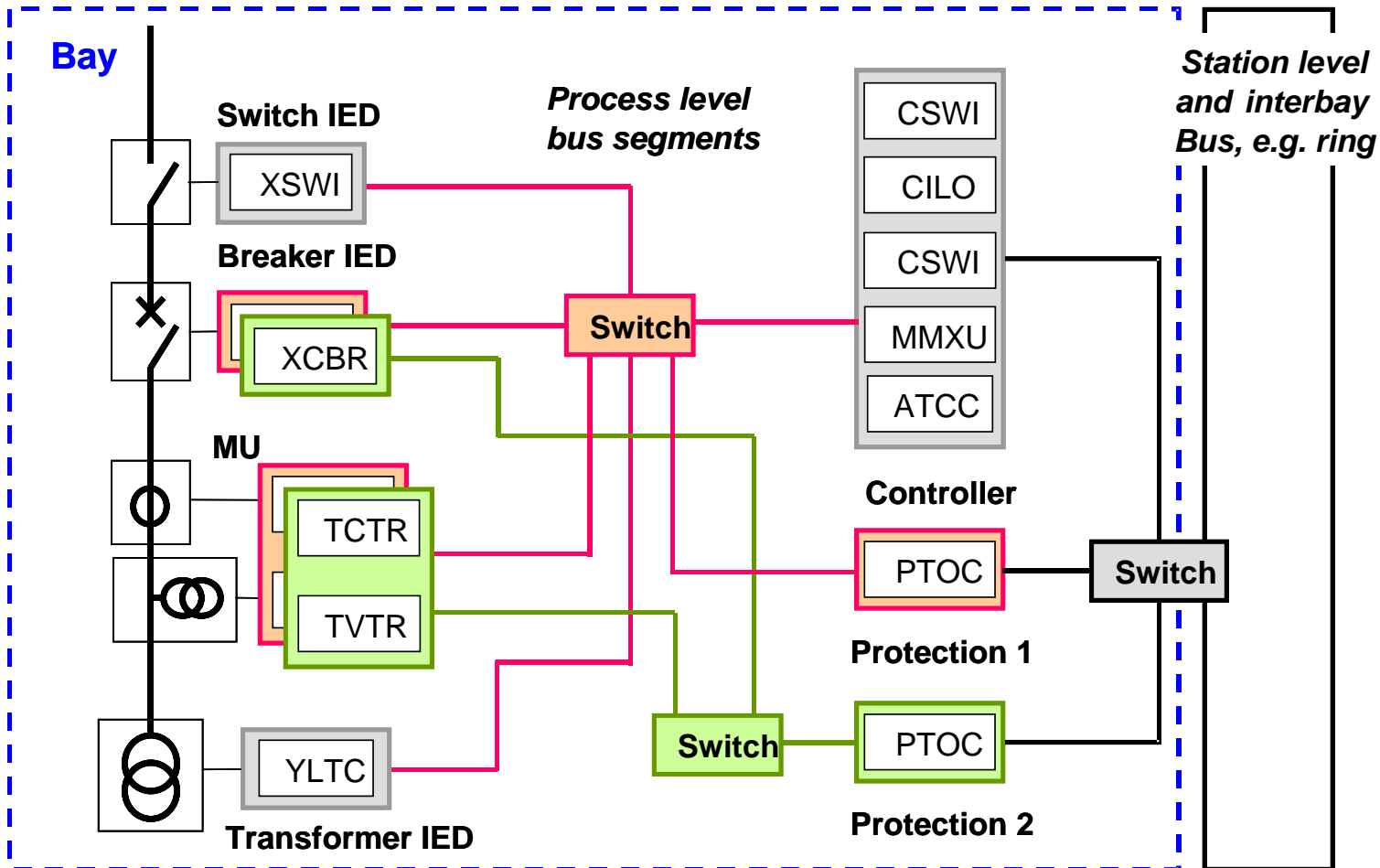
- The **substation configuration description file** (.scd) describes the complete substation configuration
  - single line diagram
  - communication network
  - IED configurations
  - binding information (e.g. trip matrix)



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# SCD: Add the Communications

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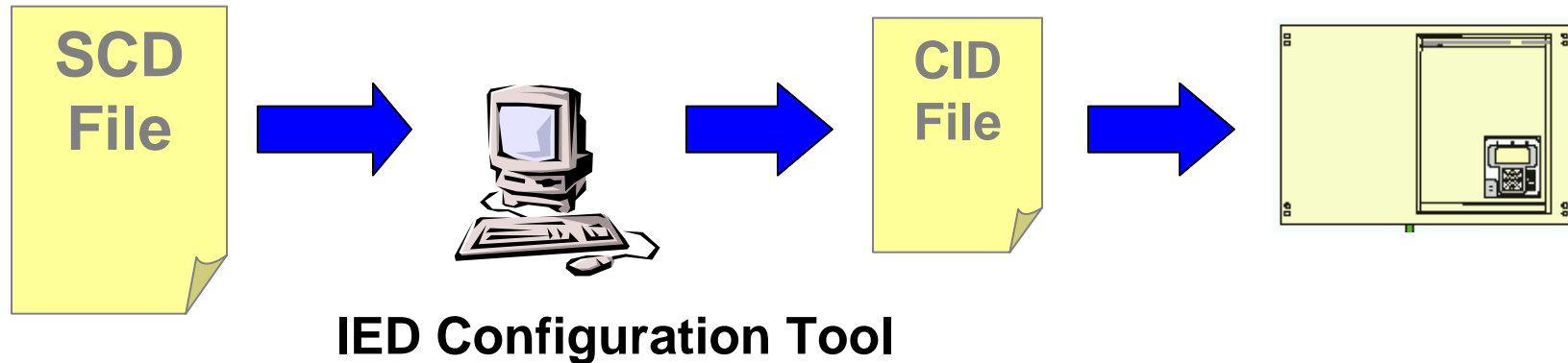




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# Configured IED Description

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- The **configured IED description file** (.cid) describes an instantiated IED with all configuration parameters relevant for that IED
- Created by the IED configuration tool from the .scd file
- Includes the device-specific configuration data
- Use of the .cid file to configure the IED is **optional**.
- As an alternate solution, a vendor specific file may be used



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# SCL Substation Section

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```
<Substation Name="">
  <VoltageLevel Name="E1">
    <Bay Ref="Q1">
      <Device Name="QA1" Type="CBR">
        <LNode Inst="1" LNClass="CSWI" IEDName="AA2SB1" LDInst="C1"/>
        <Connection CNodeName="L1"/>
      </Device>
      <Device Name="QB1" Type="DIS">
        <LNode Name="2" LNClass="CSWI" IEDName="AA2SB1" LDInst="C1"/>
        <Connection CNodeName="L1"/>
        <Connection CNodeName="BB1" BayName="W1"/>
      </Device>
    </Bay>
  </VoltageLevel>
</Substation>
```

- Concepts of voltage level, bay, power functionality
- Associates Logical Nodes (functions) with:
  - Electrical connections (required)
  - IEDs (optional)
- Can be used to build a one-line diagram



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# SCL Communications Section

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```
<Communication>
  <Subnetwork Name="W1" Type="8-MMS/TCP">
    <Text>Station bus</Text>
    <ConnectedAP IEDName="AA2SB1" APName="S1"><Address/>
    </ConnectedAP>
    <ConnectedAP IEDName="AA2SB2" APName="S1"><Address/>
    </ConnectedAP>
    <ConnectedAP IEDName="AA1KA5" APName="S1"><Address/>
    </ConnectedAP>
  </Subnetwork>
  <Subnetwork Name="W2" Type="8-MMS/TCP">
    <Text>remote station unit via router</Text>
    <ConnectedAP IEDName="AA1KA1" APName="S1"><Address/>
    </ConnectedAP>
    <ConnectedAP IEDName="AA1KA5" APName="S2"><Address/>
    </ConnectedAP>
  </Subnetwork>
</Communication>
```

- Concepts of subnetwork, and access point
- Identifies communications addresses of IEDs
- Can be used for network management



## CONFIGURATION

# SCL IED and Data Type Sections

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```
<IED Name="AA2SB1" Type="MyType">
  <AccessPoint Ref="S1">
    <Server>
      <LDevice Inst="C1">
        <LNO LNTType="LNO"/>
        <LN Name="1" LNClass="CSWI" LNTType="CSWIa"/>
      </LDevice>
    </Server>
  </AccessPoint>
</IED>
```

```
<LNNodeType Ref="CSWIa" LNClass="CSWI">
  <DO Nam="Pos" Type="DPC">
    <CtlService> <SBO/> </CtlService>
    <DA Name="stVal" FC="ST" TrgOpt="dchg" BType="Enum" EnumType="Pos"/>
    <DA Name="ctlVal" FC="CO" TrgOpt="none" BType="BOOL" />
  </DO>
  <DO Name="GrpAl" Type="SPS">
    <DA Name="stVal" FC="ST" TrgOpt="dchg" BType="BOOL">
  </DO>
</LNNodeType>
```

- Defines the object model of each device
- Shows correspondence between devices and access points
- Shows structure of server, logical devices, logical nodes, data objects, data attributes, data types
- Same information as available from self-description



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# *SCL File Types and Sections*

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Section	File Type			
	SSD	ICD	SCD	CID
	Substation One-Line and Functions	IED Template	Complete Substation	Particular IED Configuration
Header	Yes	Yes	Yes	Yes
Substation	Yes	Optional	Yes	Optional
Communications	Optional	One Instance	Yes	One Instance
IED	Optional	Yes, values optional	Multiple	Yes, including values
Data Type Templates	As needed	As needed	Multiple	As needed