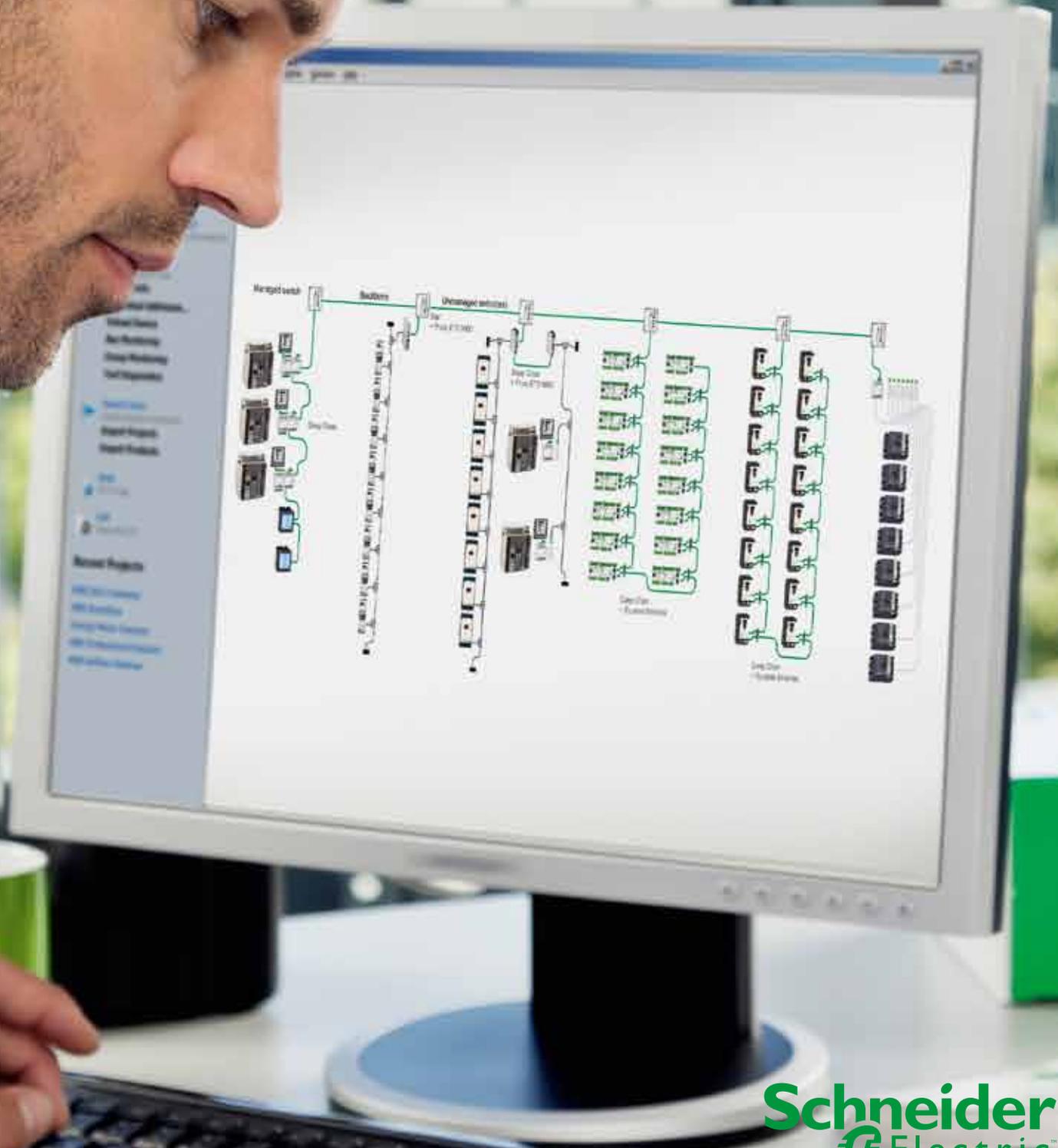


iPMCC by Blokset
Intelligent Power & Motor Control Centre

Selection Guide

How to select your Ethernet or Profibus-DP communication architecture?



> Contents



Introduction

p. 04

Criteria for architectures selection..... p. 05
Operability and Dependability p. 06



Global reference architectures

p. 08

Ethernet High Dependability p. 09
Ethernet Competitive p. 10
Ethernet Profibus-DP p. 11



Detailed communication architectures

p. 12

The backbone p. 13
iMCC Star..... p. 14
iPCC Star..... p. 15
iMCC Daisy Chain p. 16
iMCC Daisy Chain Loop..... p. 17
iPCC Daisy Chain p. 18
iPCC Proxy p. 19
iMCC Proxy p. 20
iPMCC Proxy..... p. 21
Profibus-DP p. 22

iPMCC Architectures
Introduction



Criteria for architectures selection

1

The first criterion...

for selecting the architectures **is the technological feasibility** with the existing products, i.e. the available connectivity for each IED; as well as the easiness to strictly **respect the wiring invariants**.

2

The second criterion...

is that whenever an IED offers a built-in protocol (native) the IED is **tested only in its native version**. e.g. in Ethernet architectures TeSys T is tested only with built-in Ethernet and not with Modbus-SL.

3

The third criterion...

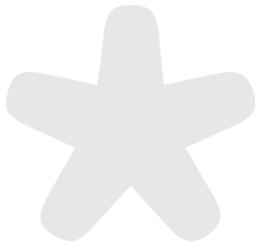
is based on the operability of the possible architectures. **Only architectures ensuring full operability** have been retained.



iPMCC architectures are based on Blokset switchboards to provide smart panel for PCC and MCC applications.



Operability & Dependability

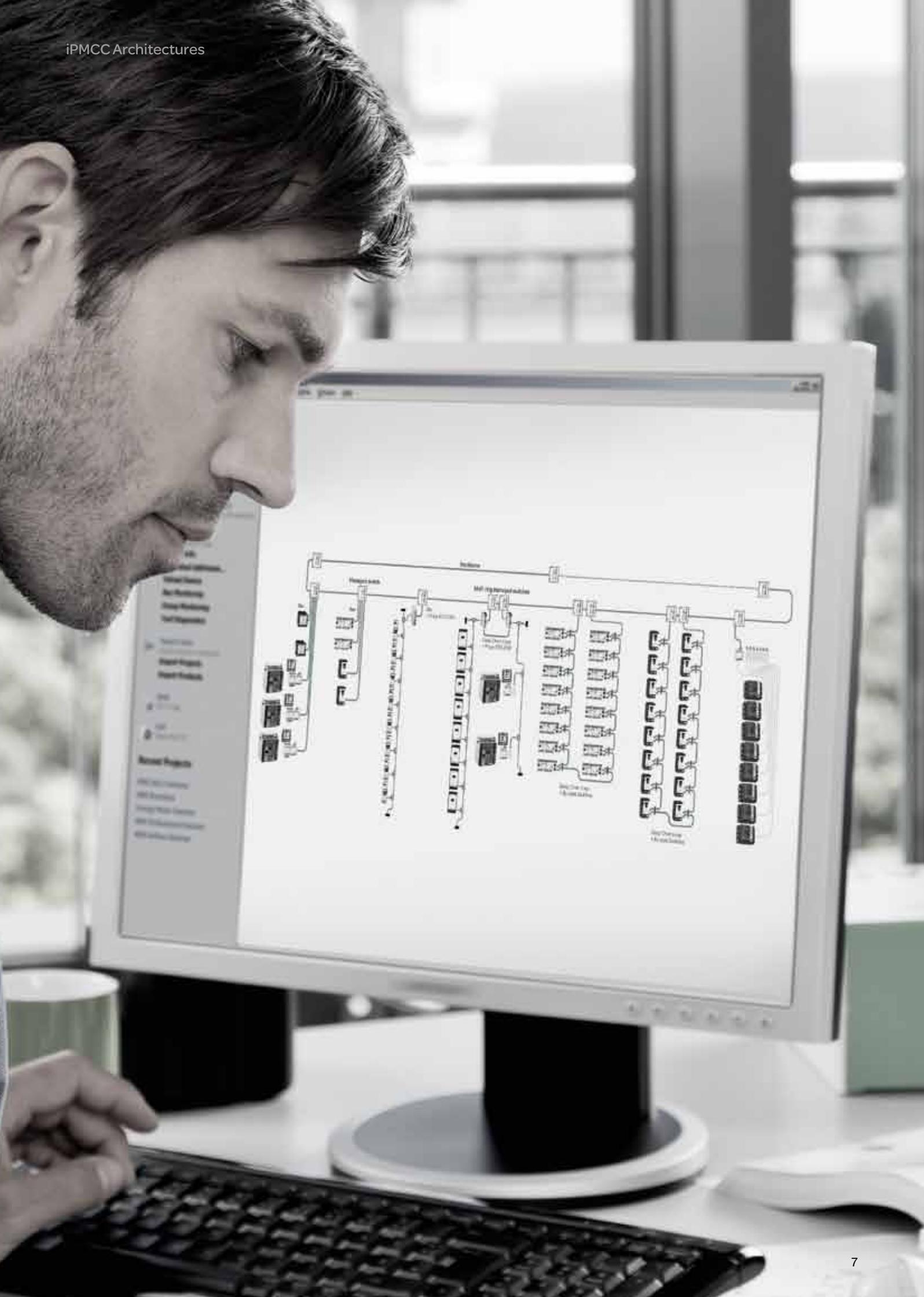


Dependability deals with abnormal situations, i.e. failures. Therefore, a certain level of degradation of the system is expected after one component has failed.

We identify the different failure modes of each topology and its tolerance to faults. We distinguish between the failure of a switch and the failure of a node (or its link). We identify also the existence of common modes and of any other additional failure mode.

Operability deals with the normal operation of the system. i.e., it is normal to remove one or more Functional Units, e.g. to withdraw a drawer. Therefore, it is legitimate to expect no degradation of the system when executing a normal operation.





iPMCC Architectures

Global reference architectures

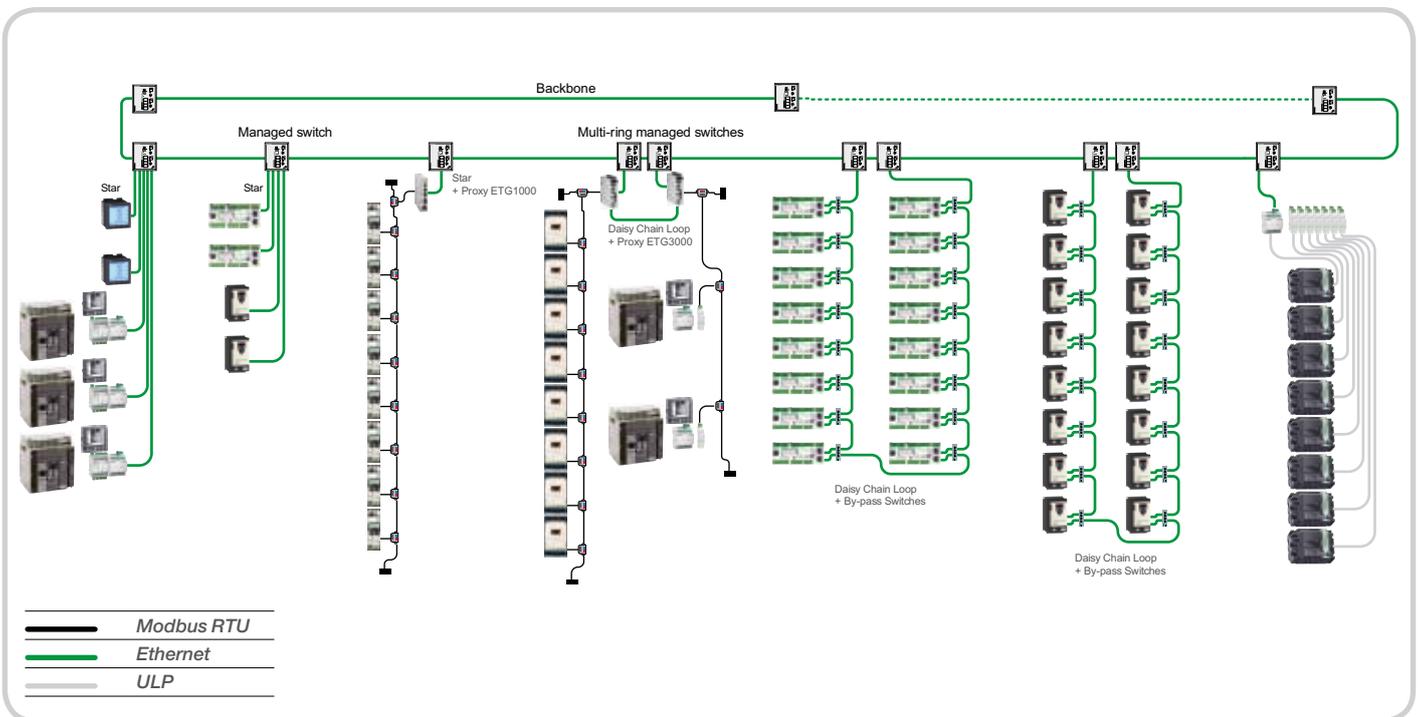


Ethernet architectures

Ethernet High Dependability Fault tolerant architecture



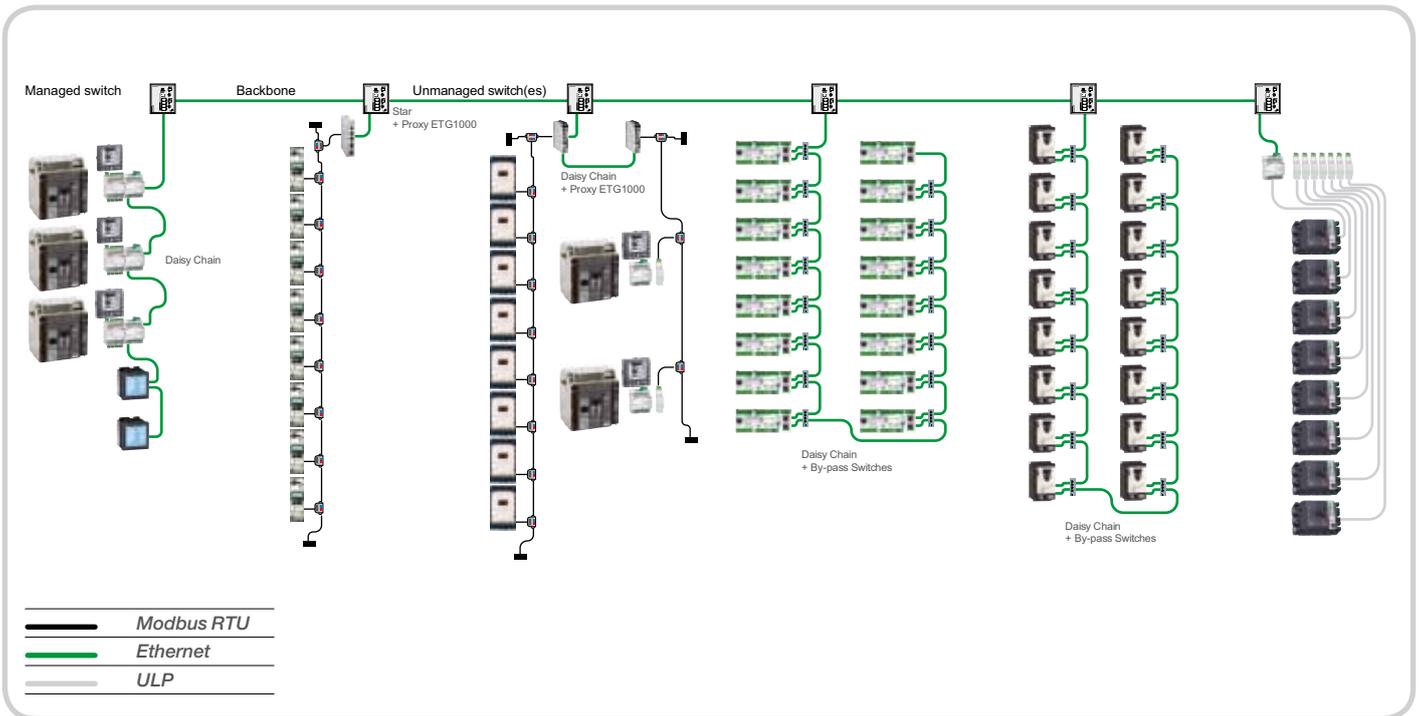
This solution of communication architecture increases process availability with high level of redundancy and performances. It is fully based on devices with native ethernet TCP or Ethernet IP protocols, for power and motor management architecture. This kind of architecture embeds the best performances supporting RSTP protocols and covers all communication faults. This solution allows also a power monitoring facilities with new communicating devices supporting a web servers.



Ethernet Competitive



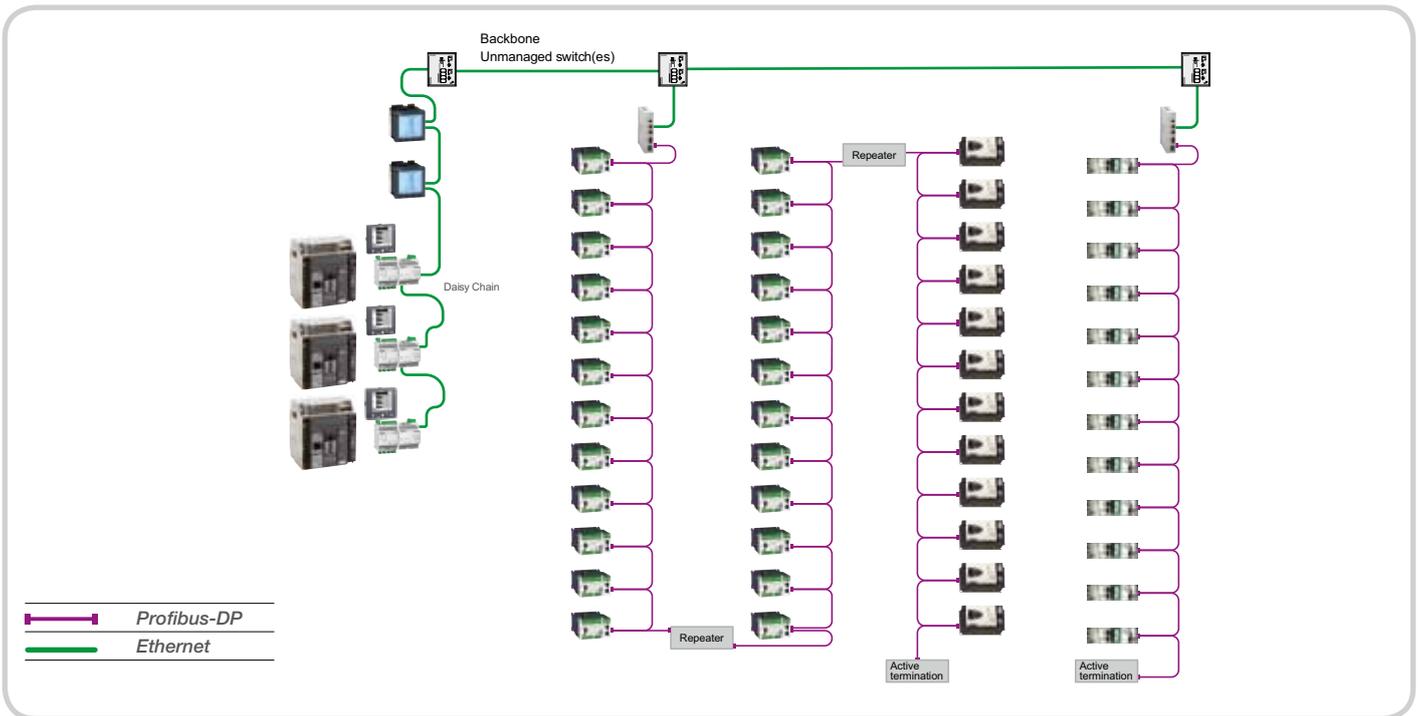
The competitive architecture is an optimized and recommended reference for some dedicated application where redundancy is not required.



Profibus-DP architecture



This solution is the recommended architecture for projects requiring fieldbus technology like Profibus-DP. This Fieldbus iPMCC functional units are fully integrated into automation infrastructure via Profibus Remote Master "PRM".

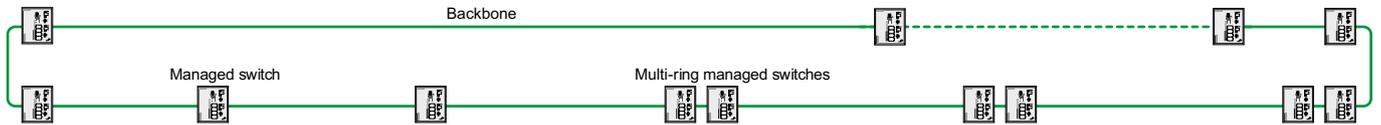


Detailed communication architectures



The backbone

A high dependability Ethernet architecture is based around a fault tolerant ring backbone (either optic fibre or copper) to which all the subsystems are connected via managed switches.



The competitive iPMCC architecture is based around a bus backbone (either optic or copper) to which all the subsystems are connected via unmanaged switches.



Connecting the backbone to the site's infrastructure

The interface between the backbone and the site's infrastructure can be done in different ways, offering from no transparency at all to full transparency.

If transparency is not required, the connection to the site's infrastructure can be done in almost any way. The most common way is through a PLC.

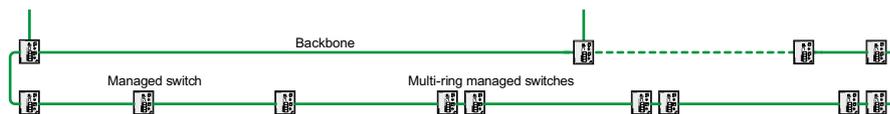
The advantage of this approach is that the iPMCC is completely isolated (i.e., protected) from the outside world. The disadvantage is that there is no transparency at all, and thus the iPMCC cannot deliver web services.

Whenever transparency is required (e.g., to access iPMCC web services) we need a direct connection between the iPMCC and the site's infrastructure.

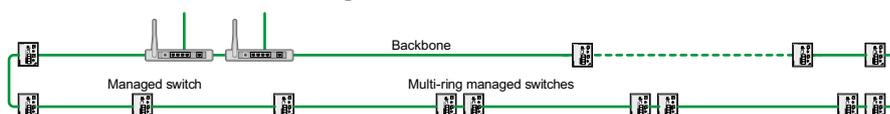
External interface through redundant routers provide complete separation between iPMCC and the site's infrastructure.

In case of competitive backbone, the connection to the infrastructure is based on managed switch.

External Interface through Switch(es)



External Interface through Redundant Routers



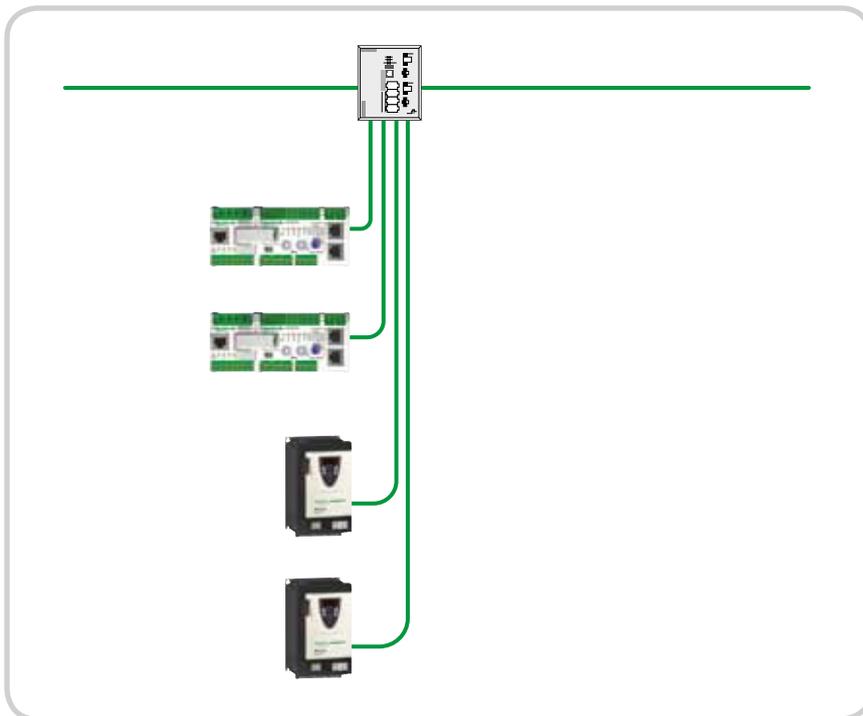
Reference device connection

iPMCC covers power and energy management with PCC offer, and motor management with MCC solutions. iPCC includes all intelligent and communicating power devices like Masterpact and Compact NSX connected to the backbone with recommended communication topologies and protocols. iMCC includes all intelligent and communicating motor management devices like TeSys and VSD connected to the backbone with recommended communication topologies and protocols.

iMCC Star



It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.

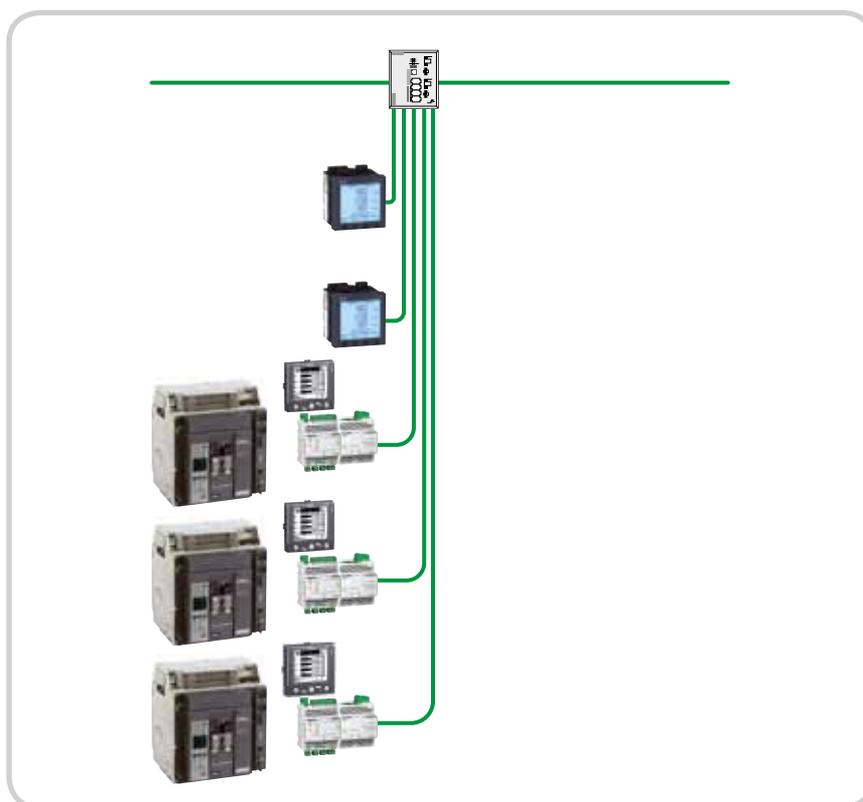


		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✘	
Tolerant to 1 st node failure	✔	
Tolerant to 2 nd node failure	✔	
Tolerant to several nodes failures	✔	0
1 or more Common Modes	0	
Additional failure modes	✔	
Operability		
Withdrawability 1 Functional Unit (FU)	✔	
Withdrawability 2 FUs	✔	✔
Withdrawability several FUs	✔	

iPCC Star



It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.



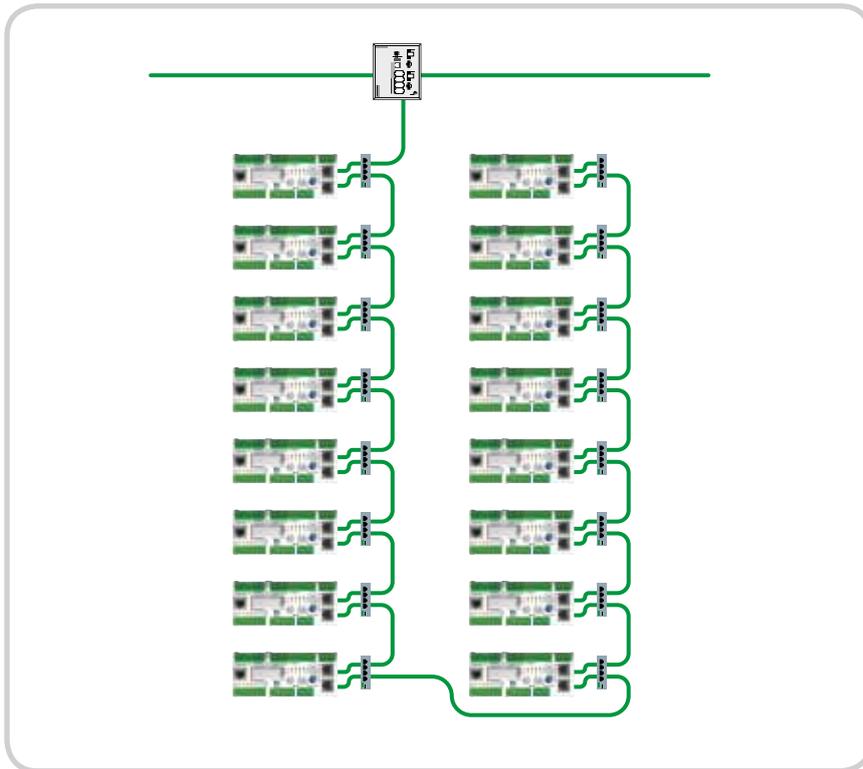
		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✗	
Tolerant to 1 st node failure	✓	
Tolerant to 2 nd node failure	✓	
Tolerant to several nodes failures	✓	0
1 or more Common Modes	0	
Additional failure modes	✓	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	
Withdrawability 2 FUs	✓	✓
Withdrawability several FUs	✓	

Reference device connection

iMCC Daisy Chain with By-pass switches



It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes, since the By-pass switch will heal automatically which insure continuity of service.

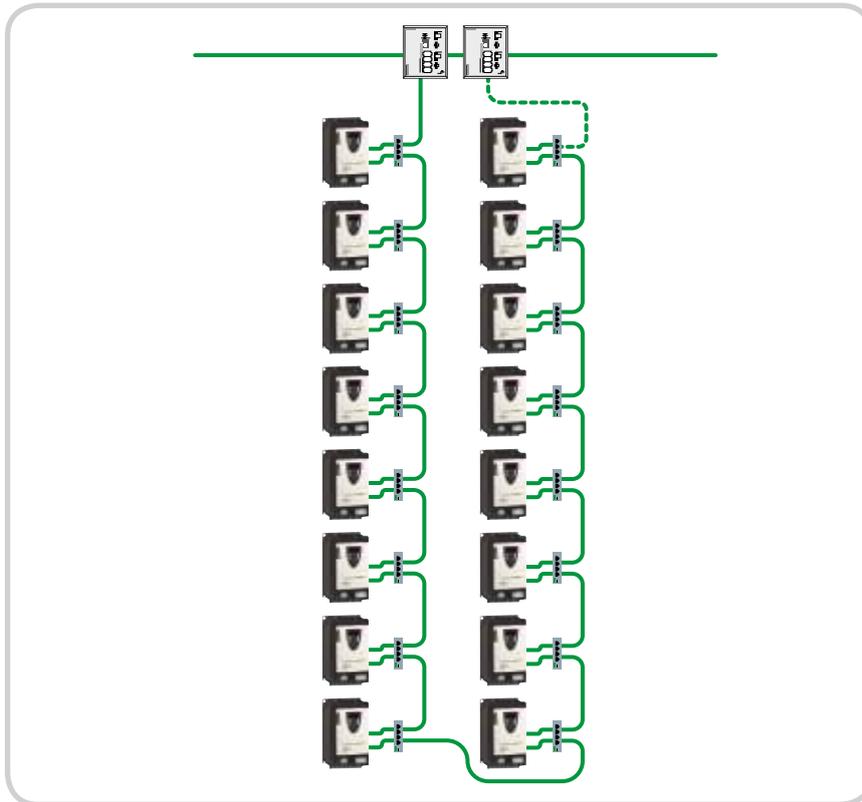


		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✗	
Tolerant to 1 st node failure	✓	
Tolerant to 2 nd node failure	○	
Tolerant to several nodes failures	○	○
1 or more Common Modes	✓	
Additional failure modes	○	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	
Withdrawability 2 FUs	✓	✓
Withdrawability several FUs	✓	

iMCC Daisy Chain Loop with By-pass switches



It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes, since the 2 switches will heal the ring automatically.



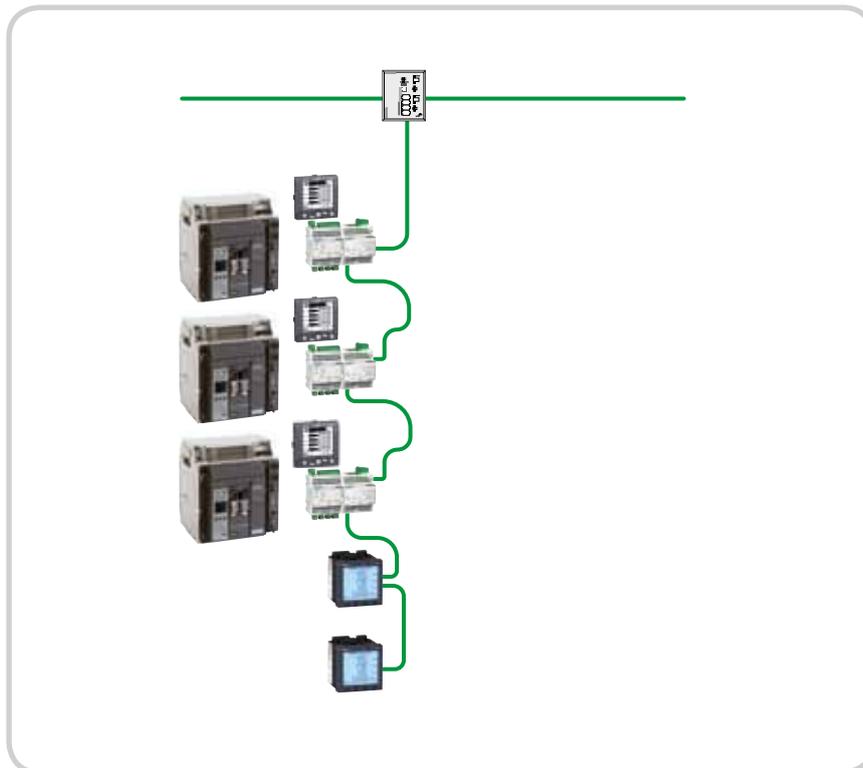
		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✓	
Tolerant to 1 st node failure	✓	
Tolerant to 2 nd node failure	✓	
Tolerant to several nodes failures	✓	✓
1 or more Common Modes	⊘	
Additional failure modes	⊘	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	
Withdrawability 2 FUs	✓	✓
Withdrawability several FUs	✓	

Reference device connection

iPCC Daisy Chain



It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.

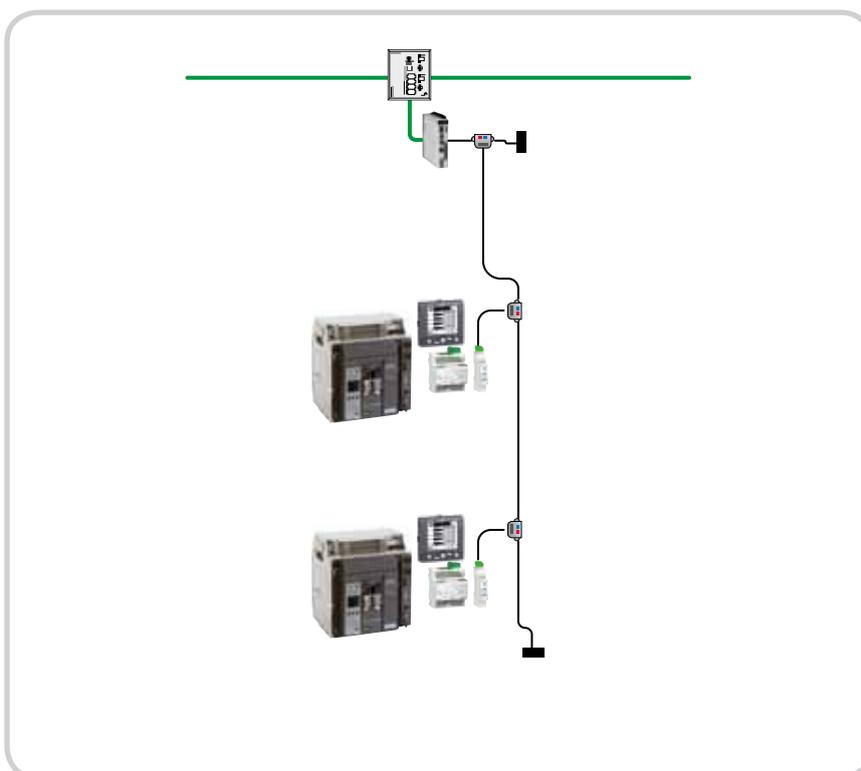


		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✗	-
Tolerant to 1 st node failure	-	
Tolerant to 2 nd node failure	-	
Tolerant to several nodes failures	✗	
1 or more Common Modes	-	
Additional failure modes	-	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	✓
Withdrawability 2 FUs	✓	
Withdrawability several FUs	✓	

iPCC Proxy



Proxy is guaranteed with ETG 1000. It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.



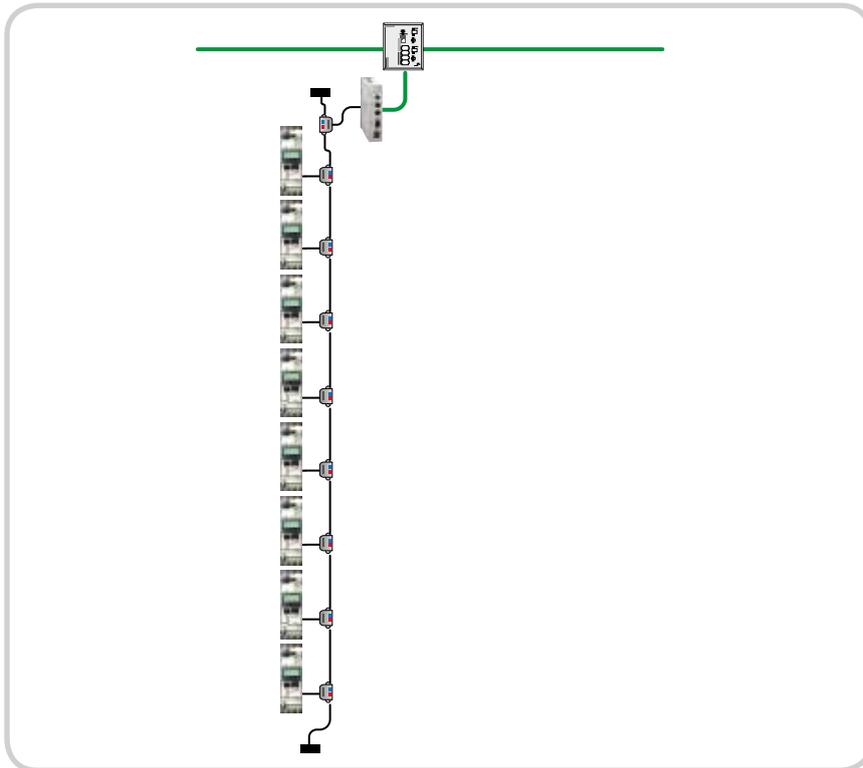
		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✗	-
Tolerant to 1 st node failure	✓	
Tolerant to 2 nd node failure	✓	
Tolerant to several nodes failures	✓	
1 or more Common Modes	✗	
Additional failure modes	✗	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	✓
Withdrawability 2 FUs	✓	
Withdrawability several FUs	✓	

Reference device connection

iMCC Proxy



Proxy is guaranteed with ETG 1000. It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.

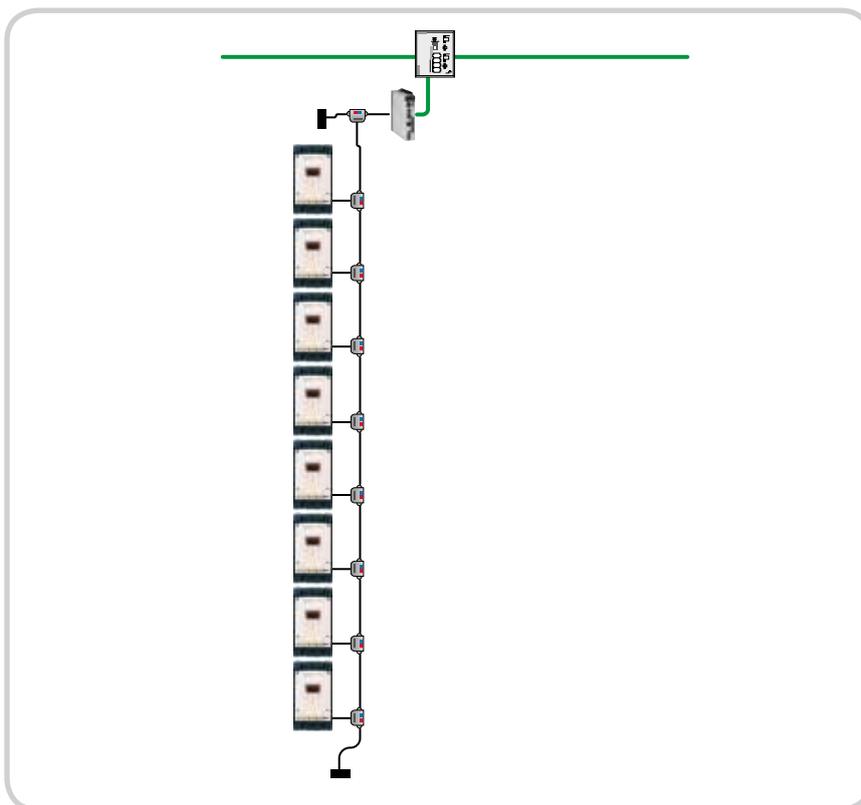


User values		Scores
Dependability		
Tolerant to 1 st switch failure	✗	-
Tolerant to 1 st node failure	✓	
Tolerant to 2 nd node failure	✓	
Tolerant to several nodes failures	✓	
1 or more Common Modes	✗	
Additional failure modes	✗	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	✓
Withdrawability 2 FUs	✓	
Withdrawability several FUs	✓	

iPMCC Proxy inside a Daisy Chain Loop



It's mandatory to use ETG 3000. It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.



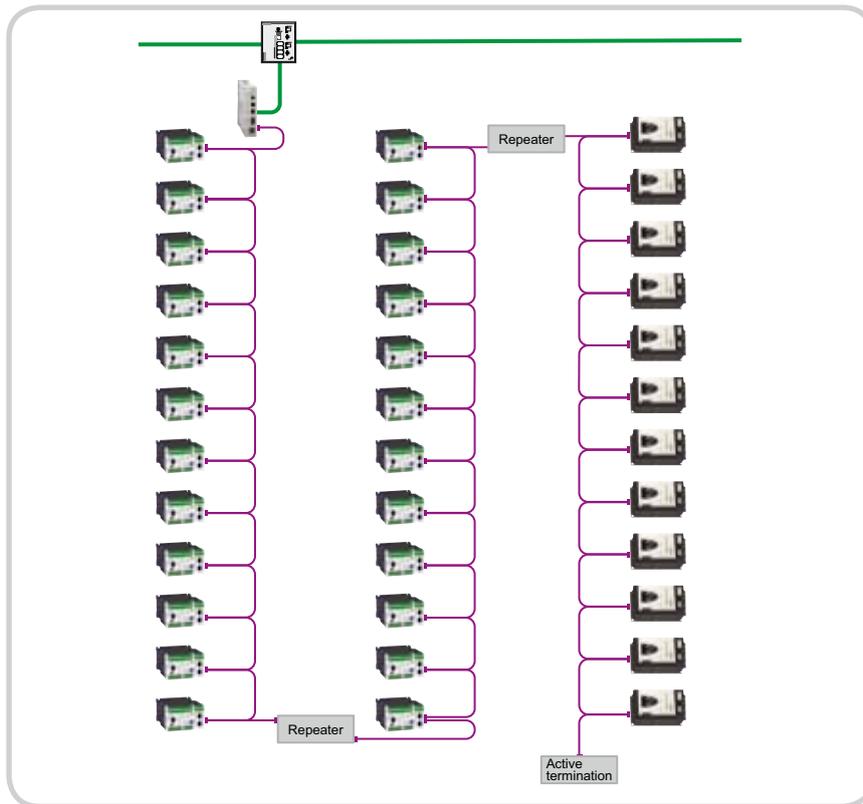
		Scores
User values		
Dependability		
Tolerant to 1 st switch failure	✓	
Tolerant to 1 st node failure	✓	
Tolerant to 2 nd node failure	✓	✓
Tolerant to several nodes failures	✓	
1 or more Common Modes	✗	
Additional failure modes	✗	
Operability		
Withdrawability 1 Functional Unit (FU)	✓	
Withdrawability 2 FUs	✓	✓
Withdrawability several FUs	✓	

Reference device connection

Profibus-DP



It guarantees normal operation.
Removal of any number of nodes **should not** affect other nodes.



Scores

User values

Dependability

Tolerant to 1 st switch failure	✘
Tolerant to 1 st node failure	✔
Tolerant to 2 nd node failure	✔
Tolerant to several nodes failures	✔
1 or more Common Modes	⊖
Additional failure modes	⊖

Operability

Withdrawability 1 Functional Unit (FU)	✔
Withdrawability 2 FUs	✔
Withdrawability several FUs	✔

⊖

✔

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Publication: Schneider Electric Industries SAS
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