



Nota de aplicação

Modicon M580

BMENOP0300 Simulação com IEDScout – Report Control Block

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Data: 08/07/2021

Versão: V1.0

Especificações técnicas

Especificações Técnicas

Hardware

BMEP584040
BMENOP0300

Firmware

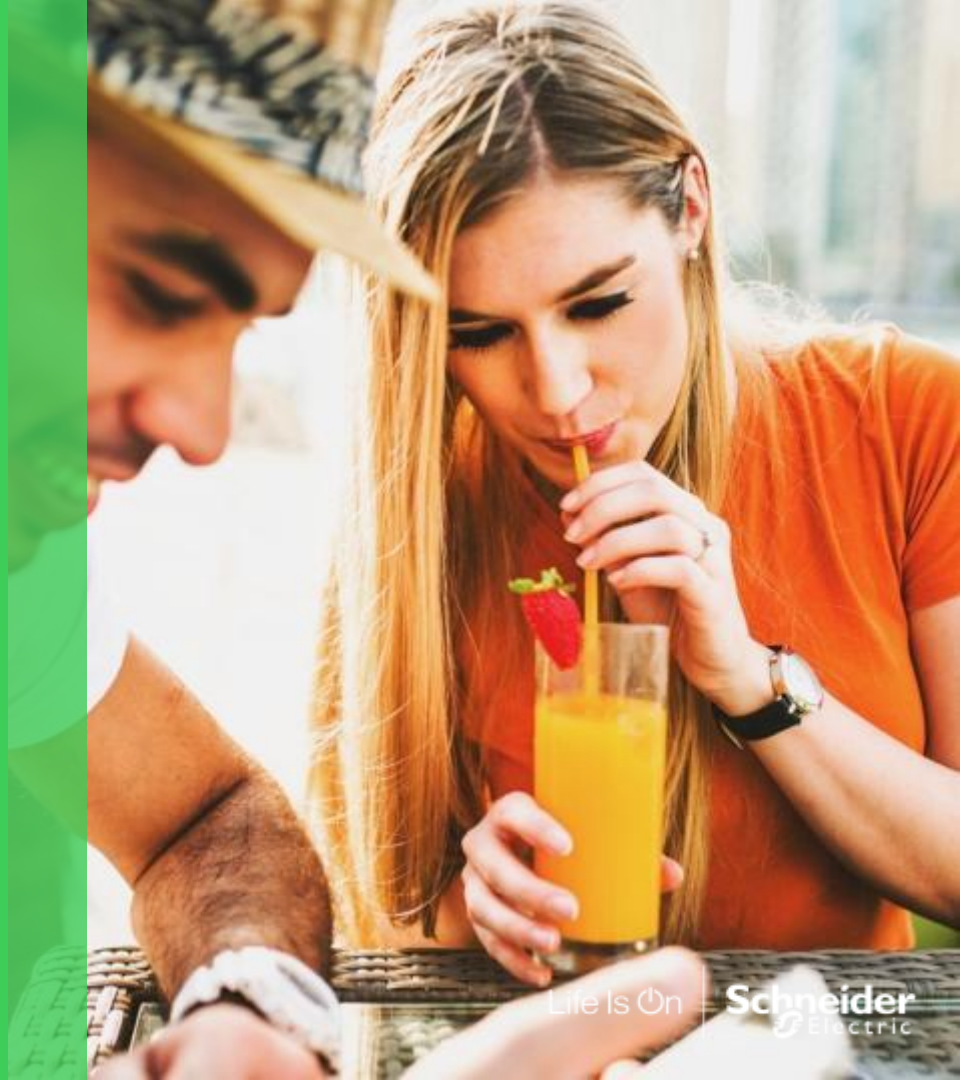
V3.2
V1.02

Software

Control Expert
Modicon IEC61850 CT
IEDScout

Versão

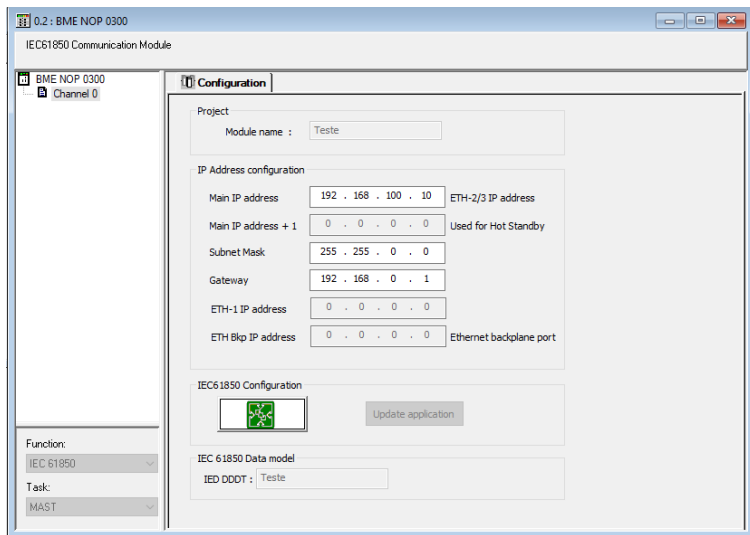
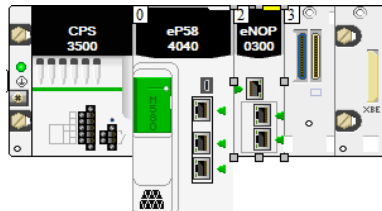
V15.0
V3.2
V5.10



Arquitetura

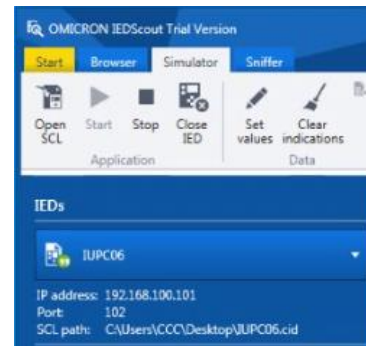
Arquitetura

BMENOP0300 e Simulador IEDScout



IEDScout Simulator

<https://www.omiconenergy.com/pt/produos/iedscout/>



Configuração

Control Expert

Configuração com o IEC61580 CT

Control Expert

Crie um novo projeto, selecione sua configuração de hardware com o modulo **BMENOP0300**.

Configure o endereço IP do modulo, mascara de rede e gateway conforme projeto de rede.

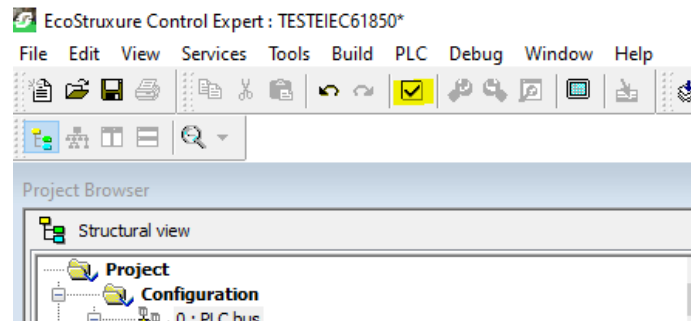
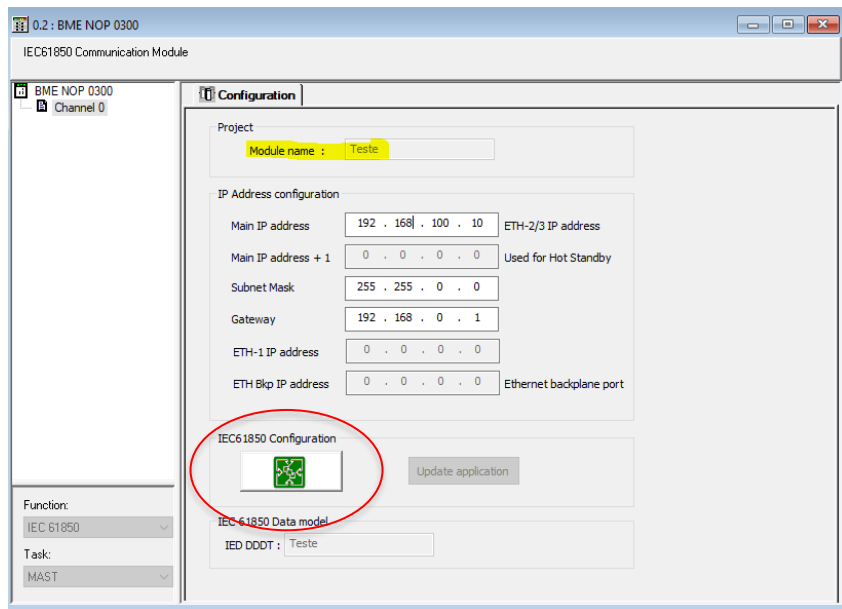
The screenshot displays the Schneider Electric Control Expert software interface. On the left, a hardware rack configuration is shown with modules labeled GPS 3200, eP58 4040, and eNOP 0300. The right pane is titled '0,2 : BME NOP 0300' and shows the 'IEC61850 Communication Module' configuration. The 'Configuration' tab is active, showing the following settings:

- Project: Module name : Teste
- IP Address configuration:
 - Main IP address: 192 . 168 . 100 . 10 (ETH-2/3 IP address)
 - Main IP address + 1: 0 . 0 . 0 . 0 (Used for Hot Standby)
 - Subnet Mask: 255 . 255 . 0 . 0
 - Gateway: 192 . 168 . 0 . 1
 - ETH-1 IP address: 0 . 0 . 0 . 0
 - ETH Bkp IP address: 0 . 0 . 0 . 0 (Ethernet backplane port)
- IEC61850 Configuration: Includes an 'Update application' button.
- IEC 61850 Data model: IED DDOOT : Teste

At the bottom left, the 'Function' dropdown is set to 'IEC 61850' and the 'Task' dropdown is set to 'MAST'.

Control Expert

Atribua um **Module Name** e confirme sua configuração.



Em seguida, para iniciar sua configuração da rede, abra o **IEC61850 CT** através do ícone.

IEC61850 CT

Para importar o arquivo ***.CID** referente ao IED que será simulado, primeiramente abra o arquivo pelo bloco de notas (*Notepad*) e faça a configuração do endereço IP do IED e salve o arquivo antes de importar no IEC61850 CT.



```
<?xml version="1.0" encoding="UTF-8"?>
<SCL xmlns:escl="http://www.selinc.com/2006/61850" xmlns="http://www.iec.ch/61850/2003/SCL">
  <Header id="PASE" version="257" revision="1.0" toolID="AcSElerator Architect 2.3.6.1014" nameStructure="IEDName">
    <History>
      <Hitem version="257" revision="1.0" when="06/16/2021 15:50:39" who="VEDOM1\nicola.perrone" what="IED exported from Project PASE" />
    </History>
  </Header>
  <Communication>
    <SubNetwork name="W01">
      <ConnectedAP iedName="IUPC06" apName="S1">
        <Address>
          <P type="IP">192.168.100.101</P>
          <P type="IP-SUBNET">255.255.0.0</P>
          <P type="IP-GATEWAY">192.168.100.10</P>
          <P type="OSI-TSEL">0001</P>
          <P type="OSI-PSEL">00000001</P>
          <P type="OSI-SSEL">0001</P>
        </Address>
        <GSE ldInst="CFG" cbName="GooseDSet13">
          <Address>
            <P type="MAC-Address">01-0C-CD-01-00-26</P>
            <P type="APPID">0026</P>
            <P type="VLAN-PRIORITY">7</P>
            <P type="VLAN-ID">075</P>
          </Address>
          <MinTime unit="s" multiplier="m">1</MinTime>
          <MaxTime unit="s" multiplier="m">1000</MaxTime>
        </GSE>
      </ConnectedAP>
    </SubNetwork>
  </Communication>
</SCL>
```

IEC61850 CT

Para importar o arquivo ***.CID** no **IEC61850 CT**, na criação do projeto, escolha a edição baseado nos IEDs da rede IEC61850, em particular, para este arquivo ***.CID**, é compatível com a edição 1.0.

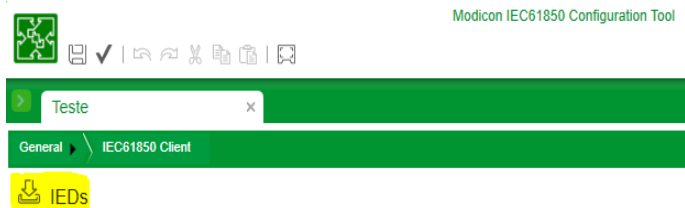
Habilite a função **IEC61850 Client** e acesse a configuração através do **IEC61850 Client Settings**.

The screenshot displays the 'Modicon IEC61850 Configuration Tool' window. The main configuration area is titled 'General' and contains several sections:

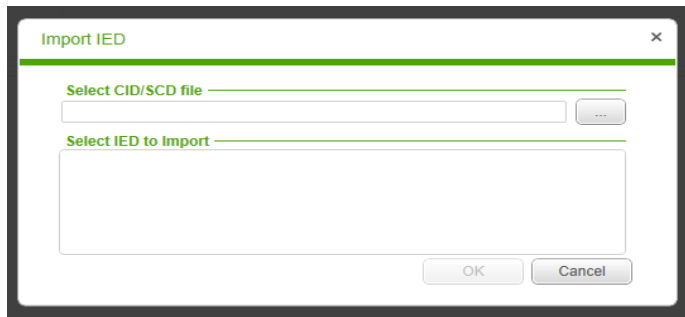
- Module Information:** Module Name: Teste; IEC61850 Edition: 1.0; Reference: BMENOP0300; PDU Size: 16384. A 'Communication Settings' button is located below these fields.
- Goose Publish:** Ethernet Port: Eth Port 1; Auto Enable: Enable.
- Module Memory:** Input Size: 249 / 4000; Output Size: 41 / 4000. An 'I/O Mapping' button is located below these fields.
- Server Function:** IEC61850 Server: Enable. An 'IEC61850 Server Settings' button is located below this field.
- Client Function:** IEC61850 Client: Enable. An 'IEC61850 Client Settings' button is located below this field.

IEC61850 CT

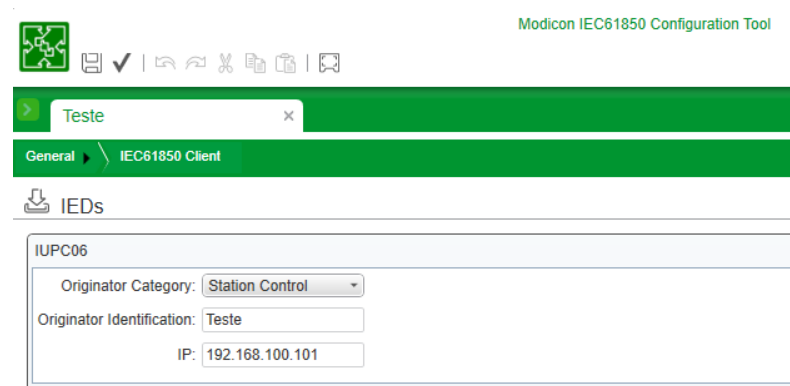
Clique em IEDs:



Selecione o arquivo *.CID:



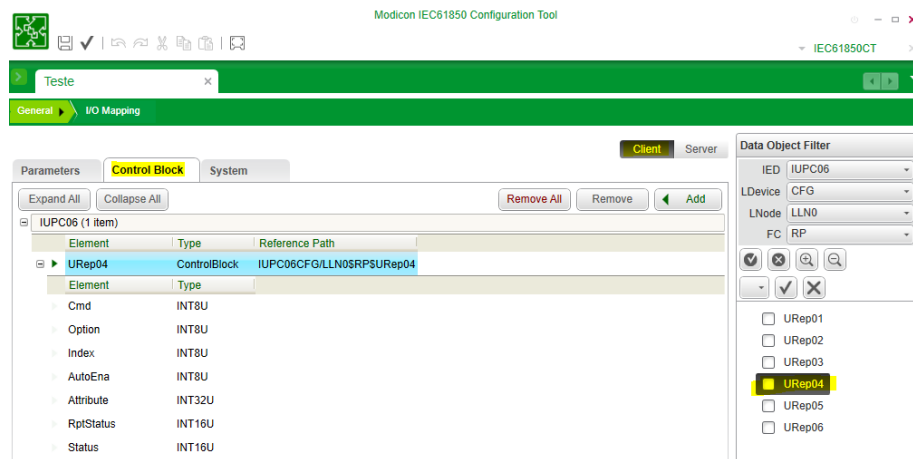
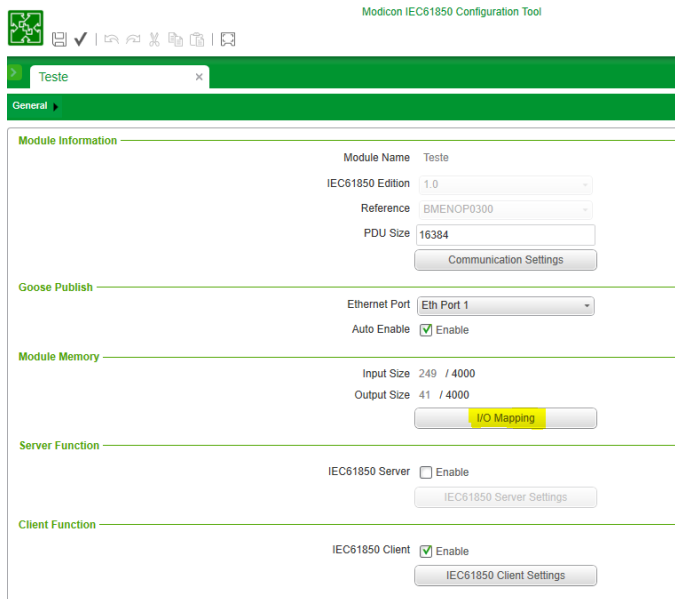
Configuração do IED é importada com o endereço IP definido pela edição do arquivo *.CID pelo Bloco de Notas (*Notepad*):



IEC61850 CT

Para configuração do Report Control Block, acesse I/O Mapping e em seguida a aba Client.

Na aba Control Block, selecione a estrutura de dados do IED que habilitará o Report Control Block.



OBS.: Esta estrutura de dados pode sofrer alterações de acordo com a estrutura de mapeamento do IED.

IEC61850 CT

Na aba Parameters, selecione as variáveis do IED que estarão vinculadas à comunicação por Report Control Block:

The screenshot displays the Modicon IEC61850 Configuration Tool interface. The main window title is "Modicon IEC61850 Configuration Tool" and the active tab is "IEC61850CT". The interface is divided into several sections:

- Toolbar:** Includes icons for file operations (Save, Open, Copy, Paste, Print) and a search bar.
- Navigation:** A green bar at the top contains a search box with "Teste" and navigation arrows.
- Menu:** A green bar below the navigation contains "General" and "I/O Mapping".
- Client/Server Selection:** Two buttons labeled "Client" and "Server".
- Data Object Filter:** A panel on the right with dropdown menus for "IED" (IUPC06), "LDevice" (CFG), "LNode" (LLN0), and "FC" (All). It also includes checkboxes for "Beh", "Health", and "Mod".
- Parameters Tab:** The "Parameters" tab is active, showing a tree view of parameters under "IUPC06 (1 item)". The tree structure is:
 - IUPC06 (1 item)
 - IUPC06MET (1 item)
 - METMMXU1 (10 items)
 - A1.phsA (9 items)
 - A1.phsB (9 items)
 - A1.phsC (9 items)
 - Hz (7 items)
 - PhV.phsA (9 items)
 - PhV.phsB (9 items)
 - PhV.phsC (9 items)
 - TotVA (7 items)
 - TotVAr (7 items)
 - TotW (7 items)

OBS.: Esta estrutura de parâmetros pode sofrer alterações de acordo com a estrutura de mapeamento do IED.

Control Expert

Ao salvar e validar sua configuração no IEC61850 CT e fechar, as variáveis serão importadas no Control Expert:

The screenshot displays the Modicon IEC61850 Configuration Tool interface. The top bar shows the title 'Modicon IEC61850 Configuration Tool' and a toolbar with icons for save, undo, redo, and other functions. Below the toolbar, there are tabs for 'Teste' and 'General', with 'I/O Mapping' selected. The main workspace is divided into three panes:

- Project Browser:** Shows a tree view of the project structure, including 'Configuration', 'Derived Data Types', 'Derived FB Types', 'Variables & FB instances', 'Motion', 'Communication', 'Ethernet Network', 'Programs', 'Animation Tables', and 'Operator Screens'. The 'Elementary Variables' folder is highlighted.
- Hardware Catalog:** Shows a list of hardware components, including 'Modicon M580 local drp', 'Analog', 'Communication', 'Counting', and 'Discrete'.
- Variables Table:** A table listing the variables imported from the IEC61850 CT configuration. The table has columns for Name, Type, Value, Comment, Alias, Alias of, Address, and HMI variable. The 'Teste_IUPC06' folder is expanded, showing various variables like 'Freshness', 'ConnectOut', 'DataModel', 'IUPC06MET', 'METMMXU1', 'A1_phaA', 'A1_phaB', 'A1_phaC', 'Hz', 'PhV_phaA', 'PhV_phaB', 'PhV_phaC', 'TotVA', 'TotVAz', 'TotW', 'ReportBlock', 'IUPC06CFG', 'LLN0', 'URep04', 'Cmd', 'Option', 'Index', 'AutoEna', 'Attribute', 'RptStatus', and 'Status'. The 'URep04' variable is highlighted, showing its detailed description and HMI variable settings.

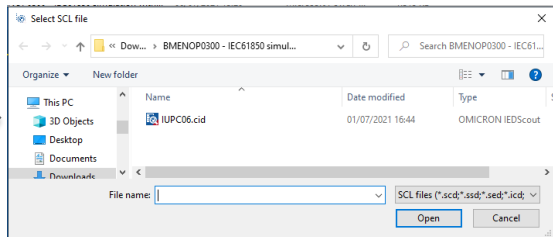
Name	Type	Value	Comment	Alias	Alias of	Address	HMI variable
BMEP58_ECPU_EXT	T_BMEP58_ECPU_EXT						
Teste_IUPC06	Teste_IUPC06						
Freshness	BOOL		0: data is not fresh 1: data is fresh				
ConnectOut	BOOL		0: Auto connect 1: disconnect				
DataModel	Teste_DDT_0		Data Model				
IUPC06MET	Teste_DDT_1						
METMMXU1	Teste_DDT_2						
A1_phaA	Teste_DDT_3						
A1_phaB	Teste_DDT_3						
A1_phaC	Teste_DDT_3						
Hz	Teste_DDT_4						
PhV_phaA	Teste_DDT_3						
PhV_phaB	Teste_DDT_3						
PhV_phaC	Teste_DDT_3						
TotVA	Teste_DDT_4						
TotVAz	Teste_DDT_4						
TotW	Teste_DDT_4						
ReportBlock	Teste_DDT_5		Report Block				
IUPC06CFG	Teste_DDT_6						
LLN0	Teste_DDT_7						
URep04	Teste_REPORT_URCB		Control Block Variable				
Cmd	BYTE		Trigger: effective on change				
Option	BYTE		Operation selection: 1/101: set/get RptEna, 2/102: set/get BufTms, 3/103: set/get IntgPd, 5/10...				
Index	BYTE		Buffer index number: 1~99				
AutoEna	BYTE		To specify if report is enabled automatically when association is established. 0: Enable on deman...				
Attribute	UDINT		Common data area for read/write below attributes that depends on Options.				
RptStatus	UINT		Low byte: 1~99 Index of RCB working High byte: Bit 0: ConfRev change Bit 1: Buffer overflow				
Status	UINT		High byte: Bit6~bit7: 0: Busy, 1: OK, 2: Error, Bit0~Bit5: Error code, refer to definition for different ...				
Teste_MOD_CTRL	Teste_MOD_CTRL						
Teste_MOD_INFO	Teste_MOD_INFO						

IEDScout

Carregar o arquivo *.CID para simulação do IED

IEDScout

As simulações podem ser realizadas em modo DEMO escolhendo a opção **Simulate IED** e o arquivo *.CID e através da função **Start**:



URep04

- Control Block attributes
 - Enabled: false
 - Reserved: false
 - Control Block reference: IUPC06CFG/LLN0\$R\$URep04
 - Report ID: Dset08
 - DataSet reference: IUPC06CFG/LLN0\$Dset08
 - Trigger options: DataChange, QualityChange, GeneralInterrogation
 - Buffer time (ms): 250
 - Configuration revision: 1
 - Integrity period (ms): 3600000
 - Owner: not present
- Information about last sent Report
 - Data
 - MET/METMMXU1.A1
 - MET/METMMXU1.Hz
 - MET/METMMXU1.PhV
 - MET/METMMXU1.TotVA
 - MET/METMMXU1.TotVAr
 - MET/METMMXU1.TotW

Simulações

Control Expert

Para habilitar o Report Control Block, na estrutura de dados deste IED, atribua os seguintes valores:

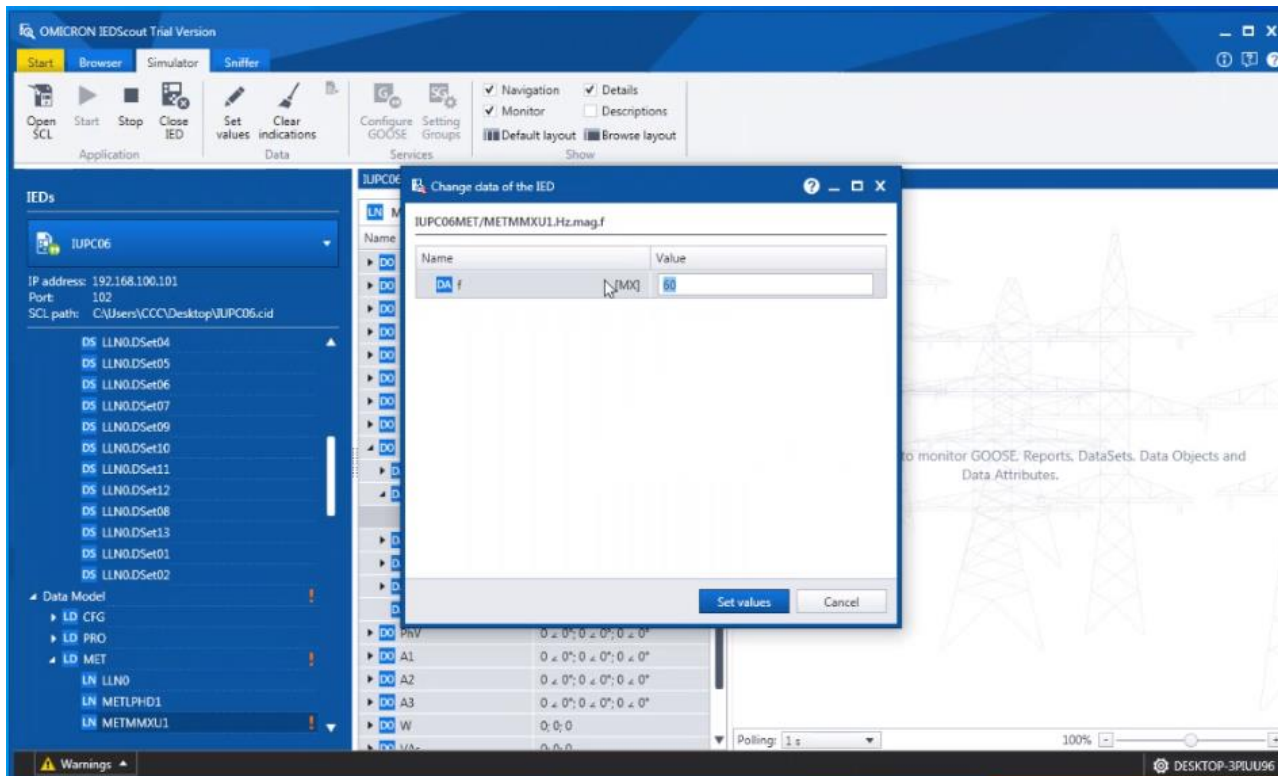
}	Option = 1
	Index = 0
	AutoEna = 1
	Attribute = 1

E ao final, Cmd = 1 para que na alteração do valor dos parâmetros a comunicação por Report Block Control permaneça ativa.

Teste_IUPC06.ReportBlock		Teste_DDT_5	Report Block
Teste_IUPC06.ReportBlock.IUPC06CFG		Teste_DDT_6	
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0		Teste_DDT_7	
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04		Teste_REPORT...	Control Block Variable
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.Cmd	1	BYTE	Trigger: effective or
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.Option	1	BYTE	Operation selection:
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.Index	0	BYTE	Buffer index number: 1~
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.AutoEna	1	BYTE	To specify if report is
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.Attribute	1	UDINT	Common data area fr
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.RptStatus	0	UINT	Low byte: 1~99 Inde
Teste_IUPC06.ReportBlock.IUPC06CFG.LLN0.URep04.Status	16385	UINT	High byte: Bit 6~bit 7:

IEDScout

Simulação de alteração do valor de frequência dentro os parâmetros da estrutura de dados do IED:



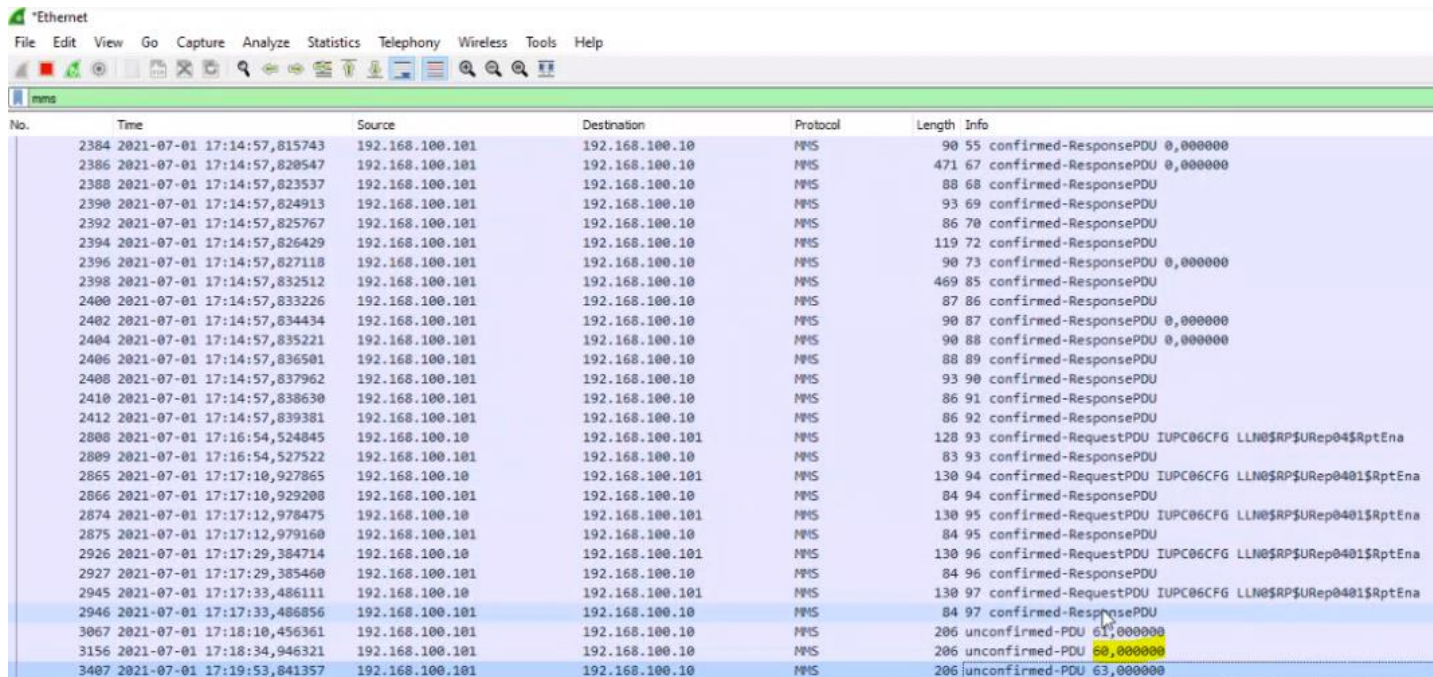
Control Expert

Após colocar o **Cmd = 1** e houve alteração do valor da variável, a comunicação por Report Block Control permanece ativa.

Teste_IUPC06		Teste_IUPC06	Teste_IUPC06
●	Teste_IUPC06.Freshness	1	BOOL 0: data is not fresh 1: data is fresh
●	Teste_IUPC06.ConnectCtrl	0	BOOL 0: Auto connect 1: disconnect
▣	Teste_IUPC06.DataModel		Data Model
▣	Teste_IUPC06.DataModel.IUPC06MET		
▣	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1		
▣	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.A1.phsA		
▣	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.A1.phsB		
▣	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.A1.phsC		
▣	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz		
●	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.db	500	UDINT
●	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.instMag.f	0.0	REAL
●	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.mag.f	60.0	REAL
●	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.q	0	WORD
▣	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.t		TIME_850_FOR...
●	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.units_m...	0	WORD
●	Teste_IUPC06.DataModel.IUPC06MET.METMMXU1.Hz.units_unit	1	WORD

Wireshark

Visualização da transação por Report Control Block através do Wireshark:



No.	Time	Source	Destination	Protocol	Length	Info
2384	2021-07-01 17:14:57,815743	192.168.100.101	192.168.100.10	MMS	90 55	confirmed-ResponsePDU 0,000000
2386	2021-07-01 17:14:57,820547	192.168.100.101	192.168.100.10	MMS	471 67	confirmed-ResponsePDU 0,000000
2388	2021-07-01 17:14:57,823537	192.168.100.101	192.168.100.10	MMS	88 68	confirmed-ResponsePDU
2390	2021-07-01 17:14:57,824913	192.168.100.101	192.168.100.10	MMS	93 69	confirmed-ResponsePDU
2392	2021-07-01 17:14:57,825767	192.168.100.101	192.168.100.10	MMS	86 70	confirmed-ResponsePDU
2394	2021-07-01 17:14:57,826429	192.168.100.101	192.168.100.10	MMS	119 72	confirmed-ResponsePDU
2396	2021-07-01 17:14:57,827118	192.168.100.101	192.168.100.10	MMS	90 73	confirmed-ResponsePDU 0,000000
2398	2021-07-01 17:14:57,832512	192.168.100.101	192.168.100.10	MMS	469 85	confirmed-ResponsePDU
2400	2021-07-01 17:14:57,833226	192.168.100.101	192.168.100.10	MMS	87 86	confirmed-ResponsePDU
2402	2021-07-01 17:14:57,834434	192.168.100.101	192.168.100.10	MMS	90 87	confirmed-ResponsePDU 0,000000
2404	2021-07-01 17:14:57,835221	192.168.100.101	192.168.100.10	MMS	90 88	confirmed-ResponsePDU 0,000000
2406	2021-07-01 17:14:57,836501	192.168.100.101	192.168.100.10	MMS	88 89	confirmed-ResponsePDU
2408	2021-07-01 17:14:57,837962	192.168.100.101	192.168.100.10	MMS	93 90	confirmed-ResponsePDU
2410	2021-07-01 17:14:57,838630	192.168.100.101	192.168.100.10	MMS	86 91	confirmed-ResponsePDU
2412	2021-07-01 17:14:57,839381	192.168.100.101	192.168.100.10	MMS	86 92	confirmed-ResponsePDU
2808	2021-07-01 17:16:54,524845	192.168.100.10	192.168.100.101	MMS	128 93	confirmed-RequestPDU IUPC06CFG LLN0\$RP\$URep04\$RptEa
2809	2021-07-01 17:16:54,527522	192.168.100.101	192.168.100.10	MMS	83 93	confirmed-ResponsePDU
2865	2021-07-01 17:17:10,927865	192.168.100.10	192.168.100.101	MMS	130 94	confirmed-RequestPDU IUPC06CFG LLN0\$RP\$URep0401\$RptEa
2866	2021-07-01 17:17:10,929208	192.168.100.101	192.168.100.10	MMS	84 94	confirmed-ResponsePDU
2874	2021-07-01 17:17:12,978475	192.168.100.10	192.168.100.101	MMS	130 95	confirmed-RequestPDU IUPC06CFG LLN0\$RP\$URep0401\$RptEa
2875	2021-07-01 17:17:12,979160	192.168.100.101	192.168.100.10	MMS	84 95	confirmed-ResponsePDU
2926	2021-07-01 17:17:29,384714	192.168.100.10	192.168.100.101	MMS	130 96	confirmed-RequestPDU IUPC06CFG LLN0\$RP\$URep0401\$RptEa
2927	2021-07-01 17:17:29,385460	192.168.100.101	192.168.100.10	MMS	84 96	confirmed-ResponsePDU
2945	2021-07-01 17:17:33,486111	192.168.100.10	192.168.100.101	MMS	130 97	confirmed-RequestPDU IUPC06CFG LLN0\$RP\$URep0401\$RptEa
2946	2021-07-01 17:17:33,486856	192.168.100.101	192.168.100.10	MMS	84 97	confirmed-ResponsePDU
3067	2021-07-01 17:18:10,456361	192.168.100.101	192.168.100.10	MMS	206	unconfirmed-PDU 01,000000
3156	2021-07-01 17:18:34,946321	192.168.100.101	192.168.100.10	MMS	206	unconfirmed-PDU 00,000000
3407	2021-07-01 17:19:53,841357	192.168.100.101	192.168.100.10	MMS	206	unconfirmed-PDU 63,000000

Avisos Importantes

- Equipamentos elétricos devem ser instalados, operados e manuseados apenas por profissionais qualificados;
- Um profissional qualificado é aquele que possui habilidades e conhecimentos relacionados com a construção, instalação e operação que equipamentos elétricos, e recebeu treinamento adequado para reconhecer e evitar os perigos envolvidos;
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