
**TS 110/10(20) kV DONJI ANDRIJEVCI –
TEHNIČKO RJEŠENJE SEKUNDARNOG
SUSTAVA U SKLADU S NORMOM IEC 61850**

Ključne točke

- Blokade sklopnih aparata pomoću GOOSE poruka umjesto žičanih blokada između polja.
- Uporaba GOOSE poruka za potrebe funkcije sinhroncheka između upravljačke jedinice u spojnomojnom polju i numeričkog releja distantne zaštite.
- Regulacija napona energetskih transformatora spojenih u paralelu pomoću diskretnih i analognih GOOSE poruka.

Blokade sklopnih aparata

- Sve blokade između sklopnih aparata su programske i izvedene su distribuirano.
- Komunikacijom su ostvarene neophodne veze na horizontalnoj razini odašiljanjem i prihvaćanjem GOOSE poruka između upravljačkih jedinica.
- Postoji i razmjena GOOSE poruka između upravljačke jedinice u spojnom polju i releja zaštite u vodnim poljima za potrebe funkcije sinkrocheka.

Blokade sklopnih aparata

- Prikaz skupa podataka koji se šalju iz upravljačke jedinice iz SP polja prema drugim jedinicama.

The screenshot shows the SET 600 software interface. The main window displays the dataset content for 'Dataset: E4_REC.LD0.LLN0.E4ALL'. The dataset content is as follows:

```
LD0.QCRSV1.AckRsvBay.stVal.fc=ST
LD0.QCRSV1.AckRsvBay.q.fc=ST
LD0.QCRSV1.RqRsvBay.stVal.fc=ST
LD0.QCRSV1.RqRsvBay.q.fc=ST
LD0.DPGGIO1.DPCSO.stVal.fc=ST
LD0.DPGGIO1.DPCSO.q.fc=ST
LD0.DPGGIO2.DPCSO.stVal.fc=ST
LD0.DPGGIO2.DPCSO.q.fc=ST
LD0.DPGGIO9.DPCSO.stVal.fc=ST
LD0.DPGGIO9.DPCSO.q.fc=ST
LD0.SPGGIO24.Ind.stVal.fc=ST
LD0.SPGGIO24.Ind.q.fc=ST
LD0.DPGGIO13.DPCSO.stVal.fc=ST
LD0.DPGGIO13.DPCSO.q.fc=ST
LD0.DPGGIO14.DPCSO.stVal.fc=ST
LD0.DPGGIO14.DPCSO.q.fc=ST
```

Below the dataset content, there is a table for the 61850 namespace of IED: E4_REC:

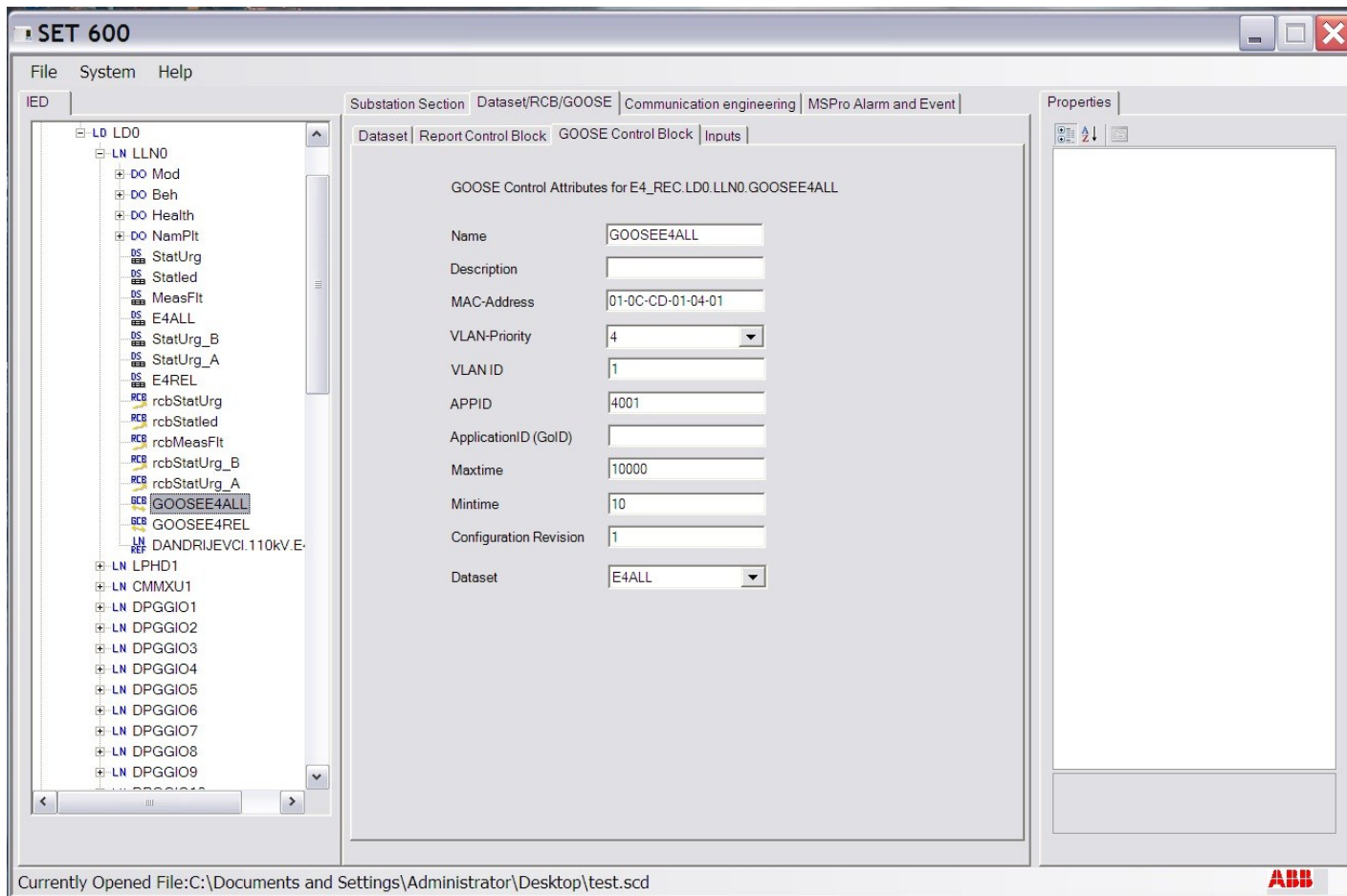
LD's	LN's	DO's	DAI's /SDI's	Structured DAI
LD0				

The interface also shows a tree view on the left with the following structure:

- LN LLN0
 - DO Mod
 - DO Beh
 - DO Health
 - DO NamPlt
 - DS StatUrg
 - DS Statled
 - DS MeasFlt
 - DS E4ALL
 - DS StatUrg_B
 - DS StatUrg_A
 - DS E4REL
 - RCE rcbStatUrg
 - RCE rcbStatled
 - RCE rcbMeasFlt
 - RCE rcbStatUrg_B
 - RCE rcbStatUrg_A
 - GEER GOOSEE4ALL
 - GEER GOOSEE4REL
 - LN DANRIJEVCI.110kV.E.
- LN LPHD1
- LN CMMXU1
- LN DPGGIO1
- LN DPGGIO2
- LN DPGGIO3
- LN DPGGIO4
- LN DPGGIO5
- LN DPGGIO6
- LN DPGGIO7
- LN DPGGIO8
- LN DPGGIO9

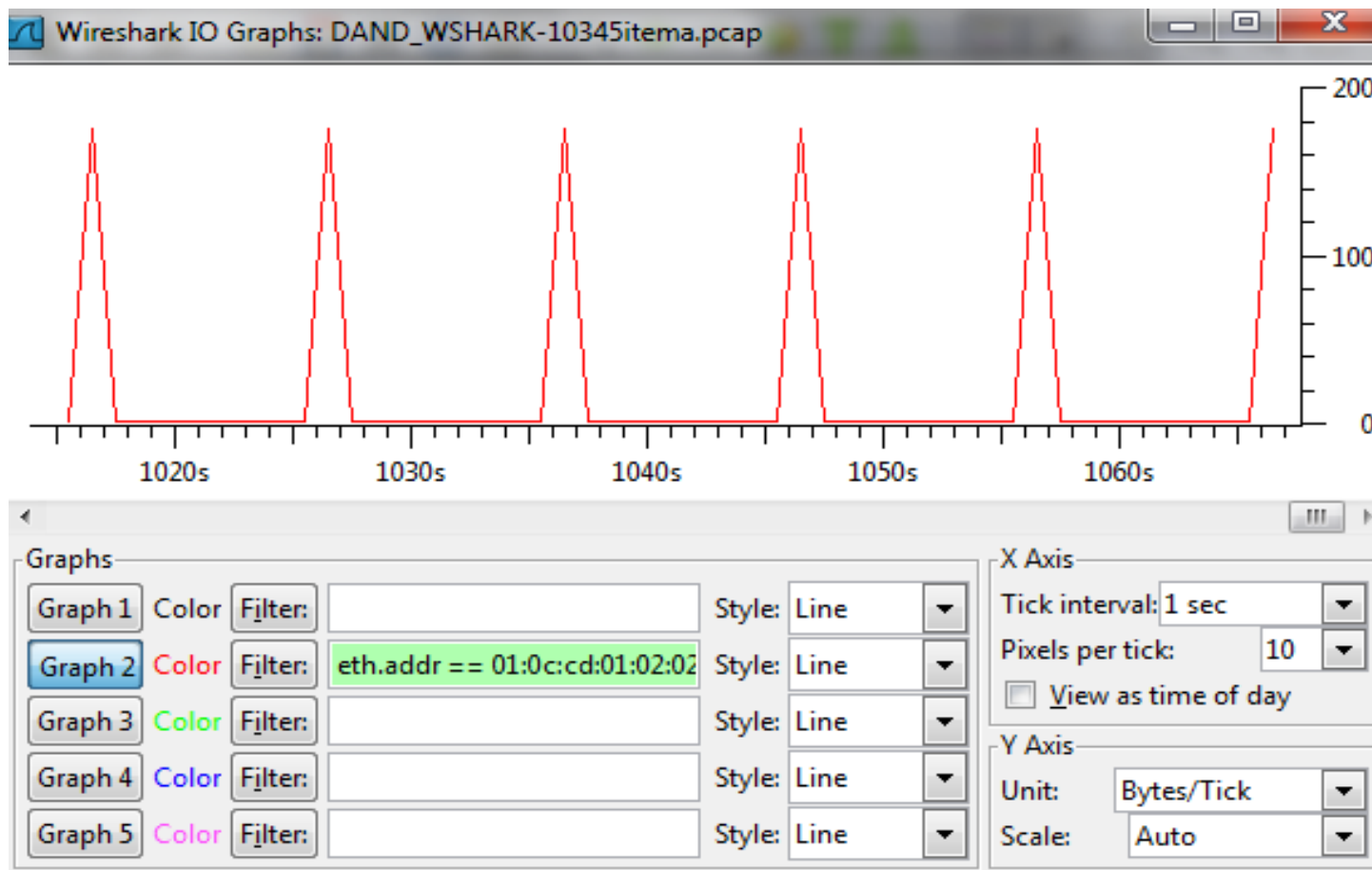
Blokade sklopnih aparata

- Prikaz definiranja GOOSE poruke u upravljačkoj jedinici smještenoj u SP za druge jedinice.



Blokade sklopnih aparata

- Prikaz GOOSE poruke između upravljačkih jedinica (Tmaks = 10 s).



Blokade sklopnih aparata

- Prikaz prihvata GOOSE poruka i skupova podataka iz drugih polja u upravljačkoj jedinici SP.

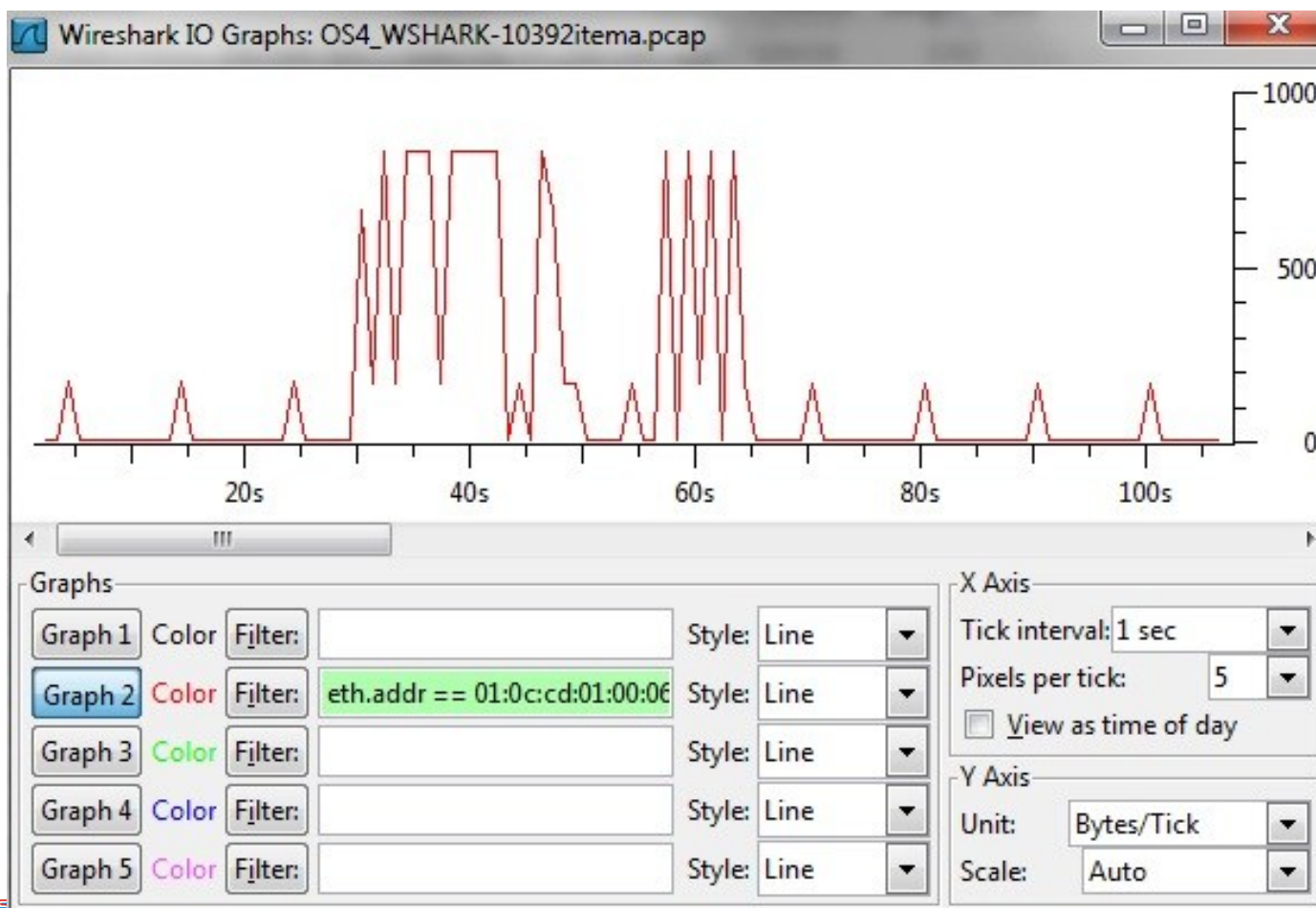
The screenshot displays the SET 600 software interface. The main window is titled "Substation Section Dataset/RCB/GOOSE Communication engineering MSPro Alarm and Event". The left pane shows a tree view of the substation components, including LLNO, LPHD1, and various DPGGIO and GOOSE blocks. The central pane shows the "Inputs Configured for E4_REC.LD0.LLNO" list, which includes various GOOSE messages like E1_REC.LD0.QCRSV1.RqRsvBay.q and E1_REC.LD0.DPGGIO1.DPCSO.stVal. Below this list are "Refresh" and "Remove Input" buttons. The "Available Datasets" list at the bottom includes E2_REC.LD0.E2ALL, E2_REC.LD0.E2REL, E5_REC.LD0.E5ALL, E1_REC.LD0.E1ALL, E1_REC.LD0.E1REL, and E3_REC.LD0.E3ALL. An "Add Dataset to Inputs" button is located at the bottom of the available datasets list. The right pane shows the "Properties" window for the selected dataset, with a table for "Misc" properties:

(Name)	LLNO
Class	LLNO
Description	
Inst	
LogEnable	False
Prefix	

At the bottom of the Properties window, there is a note: "(Name) Return the Name of the LN (Prefix+Class+Instance)". The status bar at the bottom indicates the currently opened file: "C:\Documents and Settings\Administrator\Desktop\test.scd". The ABB logo is visible in the bottom right corner.

Blokade sklopnih aparata

- Prikaz GOOSE poruke između upravljačkih jedinica (Tmin = 10 ms).



Funkcija sinkrocheka

- Prikaz skupa podataka koji se šalju iz upravljačke jedinice iz SP polja prema relejima zaštite u VP-ima.

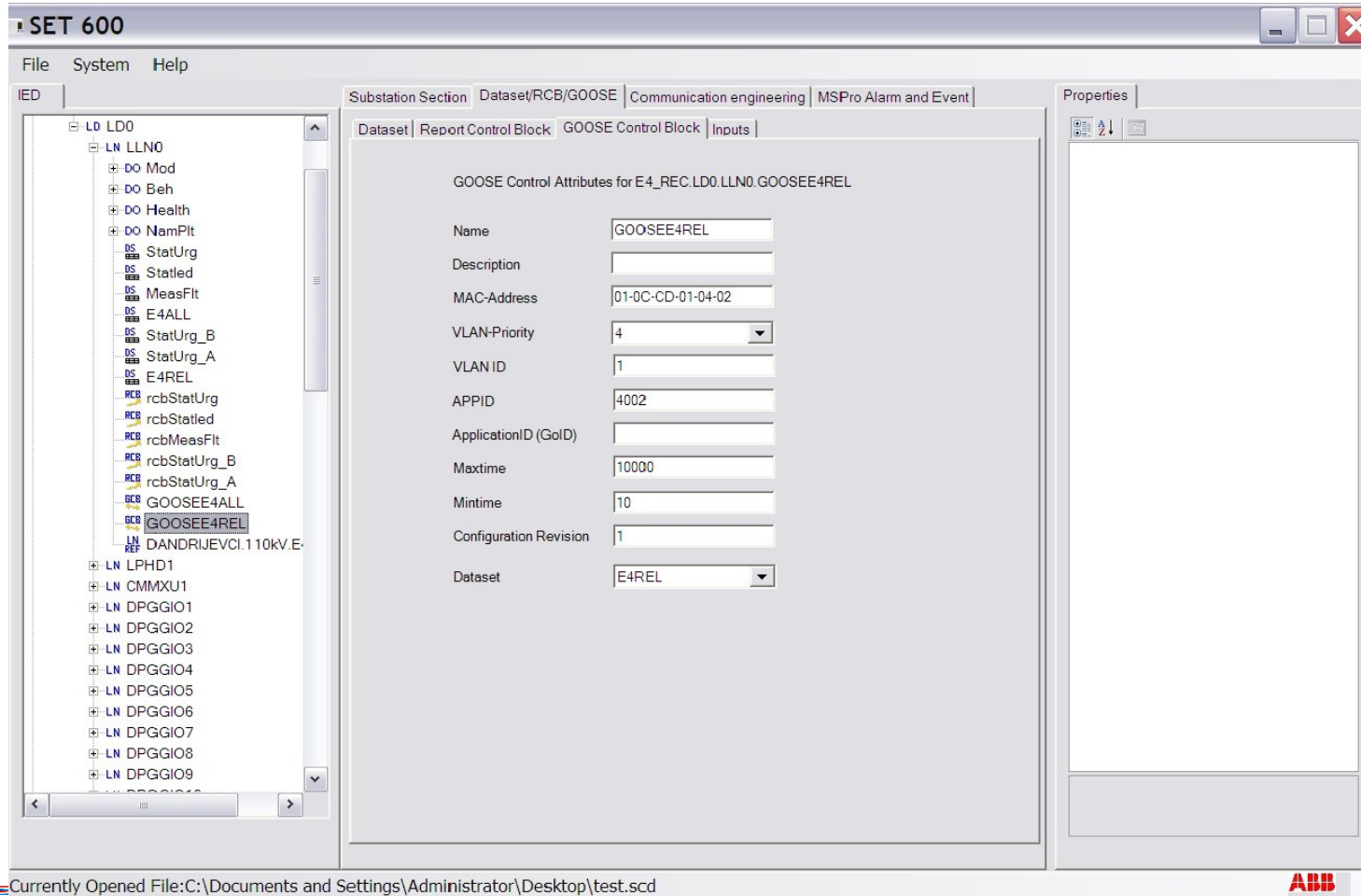
The screenshot shows the SET 600 software interface. The main window is titled "SET 600" and has a menu bar with "File", "System", and "Help". The interface is divided into several panes:

- Left Pane (IED):** A tree view showing the hierarchy of IED components. The "E4REL" dataset is selected under the "GOOSE" category.
- Top Pane (Substation Section):** Shows the current configuration context: "Dataset/RCB/GOOSE", "Communication engineering", and "MSPro Alarm and Event".
- Center Pane (Dataset Content):** Displays the "Dataset Content for Dataset: E4_REC.LD0.LLN0.E4REL". The content lists several GOOSE messages: "LD0.SPGGIO25.Ind.stVal.fc=ST", "LD0.SPGGIO25.Ind.q.fc=ST", "LD0.SPGGIO26.Ind.stVal.fc=ST", "LD0.SPGGIO26.Ind.q.fc=ST", "LD0.SPGGIO27.Ind.stVal.fc=ST", "LD0.SPGGIO27.Ind.q.fc=ST", "LD0.SPGGIO28.Ind.stVal.fc=ST", and "LD0.SPGGIO28.Ind.q.fc=ST".
- Bottom Pane (61850 namespace):** A table showing the mapping of IED components to the IEC 61850 namespace. The table has columns for "LD's", "LN's", "DO's", "DAI's /SDI's", and "Structured DAI". The first row shows "LD0" in the "LD's" column.
- Right Pane (Properties):** Shows the "Misc" properties for the selected dataset, with the name "E4REL" and a description field.

At the bottom of the window, the status bar indicates "Currently Opened File: C:\Documents and Settings\Administrator\Desktop\test.scd". The ABB logo is visible in the bottom right corner.

Funkcija sinkrocheka

- Prikaz definiranja GOOSE poruke u upravljačkoj jedinici smještenoj u SP za releje zaštite u VP-ima.



Uporaba diskretnih i analognih GOOSE poruka

- Regulacija napona energetskih transformatora spojenih u paralelu znači regulaciju dva ili više energetskih transformatora spojenih na iste sabirnica na strani nižeg napona
- Paralelni rad se može ostvariti s tri različite metode:
 - metode reverzne reaktancije,
 - metode vodeći-prateći*,
 - metode minimalne kružne struje*.

*Zahtijeva komunikaciju između funkcija regulacije napona spojenih u paralelu

Uporaba diskretnih i analognih GOOSE poruka

- Dva 20 MVA, 110/20 kV, YNd5 energetska transformatora s regulacijskom sklopkom.
- Svaki energetska transformator ima svoj numerički uređaj s integriranim upravljačkim i zaštitnim funkcijama.
- Razmjena nužnih podataka za navedenu metodu je ostvarena uporabom GOOSE poruka u skladu s normom IEC 61850.

Uporaba diskretnih i analognih GOOSE poruka



RET670
87T, 87N,
50/51, 50N/51N, 49,
90 (ATCC), 84 (YLTC)

REB500 BU
21T, 50/51

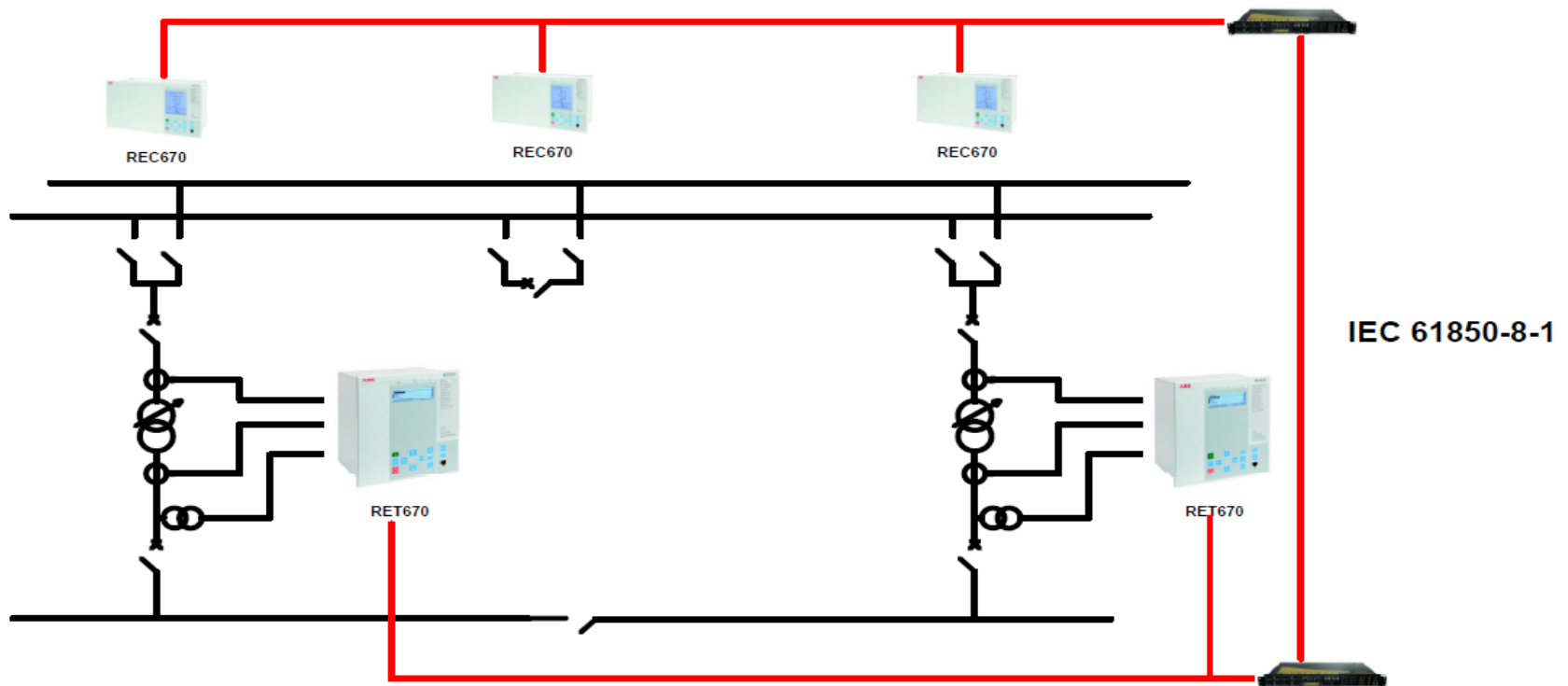
REX521+SPAZC402
50N/51N

Uporaba diskretnih i analognih GOOSE poruka

- ATCC predstavlja regulator napona i sastoji se od funkcija poput:
 - mjerenja i nadzora napona,
 - vremena zatezanja, kompenzacije pada napona,
 - mjerenja i nadzora kružne struje.
- YLTC predstavlja regulacijsku sklopku i sastoji se od funkcija poput:
 - čitanja položaja preklopke,
 - nadzora rada mehanizma sklopke,
 - izdavanja komandi više/nije.

Uporaba diskretnih i analognih GOOSE poruka

- Upravljačke jedinice sadrže GOOSE kontrolne blokove s pripadnim skupom podataka o stanjima prekidača i rastavljača koje su potrebni regulaciji napona za pojedinačni/paralalni rad.



Uporaba diskretnih i analognih GOOSE poruka

- Svi potrebni podaci za rad regulacije napona se dobivaju isključivo razmjenom diskretnih i analognih GOOSE poruka između dva transformatorska polja.

The screenshot displays the IED configuration interface. On the left, a tree view shows the hierarchy: IED > E3_RET > E5_RET > AP S1 > LD LD0 > LN LLNO. Under LN LLNO, various data objects are listed, including DO Mod, Beh, Health, NamPlt, DS StatUrg, StatNrmI, MeasFlt, OLTCT2, StatUrgB, RCB rcbStatUrg, rcbStatNrmI, rcbMeasFlt, rcbStatUrgB, RCB GOOSEE5E3, LN REF DANDRIJEVCI.110, LN LPHD1, LN CMMXU1, and LN CMMXU2.

The main window shows the configuration for the GOOSE Control Block 'E5_RET.LD0.LLNO'. The 'Inputs Configured' list includes:

- E3_RET.LD0.TR8ATCC1.VCTRStatus.stVal
- E3_RET.LD0.TR8ATCC1.LodARe.mag.f
- E3_RET.LD0.TR8ATCC1.LodAlm.mag.f
- E3_RET.LD0.TR8ATCC1.SetV.mag.f
- E3_RET.LD0.TR8ATCC1.PosRel.mag.f
- E3_RET.LD0.TR8ATCC1.BusV.mag.f
- E3_RET.LD0.TR8ATCC1.X2.mag.f

Buttons for 'Refresh' and 'Remove Input' are visible. Below, the 'Available Datasets' list contains 'E3_RET.LD0.OLTCT1'.

Uporaba diskretnih i analognih GOOSE poruka

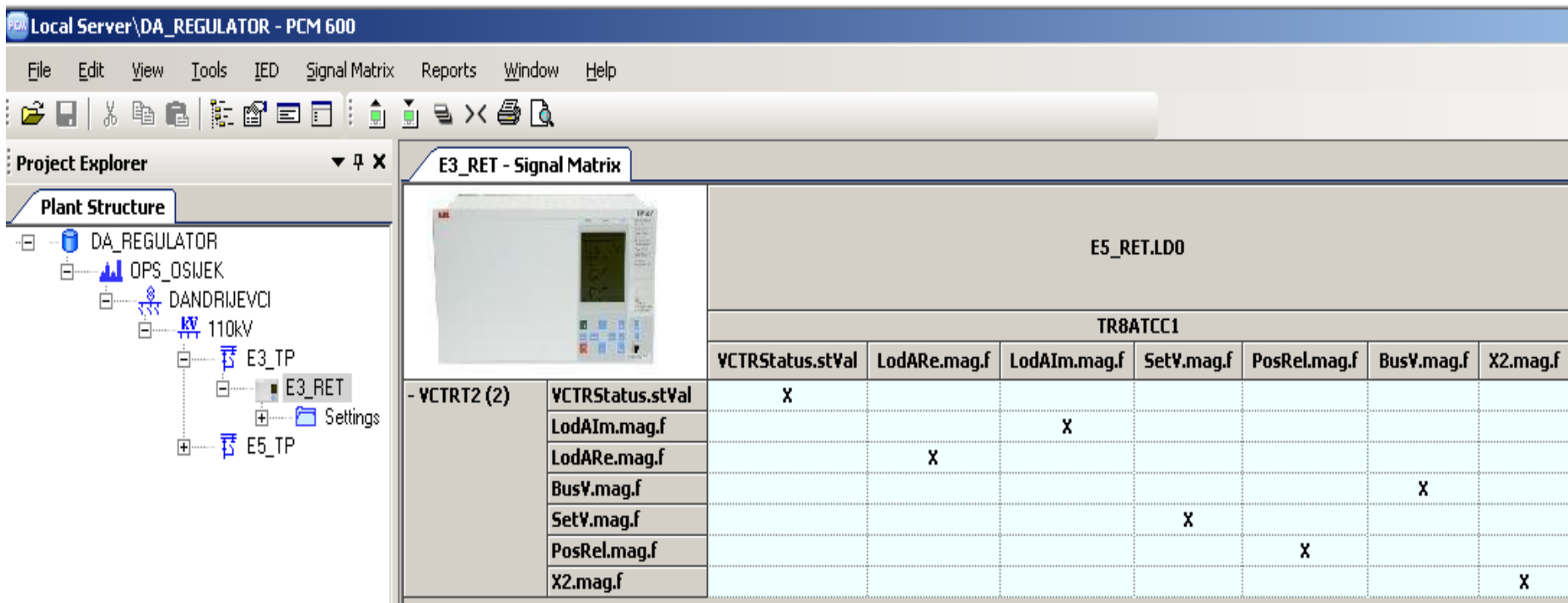
- Svaki funkcijski blok regulatora napona šalje identični skup podataka, ali s jedinstvenom adresom GOOSE poruke.

Dataset	Report Control Block	GOOSE Control Block	Inputs
GOOSE Control Attributes for E3_RET.LD0.LLN0.GOOSEE3E5			
Name	<input type="text" value="GOOSEE3E5"/>		
Description	<input type="text"/>		
MAC-Address	<input type="text" value="01-0C-CD-01-03-05"/>		
VLAN-Priority	<input type="text" value="4"/>		
VLAN ID	<input type="text" value="1"/>		
APPID	<input type="text" value="3005"/>		
ApplicationID (GoID)	<input type="text"/>		
Maxtime	<input type="text" value="10000"/>		
Mintime	<input type="text" value="1000"/>		
Configuration Revision	<input type="text" value="1"/>		
Dataset	<input type="text" value="DLTCT1"/>		

Dataset	Report Control Block	GOOSE Control Block	Inputs
GOOSE Control Attributes for E5_RET.LD0.LLN0.GOOSEE5E3			
Name	<input type="text" value="GOOSEE5E3"/>		
Description	<input type="text"/>		
MAC-Address	<input type="text" value="01-0C-CD-01-05-03"/>		
VLAN-Priority	<input type="text" value="4"/>		
VLAN ID	<input type="text" value="1"/>		
APPID	<input type="text" value="5003"/>		
ApplicationID (GoID)	<input type="text"/>		
Maxtime	<input type="text" value="10000"/>		
Mintime	<input type="text" value="1000"/>		
Configuration Revision	<input type="text" value="1"/>		
Dataset	<input type="text" value="DLTCT2"/>		

Uporaba diskretnih i analognih GOOSE poruka

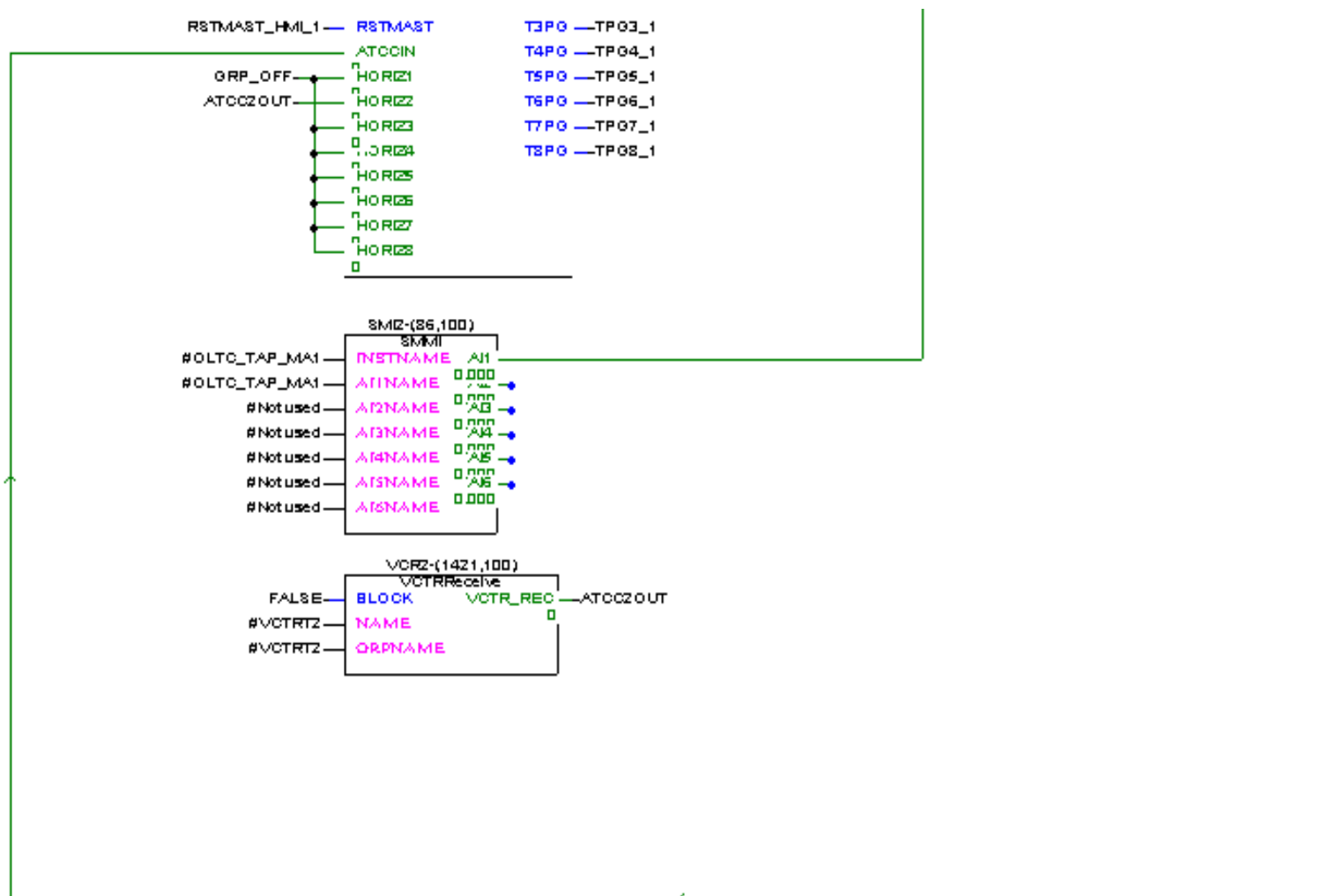
- Povezivanje GOOSE poruke iz numeričkog uređaja (E5_RET670) s blokom regulatora napona u drugom numeričkom uređaju (E3_RET670).



The screenshot shows the IED configuration software interface. The Project Explorer on the left displays the plant structure: DA_REGULATOR > OPS_OSJEK > DANDRIJEVCI > 110kV > E3_TP > E3_RET. The main window is titled 'E3_RET - Signal Matrix' and shows a signal matrix table for the E3_RET device. The table is organized into two sections: E5_RET.LDO and TR8ATCC1. The TR8ATCC1 section contains a table with columns for various signals and rows for connections from E3_RET signals.

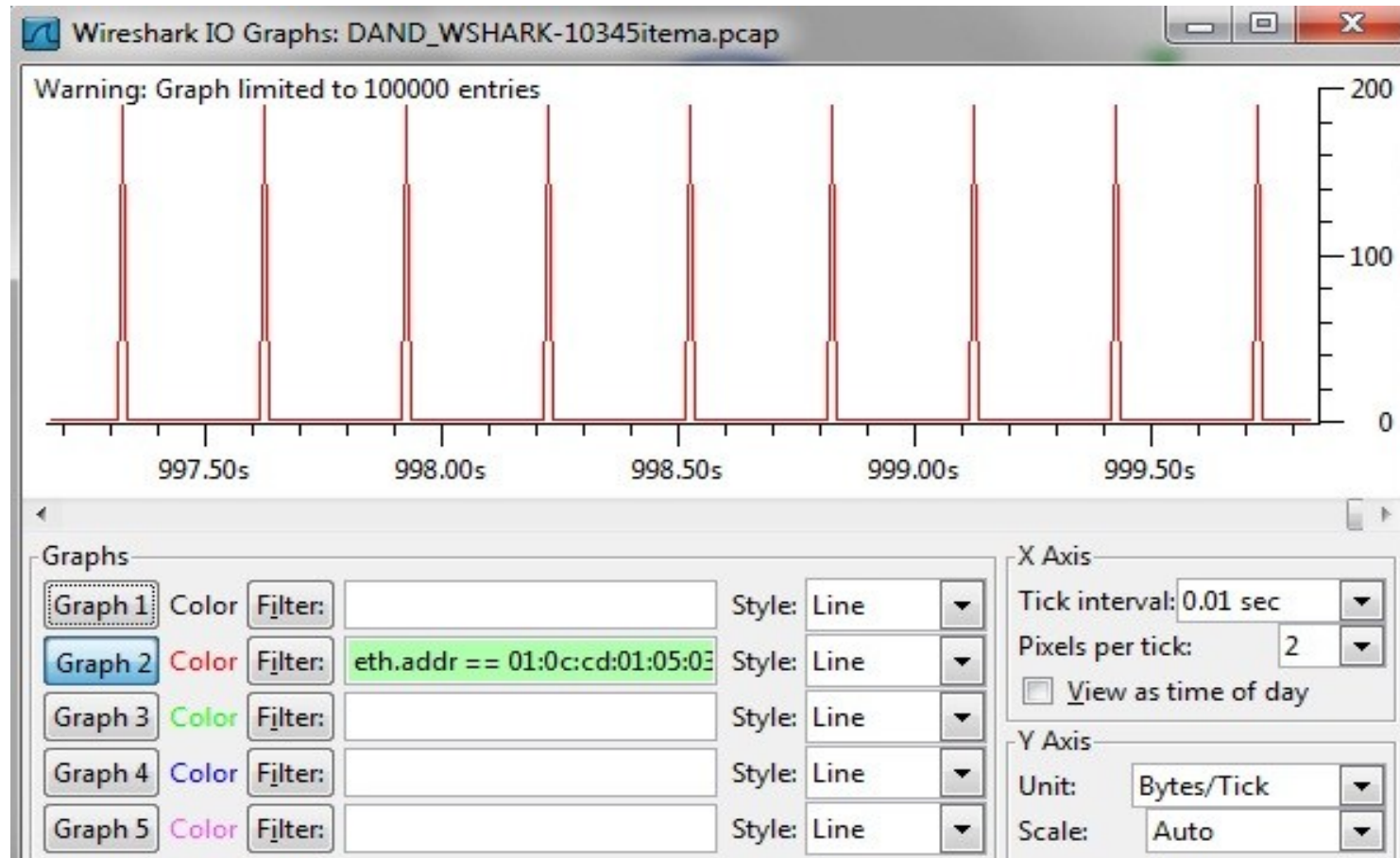
		E5_RET.LDO						
		TR8ATCC1						
		VCTRStatus.stVal	LodARE.mag.f	LodAIM.mag.f	SetV.mag.f	PosRel.mag.f	BusV.mag.f	X2.mag.f
- VCTR2 (2)	VCTRStatus.stVal	X						
	LodAIM.mag.f			X				
	LodARE.mag.f		X					
	BusV.mag.f						X	
	SetV.mag.f				X			
	PosRel.mag.f					X		
X2.mag.f							X	

Uporaba diskretnih i analognih GOOSE poruka



Uporaba diskretnih i analognih GOOSE poruka

- Prikaz GOOSE poruke između regulatora napona (Tmaks = 300 ms).



Uporaba diskretnih i analognih GOOSE poruka

- Za potrebe regulacije napona energetskih transformatora spojenih u paralelu se koristila metoda minimalne kružne struje uz uporabu komunikacije u skladu s normom IEC 61850.
- Od rujna 2007. ukupno tri transformatorske stanice na području PrP Osijek s navedenim načinom regulacije napona se nalaze u pogonu te su realizirane u suradnji Končarevih i ABB-ovih inženjera.