

**FORM 2**

THE PATENTS ACT, 1970  
(39 of 1970)  
AND  
THE PATENTS RULES, 2003

**COMPLETE  
SPECIFICATION**

(See Section 10; rule 13)

TITLE OF THE INVENTION

“DIAGNOSIS FOR GOOSE COMMUNICATION”

**APPLICANT**

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The following specification particularly describes  
the invention and the manner  
in which it is to be performed

**CLAIMS**

1. A method of diagnosis for logic of a distributed application of a process control system, wherein the distributed application is implemented based on Generic Object Oriented Substation Event (GOOSE), the method comprising:

5       creating at least one logic diagnosis module based on a data model for the distributed application;  
          obtaining GOOSE signal information; and  
          executing the at least one logic diagnosis module based on the GOOSE signal information.

10       2. The method of claim 1, wherein the at least one logic diagnosis module is implemented as a script or as a Programmable Logic Controller (PLC), and the data model is obtained from configuration description file(s) of the process control system.

15       3. The method of claim 1, wherein obtaining the GOOSE signal information comprises:  
          capturing online GOOSE packets on a network in the process control system to obtain the GOOSE signal information; or  
          receiving offline recorded GOOSE packets of the process control system to obtain the GOOSE signal information.

20       4. The method of claim 1, 2 or 3, wherein executing the at least one logic diagnosis module comprises:  
          assigning the GOOSE signal information to the data model or to the at least one logic diagnosis module.

25       5. The method of claim 1, 2 or 3, wherein executing the at least one logic diagnosis module comprises:  
          executing the at least one logic diagnosis module manually or automatically by cycle or a GOOSE event trigger during a test or a commission or an operation of the process control system.

30       6. The method of claim 1, 2 or 3, further comprising:  
          recording information related to the executing; and  
          analyzing the information when an exceptional case happens.

35       7. The method of claim 6, wherein the information comprises at least one of GOOSE raw packets, Intelligent Electronic Device (IED) information, GOOSE control block information, GOOSE dataset, GOOSE signal event of sequence and the diagnosis result.

8. The method of claim 1, 2 or 3, wherein the process control system is selected from a group

consisted of a Substation Automation System, a hydro power plant, a wind power system, and a distributed energy resources system.

5 9. An apparatus of diagnosis for logic of a distributed application of a process control system, wherein the distributed application is implemented based on Generic Object Oriented Substation Event (GOOSE), the apparatus comprising:

a creating means configured to create at least one logic diagnosis module based on a data model for the distributed application;

an obtaining means configured to obtain GOOSE signal information; and

10 an executing means configured to execute the at least one logic diagnosis module based on the GOOSE signal information.

10. The apparatus of claim 9, wherein the at least one logic diagnosis module is implemented as a script or as a Programmable Logic Controller (PLC), and the data model is  
15 obtained from configuration description file(s) of the process control system.

11. The apparatus of claim 9, wherein the obtaining means comprises:

a capturing means configured to capture online GOOSE packets on a network in the process control system to obtain the GOOSE signal information; or

20 a receiving means configured to receive offline recorded GOOSE packets of the process control system to obtain the GOOSE signal information.

12. The apparatus of claim 9, 10 or 11, wherein the executing means comprises:

25 an assigning means configured to assign the GOOSE signal information to the data model or to the at least one logic diagnosis module.

13. The apparatus of claim 9, 10 or 11, wherein the executing means is further configured to:  
execute the at least one logic diagnosis module manually or automatically by cycle or a  
30 GOOSE event trigger during a test or a commission or an operation of the process control system.

14. A system of diagnosis for logic of a distributed application of a process control system, wherein the distributed application is implemented based on Generic Object Oriented Substation Event (GOOSE), the system comprising:

35 at least one processor and at least one memory including computer program instructions, the memory and the computer program instructions configured to cause the device to:  
create at least one logic diagnosis module based on a data model for the distributed application;

obtain GOOSE signal information; and

40 execute the at least one logic diagnosis module based on the GOOSE signal information.

15. A computer program product of diagnosis for logic of a distributed application of a process control system, wherein the distributed application is implemented based on Generic Object Oriented Substation Event (GOOSE), the computer program product comprising at least one computer readable storage medium having computer readable program instructions stored therein,
- 5 the computer readable program instructions comprising:
- program instructions for creating at least one logic diagnosis module based on a data model for the distributed application;
  - program instructions for obtaining GOOSE signal information; and
  - program instructions for executing the at least one logic diagnosis module based on the
- 10 GOOSE signal information.

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