Development of Instrument for Metropolitan Seismic Observation Network (MeSO-net) - 2nd: Fieldbus system

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1. Use of CAN bus as MeSO-net design

MeSO-net (Metropolitan Seismic Observation Network) attaches importance to robustness for various noise, reliability of system, and operability. In order to achieve high robustness and reliability, CAN (Controller Area Network) bus is used in the autonomous cooperative seismic observation instrument of MeSO-net. It may be the first seismic observation network using CAN bus in the world. CANopen is also used to attain operability.

2. Benefit of CAN bus

The CAN ensures robust data measurement by enabling digital signal output of seismometers and rejecting contamination of noise to observed data along sensor cable. The instruments achieved high time synchronization within +/- 50 usec owing to prioritized TIME message and follow-up message which informs the delay time of sending TIME massage from 1 PPS of GPS. It also ensures reliability of the system by powerful error prevention functionality. It also ensures reliability by error correction functionality of CAN. When a communication error occurs, the CAN system detects and reports it, and then the massage will be sent again or frequently false CAN node stops communication. MeSO-net is operated by using SNMP and MIB, CANopen also has OD, which resembles MIB, and it enables total network management with including internal circuit status of seismometer and temperature and barometric sensor.

3. CAN as standard bus of geophysical instrument

The CAN bus configuration of MeSO-net is designed taking into account it's possibility to be standard bus of geophysical instruments. It is possible to deploy multi-channel observation system consists of CANopen sensors made by different manufacturers. In fact, industrial CANopen pressure sensor is used for monitoring atmospheric temperature and pressure. The reason why baud rate of 500 kbps was selected despite the data rate is only 60 kbps is that the bus configuration is designed as the standard which enables much high-sampling-rate or multi-channel monitoring. Network management of additional CANopen sensor is also available with SNMP by updating firmware of control unit.