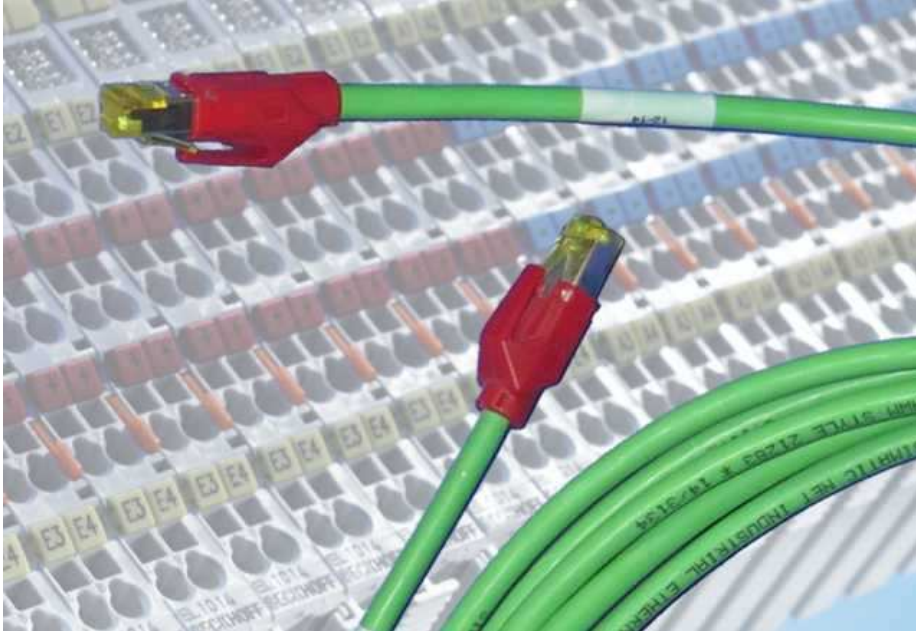


TechNews: EtherCAT Error Handling

Cable Break Detection



Sporadic cable problems within the EtherCAT fieldbus system are often difficult to find. Therefore the EtherCAT master stack and the Ethernet core provide various library functions and elements (for example, error counters) to uncover the problem.

Cyclic Error Detection

The cyclic error detection is typically the first step for finding sporadic bus errors. For this purpose, the event flag IRQ within the RX telegram can be used. This flag is set by the EtherCAT core if the RX and TX working count of the telegram is not different (the working count is incremented by the device during successful command processing in each cycle). Thus, the device position within the network can also be determined where the error occurred. With the flag ERR_FLAG the Ethernet core also provides information, whether an error has occurred during the PHY transmission of the Ethernet adapter.

```
__inline void __CheckError(void)
{
    //Check station error
    for (int i=0; i<__StationNum; i++)
        if (__pSystemList[i].RxTel.s.hdr.irq & (1<<15))
        {
            //Reset error
            __pSystemList[i].RxTel.s.hdr.irq &= ~(1<<15);

            //Set error count and station index
            __ErrStationIndex = i;
            __ErrCnt++;
        }

    //Check general PHY error
    __bErrFlag = __pSystemStack->hdr.err_flag;
}
```

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Acyclic Error Detection

If an error has been detected in cyclic operation, this can now be verified via an acyclic Ethercat command. For this purpose, the flag ERR_FLAG of the Ethernet core must first be reset, so that the error counter can subsequently be read out.

```
__inline void __CheckStationError(PSTATION_INFO pStation)
{
    RX_ERR_CNT    RxErrCnts = { 0 };
    ADD_ERR_CNT   AddErrCnts = { 0 };
    LOST_LINK_CNT LostLinkCnts = { 0 };

    //First try to reset ethernet core error flag
    if (__pUserStack->hdr.err_flag)
        __pUserStack->hdr.err_flag = FALSE;

    //Do some delay
    Sleep(100);

    //Check flag again
    if (__pUserStack->hdr.err_flag == FALSE)
    {
        //Send ethercat command
        if (ERROR_SUCCESS == Ecat64SendCommand(
            FPRD_CMD,
            pStation->PhysAddr,
            0x300,
            sizeof(RX_ERR_CNT),
            (PUCHAR)&RxErrCnts))

            if (ERROR_SUCCESS == Ecat64SendCommand(
                FPRD_CMD,
                pStation->PhysAddr,
                0x308,
                sizeof(ADD_ERR_CNT),
                (PUCHAR)&AddErrCnts))

                if (ERROR_SUCCESS == Ecat64SendCommand(
                    FPRD_CMD,
                    pStation->PhysAddr,
                    0x310,
                    sizeof(LOST_LINK_CNT),
                    (PUCHAR)&LostLinkCnts))

                    {
                        ...
                    }
            }
    }
}
```

The error analysis can be further refined, in which the error counters of the Ethernet adapter are called up with the function Sha64EthCheckStatus.