



Give me a function block written in ST as per IEC 61131-3, which monitors communication connection to OPC UA Server, Modbus Server, and Profinet used in a machine and create alarm if one of them is down. Please also added entry in audit trail reason of server down along with its error code.



Sure, here's an example function block written in Structured Text (ST) that monitors communication connections to OPC UA Server, Modbus Server, and Profinet used in a machine and creates an alarm if one of them is down. It also logs an entry in the audit trail along with the reason for the server being down and its error code.



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```
FUNCTION_BLOCK COMM_MONITOR
VAR
    UA_SERVER_CONN: BOOL; // OPC UA Server Connection Status
    MODBUS_SERVER_CONN: BOOL; // Modbus Server Connection Status
    PROFINET_CONN: BOOL; // Profinet Connection Status
    ALARM: BOOL; // Communication Alarm Status
    ALARM_REASON: STRING(255); // Alarm Reason for Audit Trail
    ERROR_CODE: INT; // Error Code for Audit Trail
END_VAR

// Check OPC UA Server Connection
UA_SERVER_CONN := OPCUA_SERVER.CONNECTED;

// Check Modbus Server Connection
MODBUS_SERVER_CONN := MODBUS_SERVER.CONNECTED;

// Check Profinet Connection
PROFINET_CONN := PROFINET_DEVICE.CONNECTED;

// Set Alarm if any of the connections are down
IF NOT (UA_SERVER_CONN AND MODBUS_SERVER_CONN AND PROFINET_CONN) THEN
    ALARM := TRUE;

    // Set Alarm Reason and Error Code
    IF NOT UA_SERVER_CONN THEN
        ALARM_REASON := 'OPC UA Server Connection Down';
        ERROR_CODE := OPCUA_SERVER.LAST_ERROR_CODE;
    ELSEIF NOT MODBUS_SERVER_CONN THEN
        ALARM_REASON := 'Modbus Server Connection Down';
        ERROR_CODE := MODBUS_SERVER.LAST_ERROR_CODE;
    ELSE
        ALARM_REASON := 'Profinet Connection Down';
        ERROR_CODE := PROFINET_DEVICE.LAST_ERROR_CODE;
    END_IF;

    // Log Audit Trail Entry for Alarm
    AUDIT_TRAIL.LOG_EVENT(EVENT_TYPE:=ALARM_REASON, EVENT_MESSAGE:=CONCAT('Error Co
ELSE
    ALARM := FALSE;
END_IF;
END_FUNCTION_BLOCK
```

This function block first checks the connection status of the OPC UA Server, Modbus Server, and Profinet device. If any of the connections are down, it sets the `ALARM` variable to `TRUE` and sets the `ALARM_REASON` and `ERROR_CODE` variables based on which server is down. It then logs an audit trail entry with the alarm reason and error code using the `AUDIT_TRAIL.LOG_EVENT` function. If all connections are up, the `ALARM` variable is set to `FALSE`.

Note that this is just an example and you'll need to adjust it to match your specific requirements and device configurations.